Exercise Outcomes For Frail Older People In Slow Stream Transition Care Programs

Submitted by

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Graduate Diploma of Physiotherapy

Masters of Health Science

A thesis submitted in total fulfilment

Of the requirements for the degree of

Doctor of Philosophy

School of Allied Health

College of Science, Health and Engineering

La Trobe University

Victoria, Australia

May 2018

Table of contents

List of tables

List of figures

List of abbreviations

ACAT	Aged care assessment team
AIHW	Australian Institute of Health and Welfare
BBS	Berg Balance Scale
BI	Barthel Index
Care	Residential aged care
CI	Confidence interval
DEMMI	De Morton Mobility Index
df	Degrees of freedom
FIT	Functional incidental training
FTSTS	Five times sit to stand test
GDS15	Geriatric Depression Scale 15
GEM	Geriatric evaluation and management
HIP	Health independence program
HITH	Hospital in the home
ICC	Intra-class correlation
IQR	Inter quartile range
MBI	Modified Barthel Index

MCID	Minimum clinically important difference
MDC	Minimal detectable change
MMSE	Mini-mental standard examination
NEADL	Nottingham extended activities of daily living scale
NHS	National Health Service
PEDD	Participant expected discharge destination
PICF	Participant information and consent form
r	Pearson correlation
RACF	Residential aged care facility
RCT	Randomised controlled trial
RUG	Resource utilization group
r_s	Spearman rank order correlation
SD	Standard deviation
SEM	Standard error of measurement
SOF	Study of osteoporotic fractures
TCP	Transition Care Program
TTO	Time trade-off
U	Mann-Whitney test statistic
UK	United Kingdom

US	United States of America
VAS	Visual analogue scale
χ^2	Chi-square distribution

Acknowledgements

This study began with the dream of assisting people within residential care facilities to maintain their level of fitness and functional abilities so as to have quality of life whilst they lived in care. Along the way this became altered to further explore the possibility of prolonging life in the community for older people at risk of long-term institutionalisation.

I have to say a huge thank-you to my supervisors especially Dr Helen McBurney who has been such a constant support through this entire journey. My thanks also go to Professor Keith Hill, Associate Professor Megan Davidson and Professor Meg Morris. When I first met Helen I never would have thought that there was any possibility of this happening – yet, she has guided me through without faltering.

My thanks also go to the people who have been involved with the study undertaken at Bendigo Health, Bentleys Supported Accommodation and Bethlehem Home for the Aged. Also, without the participants, this could never have happened.

Finally, I have to say thank-you to my long suffering and loving husband who has been generous with his time and advice and has been loyal throughout.

This work was supported by an Australian Government Research Training Program Scholarship.

Summary

Most frail older people aim to return home after being admitted to hospital. A hospital admission for an older person may lead to functional deterioration such that they may no longer be able to live at home independently. For these people, if no rehabilitation is provided, the older person may be at risk of having to move to long-term care at discharge. Options for rehabilitation have traditionally included high intensity, specialised inpatient or home-based outpatient services. More recently, both locally and internationally, forms of lower intensity, longer duration rehabilitation provide an intervention which aims to improve independence and avoid admission to long-term care after discharge. Low intensity or slow stream rehabilitation may take place in live-in healthcare facilities or at home. This thesis reviews the processes and outcomes of Australian and international live-in programs of slow stream rehabilitation for older people with chronic diseases.

A systematic review and critical analysis of the literature investigated which rehabilitation program aspects had the greatest success in terms of increasing function and independence and decreasing unnecessary admissions to long-term care. The review showed that the location of slow stream rehabilitation beds, length of rehabilitation program, multi-disciplinary team composition and dose, intensity and frequency of therapies contributed to program outcomes.

A randomised controlled trial then explored whether adding more functional exercise to the normal slow stream rehabilitation program in Bendigo, Victoria, assisted people to improve functional independence and be discharged home. It further investigated whether gains in function and discharge location were maintained up to six-months from admission to the program. The discharge destinations expected by older people and their actual discharge destinations were compared at program discharge and at six-months from admission to the intervention. Changes in physical function were also explored, as well as health-related quality of life, depression and frailty at discharge and maintenance to six-months.

The study showed that adding functional exercise did not increase the number of frail older people who returned home when compared to the usual care group. The intervention did increase the number of home discharges in comparison with historical data from Bendigo. The usual care group showed an unexpectedly high rate of discharge home. The expected and actual discharge destination were significantly related. There were no differences in balance, function, lower limb performance, health-related quality of life or depression between those discharged home in comparison with those discharged into residential care. Adding more exercise did not lead to alterations in these variables of interest. There was an association between the additional functional exercise and reduced frailty levels.

This thesis found that providing additional functional exercise in slow stream rehabilitation did not alter the rate of discharge home compared to a usual care group.

Statement of authorship

Except where reference is made in the text of the thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis accepted for the aware of any other degree or diploma. No other person's work has been used without due acknowledgement in the main text of the thesis. This thesis has not been submitted for the award of any degree or diploma in any other tertiary institution. All research procedures reported in the thesis were approved by the relevant Ethics Committee or Safety Committee or authorised officer.

Signed Date 24th May 2018

List of publications during candidature

Parker, C., Hill, K., Cobden, J., Davidson, M., & McBurney, H. (2015). Randomized controlled trial of the effect of additional functional exercise during slow-stream rehabilitation in a regional centre. *Archives of Physical Medicine and Rehabilitation, 96,* 831-6. doi: 10.1016/j.apmr.2014.12.012

List of presentations during candidature

In addition to the published manuscript, research conducted during this thesis has been presented orally at the following meetings.

Parker C. Discharge Destination when functional training is added to the bed-based Transition Care Program. (2011, October) Ninth Asia/Oceania Regional Congress of Gerontology and Geriatrics, MELBOURNE, Victoria, Australia

Parker C. Adding functional training to the bed-based Transition Care Program. (2011, December) La Trobe University, MELBOURNE, Victoria, Australia

Parker C. Outcomes when functional training is added to the bed-based Transition Care Program. (2012, November) University of Queensland, BRISBANE, Queensland, Australia

Parker C. Effects of functional training added to the bed-based Transition Care Program (2013, May) Victorian Government Department of Health, ECHUCA, Victoria, Australia

Chapter 1: Introduction

1.1 Hospitalisation, function and discharge destination

This thesis investigates the extent to which the provision of additional functional exercises during slow stream or low intensity rehabilitation provided post hospitalisation enables frail older people to return home. Most older people want to continue living independently in their homes for as long as possible (Pynoos, 2018).

Being admitted to hospital can be associated with functional decline and hospital associated disability (Boyd, Fried, Guralnik, & Bandeen-Roche, 2009; Covinsky, Pierluissi, & Johnston, 2011; Reichardt et al., 2016). Multiple admissions may lead to more severe problems, as well as reduced health-related quality of life (Karampampap, Frumento, Ahlbom, & Modig, 2017).

The term “functional decline” refers to a reduction in the ability to carry out activities of daily living (ADLs) such as dressing, eating, cooking, toileting, bathing, walking, transferring from a chair to bed (Sager et al., 1996). “Instrumental” activities of daily living such as using a telephone and managing finances are also considered to be part of function and can decline with hospitalisation (Sager et al., 1996). Many older people do not recover their pre-admission functional capabilities after hospitalisation (Boyd et al., 2008). Up to half of the people who are hospitalised have worse ADL and functional capabilities at discharge (Covinsky et al., 2003; Zisberg, Shadmi, Gur-Yaish, Tonkikh, & Sinoff, 2015). This can mean that they are less likely to return home and need to be admitted to residential care (Luppa et al., 2010). One of the main aims of physiotherapy at this time is to assist people to return home independently (Kosse, Dutmer, Dasenbrock, Bauer, & Lamoth, 2013).

The oldest people (over 85 years) are most at risk of functional deterioration when in hospital (Covinsky et al., 2003). For example, a study by Boyd et al (2008) investigated the functional abilities of 2,279 people who were 70-years and older admitted to US hospitals with medical illnesses. For those whose function deteriorated from admission to discharge, 29% had not recovered to baseline levels of function by 12 months. For discharged older people who functionally decline, there may be higher care needs (Admi, Shadmi, Baruch, & Zisberg, 2015), slow recovery to pre-hospital function (Covinsky et al., 2011) and difficulties living independently at home (Age UK, 2017a) can also occur. These factors increase the complexity and intensity of care required after discharge and the need for home care services (Wang, Zhao, & Zang, 2015). There may also be more requirements from care-givers, such as additional help with activities of daily living (Boyd et al., 2008). These changes may lead to increased stress and anxiety for care-givers (Saletti-Cuesta, Tutton, Langstaff, & Willett, 2016).

One of the factors that contributes to functional decline during hospitalisation is low mobility during the inpatient episode (Kalisch, Lee, & Dabney, 2013; Ostir et al., 2013; Zisberg et al., 2015). Zisberg et al (2015) studied mobility in 684 hospitalized adults who were over 70-years of age. They found that 48% did not walk outside their hospital rooms during the inpatient stay. A fairly small increase of 100 steps in a day in the first 24-hours of hospitalization, from a sample of 224 over 65-year old patients admitted to an acute care unit, was associated with a decreased hazard of death of 2% (Ostir et al., 2013). The people who took the fewest steps in the last 24-hours of hospitalization or those who walked less at discharge than at admission had a significantly greater risk of mortality post-discharge (Ostir et al., 2013). This highlights the importance of ongoing physical activity.

A systematic review by Martínez-Velilla et al (2015) investigated the outcomes of two different physical activity programs for frail older people during and after hospitalization. The first was a multidisciplinary program including exercise and the other was exercise alone, added to usual care. The review concluded that exercise programs may be effective for combating functional decline as well as reducing admission to residential care. Key activities for exercise programs reviewed by Martínez-Velilla (2015) included exercises for which daily activities were simulated such as sitting to standing. Other exercises included walking, balance retraining, exercises encouraging cognitive function and progressive resistance strength training. Although the study by Martínez-Velilla (2015) was hampered by limitations such as heterogeneity of interventions and baseline differences between the intervention group and usual care group, it highlights the importance of physical activities and exercises to maintain health and wellbeing during hospitalization. For example, consideration could be given to longer periods of rehabilitation post-hospitalisation aiming to improve long-term outcomes (Boyd et al., 2008).

1.2 Hospitalisation trends for frail older people

Health care systems and hospital usage varies across the world (Eurostat, 2017; OECD Health Policy Studies, 2014). In Australia, hospital admissions are currently increasing (Australian Institute of Health and Welfare, 2016b). China and Turkey have also shown large increases in hospital utilisation in the 10-year period between 2005 and 2015 (OECD, 2017a). In contrast, countries such as Italy, Finland and Iceland have reported decreasing numbers of discharges per 100,000 population (OECD, 2017a). In the United States (US) the rate of hospitalisation in public hospitals has been decreasing since 1997 for all age groups, including those over the age of 65 years (National Center for Health Statistics, 2017a, 2017b). These differences indicate dissimilarities in approaches to health care internationally as well as variations in patient needs or preferences and models of medical practice (OECD Health Policy Studies, 2014).

In Australia, from 2012-2016 the number of acute hospital admissions increased for all age groups (Australian Institute of Health and Welfare, 2017a). The greatest increase was for people aged 65-74 years which grew by an average of 5.9% each year (Australian Institute of Health and Welfare, 2017a). In the UK, there was a similar picture with the greatest percentage jump in hospital episodes for people who were 70-74 years old from 2015-2016 (6.9%) (National Statistics, 2017). A different picture was found in the US from 2005-2014, where rates of hospital admissions went down for both the 65-74-year-old age group (22.4% decrease) and the 75+ age group (21% decrease) (Agency for Healthcare Research and Quality, 2017).

The Australian Bureau of Statistics (2016) reported that in 2016, 15.3% of the Australian population was over the age of 65 years. Disproportionally, 41% of people leaving hospital were older than 65 years. These older people accounted for 48% of patient days in hospital (Australian Institute of Health and Welfare, 2017a). Only two percent of the population were reported to be over the age of 85 years and this group contributed 7% of people leaving hospital and 13% of hospital bed days (Australian Institute of Health and Welfare, 2017a).

Funding for Australian public hospitals has also been increasing annually and in 2015 the average increase was 4.7% (Australian Institute of Health and Welfare, 2017a). Part of the increase in funding was to enable additional care for older individuals. Each of the major funding bodies for health and social care have increased their allocations annually (Australian Institute of Health and Welfare, 2017a). For example, the Australian Government increased the health budget on average 3.5% annually. The state and territory governments increased health spending in 2016 by 5.2% and non-government bodies increased it by 7.2% (Australian Institute of Health and Welfare, 2017d). In 2016, the share of Australia's gross domestic product (GDP) spent on health was 9.6% (OECD, 2017b).

1.3 The cost of deteriorating health in older people

Health care spending varies considerably across countries in the Organisation for Economic Co-operation and Development (OECD) (2017b) (Table 1.1). Australia's health spending as a percentage of GDP (9.6%) was comparable in 2016 to the United Kingdom which was 9.7% (OECD, 2017b). Health expenditure in Singapore as a percentage of GDP in 2016 was 2.4% (Singapore Government, 2017). Switzerland's health spending was 12.4% in 2016 (OECD, 2017b). American health spending was reported to be the highest in the OECD countries at 17.2% in 2016 (OECD, 2017b).

Table 1.1

2015 and 2016 health spending as a percentage of GDP

Country	2015	2016
Australia	9.4	9.6
New Zealand	9.3	9.2
Singapore	2.2	2.4
Switzerland	12.1	12.4
Turkey	4.1	4.3
United Kingdom	9.9	9.7
United States of America	16.9	17.2

The cost of health care for government and non-government bodies, associated with an increasingly ageing population with deteriorating health in Australia, are considerable (Australian Institute of Health and Welfare, 2016a). This has also been reported internationally. In the US from 2005-2014 the mean cost per hospital stay for people aged 65-74-years increased by 10.5% (Agency for Healthcare Research and Quality, 2017). In 2015, UK spending on a person of 85-years was five times greater than for a person who was 30-years old (Stoye, 2017).

Additionally, there is also an economic and physical cost to each older person associated with their health issues (National Seniors Australia, 2012). A survey by

National Seniors Australia, completed by nearly 5,000 older Australians (National Seniors Australia, 2012), showed older Australians thought that around 5% of their overall income was spent on their own health. Expenditure varied according to their number of chronic diseases, with more diseases costing more (National Seniors Australia, 2012). In a study of 35,000 people by Britt et al (2015), approximately 90% of people over the age of 65 years had at least one chronic condition. More than 57% had three or more and 16% had six or more (Britt et al., 2015). Once a person has a chronic disease they are more likely to have a hospitalisation episode than people who are well (Dantas, Santan, Sarmento, & Aguiar, 2016; Palladino, Lee, Ashworth, Triassi, & Millett, 2016).

A study from the US found that one in five admissions to US hospitals in 2014 were potentially preventable resulting in larger than necessary healthcare costs (Daniels et al., 2018). In 2014, 39% of potentially preventable hospital admissions in Australia were reportedly due to chronic conditions such as chronic obstructive pulmonary disease, cancer, cardiovascular disease or diabetes (Australian Institute of Health and Welfare, 2016a). Chronic conditions may lead to frequent or unplanned admissions (Kirby, Dennis, Jayasinghe, & Harris, 2010).

1.4 Discharge destinations after hospitalisation

For elderly people, physical function and cognitive status are key factors affecting discharge destination after hospitalisation (Abrahamsen, Haugland, Nilsen, & Ranhoff, 2014; Brusco et al., 2012; Campbell, Seymour, & Primrose, 2004; Everink, van Haastregt, van Hoof, Schols, & Kempen, 2016; Lindenberg, Nitz, Rahmann, &

Bew, 2014). Okuno et al (2012) found that functional abilities, such as transfers and self-care, were important factors in deciding discharge destination in a sample of 126 older Japanese people. Age is another predictor of discharge destination (Campbell et al., 2005; Campbell et al., 2004; Gaughan, Gravelle, Santos, & Siciliani, 2017). Moreover, mortality and length of hospital stay are related to physical function and cognitive status (Campbell et al., 2004; Everink et al., 2016; Lindenberg et al., 2014). A more recent systematic review investigating factors influencing home discharge after hospitalization of older individuals had similar findings (Everink et al., 2016). Home discharge was related to age (being younger) (Siebens et al., 2012). It was also associated with being married, having higher functional abilities, not being depressed and having intact cognition (Abrahamsen et al., 2014; Everink et al., 2016). A seminal study by Campbell et al (2005) analysed the relationship between seven variables and the discharge destination of 1626 older adults. Physical functional capability on day three of admission, rather than diagnosis, was most strongly related to discharge destination (Campbell et al., 2005). Poor physical abilities were associated with adverse outcomes such as early admission to long-term care.

Comparable findings were also reported for Australia (McCallum, Simons, Simons, & Friedlander, 2005). The presence of recurrent falls, impaired mobility, dependence in activities of daily living and urinary incontinence before admission were associated with adverse outcomes such as longer hospital length of stay and admission to residential care following hospital discharge (Anpalahan & Gibson, 2008; Australian Institute of Health and Welfare, 2013c).

Independence and being able to continue living at home in the community are important to elderly people as they continue to age (Szanton, Roth, Nkimbeng, Savage, & Klimmek, 2014). More than 80% of Americans want to stay in their current residence for as long as possible (Bayer & Harper, 2000). Even if they require assistance to remain at home, only a few Americans would prefer to move out of their own home (13%) (Bayer & Harper, 2000). Financially the cost is greater for health service funding bodies when older adults live in residential aged care facilities than living at home even when the fee is included for health services visiting the home to provide care (Chappell, Dlitt, Hollander, Miller, & McWilliam, 2004).

To minimise functional decline whilst elderly people are in hospital, the Victorian Government has developed some Australian guidelines (Department of Health and Human Services, 2017f). These recommend the use of person centred, simple strategies which implement the latest scientific evidence to optimise quality, safety and patient outcomes. This ‘Older people in hospital’ resource includes hard copy, e-learning and audio material to assist health service providers with their use (Department of Health and Human Services, 2017f). These resources were developed as part of the ‘Best practice in person-centred healthcare for older Victorians’ study (Tinney et al., 2007). They have been partially evaluated and have been shown to have increased awareness of person-centred health which, in turn, has been expected to improve staff practice (Tinney et al., 2007).

1.5 Planning discharge services and destinations

Discharge planning is a routine part of service delivery for each hospital admission (Katikireddi & Christopher, 2009). The aim is for services to be coordinated as they plan for the transition between hospital and the place to which the person is discharged (Katikireddi & Christopher, 2009). A recent Cochrane review reported that discharge planning for older people may reduce hospital length of stay (mean difference 0.73 days) and readmissions within three months and improve satisfaction of staff and patients with health services performance (Goncalves-Bradley, Lannin, Clemson, Cameron, & Shepperd, 2016). The aim of discharge planning is for each older patient to be assessed whilst in acute care and referred to the service that can provide the most appropriate level of care upon discharge (Department of Health, 2013a). Another aim is for the best services to be in place as close as possible to where the patient lives (Department of Health, 2013a).

It has been argued that effective planning for discharge needs to commence early (Bauer, Fitzgerald, Haesler, & Manfrin, 2009). Discharge planning also needs to take into consideration the needs of the person, how the needs can best be met, who is able to help fulfil these needs and funding availability (Frank, 2004). Options for discharge in Victoria are shown in Figure 1.1. For people who require assistance overnight, there are several different services that can provide ongoing management until recovery is optimised and the final discharge destination has been decided and organised (palliative care, admitted rehabilitation, geriatric evaluation and management or transition care (Department of Health and Human Services, 2017b)). For people who can manage without care overnight on discharge, there are several visiting services to the home that can be arranged (Department of Health and Human Services, 2017e, 2018d). These are palliative care, the hospital admission risk program, post-acute care, hospital in the home, home and community care or transition care (Department of Health and Human Services, 2018c). Other health services may be organised at the hospital on an outpatient basis. In Australia, these include sub-acute ambulatory care services and renal dialysis (Department of Health, 2013a).

1.6 Services after an acute hospital episode of care

After elderly people have been hospitalised, some require additional services to enable them to live at home independently (Boyd et al., 2008; National Audit Office, 2016). Even if they may eventually require institutionalisation, a proportion of older individuals can receive additional services that aim to further maximise their physical capability (Turner-Stokes, Paul, & Williams, 2006; Wysocki, Thomas, & Mor, 2015). There are several different publicly funded options in Victoria, Australia, which are available when the acute admission has been completed which may assist the older person (Department of Health and Human Services, 2018b). These services can be tailored to the person's needs. Some of the options, for example inpatient rehabilitation, may also be used as an alternative to an acute hospital admission (Department of Health and Human Services, 2017b, 2017g). Such programs are depicted in Figure 1.1.

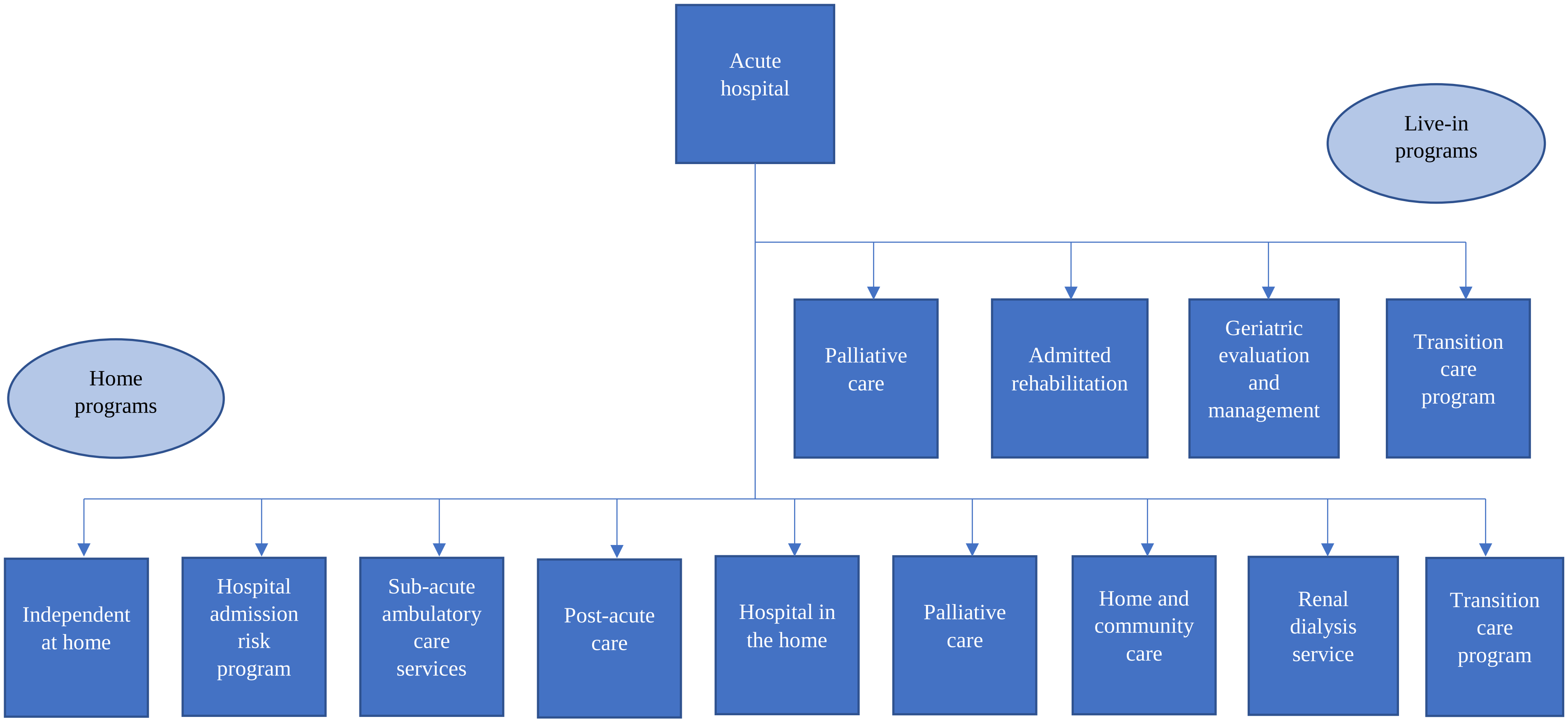

Figure 1.1 Options for discharged elderly people in Victoria.

1.7 Rehabilitation in Victoria after acute hospitalisation

The World Health Organisation (2011) defines rehabilitation as:

...a set of measures that assist individuals who experience, or are likely to experience, disability to achieve and maintain optimal functioning in interaction with their environments. (p.96)

In practice, rehabilitation encompasses the co-ordination of a multi-disciplinary team which includes various professions. It also involves patients and families in different situations for which any homogeneity is difficult to identify. Components and practices in rehabilitation vary widely making comparisons hard to interpret without clear definitions.

Inpatient or 'admitted' rehabilitation in Victoria, Australia, aims to enable people to improve their mobility, behaviour, cognition and function and to prevent deterioration so that they can return home (Department of Health and Human Services, 2017b). It typically takes place in a hospital environment which is designed to promote independence (Department of Health, 2013b). The main principle underpinning admitted rehabilitation from the Victorian Department of Health perspective is that "people receive equitable access to rehabilitation services in the most appropriate setting and in a timely manner" (Department of Health and Human Services, 2017b). It is expected that the person involved should be at the centre of the intervention with goals set in conjunction with them (Department of Health and Human Services, 2017b). A multi-disciplinary team typically provides interdisciplinary care that is managed by a clinician who is a rehabilitation or geriatrics specialist. Elements such as program duration, intensity and frequency of therapies are matched to patient goals, status and abilities (Department of Health and Human Services, 2017b).

The South Australian Health triage guidelines suggest that most older patients should be able to tolerate a minimum of two hours of therapies daily (South Australian Health, 2017). This is a little less than the US where a minimum of three hours of rehabilitation is typically provided daily (MedPAC, 2017a). A daily duration of rehabilitation is not specified for Victorian patients admitted for rehabilitation.

In Victoria, most rehabilitation patients (70%) are over the age of 65 years (Department of Health and Human Services, 2017b). In all of Australia, 80% of rehabilitation patients are over the age of 60 years (Australian Institute of Health and Welfare, 2017a). The most common Victorian diagnoses requiring rehabilitation are orthopaedic conditions such as hip and knee joint replacements or neurological conditions such as stroke (Department of Health and Human Services, 2017b). Australian states and territories vary considerably with regard to the percentage of total rehabilitation separations (the process by which an episode of care for an admitted patient ceases (Metadata Online Registry, 2017)). The proportion of total separations (acute and rehabilitation) for rehabilitation in Victoria in 2015 (1.1%) was less than the percentage proportion for other states such as Queensland (2.1%), South Australia (2.7%) and New South Wales (2.1%) (Productivity Commission, 2017b). Potential reasons for this are discussed in Chapter 2.

A systematic review and meta-analysis of inpatient geriatric rehabilitation found some benefits from rehabilitation when compared to usual care (Bachmann et al., 2010). In the short-term there were improved functional outcomes, decreased admission to long-term care and decreased mortality (Bachmann et al., 2010; Rubenstein et al., 1984; Zasadzka et al., 2016). Components that added to program success were comprehensive geriatric assessment with implemented recommendations and geriatrician follow-up post-discharge (Bachmann et al., 2010). Factors associated with home discharge after inpatient rehabilitation include younger age, being married, higher cognitive and functional status and absence of depression (Everink et al., 2016; Kool, Oesch, & Bachmann, 2017). Bachmann et al suggested that admitted geriatric rehabilitation is expensive and requires considerable resources and that more research in the area needs to be performed (2010).

1.8 Post-acute live-in options after hospitalisation

In Victoria, there are several post-acute live-in options besides inpatient rehabilitation for older patients still needing overnight care at hospital discharge (Figure 1.1). These include palliative care, geriatric evaluation and management (GEM) and transition care (Department of Health and Human Services, 2017a, 2017g).

Palliative care referral is considered when the requirement is to acquire the 'best possible quality of life for the person with a life-limiting illness' (My Aged Care, 2015). It aims to provide support for carers and families as well as enabling the maximum possible level of independence for the patient (Cancer Council Australia, 2017).

Geriatric evaluation and management inpatient wards in Australia have been established with the aim of improving function and mobility for patients to enable restoration and discharge for frail, elderly inpatients (de Morton & Lane, 2010; Van Craen et al., 2010). Interventions are usually provided by a multi-disciplinary team which typically includes a comprehensive geriatric assessment due to complex co-morbidities found in this cohort of ill, elderly inpatients (Department of Health and Human Services, 2017d; Ellis & Langhorne, 2005). A comprehensive geriatric assessment is used which informs the delivery of services to assist with the restoration of healthy living (Ellis & Langhorne, 2005). Patients are typically admitted, assessed, treated and managed by a geriatrician (Department of Health, 2013a). Patients admitted for geriatric evaluation and management are generally over 65-years old, although younger patients with conditions which are more frequently associated with older people may be included (Department of Health, 2013a). In a systematic review by Van Craen et al (2010) people admitted to geriatric evaluation and management units came from home, the emergency department or from hospitals.

Admission to a GEM ward was found to be beneficial for frail older people in the systematic review by Van Craen (2010). This review found that provision of GEM was heterogeneous across the studies. There was less functional decline at discharge from GEM and less admission to long-term care at one year, but mortality and readmission rates did not appear to be reduced significantly (Van Craen et al., 2010).

In 2015, 1.1% of discharges from Victorian hospitals were from geriatric evaluation and management wards (Productivity Commission, 2017b). The same percentage of discharges were from inpatient rehabilitation in Victoria (Productivity Commission, 2017b). In New South Wales and Queensland 2.1% of discharges were from rehabilitation and 0.3% from geriatric evaluation and management wards (Productivity Commission, 2017b). This demonstrates that usage of health services in Australia varies from state to state or territory.

Referral to the Transition Care Program (TCP) is for older people who can benefit from increased dosages of low intensity therapies to maximise their potential following hospitalisation. TCP is also designed for people who are at risk of being admitted to long-term care perhaps prematurely (My Aged Care, 2017a). It is short-term and has patient-centred goals with input from various therapies to improve function and independence (Department of Health, 2015b). The program can be provided in the home or in a live-in environment if overnight care is required (Australian Institute of Health and Welfare, 2014). The TCP for slow stream rehabilitation is the focus of studies in this thesis.

1.9 Long-term care after an acute hospital stay

Although several options for live-in care are available when patients are discharged from hospital in Australia (Department of Health and Human Services, 2017g), a report published by the Australian Institute of Health and Welfare showed that most people (92%) were discharged home (2017a). This included most older people (83%) (2013c). Some of the older people came into hospital from residential care and then returned to their residential facility at the completion of hospitalisation (8%). A small percentage (5%) died and some (4%) entered an aged care facility or the TCP

(Australian Institute of Health and Welfare, 2013c). Eleven per 1,000 patient bed days (1.1%) were used nationally in 2016 by people waiting in hospital for a bed in a residential aged care facility in Australia (Australian Institute of Health and Welfare, 2017a). The people who were waiting in hospital to move to long-term care stayed in hospital for an average of 28 days. This is considerably longer than the overall average of 6.1 days in hospital (Australian Institute of Health and Welfare, 2013c). It appears that a considerable proportion of admissions to residential aged care facilities (at least a third) occur as the final discharge destination following hospitalisation (Australian Institute of Health and Welfare, 2013c).

1.10 Health and wellbeing in residential care

Once people are admitted to residential care in Australia they have an average length of stay of 35 months (Department of Health, 2017a). The length of stay in residential care is often completed by death (81%) (Australian Institute of Health and Welfare, 2017c; Barclay et al., 2014). It has been reported in the UK that 21% of all deaths take place in residential care homes (Barclay et al., 2014). Moving into residential care is stressful for the new resident as it may signify loss of independence, autonomy and sense of identity (Brownie, Horstmanshof, & Garbutt, 2014). Participation in the decision to move to care and knowledge of care life were found to be factors involved with positive adjustment to living in residential care (Johnson & Bibbo, 2014; Lee, 2010). Wellbeing and satisfaction with life were compared for a group of nursing home and community-dwelling residents in Italy (Cesetti, Vercovelli, & Ruini, 2017). The study by Cesetti et al (2017) showed that, for a range of measures including feeling there was a purpose for life and psychological wellbeing, the nursing home residents scored worse than those living in the community. In addition, Australian data showed that nearly half of all nursing home residents were depressed (Australian Institute of Health and Welfare, 2017b).

Recently published studies show that during their time in a residential care facility, older people are likely to decline further in their functional capabilities (Jerez-Roig, de Brito Macedo Ferreira, de Araujo, & Lima, 2017; Lee et al., 2015; Yoon, Brown, Bowers, Sharkey, & Horn, 2016). A study measuring the steps taken by 27 nursing homes residents (mean age 87 years) showed that they took a median of 1,300 steps daily (Buckinx et al., 2017a). Walking less steps was associated with lower physical capacity and increased disability (Buckinx et al., 2017a). A longitudinal study from Brazil (Jerez-Roig et al., 2017) measured the function of 280 institutionalised adults (mean age of 80.4 years) six-monthly for two years. There was a 56% probability of studied participants functionally declining after two years. Jerez-Roig et al (2017) reported that initially functional decline was more pronounced before the rate of decline slowed down. Factors predicting decline such as decline in continence were considered potentially treatable and, if treated, may prevent further functional loss (Jerez-Roig et al., 2017).

A systematic review, including studies from nursing homes in nine different countries (1373 patients), showed that about half of the long-term care residents could be categorised as frail (Kojima, 2015). The most commonly used definition of frailty used in this review by Kojima (2015) was the definition from Fried et al (2001). Frailty is defined by the presence of at least three criteria (Fried et al., 2001). These are self-reported exhaustion, slow walking speed, low physical activity, weakness (grip strength) and unintentional weight loss (10 pounds in the past year) (Fried et al., 2001). Frailty was associated with mortality in a study of 383 people (median age 88 years) living in South Australian residential aged care facilities (Theou et al., 2017). The most frail residents lived for the shortest time (Theou et al., 2017).

A Swedish study researched factors associated with 'thriving' (well-being and living life to the full (Haight, Barba, Courts, & Tesh, 2002)) for 191 residents of a nursing home (Patomella, Sandman, Bergland, & Edvardsson, 2016). Those residents who had higher functional capacity and independence in activities of daily living and were able to walk appeared to live better in care (Patomella et al., 2016). These abilities enabled residents to move around independently and develop relationships with staff and other residents which were also associated with satisfactory settling into residential care (Lee, 2010). Similar findings were reported in Singapore nursing homes where residents who were more independent and communicated well with staff rated their quality of life as higher (Wang et al., 2016).

1.11 Post-acute aged care framework in Australia

Post-acute or 'sub-acute care' in Australia has been operationally defined as rehabilitation, palliative care, geriatric evaluation and management, and psychogeriatric care (Australian Institute of Health and Welfare, 2013b). It has also been described as "…specialised multidisciplinary care in which the primary need for care is optimisation of the patient's functioning and quality of life. A person's functioning may relate to their whole body or a body part, the whole person, or the whole person in a social context and to impairment of a body function or structure, activity limitation and/or participation restriction" (Australian Institute of Health and Welfare, 2013b) p. 9-10.

Jesus and Hoenig (2015) proposed a post-acute care framework that could be adapted for slow stream rehabilitation as used in transition care programs. The model in Figure 1.2 defines important building blocks of this type of transition care program. The original framework from Jesus and Hoenig has been slightly amended (Figure 1.2) and has been included with permission from Tiago Jesus (Appendix 1).

The patient has been centred in this diagram because providing 'timely, appropriate and effective' patient-centred care is a focal point for health services (Department of Health and Human Services, 2018c; World Health Organisation, 2016). The external healthcare environment is argued to include funding and resource provision (Department of Health and Human Services, 2017c). Social and cultural factors also influence health (Institute of Medicine, 2006) and health outcomes (Abrahamsen et al., 2015). An example of a sociodemographic health factor is that in some countries more than others the family are more involved in long-term care for needy family members (Abrahamsen et al., 2015). The structure of the program including staff (Avalere Health LLC, 2015; Muindi & K'Obonyo, 2015), resources and how they are managed can influence outcomes for patients receiving rehabilitation (Pioli et al., 2011).

Patient care processes can be thought of in relation to clinical guidelines, individualisation, amount and timing of program, co-ordination of care and the specific interventions (Jesus & Hoenig, 2015). Guidelines direct the rehabilitation approach, based on the most up to date research evidence (Department of Health, 2015b; NHS England, 2016). As individuals have varying potential for recovery, the guidelines for Australian transition care programs suggest that services should be individualised (Department of Health, 2015b). Intensity and frequency (dosage) of treatment has been shown to affect outcomes for participants in rehabilitation with increased intensity resulting in increased benefits (Jette, Warren, & Wirtalla, 2005; Lee et al., 2012a; Lohse, Lang, & Boyd, 2014). The specific interventions provided will vary according to the patient's medical conditions, abilities and goals (Kauffman, Scott, Barr, & Moran, 2014). There is some evidence that clinical coordination of care can improve quality of patient care, reduce waste and costs (Ovretveit, 2011). Quality improvement in coordination of care may also reduce hospital admissions for older people with chronic diseases (Tricco et al., 2014).

Interprofessional processes include those around team functioning and improvement procedures. The interprofessional team can improve patient outcomes (Ariss et al., 2015; Gougeon, Johnson, & Morse, 2017). Some aspects of team functioning such as task orientation, effectiveness and organisation are also associated with functional improvement and patient length of stay in stroke rehabilitation (Strasser et al., 2005).

The level of frailty at admission to inpatient geriatric rehabilitation may affect outcomes (Arjunan, Peel, & Hubbard, 2018; Nolan, Power, Long, & Horgan, 2016). Post-acute rehabilitation has also been shown to make a difference to a participant's level of frailty with even the most disabled older people making gains (Peel, Hubbard, & Gray, 2013). Peel et al recommended that further work was required in this area to confirm findings (Peel et al., 2013).

Functional capacity may also be increased by geriatric rehabilitation (Bachmann et al., 2010). Bachman et al (2010) reported that geriatric inpatient rehabilitation “seems to have the potential to improve” function but that there is a scarcity of evidence to be completely clear.

Psychosocial and behavioural issues are also relevant to outcomes from rehabilitation. Active coping, planning and self-distraction strategies have all been associated with improvements in the six-minute walking test for older participants taking part in pulmonary rehabilitation (Russo et al., 2017). More engagement by participants in post-acute rehabilitation may lead to additional functional gain (Lenze et al., 2012). Depression and cognition are factors predictive of home discharge from rehabilitation (Everink et al., 2016), although the strongest predictor appeared to be better mobility (Kool et al., 2017).

Broader aims of slow stream rehabilitation include functional and health-related quality of life improvement, discharge destination to home, prevention of potentially avoidable readmission, decreased mortality and low program length of stay (Comans, Peel, Cameron, Gray, & Scuffham, 2015; Dawda & Russell, 2014; NHS Benchmarking Network, 2017).

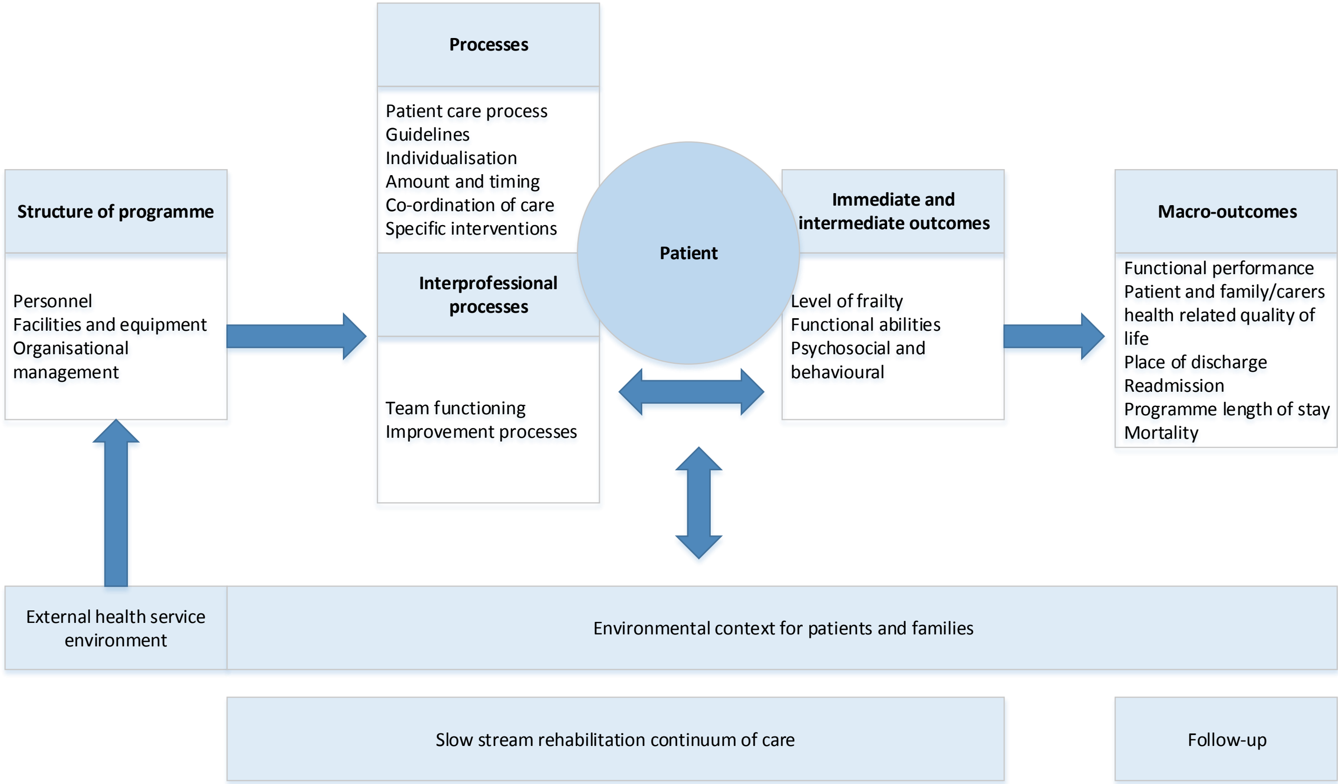

Figure 1.2 Visual representation of slow stream rehabilitation framework. (Reproduced with permission from Tiago Jesus, Appendix 1)

1.12 Rationale for this thesis

Prior to commencing this study, I was a physiotherapist working with older people in residential care facilities in Australia. I witnessed that residents entering aged care sometimes experienced a deteriorating trajectory in terms of independence, functional abilities and health-related quality of life. The current research started with a scoping project examining the approach by residential aged care facilities in central Victoria to increasing the functional abilities of residents (Department of Human Services, 2005). This led to an investigation of the varying regional approaches to slow stream rehabilitation (Transition Care Program (TCP)) in Australia (Department of Health and Ageing, 2005). The TCP aimed to enhance the functional level of older people leaving hospital and to reduce premature admission to permanent residential care.

This thesis firstly reports a systematic review to quantify the outcomes of the TCP programs. The review is followed by a study designed to quantify the outcomes of adding more functional exercises to a standard transition care program. The aim of adding greater high-quality exercise to the usual transition care program was to assist more older people to become more functionally independent and able to return to the their homes.

The thesis has a major focus on rehabilitation options following acute hospitalisation for people older than 65 years of age. It specifically addresses the outcomes for people in the Australian slow stream rehabilitation program of transition care. It is directed towards frail older individuals who require overnight care and are most at risk of premature admission to long-term care. The participants in the study reported in this thesis received either usual care or usual care plus additional functional exercise whilst living in a residential facility.

1.13 Research questions, objectives and hypotheses

1.13.1 Scope and aims

This research initially explores outcomes and processes for the regional slow stream rehabilitation transition care programs in Victoria, Australia. Following this, a randomised controlled trial is reported that measured the effects of adding extra functional physical activities to the normal live-in program of slow stream rehabilitation transition care. Additional physical activity was provided to the intervention group to see if it assisted more people to be discharged home.

1.13.2 Research questions

From a search of the literature and Schnelle's (1995) work on functional incidental training in residential care, a randomised controlled trial was designed to test the question of whether adding functional training to standard physiotherapy within slow stream rehabilitation would alter outcomes for frail older people.

1.13.2.1 Primary research question

The primary research question for this thesis refers to the model in Figure 1.2 (macro-outcome) and is:

‘Does the provision of additional functional exercise during slow stream rehabilitation alter the number of frail older people who return home after discharge from the program?’

1.13.2.2 Hypotheses

i. Compared with usual care, the provision of additional functional exercise during slow stream rehabilitation delivered in transition care will alter the number of frail older people who return home after discharge. Location of residence will be maintained to six-months from admission.

ii. There will be a significant positive relationship for both groups between participants’ expected discharge destination and their actual discharge destination.

iii. Function, health-related quality of life and depression will be significantly different for those discharged home in comparison with those discharged to care.

iv. Adding functional training to the standard transition care slow stream rehabilitation program will improve functional performance and health-related quality of life and reduce depression from admission to discharge. Changes will be maintained to six-months from admission.

v. Adding functional training to the standard transition care slow stream rehabilitation program will alter functional performance and health-related quality of life and reduce depression by an amount that corresponds to clinically noticeable change.

vi. The addition of functional training to usual care will alter frailty.

vii. Exercise continuation after discharge will be higher in the functional training group than the usual care group.

1.14 Thesis overview

This thesis comprises six chapters. Following this introduction, Chapter 2 presents an exploratory study to understand the models used in transition care programs in regional Victoria, Australia. Chapter 3 then critically reviews the literature regarding the outcomes of slow stream rehabilitation for frail older people. It explores published randomised controlled trials (RCTs) that aim to improve function and discharge destination for elderly participants. Chapter 4 presents and justifies the methods for the main study, an RCT on the effects of adding more functional exercises to the usual care for TCP participants. The participants were recruited from live-in transition care and randomised to receive additional functional training coupled with standard physiotherapy or standard physiotherapy alone. Outcomes were assessed at baseline, discharge from the transition care program and six-months post admission to transition care. In Chapter 5, the results from this RCT are reported. Chapter 6 discusses the findings from the RCT and answers the research questions. It also summarises the main findings of the thesis and considers the significance, impact and implication of the research. Figure 1.3 summarises the thesis structure and content.

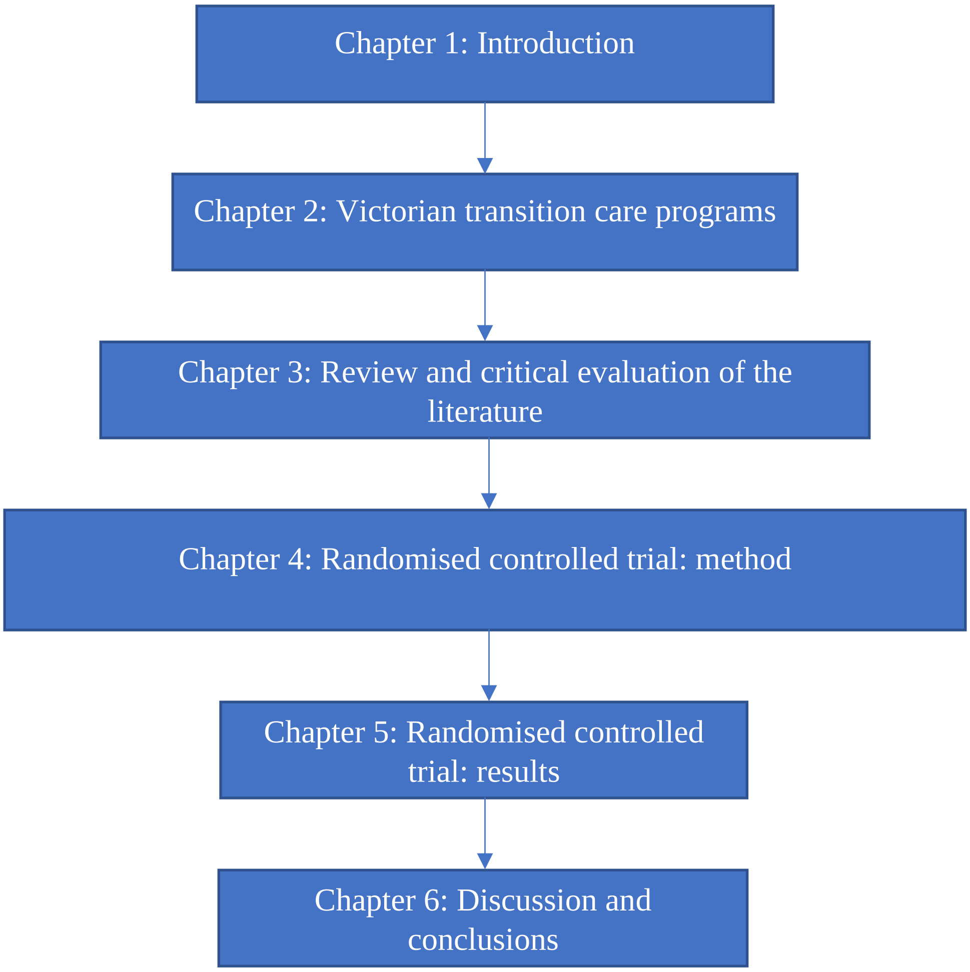

Figure 1.3 Structure and content of the thesis.

Chapter 2 Models of slow stream rehabilitation for frail older people

This chapter will critique models of transitional care for frail older adults and compare Australian and, in particular, Victorian slow stream rehabilitation programs with similar international services. In addition, this chapter includes a scoping report analysing slow stream rehabilitation programs in regional Victoria, Australia. These regional programs are newly developed and are still evolving. Given that the thesis focuses on additional exercise provided for recipients of these transitional care programs, it is important to provide a brief summary of how the programs operate in Australia and worldwide to provide the context for the study that follows.

2.1 Overview of transition care slow stream rehabilitation

2.1.1 Slow stream rehabilitation programs for older people after discharge

The period after discharge from hospital is a critical one for frail older people (Boyd et al., 2008). It has been recognised that, for some of these people, a need exists for rehabilitation programs that bridge the gap between hospital and home (MacArthur & Hendry, 2017). An estimated 25% of older hospitalised people in the UK have post-acute care needs (NHS Benchmarking Network, 2017). Up to one quarter may be readmitted at three, six and twelve months post discharge (Young et al., 2005). A study in the UK showed that physical function continued to decline post-hospitalisation with 31% of frail older people being admitted to long-term care and 36% mortality at one year after discharge (Young et al., 2005). When older people were provided with structured physical therapy or rehabilitation programs immediately after hospital discharge, they had an increased likelihood of returning home (Buijck et al., 2012; Muller, Collier, Wells, Bauer, & Petroulakis, 2017; NHS Benchmarking Network, 2017). Post-acute hospitalisation programs exist in many parts of the world including Europe, the US, Canada and Brazil (Kumpers et al., 2010; Leung et al., 2016; MacArthur & Hendry, 2017) and Australia (My Aged Care, 2017a). A challenge exists when reviewing the literature due to the confusion of interchangeable terms in the sphere of geriatric rehabilitation (Abrahamsen et al., 2015; Davis, Morgans, & Stewart, 2016). Terms used interchangeably include 'postacute', 'sub-acute care' and 'intermediate care' (Abrahamsen et al., 2015; Davis et al., 2016).

Slow stream rehabilitation programs are usually established with the broad aim of assisting older people with safe and earlier transitions out of inpatient care and back to their homes (Dawda & Russell, 2014; National Institute for Health and Care Excellence, 2017). They aim to help recipients to avoid prolonged hospital stays or inappropriate admission to long-term care (Comans et al., 2015) whilst maximising independence (Department of Health, 2009, 2017b; MacArthur & Hendry, 2017; MedPAC, 2017a). These programs are usually directed towards people who are no longer classified as requiring acute hospital care, yet are not well enough to be managed by their general medical practitioner in the community (Dawda & Russell, 2014; Poulos & Eagar, 2007). Terms used for post hospital rehabilitation programs include "intermediate care" in the UK (National Institute for Health and Care

Excellence, 2017). Intermediate care is an overarching term which covers four types of response in the UK (Age UK, 2017b) which are:

i. a live-in program of provided health professional services,
ii. a crisis response aiming to prevent older people from being admitted to acute hospital,
iii. home-based care with multi-disciplinary services and
iv. 'reablement' where health service staff assist with the relearning of tasks enabling independence (Age UK, 2017b).

In the Netherlands, Plochg et al evaluated an 'intermediate care' model (2005). A national program of "geriatric rehabilitation" has since been evaluated and incorporated into normal practice in the Netherlands (Holstege et al., 2017; Kroneman et al., 2016). In Norway, the term 'intermediate care' is used (Dahl, Johnsen, Saetre, & Steinsbekk, 2015a). The term 'post acute care' in the US covers inpatient rehabilitation, short term care in skilled nursing facilities, services at home or in long-term care homes (Burke et al., 2017b; Murad, 2012). 'Post-acute care' is also the term used in Brazil (Guilherme, Soares, Japiassu, Gomes, & Pereira, 2017; MacArthur & Hendry, 2017) . For clarity and consistency in this thesis these programs will be referred to as "slow stream rehabilitation" and it will focus on only live-in after-hospital programs differentiating from subacute inpatient rehabilitation.

The Australian Transition Care Program (TCP) is jointly funded by the Australian Government and all Australian state and territory governments and was established in 2004 (Australian Institute of Health and Welfare, 2014). The program guidelines (Department of Health, 2015b) have printed an extract from the original agreement endorsed by the Care of Older Australians Working Group:

Transition care provides short-term support and active management for older people at the interface of the acute/subacute and residential aged care sectors. It is goal-oriented, time-limited and targets older people at the conclusion of a hospital episode who require more time and support in a non-hospital environment to complete their restorative process, optimise their functional capacity and finalise and access their longer-term care arrangements. (p. 10)

Comparable international slow stream rehabilitation programs include a Canadian approach (low-intensity, long-duration rehabilitation) which was reported to take place in a dedicated residential facility as described by Leung et al (2016). It can also take place in a transition care unit (Manville, Klein, & Bainbridge, 2014). In New Zealand the location was in care homes (Parsons et al., 2012). In the United Kingdom either acute hospital beds, community hospitals, stand-alone facilities or nursing homes are used (National Institute for Health and Care Excellence, 2017; Young, 2009). Skilled nursing facilities or swing-beds in an acute hospital are used in the United States (MedPAC, 2017b). Taiwan have facilities with a dedicated post-acute unit (Lee et al., 2011). Chronic care hospitals were used for slow stream rehabilitation in Brazil (Guilherme et al., 2017), a residential home in Holland (Kroneman et al., 2016; Plochg et al., 2005) and intermediate care hospitals in Norway (Dahl et al., 2015a).

Table 2.1 summarises and highlights the different elements of these world-wide programs. Further detailed information regarding eligibility criteria, location of program provision, program duration, therapies, outcomes measured and measures used is found in 2.1.2-2.1.8.

Table 2.1

Elements of world-wide post-hospitalisation programs

Author (country)	Descriptive term for program	Eligibility criteria	Location of program	Duration	Therapies provided	Outcomes measured	Outcomes measures used
Department of Health (2015b) (Australia)	Transition care program	Hospital stay completed Assessed as requiring permanent care by aged care assessment team Medically stable Assessed as needing further care to maximise full potential	Home or bed-based in acute hospital or residential care home or stand-alone facility	18 weeks	Nursing Allied health as required GP Geriatrician Case management	ADLs Consumer satisfaction	Barthel Index Consumer satisfaction surveys
Guilherme (2017) (Brazil)	Post-acute care	Discharge from hospital Chronic conditions Rehabilitation needs	Chronic Care hospital or small hospital	60+ days	Interdisciplinary team	Function LOS	Karnofsky performance scale
Leung et al (2016), Pitzul et al (2016) and Manville et al (2014) (Canada)	Slow stream rehabilitation, complex continuing care or alternate level of care	Living at home before hospitalisation Able to participate in physiotherapy sessions of minimum 20 minutes	Slow stream rehabilitation unit or Transitional Care Unit or complex	120 days	30 minutes, 3 x week Occupational therapy Physiotherapy Dietetics	Balance Cognition Confusion Depression	FIM BBS CGA-FI CAM

Author (country)	Descriptive term for program	Eligibility criteria	Location of program	Duration	Therapies provided	Outcomes measured	Outcomes measures used
		Identified rehab goals	continuing care facility		Speech pathology Social work Therapeutic recreation staff GPs Geriatrician Nursing	Frailty Function	PHQ-9
Plochg et al (2005) and Holstege et al (2017) (Netherlands)	Intermediate care	Discharge from hospital Chronic conditions Complex care needs Medically stable Unable to be discharged home Patient insured	Residential home	3 months	Nursing Occupational therapists Physiotherapists Geriatrician	Cognition Discharge destination Function Length of stay Readmission	Barthel Index BBS FAC CPS

Author (country)	Descriptive term for program	Eligibility criteria	Location of program	Duration	Therapies provided	Outcomes measured	Outcomes measures used
Abrahamsen et al (2014) (2015) and Dahl et al (2015b) (Norway)	Intermediate care, post-acute care or intermediate care	Post discharge from acute hospital Multiple chronic conditions Comprehensive care needs Needing inpatient care for at least 3 more days after hospital discharge Expected to be able to return home	Municipal nursing home (skilled nursing home)	Dependent on need	Nursing Occupational therapists Physiotherapists GP	Cognition Depression Discharge destination Functional status Readmissions Hospital use Mortality Nutritional status	ADL variables Barthel Index TUG GDS MNA
Abrahamsen et al (2015) (Italy)	Post-acute care	Not requiring acute care but cannot be discharged home Medically stable Considered to have rehabilitation potential	Inpatient hospital	40 days	Nursing Physiotherapists Geriatrician Health care workers	Cognition Depression Discharge destination Function Mortality	Barthel Index MMSE GDS Tinetti scale
Chong et al (2013) and Goh	Post-acute care	Discharge from hospital	Community hospitals	5 weeks	Nursing Medical	Cognition Delirium	Barthel Index GDS

Author (country)	Descriptive term for program	Eligibility criteria	Location of program	Duration	Therapies provided	Outcomes measured	Outcomes measures used
(2012) (Singapore)					Multidisciplinary team	Depression Function Quality of life Readmission	CAM MMSE SF12
Lee et al (2011) and Lee et al (2012a) (Taiwan)	Post-acute care	Discharge from hospital Medically stable	Post-acute unit	12 weeks	Interdisciplinary team	Cognition Depression Function Nutritional status Pain	Barthel Index MMSE GDS MNA NRS
Department of Health (2009) and NHS Benchmarking Network (2017) (UK)	Intermediate care	Hospital stay completed or at risk of being admitted to acute hospital Need help to regain independence Medical stability	Home or bed based – acute hospital or community hospital or residential care home or stand-alone facility	6 weeks	Nursing Allied health as required	ADLs	Barthel Index or TUG or NEADL

Author (country)	Descriptive term for program	Eligibility criteria	Location of program	Duration	Therapies provided	Outcomes measured	Outcomes measures used
Centers for Medicare & Medicaid Services (2015), Kramer et al (2015) and UpToDate (2017) (US)	Skilled nursing facilities (short term)	Minimum of three days in acute hospital ADL impairments Need for rehabilitation to regain function Medical instability requiring frequent nursing or medical intervention	Skilled nursing facility or acute hospital (swing bed)	20 days covered by Medicare and up to 100 days partially covered	Nursing Physiotherapy Occupational therapy Audiology Medical care	ADLs Readmissions	Number of ADL problems

Note. GP = general medical practitioner; ADLs = activities of daily living; LOS = length of stay; FIM = functional independence measure; BBS = berg balance scale; CGA-FI = comprehensive geriatric assessment frailty index; CAM = confusion assessment method; PHQ-9 = patient health questionnaire; FAC = functional ambulation categories; CPS = cognitive performance scale; TUG = timed up and go test; GDS = geriatric depression scale; MMSE = mini-mental standard examination; SF12 = 12-item short form survey; MNA = mini nutritional assessment; NEADL = Nottingham extended activities of daily living scale; NH = nursing home; NRS = numerical pain rating scale.

2.1.2 Eligibility criteria for slow stream rehabilitation

Most slow stream rehabilitation programs are set up to assist older people to maintain mobility upon leaving hospital and this is one of the primary eligibility criteria (Australian Institute of Health and Welfare, 2011b). Others aim to prevent admission to acute hospital (Department of Health, 2009; National Institute for Health and Care Excellence, 2017). Programs that aim to bridge the gap between discharge and home in the community are called “step-down” programs whilst those that aim to prevent admission to hospital are called “step-up” in the UK (National Institute for Health and Care Excellence, 2017). The other major eligibility criterion for eligibility for “step-down” programs is medical stability (Burke et al., 2017b; Department of Health, 2015b; Lee et al., 2011; Leung et al., 2016; Plochg et al., 2005). There also needs to be a professional view that the person could further maximise their potential with additional time and therapies (Age UK, 2017b; Department of Health, 2015b).

To be able to access a slow stream rehabilitation place in Australia an assessment also needs to be carried out by an Aged Care Assessment Team (ACAT) at the completion of the hospital episode whilst the person is still in hospital (Department of Health, 2015b). The assessors are often nurses, social workers or other allied health professionals (My Aged Care, 2017b). The aged care assessment team needs to ascertain that the person wishes to take a slow stream rehabilitation place and that they are currently functioning at a level where residential care would be appropriate upon discharge from hospital. In the UK, assessment for slow stream rehabilitation (intermediate care) can also be performed by staff from a range of disciplines including nurses or allied health staff (National Institute for Health and Care

Excellence, 2017). The US assessment also considers the needs and goals of the patient and involves them in the decision-making process (MedPAC, 2017b). Assessors are advised to discuss with the potential recipient that the slow stream rehabilitation program is designed to work with existing community supports such as family and friends and working together is likely to produce the best outcomes (National Institute for Health and Care Excellence, 2017) . The UK guidelines note that if the move to slow stream live-in rehabilitation is likely to take longer than two days then it may be worthwhile considering other options (National Institute for Health and Care Excellence, 2017). In the US, accessing Medicare funded skilled nursing facilities for slow stream rehabilitation relies on doctors deciding that daily skilled nursing or therapy is required. The patient also needs to have had at least a three day stay in an acute hospital (Medicare, 2017a). There is also the requirement that the elderly person requires more care than they or their family members can manage alone (National Institute for Health, 2015). The care required for Medicare funded entry to American skilled nursing facilities must be more than “custodial care” (the American term for activities of daily living such as getting in and out of bed and eating) (Centers for Medicare & Medicaid Services, 2015).

2.1.3 Therapies provided in slow stream rehabilitation

In Canada, if a patient is not able to manage high-intensity therapies for 60-120 minutes at least once daily, a program of slow stream rehabilitation may be more appropriate than a higher intensity inpatient rehabilitation program (Leung et al., 2016). In this study by Leung et al (2016) the definition of slow stream rehabilitation is 20 minutes of therapeutic participation three times per week for a duration of up to

120 days. In the United States, if a patient can tolerate three hours daily of therapy then inpatient rehabilitation rather than slow stream rehabilitation may be an option (MedPAC, 2017a). For skilled nursing facilities in the US, the therapy provided varies from patient to patient based on an activity of daily living score and resource utilization groups (RUG) with Medicare funding altered accordingly (MedPAC, 2017b). RUGs are allocated nursing and therapy weightings that are added to the Medicare base payment rates for funding purposes (MedPAC, 2017b).

The duration of daily therapy is not specified on the Australian transition care program and is individualised to the patient and what is required to maintain or improve physical and cognitive abilities (Department of Health, 2015b). A study of Australian slow stream rehabilitation (transition care) costs during 2009-2010 (Comans et al., 2015) showed that an average of 11 hours per week of direct care was provided to recipients. In Taiwan, Lee et al (2012a) compared the usual dosage of interdisciplinary therapy (40-minutes per day for five days per week) with an increased dosage (80-minutes for five days per week) and found significant improvement in the Barthel Index, the Geriatric Depression Scale and a reduction in pain associated with the higher dosage of therapy. Intensity of therapy (physiotherapy and occupational therapy) in slow stream rehabilitation was associated with improved functional mobility (Chen, Heinemann, Granger, & Linn, 2002) and reduced length of stay in a study by Jette et al (2005). Increasing therapy up to 1.5 hours per day was associated with an improvement in the mobility domain of function (Jette et al., 2005). In a study population of 481,908 recipients admitted to skilled nursing facilities for slow stream rehabilitation in the US with hip fracture, Jung et al (2016) reported that an extra hour of therapy each week was associated with a 3% increase in home discharges. It could be speculated that further increasing therapies may further increase the benefits.

World-wide, the therapeutic services provided to recipients of slow stream rehabilitation appear to be mixed and include interventions delivered by physicians, nurses, physiotherapists, occupational therapist, dietitians, social workers, recreation therapists and speech pathologists (Department of Health, 2017b; Herfjord, Heggestad, Ersland, & Ranhoff, 2014; Leung et al., 2016; National Institute for Health, 2015; National Institute for Health and Care Excellence, 2017; Plochg et al., 2005). The exact mix of therapies, frequency, intensity and duration of therapy to achieve the best outcomes is not clear and varies according to individual recipient goals (Age UK, 2017b; Department of Health and Human Services, 2017h) or RUGs in the US (MedPAC, 2017b). It may be that, even within this cohort of patients, division into those with poorer or better functional activities of daily living at entrance to slow stream rehabilitation may assist with predicting their recovery (Abrahamsen, Haugland, Nilsen, & Ranhoff, 2016). Natural recovery might be responsible for some of the functional change observed (Mallinson et al., 2014). Further study is needed to clarify which factors contribute to improve outcomes with slow stream rehabilitation.

2.1.4 Optimal program duration

The optimal duration for slow stream rehabilitation programs is not completely clear and there are variations in the content, context and dosage of slow stream rehabilitation between countries. Most programs are time limited. Maximum durations include 120 days in Canada, (Leung et al., 2016), 12 weeks in Taiwan, (Lee et al., 2011) 3 months in Holland (Plochg et al., 2005), 18 weeks in Australia (Department of Health, 2017b) and 6 weeks in the UK (Young, 2009) (refer to Table 2.1). Some program durations are tailored to the individual and are associated with individual needs and priorities (Dahl et al., 2015b; Herfjord et al., 2014). In the US skilled nursing facilities are completely covered by Medicare in the first 20 days and then partially covered up to 100 days (Medicare, 2017a; MedPAC, 2017b). Although there are maximum slow stream rehabilitation program lengths of stay, many recipients do not utilise all possible days available. For example, although a slow stream rehabilitation episode can last up to 18 weeks in Australia, the average length in 2012-2013 was 61 days (Productivity Commission, 2017a) which reduced to 59 days in 2016-2017 (Department of Health, 2017a). In Canada, the average length of stay in slow stream rehabilitation was 82.5 days which was less than the maximum duration of 120 days allocated to each individual (Leung et al., 2016). The UK program reported an average length of stay of 27 days (NHS Benchmarking Network, 2017).

2.1.5 Prevention of acute hospital readmission for frail elderly people

Hospitalisation for frail elderly people is associated with further readmissions with UK reports of up to 25% of discharged elderly people being readmitted within one year (Burke et al., 2016; Young et al., 2005). Prevention of readmission as well as reducing acute hospital lengths of stay are driving factors for the development of some slow stream rehabilitation programs internationally (Dahl et al., 2015b; Department of Health, 2015b; Li, Cai, Yin, Glance, & Mukamel, 2012; Young, 2009).

Whether hospital readmission rates are altered as a result of slow stream rehabilitation is not completely clear (Griffiths, Edwards, Forbes, Harris, & Ritchie, 2007; Hall, Peel, Comans, Gray, & Scuffham, 2012; Lee et al., 2011). A small number of publications reported high rates (40.5% in Australia) of recipient readmissions to an acute hospital over six-months following admission to slow stream rehabilitation (Comans et al., 2015). Yet others reported no difference in readmission rates between people discharged to slow stream rehabilitation compared to those who received usual care (Dahl et al., 2015b). In Australia, if readmission is required during slow stream rehabilitation, the place on the program is maintained so long as readmission is only for an overnight stay (Department of Health, 2015b). If the hospitalisation lasts for longer than overnight then the slow stream rehabilitation episode ceases as the service provider may no longer be eligible for the flexible care subsidy funding under the Aged Care Act 1997 and the Aged Care (Transitional Provisions) Act 1997 (Department of Health, 2015b). Short breaks in stay at a skilled nursing facility stay for slow stream rehabilitation are also allowed in the US and insurance companies will continue to pay for care (Centers for Medicare & Medicaid Services, 2015). Given the varying rules across programs, direct comparison of outcomes can become challenging.

2.1.6 Optimising the slow stream rehabilitation environment

The environment in which slow stream rehabilitation is delivered is another determinant of outcome (Australian Institute of Health and Welfare, 2014; NHS Benchmarking Network, 2017). A Cochrane review comparing care home, hospital and own home for rehabilitation reported that it is not completely clear which location is the most beneficial (Ward, Drahota, Gal, Severs, & Dean, 2008). The Australian slow stream rehabilitation places can be utilised either at home or in a residential facility if overnight or more complex care is required (Department of Health, 2015b). Live-in places are located in long-term residential care facilities or in a separate part of an existing hospital in the US and Australia (MedPAC, 2017b; My Aged Care, 2017a). In Norway the setting is within a municipal nursing home (Orvik, Nordhus, Axelsson, & Axelsson, 2016). The environmental setting for slow stream rehabilitation can also change during the Australian intervention, i.e. from residential care to home, if the requirements of care alter (Department of Health, 2015b). The approach to slow stream rehabilitation in the UK is similar in that care can be provided in a community hospital, residential care home or in the person's home (Young, Gladman, Forsyth, & Holditch, 2015). In some countries the home based service is a totally separate program to live-in slow stream rehabilitation (i.e. Home Health Care in the US (Medicare, 2017b)). The differences between slow stream rehabilitation environments again make direct comparisons between programs across the globe complex.

2.1.7 Slow stream rehabilitation discharge destinations

One of the primary outcomes of interest for slow stream rehabilitation is the discharge destination (Jung et al., 2016). The aim of these programs is for recipients to be discharged from slow stream rehabilitation back to independent living in their homes in the community (National Institute for Health and Care Excellence, 2017). Slow stream rehabilitation also aims to prevent early admission to long-term residential care (Ariss et al., 2015). However, some elderly people may be admitted to slow stream rehabilitation for end of life care (32% of recipients) (Guilherme et al., 2017), while others are discharged from slow stream rehabilitation back into the acute hospital (22.8%) (Burke et al., 2016) as this is a high-risk cohort (Comans et al., 2015). The slow stream rehabilitation approach to caring for elderly people discharged from acute hospitals has shown some success in terms of recipients being discharged home (NHS Benchmarking Network, 2017). For example, 67.5% of people in Taiwan were discharged home (Lee et al., 2012b). Likewise, 61.5% of people from Ontario were discharged home (Leung et al., 2016). In the UK , 69% of recipients were discharged back to their homes (NHS Benchmarking Network, 2017). In Norway, 80% (Abrahamsen et al., 2014) and 66.6% of people in the Netherlands (Plochg et al., 2005) were discharged home. The rate of discharged recipients in the US from skilled nursing facilities appeared to be similar at 72% (Kramer et al., 2015). The evidence from implementation of slow stream rehabilitation in the UK shows that the risk of admission to long-term care decreases (Ariss et al., 2015). However, increasing age, less ability functionally and poorer cognitive skills are consistently associated with admission to nursing home care (Ariss et al., 2015).

Australian data showed that an average of 54% of slow stream rehabilitation recipients were able to be discharged home at program completion (Australian Institute of Health and Welfare, 2014). Those who received slow stream rehabilitation in a live-in setting rather than at home were more likely to be admitted to residential care (66.4% to care and 9.5% to home) (Australian Institute of Health and Welfare, 2014). The Australian Institute of Health and Welfare reports a clear association between the level of function and discharge destination where decreased function is more likely to lead to admission to residential care (2014). An evaluation of the Australian slow stream rehabilitation program showed that improvements in physical function were associated with the length of the program, which in turn was associated with differences in discharge destination (Australian Institute of Health and Welfare, 2014). Those that eventually died, were readmitted to hospital or were admitted to long-term care in Australia had shorter slow stream rehabilitation (Australian Institute of Health and Welfare, 2014). From 2005-2012 Australian data showed large variations between states for discharges to residential care. For example, 3.5% versus 45% of recipients were admitted to residential care within two weeks of transition care discharge in New South Wales and Victoria respectively (Australian Institute of Health and Welfare, 2014). Table 2.3 may provide some explanation for this large difference.

Discharge destination data for Victorian transition care recipients are shown in Table 2.2 (Muller et al., 2017). This shows that the percentage of people being discharged home increased by 4% over a five-year period. The percentage of people entering long-term care decreased by 8%. These changes suggest that outcomes are improving with refinements to the developing slow stream rehabilitation program in Victoria, Australia.

Table 2.2

Discharge destination for Victorian slow stream rehabilitation recipients

Year	Hospital %	Low-level residential care %	High-level residential care %	Home %	Death %
2008-09	20.2	11.1	33.4	27.3	3.4
2009-10	21.8	11.2	28.8	29.9	2.9
2010-11	23.1	11.0	27.7	29.2	3.3
2011-12	23.2	11.2	26.0	30.4	3.0
2012-13	23.8	11.0	25.0	31.2	3.3
2013-14	21.8	9.8	26.5	31.3	3.2

2.1.8 Outcomes and outcome measures used for slow stream rehabilitation

Two of the main outcomes quantified with slow stream rehabilitation are:

i) hospital readmission (Ariss et al., 2015), and

ii) acute hospital length of stay (Fleming et al., 2004).

Slow stream rehabilitation is associated with reduced hospital readmission and decreased acute hospital length of stay world-wide (Ariss et al., 2015; Dahl et al., 2015a; Dahl et al., 2015b; Dawda & Russell, 2014; Griffiths et al., 2007). The exception is hospital length of stay in the US which is around twice as long for patients discharged to post-acute care (including all programs of home health, inpatient rehabilitation, long-term care hospital, post-acute care and skilled nursing facilities) (Tian, 2016). Another outcome of interest is the functional ability of participants and how much this improves over an episode of care (Lee et al., 2012a; NHS Benchmarking Network, 2017; Young et al., 2015). The term "physical function" refers to the ability of the person to perform necessary activities of daily living such as walking and getting in and out of bed (Stewart & Painter, 1997). Maintaining physical function is related to independence in ageing (Vaughan et al., 2016) and mortality (Keeler, Guralnick, Tian, Wallace, & Reuben, 2010).

There are several reports of improvements in physical function related to slow stream rehabilitation (Australian Institute of Health and Welfare, 2012; NHS Benchmarking Network, 2017; Productivity Commission, 2017a). A recent audit of slow stream rehabilitation in the UK found an average improvement of 35% in independence in patients who received slow stream rehabilitation in live-in places (NHS Benchmarking Network, 2017). Likewise, 58% of Australian live-in slow stream rehabilitation recipients left with better function as shown by improvements on the Modified Barthel Index (Australian Institute of Health and Welfare, 2014). Leung et al (2016) reported that 38% more of the recipients were ambulatory at the end of slow stream rehabilitation compared to the commencement of the program. Another study reported functional improvement for hip fracture repair patients in slow stream rehabilitation comparing skilled nursing facilities with inpatient rehabilitation and home health services in the US (Mallinson et al., 2014). The improvements in self-care and mobility status were greatest for the cohort in skilled nursing facilities at the completion of the program.

Post-hospitalisation, slow stream rehabilitation programs have used a variety of measures to assess outcomes (Table 2.1). Outcome measures have included the Charlson Comorbidity Index (Jung et al., 2016), Cognitive Performance Scale (Jung et al., 2016; Parsons et al., 2012), various measures of activities of daily living (ADLs) (Garasen, Windspoll, & Johnsen, 2007; Jung et al., 2016; Leung et al., 2016; Parsons et al., 2012), Nottingham Extended Activities of Daily Living Scale (Fleming et al., 2004; Green et al., 2005; Young et al., 2007), Barthel Index (Chong et al., 2013; Crotty et al., 2005; Fleming et al., 2004; Green et al., 2005; Herfjord et al., 2014; Lee et al., 2011; Lenze et al., 2012; Mallinson et al., 2014; Young et al., 2007), de Morton Mobility Index (de Morton, Brusco, Wood, Lawler, & Taylor, 2011a), Mini-Mental State Examination (Chong et al., 2013; Herfjord et al., 2014; Lee et al., 2011), Geriatric Depression Scale (Chong et al., 2013; Herfjord et al., 2014; Lee et al., 2011; Martinez et al., 2015), Depression Rating Scale (Parsons et al., 2012), Cornell Scale for Depression (Herfjord et al., 2014), Patient Health Questionnaire (Leung et al., 2016), Assessment of Quality of Life (Crotty et al., 2005), Short Form Health Survey 12 (Chong et al., 2013; Leung et al., 2016), General Health Questionnaire (Fleming et al., 2004), Euroqol 5D and accompanying visual analogue scale (Ariss et al., 2015; Parsons et al., 2012), Mini Nutritional Assessment (Lee et al., 2011), Timed Up-and-Go test (Lee et al., 2011), Pain Numerical Rating Scale (Lee et al., 2012a), Hospital Anxiety and Depression Scale (Green et al., 2005; Young et al., 2007), gait speed (Lenze et al., 2012; Leung et al., 2016), Montebello Rehabilitation Factor Score (Chong et al., 2013) ambulatory status (Chong et al., 2013), Berg Balance Scale (Leung et al., 2016), Functional Independence Measure

(Leung et al., 2016) and the Comprehensive Geriatric Assessment Frailty Index (Leung et al., 2016) (Table 2.1).

The number of different measures used mean that direct comparisons of clinical benefits in the various programs are difficult. It appears that the most commonly used measure for functional outcomes is the Barthel Index as used in the UK, Australia, Singapore, Taiwan and in some instances the US programs.

Overall it seems that slow stream rehabilitation programs after hospital for elderly people have some beneficial effects on functional outcomes and discharge destination (Jung et al., 2016; Muller et al., 2017; NHS Benchmarking Network, 2017) but the optimal approach is not completely clear. The best location for care, ideal duration of program as well as the exact combination and amount of therapies also requires clarification. The data regarding functional outcomes and discharge destinations shows major variations across the world as well as within Australia (Table 2.1). Recent state and territory data (2015-2016) regarding outcomes from the states and territories of Australia is shown in Table 2.3 (Productivity Commission, 2017a). As shown in Table 2.3, Victoria, West Australia and Tasmania recipients of slow stream rehabilitation enter and leave the program with a lower Modified Barthel Index score compared with participants in other Australian states. This illustrates that they are less functionally able than recipients in other states or territories and would be consistent with a higher number of recipients entering long-term care at the completion of their program.

Table 2.3

Modified Barthel Index score on admission and discharge by state and territory

	New South Wales	Victoria	Queensland	West Australia	South Australia	Tasmania	Australian Capital Territory	Northern Territory	Australia
BI on admission	79	64	72	58	69	65	85	84	71
BI on discharge	91	72	83	66	86	82	93	94	81
Average length of stay in days	68	56	53	55	65	51	69	83	60

Note. BI = Barthel Index.

Due to the flexible nature of the approach allowed by the funders of the TCP (Department of Health, 2015b), there is considerable variation of service provision models even within the states of Australia (Australian Institute of Health and Welfare, 2014). Differences in the model and processes within Victoria at the regional level have been explored in more detail in the study detailed in 2.2.

2.2 A scoping study of transition care models in regional Victoria

This study utilised a qualitative research design using semi-structured interviews as the method of data collection. Semi-structured interviews were chosen as they allow the interviewer to outline the area to be explored using open ended questions, whilst still permitting the investigation of an idea in greater depth (Britten, 1995). This inquiry used a constructivist paradigm (Guba & Lincoln, 1994). A constructivist paradigm wants to understand the perspective of each individual participant and create a picture based on a synthesis of the individual experiences (Guba & Lincoln, 1994). The picture in this instance was of participation in a regional transition care program.

The aim was to explore, critically evaluate and document models and processes of approaches to transitional care in regional Victoria. For the thesis, this is important background information to put into context the model used in the regional centre involved in the major study reported in Chapters 4 and 5.

2.2.1 Method

A low risk Human Research Ethics Committee submission received approval from La Trobe University faculty ethics committee (FHEC09/66 Appendix 4).

2.2.1.1 Participants

The co-ordinators managing the six transition care regional programs in Victoria were the individuals most likely to know a great deal about the models being applied in their geographical location. Therefore, these were the people targeted to be participants for this study. Homogeneous sampling was the technique employed with the aim to involve all Victorian regional co-ordinators in order to obtain a comprehensive data-set. Contact details for the potential participants were obtained from regional hospitals by ringing the hospital switch boards and asking for the names and email addresses of TCP co-ordinators. Written information, participant information and consent forms were forwarded electronically to the email addresses for each potential participant (co-ordinator) describing the study and its implications (Appendix 6). The primary researcher had no previous relationship with any of these participants.

2.2.1.2 Procedure

At the time of designing this scoping study, there was no validated questionnaire specific to slow stream rehabilitation that could be used to interview the participants. A questionnaire was therefore developed to enable information about context, mechanisms and outcomes to be collected. The questions were a mixture of standard open ended and closed fixed responses (Appendix 7) to permit the investigation of the focus area in detail (Bolderston, 2012).

Questions were provided in advance of the interviews to allow the health professional participants to prepare and gather any information. Appointments were set up for face to face interviews by the primary researcher (CP) at the convenience of the interviewees (Britten, 1995). Interviews were organised to allow the participants to respond factually as well as to give their opinions. Face to face rather than telephone interviews were chosen to allow for gathering of non-verbal as well as verbal information and as data to be collected was unlikely to be sensitive (Oltmann, 2016). Only the participants and researcher were to be present at the interview. Each interview was tape recorded and later transcribed to enable accurate data collection. Once transcribed the tape recordings were destroyed.

2.2.2 Data analysis

Tape recordings were transcribed verbatim from the tape recordings by the primary researcher. The transcriptions were sent to the co-ordinators for member checking and verification of content prior to analysis and reporting (O'Brien, Harris, Beckman, Reed, & Cook, 2014). Member checking refers to sending the transcripts back to the participants for correction and verification prior to further data analysis (Thomas, 2017). Participants had few corrections and those that were suggested were adopted. Information for each question was collated and familiarisation with data through reading and listening took place. Sensitive data were then de-identified. The data were then organised and indexed. Recurrent themes were identified and the range of responses organised into categories for description and interpretation. Participant opinions and comments on the model implementation were contrasted with recent knowledge on effective implementations from the literature.

2.2.3 Results and discussion

Following the provision of the participant information sheet and consent form and questionnaire, all six healthcare participants provided written consent. The interviews all took place at the participant's workplace and were recorded. Interview duration varied from 30-60 minutes. Only the participant and researcher were present at each interview.

2.2.3.1 Participant characteristics

The participants who were interviewed were generally not solely dedicated to the TCP and also had other responsibilities as shown in Table 2.4. These different roles showed that the co-ordination of each program was approached from a different management perspective for each participating centre. The diverse roles may have led to differing levels of management thus varying spheres of influence and resourcing availability. Having various responsibilities in the job could be advantageous or problematic (Douglas, Raban, Walter, & Westbrook, 2017; Ruderman, Ohlott, Panzer, & King, 2002).

Table 2.4

Location and roles of participants

Location	Role description
Location 1	Care Co-ordination and Deputy Director of Access and Patient Flow
Location 2	Transition Care Program Manager
Location 3	Geriatric Evaluation and Management in the Home, Transition Care Program and Restorative Care Manager
Location 4	Health Independence Program and Transition Care Program Manager
Location 5	Transition Care Program Manager
Location 6	Rehabilitation in the Home and Transition Care Program Manager

2.2.3.2 Transition care program development and allocation

The number of live-in slow stream rehabilitation places in a facility has been shown to be relevant to outcomes. For skilled nursing facilities with higher numbers of recipients in the facilities (>102) there was up to a 25% decrease in hospital readmissions with slow stream rehabilitation intervention (Li et al., 2012). For people receiving slow stream rehabilitation in a nursing home, functional outcomes were better in the larger facilities (Li, Cai, Mukamel, & Glance, 2010). At the time of the interviews, all of the participants noted that their transition care programs had been funded and had commenced. Participants noted that the Department of Health had informed programs managers that additional places were to be funded (expansion of between 12-110%). The number of places and whether they were live-in or home based is shown in Table 2.5. Following the expansion of programs, the ratio of bed-based to home-based places was expected to be close to 1:1. At the time of this study there had not been any detailed published study of occupancy and demand regarding transition care. This illustrated that the environment of the main study, which is the focus of this thesis, took place in a changing and developmental phase of Australian transition care.

Table 2.5

Number of TCP places in each Victorian transition care service regionally in 2011

Location	Total Number of TCP places	Bed based TCP places	Home based TCP places
1	64	39	25
2	12	8	4
3	65	32	33
4	55	34	21
5	20	13	7
6	38	28	10

2.2.3.3 Slow stream rehabilitation occupancy rates

Occupancy rates reported by the participants for the different regional Victorian programs were variable. Some of this variation appeared to be due to the fact that some programs were still in the early developmental stage and reported occupancy rates varied from 56% to 99%. Comments ranged from, 'We are still struggling to fill places' to 'Our implemented model is pretty tight'. The average occupancy rate across Australia in 2010-2011 was 82% (Australian Institute of Health and Welfare, 2012). It appeared that some places, particularly those with less well-developed programs, had a poor referral base and found it difficult to find suitable patients for the program. Some of the participants reported a poor local understanding of the program. A similar problem was noted by Plochg et al (2005). They mentioned that, to avoid empty places on the Dutch program, admission criteria were applied subjectively. Some clinicians were concerned that if the expected number of people did not go through the program then staff could lose their jobs (Plochg et al., 2005). In turn, with less staff fewer patients can be admitted (Plochg et al., 2005). This was important to Chapters 4 and 5 in this thesis as it may have affected recruitment of participants and those recruited may not have been representative of the greater transition care population.

2.2.3.4 Slow stream rehabilitation teams

Teamwork and collaboration are crucial components of a successful outcome for post-acute slow stream rehabilitation programs (Murad, 2012). The interdisciplinary team has a key role in the facilitation of communication and co-ordination as well as continuity of care in the program (Weeks, McInnis-Perry, MacQuarrie, & Jovanovic, 2016). Various compositions of therapeutic disciplines are found in post-acute care teams around the world (Table 2.1). A similar picture was found in the Victorian regional programs. There were variations but most of the regional teams included occupational therapy, nursing, physiotherapy, allied health assistants, speech pathology and dietetics. Other services such as podiatry or continence advisors were purchased privately specifically for the program as necessary. Having a range of therapies available for patients has been reported to be beneficial and may lead to a reduction in service costs (up to 17%) (Ariss et al., 2015). Some of the participants commented that their regional team purchased all of the therapies that their clients needed from private practices whilst other regions had a specific designated care team. A similar picture to the one painted here in regional Victoria, is reportedly found across Australia (Comans et al., 2015). This may not necessarily have affected the quality of the program, so long as communication between team members regarding the patients remained optimal (Baillie et al., 2014) Poor communication is known to be associated with less successful patient discharge and higher readmission rates (Baillie et al., 2014; Vasilevskis et al., 2017) and strong interdisciplinary teamwork is associated with better patient outcomes (Ariss et al., 2015).

All of the regional Victorian teams had case managers or co-ordinators whose background was in nursing or social work. The tertiary clinical skills of these clinicians were used according to the needs and priorities of program recipients. The literature revealed that the availability of case managers may also assist with the reduction of emergency readmissions (Ariss et al., 2015). In addition, blurring of boundaries for professional health clinicians can sometimes be beneficial in that it can aid with identification of complementary patient issues (Nancarrow, 2004).

There was considerable variation in clinician employment hours within regional Victorian slow stream rehabilitation. In some regions there was a specific hourly amount of a therapy employed and all clients' needs had to be fitted into this time. This was infrequently seen as problematic by participants. In other regions the amount of therapy time was dependent on the client needs. If a client required more therapy of one sort, then the TCP co-ordinator was able to access it. One comment received was, 'Staff do not seem too stretched although the work fluctuates related to complexity of the clients'.

When ratios of therapy to client were known by participants for their teams, the ratios were variable. Ratios from 2 to 7 hours per client per week were reported for case managers. For physiotherapy the ratio varied from 0.47 hours per client per week to 2.1 hours per client per week. For occupational therapy the ratio varied from 0.47 hours per client per week to 2.5 hours per client per week. Allied health assistant hours showed the greatest variation with hours per client varying from 2.4 hours to over 6 hours per client per week. Interestingly, there did not appear to have been either formal or informal benchmarking of these ratios between the different regional programs. There was no dissatisfaction or satisfaction expressed by participants regarding their available therapy hours or ratios. There is some evidence in the literature showing that higher rates of support staff (i.e. allied health assistants) to qualified staff ratios may lead to greater improvements in health-related quality of life scores (Dixon, Kaambwa, Nancarrow, Martin, & Bryan, 2010).

The way that services in each Victorian region had developed was related to the availability of disciplines within the geographical location. It can be difficult to recruit to allied health positions in rural Australia (Schoo, Lawn, & Carson, 2016). The only option, when recruitment is not possible, may be to purchase services from private practice. One of the co-ordinators commented, 'When you are talking about distances and small numbers it is very difficult, when you are already stretched, for allied health services especially if you only want a 0.1 EFT of a discipline, then you are not going to be able to recruit to that position.' If fractional staff could not be recruited and private services were not available, participants reported that other team therapists were asked to do overtime to service the program recipients.

When asked regarding the advantages and disadvantages between designated teams or purchased services from private practitioners, the co-ordinators responses were diverse. In some cases, the brokered services from private practitioners were performed by therapists who had worked with the TCP for some years. For these, the therapists generally felt as if they were part of the team in a similar way to those therapists with designated TCP positions. This team spirit reportedly was beneficial with all staff feeling valued and working together towards the achievement of the client goals. Co-location of designated staff often facilitated easy communication between team members.

In occasional instances, therapists rotated in and out of transition care teams and to other areas within health services. This enabled information about the relatively new program to spread through the organisation when the staff moved to different programs within the health service. This finding is also reported in a qualitative study exploring transitions between acute and post-acute services (Baillie et al., 2014). If sick or holiday leave needed to be covered and there were no available slow stream rehabilitation staff available to step-in, previous staff who had worked a rotation in the program and had moved on to another part of the health service may be able to takeover in the short term. However, in one organisation, although rotations were started they did not continue because staff enjoyed working with the program and did not want to move on to work elsewhere.

Participants were asked to compare the care provided in home-based versus live-in transition care places. Three of the respondents felt that live-in patients received more input from the allied health professionals whereas the home clients received more input from allied health assistants. Two participants responded that the amount of therapy was totally dependent on the client goals and needs. Another mentioned that the amount of allied health provided was dependent on where the client lived and the availability of allied health in that area. All of these comments further suggest the variability between programs.

Few transition care programs had a full range of staff that were experienced, stable and salaried. There were wide variations in both experience and stability of staff which may have affected the team's effectiveness. The World Health Organisation Patient Safety Curriculum Guide discusses effective health care teams and 'team instability' is referred to as a barrier (World Health Organisation, 2009) to effectiveness. Mickan and Rodger (2005) found, in a qualitative study with two iterations involving 241 health professional participants, six key characteristics (purpose, goals, leadership, communication, cohesion and mutual respect) differentiated effective from less-effective health care teams. A study of treatment teams that worked or didn't work reported that 68% of the variance of a health team's effectiveness was explained by their cohesiveness (Vinokur-Kaplan, 1995).

2.2.3.5 Geriatrician and rehabilitation consultant involvement

Three of the transition care co-ordinators reported that Geriatricians or Rehabilitation Consultants were accessed by clients as part of slow stream rehabilitation. Two services expected to be able to access a Geriatrician in the near future. All participants highly valued the input that a Geriatrician had, or could have, into slow stream rehabilitation. One mentioned that the geriatrician service, '…. works very well. The bed-based people also get a medical review on an as needs basis'. Those services that did not have Geriatrician involvement in the team were unable to access a Geriatrician in their regional area.

Geriatrician input was seen as important as it added an additional level of expertise and oversight to the program. Research showed that Geriatrician input was valuable when investigated in a skilled nursing facility (Kauh, Polak, Hazelett, Hua, & Allen, 2005). It was found that if medical conditions were treated effectively throughout the program, potentially length of stay may be shortened with benefits economically to the health system as well as to the program recipient (Kauh et al., 2005).

2.2.3.6 Local environment of transition care live-in places

Co-ordinators expressed a wide spread of views regarding the best location to deliver slow stream rehabilitation services. In this study, co-ordinators reported live-in places were found in acute health services, residential aged care facilities and a specific slow stream rehabilitation facility. Sometimes they were co-located with the regional hospital and sometimes they were off-site. Lack of available services meant little choice regarding location at times. When transition care beds were situated in an acute ward it was reportedly felt that it may have been difficult for nurses to fully concentrate on the concept of slow stream rehabilitation due to frequent acute patient admissions and discharges. Patients who are in acute beds working towards functional improvement may tend to take second place to those patients who are medically unstable (Fisher & Zorzitto, 1983). One participant commented, ‘It has been a big learning for the acute hospital staff to understand the difference between acute and transition care’. Rehabilitation patients were sometimes viewed by the clinicians interviewed as different to the regular acute patients requiring a different therapy approach. The slow stream rehabilitation patients required less active input from the acute nurses as they were medically stable but needed ongoing encouragement to dress normally and be as independent as possible. However, when acute nurses did get used to, and accept, the transition care idea they favoured the program as they saw the ‘clients get back to their home environments and communities’. The placing of live-in slow stream rehabilitation beds in an acute hospital environment occurs in the US (swing bed) but there is little available evidence regarding this approach versus a skilled nursing facility (Burke et al., 2017a). The placing of live-in slow stream rehabilitation beds in an acute hospital environment does not appear to be common practice more broadly.

When transition care beds were within residential aged care facilities some clinicians felt that this was preferable as the environment was more homelike. However, a disadvantage was that nursing staff in residential aged care facilities did not always expect people to go home. Sometimes they thought that the recipients would stay permanently and therefore did not always work with allied health slow stream rehabilitation staff to reach the goal of home discharge. This was also reported in the UK for slow stream rehabilitation services (Young, 2009).

The participants with experience of an onsite transition care facility (in a separate building on the hospital site), who had also experienced places provided in residential aged care facilities, reported that a specific building was the best environment for slow stream rehabilitation. One participant commented, ‘The staff are all in favour of having TCP onsite as everyone has the same focus and goal’. However, it was also mentioned that nurse ratios had to be changed and a nurse unit manager added once the facility was on-site which increased program expenses. This meant less money for the other team members which participants felt may have affected the program outcome. Published literature shows that there are beneficial effects of increased rather than decreased nursing care in terms of such patient outcomes as patient health-related quality of life, mortality, readmissions, length of stay and complications (Aiken et al., 2014; Avalere Health LLC, 2015).

2.2.3.7 Transition care as an acute hospital discharge option

Participants said that knowledge of eligibility criteria for admission to slow stream rehabilitation varied within the acute hospital and people planning for discharge and therefore were not consistently applied across all health agencies. This was mentioned as an issue in the international literature (Baillie et al., 2014; Burke et al., 2017b; Nancarrow, 2004). The newer Victorian regional programs emphasised educating staff in the acute hospital to consider transition care as a discharge option. Longer established Victorian programs generally used discharge checklists to be used by discharge planners to assist with referrals. It was mentioned by one coordinator that, as the Australian health workforce remains quite mobile, education about the slow stream rehabilitation program needs to be ongoing to ensure continued knowledge, and appropriate program use. One participant said, ‘Education was not taken into account when the program was set up and it could almost be a full-time position’. This is an important point as, if the acute hospital staff do not have knowledge of the discharge options available, discharge may be delayed (National Audit Office, 2016). However, if further additional funding was provided for an educator position which wasn’t covered by an increase in service funding, there would, as a natural consequence, be less rehabilitation services provided. When single entry point systems existed in the regional Victorian programs, there was reportedly increased clarity regarding appropriate referrals to slow stream rehabilitation.

Discharge systems from hospital to transition care varied in terms of which staff did the discharge planning and attended discharge planning meetings and the exact processes. One of the participants reported, ‘Referral is just a verbal referral from the discharge planning meetings’. Others mentioned detailed form filling. Where possible, local transition care case managers attended discharge meetings and assisted with the formalised referrals. The international literature supports the need for consistent ongoing effort to improve liaison between acute and slow stream rehabilitation staff to ensure appropriate education and training and thus streamlined use of the program (Nancarrow, 2004)

2.2.3.8 Goals and achievements in slow stream rehabilitation

Goals for clients in the Victorian regional programs reportedly were improvement rather than maintenance when made at program admission regardless of their expected discharge destination. One participant commented, ‘They all want to go home and that is their goal’ and another said, ‘There are always goals and most TCP clients improve. We have had some people referred just for high level care and yet they have gone home’. Participants felt strongly that their programs were extremely valuable with the additional time and therapies provided enabling benefits holistically for both patients and their families.

This study of regional Victorian slow stream rehabilitation programs showed that local programs differed in a variety of ways despite being established under the same funding model. Team composition and ratios per client, discharge planning, location of bed-based places, Geriatrician involvement and place occupancy all varied across regional Victoria.

In June 2009 there was an average provision ratio of 1.1 transition care places per 1,000 of the eligible age group (Australian Institute of Health and Welfare, 2011a) across Australia with 14 Transition Care Program service outlets in Victoria. Transition care places were allocated to Victorian regional health agencies and not to Victorian local government jurisdictions, so it was not known exactly what the ratio of places to percentage of people over the age of 70 years was for each of these regional programs. From data published in 2017 (Muller et al., 2017; Productivity Commission, 2017a) the program across Victoria was still evolving with more places yet to be implemented. Program flexibility as found in this study was valued by the participants as it was seen as a way of meeting the needs of individuals and their communities whilst still enabling Government guidelines to be met (Department of Health, 2015b).

2.3 The Transition Care Program at Bendigo Health, Australia

The study in Chapters 4 and 5 took place within the Bendigo Health slow stream rehabilitation program. The Bendigo Health Transition Care Program approach appears to be representative of the general Victorian regional approach to transition care as demonstrated by this scoping study. At the commencement, Bendigo Health had 10 home-based transition care places and 10 bed-based places within the City of Greater Bendigo, Australia. The live-in places were provided in residential aged care facilities within 5kms from the main hospital in Bendigo. The average length of time each person spent in both home-based and live-in transition care together was 51 days. From Bendigo Health TCP data, 70% of live-in patients were discharged to residential care and 30% home. Discharge planning meetings took place regularly on the acute wards of the hospital and the transition care program triage workers attended these meetings. If someone was identified as a potential transition care program recipient during the meeting a referral to transition care would be written and sent and the triage worker would then visit the person on the ward with a folder of information about the program. Often a referral to the aged care assessment team would be sent off at the same time and the two assessments would take place within a day or so of each other. If the person was eligible and agreed to the program the patient would sign a contract and the program would commence post-discharge from acute hospital.

The Bendigo Health slow stream rehabilitation team included physiotherapy, occupational therapy, social work, nursing, dietetics, a geriatrician, allied health support staff and purchased in podiatry, speech pathology and continence advisors as required. Elements of a comprehensive geriatric assessment (Ellis, Whitehead, Robinson, O'Neill, & Langhorne, 2011; Rubenstein, Stuck, & Siu, 1991) were regularly utilised. All team members were experienced, stable and in salaried positions. Each team member assessed and managed the clients individually and patient goals were developed with team and patient input. A weekly case conference took place when individual goals were discussed and management plans were developed and reviewed for each individual patient to be reviewed. All available staff attended to discuss client progress. An approach such as this which includes frequent communication and collaboration between team members has been seen as fundamental to high quality care for geriatric inpatient rehabilitation (Aberga & Ehrenberga, 2017) and intermediate care (National Institute for Health and Care Excellence, 2017). These principles are also incorporated into the National Institute for Health and Care Excellence guidelines for intermediate care (National Institute for Health and Care Excellence, 2017). Bendigo Health had a regular, very experienced allied health team and involved a geriatrician who was accessible when required. The manager of the program was full-time and her sole role was to manage the Bendigo Health transition care program.

Slow stream rehabilitation programs are starting to fill an important place in the health service journey for frail, older people. Major differences between Bendigo Health and other regional Victorian slow stream rehabilitation programs were their full-time manager and stable, permanent staff. Variations also existed for programs across Australia and the world as mentioned in Table 2.1. The aim for this chapter has been to review TCP programs in Victoria and to note similarities and differences in a local, national and international context. The overall aims of all programs are similar. They aim to assist older people with safer and earlier transitions out of hospital and back to their homes. Other similarities include patient eligibility criteria and locations where care is provided. Locally and nationally, funding and funding guidelines are also similar. Differences locally, nationally and internationally between programs include the exact therapies provided, duration and dosage of programs. This provides a basis for the literature review to follow.

The following chapter, Chapter 3, will explore randomised controlled trials that have been carried out within slow stream rehabilitation programs to improve outcomes for frail elderly people.

Chapter 3 Outcomes of additional exercise during slow stream rehabilitation: systematic review and critical evaluation of the literature

3.1 Aim

This chapter examines the literature on randomised controlled clinical trials of slow stream rehabilitation where additional exercise was added to standard therapy programs for frail older adults following hospitalisation. The focus is on critically evaluating the level of evidence for different therapeutic interventions used in slow stream rehabilitation. Also evaluated was the extent to which each approach was associated with significant changes in outcome. The key outcomes of interest were discharge destination, physical function, health-related quality of life and mental health.

3.2 Background

Chapter 2 described how slow stream rehabilitation for frail older people was introduced in Australia and several other parts of the world. It showed that this field is characterised by varying terminology, a range of program components and different outcome measures used to quantify the effects of slow stream rehabilitation. It also highlighted the differences in program content, duration and delivery context. The specific focus of this chapter is to examine patient outcomes for usual care versus slow stream rehabilitation for frail older people. The objective is to understand which therapies and what duration, intensity and frequency produce the best outcomes, particularly in relation to function and discharge destination. Mortality and readmission rates were not included as outcome variable in this review. This is because few publications had large enough sample sizes and length of follow-up to make this analysis worthwhile.

Function and discharge destination after hospitalisation for elderly people are important for healthcare professionals to consider for several reasons. Firstly, an older person moving into care is likely to cost health funding agencies considerably more than if they are living at home (Comans et al., 2016; Department of Health, 2017a). Secondly, most older Australians want to continue living at home (Australian Institute of Health and Welfare, 2015). This is not only because of the home itself, but because they want to be in their community with its familiarity and social networks (Olsberg & Winters, 2005).

Only 4.9% of older Australians live in residential care (Department of Health, 2016). There is a national provision target of Australian Government subsidised operational aged care places. In 2016 for every 1,000 people over the age of 70, the ratio for this target was 113.2. This means that for every 1,000 people >70 years old there were 113.2 subsidised home care and residential care places (Department of Health, 2016). Recognising the increasing number of older Australians and their preference to stay at home, the Government plans to raise this ratio to 125 by 2022 (Department of Health, 2016). They also plan to change the balance of care types within this ratio (Department of Health, 2016). For this planned change, home care packages will increase from 27 to 45 and residential places will reduce from 86 to 78 for every 1,000 people >70 years old (Department of Health, 2016). Home care packages cost considerably less than residential aged care places (Department of Health, 2017a; Kok, Berden, & Sadiraj, 2015). If more frail elderly people are discharged home, costs entailed with additional services may be avoided.

A proportion of older people use an acute hospital bed whilst waiting for long-term care (Forder, 2009; Gaughan et al., 2017; O'Neill & Coughlan, 2001). For example, an Irish study found that more than 8500 days each year were used by elderly patients waiting for permanent care (O'Neill & Coughlan, 2001). A recent UK report about hospital discharge (National Audit Office, 2016) estimated that 2.7 million hospital bed days were used by older adults each year when they no longer required medical care (National Audit Office, 2016). In Australia, the Australian Institute of Health Welfare reported that 11.3 patient days per 1,000 patient days (1.13%) were being taken up by older people waiting for residential care (Australian Institute of Health and Welfare, 2017a).

Waiting in hospital when it is not needed has several consequences (Rojas-Garcia et al., 2018). In the UK, delayed discharge was found to be associated with increased mortality (Green, Dorling, Minton, & Pickett, 2017). In addition, mental health, mobility and the ability to undertake activities of daily living can deteriorate (National Audit Office, 2016; Rojas-Garcia et al., 2018). There is a risk of acquiring infections (Monitor, 2015) such as unspecified clinical sepsis (25.5%) and pneumonia (24.8%) (Cai et al., 2017). There can be a less than optimal throughput of patients through the hospital as well as increased costs to the local health service (Gaughan, Gravelle, & Siciliani, 2015) and funding bodies (National Audit Office, 2016).

Optimal slow stream rehabilitation programs may be able to reduce admission to long-term care and readmission to acute hospital with resultant hospital funding savings (Abrahamsen et al., 2016; Jung et al., 2016; Moen, Ormstad, Wang-Hansen, & Brovold, 2017; Parsons et al., 2012; Zisberg et al., 2015). In addition, low intensity interventions may improve functional abilities and health-related quality of life and increase independence (Abrahamsen et al., 2016; Andersson, Marcusson, & Wressle, 2014; Falvey et al., 2016). Slow stream rehabilitation might improve satisfaction for frail program recipients and their carers, by giving the recipient more time to improve and to make decisions about long-term care (Muller et al., 2017).

The aim of this systematic review is to better understand which factors increase the likelihood of frail older people returning home after an episode of hospitalisation. Of particular interest were factors relating to the content and dosage of slow stream rehabilitation programs and how they were related to variables such as function, health-related quality of life, mental health and discharge destination.

3.3 Method

The systematic review was reported according to the Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) guidelines (Liberati et al., 2009). Randomised controlled trials investigating older adults receiving rehabilitation in a residential facility, outside the acute hospital, after a period of hospitalisation and specifically after inpatient rehabilitation, were identified by searching nine electronic databases. The databases included Allied and Complementary Medicine (AMED), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane, Embase, Medline, PsycINFO, PubMed, Scopus and SPORTDiscus to January 2018. The concepts for the search strategy were age, post hospital, residential rehabilitation, exercise and outcome. These concepts were combined using 'AND'. Free text within each concept was combined with 'OR'. Each database was searched with an individualised search strategy. Further detailed information regarding the search strategy is found in Appendix 3. In addition, reference lists of identified studies were hand searched to find additional potentially useful studies. Limitations to the search were papers published between 1990 and December 2017 and publications in the English language.

3.4 Selection of studies

Selection of studies was based on the criteria in Table 3.1. After running the search, duplicates were then removed. The study titles were checked before the abstracts were reviewed. Both the title and the abstract were checked against the selection criteria. The full text was also compared with the selection criteria. Two reviewers compared their selections agreement with inter-rater review agreement calculated using a weighted Kappa (Landis & Koch, 1977). In addition, a consensus meeting between the reviewers was held to agree upon final study inclusion.

Table 3.1

Study selection criteria

	Inclusion	Exclusion
Population	• Human adults ≥ 65 years • Post hospitalisation • Previously community dwelling • Medically stable • Assessed as requiring further ‘therapy’ to maximise potential and avoid admission to long-term care • Transferred to rehabilitation after hospital • Patients with generalised frailty and orthopaedic conditions • At risk of admission to long-term care	• Healthy adults of any age living in the community • Terminally ill older adults • Medically unstable older adults • Patients with dementia
Location	• Locations where overnight care is available including community hospitals, skilled nursing facilities, residential aged care facilities, specific post-acute facilities	• Acute hospital • Home • Inpatient rehabilitation
Intervention	• Provided by physiotherapists or physical therapists • Exercise • Functional training	
Indicator	• Any measure of physical fitness or functional capacity	• Studies measuring cost, length of stay in hospital, use of other

	Inclusion	Exclusion
	used in elderly healthcare or discharge destination	measures unrelated to physical capacity
Outcome	• Functional measure, • Final destination of residence	
Design	• Randomised controlled trials	• Studies other than randomised controlled trials

3.4.1 Key search terms

The search was limited to the English language, humans and to studies published between January 1990 and December 2017. The key search terms were:

- Elder* OR aged OR geriatric OR elderly OR "older adult" AND
- "Post hospital* OR post-acute OR postacute OR post discharge OR aftercare OR "patient discharge" AND
- "Residential rehabilitation" OR "integrated care" OR "intermediate care" OR "post-acute care" OR "subacute care" OR subacute OR "transition* care" OR "care transitions" OR "care home rehabilitation" OR "slow stream rehabilitation" OR "community hospital" OR "skilled nursing facilit*" AND
- Exercis* OR physiotherapy OR "physical therapy" OR "functional training" OR "functional exercise" OR "functional therapy" AND
- "Randomised controlled trial" OR "randomized controlled trial".

The search terms were expanded and subject definition notes were searched for related fields or topics and MeSH terms. The * symbol was used to allow for the inclusion of all possible alternative endings to the word.

3.4.2 Quality scoring

The PEDro scale was used for the quality evaluation of the studies found for this systematic review (Centre for Evidence-Based Physiotherapy, 1999). The scale has been found to be a valid measure of the methodological quality of clinical trials (de Morton, 2009; Moseley, Herbert, Maher, Sherrington, & Elkins, 2011). There are 11 specified items on the scale (Table 3.2). It was developed to assist users to know whether studies are internally valid with enough statistical information reported to make the findings interpretable (Centre for Evidence-Based Physiotherapy, 1999). The first item on the scale (eligibility criteria specified) is not used to calculate the PEDro score (Centre for Evidence-Based Physiotherapy, 1999) as it is more related to external validity. In addition, for this review, it is likely that item five (blinding of all subjects) was less achievable as it was not possible for the subjects to be blinded as they knew whether they were in the intervention group and were performing exercise or not. Item six (blinding of all therapists who administered the therapy) was also not achievable as therapists knew if they were prescribing exercise therapy to study participants. Items five and six have also been noted in the literature to be difficult to achieve (de Morton, 2009; University of Sydney, 2018b). It has also been found that these items are the least well adhered to in study samples (de Morton, 2009; Herbert, Jamtvedt, Birger Hagen, & Mead, 2011; Moseley et al., 2011; University of Sydney, 2018b).

Doi and Barendregt (2013) suggested that quality scoring needs to be approached with care. Setting too high a quality score may lead to mistaken omission of studies with lower scores but large effect sizes. This may in turn result in a smaller pooled effect size in a meta-analysis. Seven was reported as an achievable score for studies of physiotherapy interventions such as these (Moseley et al., 2011). The average reported study quality score was 5.3 in 2008 by Moseley et al (2011) and 5.1 in 2018 reported by the University of Sydney (2018b). The highest likely score is 8 (Moseley et al., 2011). Papers in this review were scored for quality and no threshold score was set for inclusion. It was recognised that including lower scoring trials may have introduced a bias and this was considered when formulating conclusions (Herbert et al., 2011).

3.4.3 Statistical analysis

Meta-analysis was completed for comparable data for physical function and discharge destination. Revman 5.3 (The Cochrane Collaboration, 2014) was used for the calculations for studies which used similar measures and adequate data for comparison. Reported outcome measures for function were very diverse with different scoring mechanisms. Several measures were reported only in one study. Where measures were used in more than one study, sometimes the data were reported differently. For instance, medians and interquartile ranges of scores at two different assessments versus mean differences and confidence intervals. Some scores were not able to be imputed into Revman for meta-analysis. In these instances, only the raw individual study findings were reported. For the Modified Barthel Index (MBI) (a measure of function) enough data were available for meta-analysis. Herbert (2011) on page 102, noted that when averaged across many studies, analyses of end results or change scores gives the same result. Where change scores for the MBI between baseline and follow-up with standard deviation were given, change data were used. When follow-up scores (end results) with standard deviation were reported, the end scores and standard deviations were used for comparison. The outcome effect measure of random effect was used as suggested by Borenstein et al as the included data has been taken from published studies and the true effect size may vary from study to study (Borenstein, Heges, Higgins, & Rothstein, 2010). Dichotomous data regarding discharge destination was entered into Revman 5.3 (The Cochrane Collaboration, 2014) for outcomes at discharge, 2-4 months, six-months and one year.

3.5 Results

3.5.1 Study selection

The electronic databases search initially yielded 56 studies. Twenty-seven records were sourced from examination of published journal article reference lists and by searching through relevant author's other publications. After the removal of duplicates, there remained 45 studies. The titles for all studies were reviewed by two researchers (CP and HM). There was good agreement between the two reviewers for review of the titles (k = .81). Abstracts for the remaining 26 studies were also reviewed by the raters. There was absolute agreement about which full-texts should be reviewed (k = 1.0). The two assessors then individually reviewed 19 full texts. Following a consensus discussion there was complete agreement about the inclusion of nine studies in the analysis (k = 1.0). The process is summarised in Figure 3.1.

It was considered to be important to find similar rehabilitation intervention locations to the studies in this thesis, to enable comparison of interventions. Therefore, studies that were excluded from this review included:

i. Rehabilitation interventions that commenced in the acute hospital setting and continued at home (Counsell et al., 2000; Saltvedt, Mo, Fayers, Kaasa, & Sletvold, 2002),

ii. Rehabilitation interventions commenced whilst active treatment was ongoing in acute hospital (Shyu et al., 2005),

iii. Inpatient rehabilitation occurring in the acute hospital environment (Cohen et al., 2002),

iv. Elderly patients admitted from home for inpatient rehabilitation intervention (Karppi, 1995). These patients were a different cohort as they had not experienced an acute hospitalisation with potential hospital acquired functional decline and

v. Geriatric evaluation and management interventions (Van Craen et al., 2010). The GEM approach to elderly care involves assessment followed by management of geriatric co-morbidities either after acute care or as a stand-alone service with patients transferred from the emergency department or admitted directly from home (Saltvedt et al., 2002; Van Craen et al., 2010). There may be a rehabilitation element to the care but that is not the primary focus of geriatric evaluation and management (Department of Health, 2013b). Thus, studies explicitly of geriatric evaluation and management where specific rehabilitation components were not an important part of the intervention were not included.

Applegate et al (1990) reported a study which took place in a geriatric assessment unit in a separate rehabilitation facility involving participants who had already spent more than two weeks in hospital for acute medical care. The study by Applegate (1990) was included for review and analysis as this cohort of participants was similar to the other included studies. Garasen et al (2007) reported a study of intermediate care which took place at a community hospital with reported outcomes to six-months. A further study by Garasen et al (2008) followed up these people to one year. Both studies were included to enable the inclusion of the one-year follow-up data in meta-analysis. Young et al (2007) reported a study which included results from five different centres that implemented intermediate care programs. Background information for the Young et al (2007) study has also been published (Green, Young, & Forster, 2006). Additional information regarding the intervention centres was provided in the background paper (Green et al., 2006).

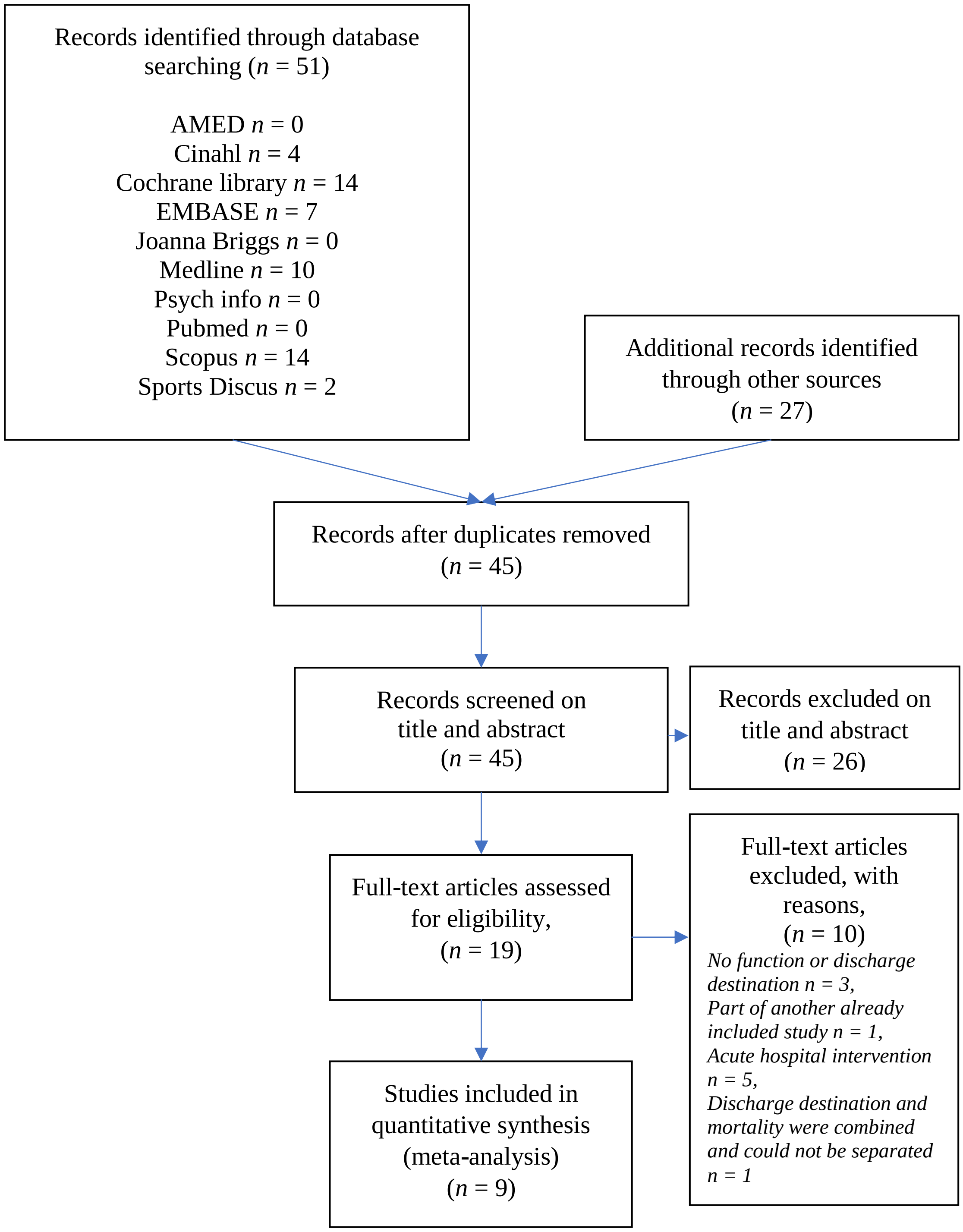

Figure 3.1. Flow chart of literature search and selection process.

3.5.2 Quality scoring

The PEDro scoring criteria were used to assess study quality. The results are shown in Table 3.2. Criterion number one was not included in the total score. As suggested by the PEDro website (University of Sydney, 2018a), where it was clear that each criterion was met, one point was awarded (Table 3.2). If it was not clear that the criterion were met, or if it was not written in the paper, no point was given.

PEDro quality scores ranged from 1-8. Eight studies scored 6-8 points and had good methodological quality. One study scored two points (Salgado et al., 1995). Salgado et al did not randomly select participants. Rather they matched two groups of patients for age, gender, activities of daily living status and diagnosis. This facilitated comparisons between groups (Salgado et al., 1995). There was no mention of assessor blinding in the study by Salgado (1995). Between group statistical comparison was included for discharge destination (Salgado et al., 1995). The attrition rate was >15% (intervention group 27% and usual care group 26%) (Salgado et al., 1995). Several studies reported attrition higher than 15% for criterion 8 regarding follow-up for > 85% participants. As this is a high-risk cohort for readmission with some patients having characteristics similar to hospitalised patients this is to be expected (Burke et al., 2016). All studies were included in the following analysis recognising that not all studies had high PEDro quality scores, may have had some risk of bias and therefore the results may not be generalizable to a broader population of slow stream rehabilitation participants.

Table 3.2

Quality scoring using PEDro criteria

	PEDro criterion										
Study (first author, date)	1	2	3	4	5	6	7	8	9	10	11	Total
Applegate 1990	1	1	1	1	0	0	1	0	1	1	1	7
Chong 2013	1	1	1	1	0	0	1	0	1	1	1	7
Crotty 2005	1	1	1	1	0	0	1	0	1	1	1	7
Fleming 2004	1	1	1	1	0	0	1	0	1	1	1	7
Garasen 2007	1	1	1	1	0	0	1	0	1	1	1	7
Kuisma 2002	1	1	1	1	0	0	1	1	1	1	1	8
Lenze 2012	1	0	0	1	0	0	1	1	1	1	1	6
Salgado 1995	1	0	0	1	0	0	0	0	0	1	0	2
Young 2007	1	1	1	1	0	0	1	0	1	1	1	7

Note. PEDro criteria: 1. Eligibility criteria were specified. 2. Random allocation. 3. Concealed allocation. 4. Baseline similarity between groups. 5. Subject blinding. 6. Therapist blinding. 7. Assessor blinding. 8. Follow-up > 85%. 9. Intention-to-treat analysis. 10. Between-group statistical comparisons. 11. Point measures and measures of variability reported.
Item scoring: 1 = present, 0 = absent. Criterion 1 is not included in the total score.

3.5.3 Features of the study participants

Participant characteristics are summarised in Table 3.3. The average age of participants in the included studies ranged from 75-86 years. In 5 of the studies

(55%) the average age was over 80 years. In all studies except for one (Crotty et al., 2005) there were more females. A predominance of elderly females using health services is normal with the number of older women in Australia being greater than older men (Australian Bureau of Statistics, 2017). There was no report of power analysis or sample size calculations for 2 of the studies reviewed (Lenze et al., 2012; Salgado et al., 1995). Three studies did not recruit the necessary number of participants to satisfy the sample sizes determined from their stated power analyses (Applegate et al., 1990; Fleming et al., 2004; Young et al., 2007). Sample sizes varied from 26 to 490 participants. There were 1,597 participants overall when the results of all the studies were combined (902 intervention group, 695 usual care group).

Five studies mentioned home living circumstances prior to hospital admission with three studies mentioning the percentage of participants who lived alone (Applegate et al., 1990; Fleming et al., 2004; Young et al., 2007). Whether or not a participant lived alone may have been important as support within the home may affect whether or not participants post rehabilitation are able to be discharged home (Everink et al., 2016). The three studies that reported the percentage of participants living alone, showed that more than half of the participants did not have anyone living with them (88.5% by Fleming et al (2004), 53% by Applegate (1990) and 69% by Young et al (2007)). Young and Green et al (2006; 2007) reported data from five sites, all of which showed that over half of the participants lived alone.

Attrition within the included studies was generally high and mostly related to readmission or death of participants rather than withdrawal. Refusal to take part in follow-up by 15% of participants was reported by one study (Chong et al., 2013). No reason for this refusal was given (Chong et al., 2013). Rates of attrition were described at various time-periods after discharge. Attrition rates were reported at assessment time points. The range of attrition rate reporting was from discharge, one week following discharge, 60 days after discharge, three, six, eight to 12 months after discharge. The range of attrition was from 12% at discharge by Lenze et al (2012) to 28% at four months by Crotty et al (2005) and 32% at six months reported by Young et al (2007).

Table 3.3

Characteristics of participants

Study (first author, date, country)	Program descriptor	Mean age (years)	% female	Living alone	Sample size (*n*)	IV and UC size (*n*)	Attrition
Applegate 1990 US	Geriatric assessment	78.8	76.8%	53%	155	78/77	24 (16%) mortality at six months
Chong 2013 Singapore	Subacute rehabilitation	77.9	69%	NA	162	92/70	40 at twelve months (16 died, 24 refused follow up) (25%)
Crotty 2005 Australia	Long-term care facility	83	49%	NA	320	212/108	90 at four months (87 died, 3 withdrew) (28%)
Fleming 2004 UK	Care home rehabilitation	81*	69%	88.5%	165	81/84	32 (19%) by three months, 54 (33%) in total by twelve months
Garasen 2007 Norway	Intermediate care	81	70%	21% lived with partner	142	72/70	39 to readmission at 60 days (27%) and 23 dead at six months (16%)

Study (first author, date, country)	Program descriptor	Mean age (years)	% female	Living alone	Sample size (*n*)	IV and UC size (*n*)	Attrition
Kuisma 2002 Hong Kong	Institutional rehabilitation	75	60%	NA	81	40/41	6 (7%) by discharge, 13 (16%) at four months, 16 (20%) at eight months, 25 (31%) at twelve months
Lenze 2012 US	Postacute rehabilitation	78.4	74%	NA	26	14/12	3 (12%) by discharge because of prolonged hospitalisation
Salgado 1995 Australia	Mobile rehabilitation program	82	NA	NA	56	33/23	15 (27%) mortality by discharge
Young 2007 UK	Postacute care	86	69%	69%	490	280/210	86 at one week after discharge (18%), 125 in total at three months (26%), 157 in total at six months (32%)

Note. NA=not available; IV = intervention group; UC = usual care group.
* = median.

3.5.4 Program location, length, eligibility and diagnoses

Details regarding program location, length of intervention, eligibility criteria and admission diagnosis are in Table 3.4. Program locations included residential care homes, community hospitals, a skilled nursing facility, a transitional care facility and rehabilitation units. Due to the different locations, it was not possible to be completely sure that the included studies were exactly comparable.

Information regarding length of stay and outcome is provided in Table 3.4. All studies provided some information about the length of the facility live-in programs. The length varied from 10.4 days (Garasen et al., 2007) to no discharge as some participants (90% of usual care group) stayed on permanently in the care home where the intervention took place (Salgado et al., 1995). In some instances, the average length of stay was longer for the intervention group (Applegate et al., 1990; Crotty et al., 2005; Fleming et al., 2004; Lenze et al., 2012; Young et al., 2007). For others, usual care length of stay was greater than intervention group (Chong et al., 2013; Garasen et al., 2007; Salgado et al., 1995). Length of stay did not appear to be related to functional or discharge destination improvement (Table 3.4). Applegate et al (1990) reported improvement in discharge destination for the intervention group with longer length of stay (intervention group mean length of stay = 23.6 days, usual care group = 5 days). Fleming et al (2004) and Young et al (2007) reported similar findings for both groups for discharge destination (Fleming et al intervention group mean length of stay = 36 days, usual care group = 26.5 days, Young et al intervention group mean length of stay = 21 days, usual care group = 14 days). Five of the nine programs stated an age criterion for eligibility. Kuisma (2002) reported an eligibility criterion of ≥50 years (2002), and the mean age of admitted participants was 75 years.

In most studies, the participants were included after completing an episode of acute care, were medically stable, were unable to go directly home and live independently and were at risk of long-term institutionalisation. The diagnoses of participants were primarily orthopaedic or medical in nature. Two investigations (Chong et al., 2013; Kuisma, 2002) focussed entirely on participants with a hip fracture. Participants with orthopaedic conditions were also a primary focus area for the work by Applegate et al (1990) (39%), Fleming et al (2004) (18%) and Young et al (2007) (41%). Salgado and colleagues referred to participants in their study as the frail elderly (1995). In some studies, the diagnosis was unknown and described as miscellaneous, non-specific or missing medical conditions (Applegate et al., 1990; Fleming et al., 2004; Garasen et al., 2007; Salgado et al., 1995; Young et al., 2007). Percentages of participants with unknown diagnoses ranged from 10% for Young et al (2007) to 40% for Fleming et al (2004).

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Table 3.4

Details regarding slow stream rehabilitation programs

Study (first author, date, country)	Location of intervention	Mean length of stay in days IV/*UC*	Eligibility criteria	Diagnosis on admission
Applegate 1990 US	10-bed unit separate to Community hospital	23.6/5	≥65 years, At risk of nursing home placement, Potentially reversible functional impairment, Loss of independence in more than ADL, Willingness to participate, Access to a GP for aftercare	Hip fracture 18%, Other orthopaedic 21%, Other surgery 9%, Medical 32%, Musculoskeletal 6%, Psychiatric disorders 5%, Miscellaneous 11%
Chong 2013 Singapore	Community hospital, intervention and control groups on different wards	35 / *48*	Admitted to local hospital, Required rehabilitation after hip fracture, Consented	Hip fracture 100%

Study (first author, date, country)	Location of intervention	Mean length of stay in days IV/*UC*	Eligibility criteria	Diagnosis on admission
Crotty 2005 Australia	Private off-site facility 5-25 kms from study hospitals	46* / *18**	Decision made to go to care, Assessment had taken place, Medically stable, Discharge ready, Long-term care bed not available	Musculo-skeletal 30%
Fleming 2004 UK	Care home	36 days within three months / *26.5 days within three months*	≥65 years, Lived in social services districts serviced by scheme, Wanted to return home, No longer required medical care, Potential to improve, Consented, Met criteria for care	Cardiorespiratory 16%, Gastroenterological 7%, Infection 2%, Neurological 14%, Orthopaedic 18%, Peripheral vascular disease 3%, Non-specific 40%

Study (first author, date, country)	Location of intervention	Mean length of stay in days IV/*UC*	Eligibility criteria	Diagnosis on admission
Garasen 2007 Norway	Teaching nursing home (community hospital)	10.4 / *13.1*	≥ 60 years, Admitted to general hospital due to an acute illness, In need of care ≥ 3-4 times per week, Admitted from home, Expected to return home	Cardiac 31%, Orthopaedic 19%, Infection 17%, Respiratory 8%, Neurological 7%, Cancers 4%, Other/missing 14%,
Kuisma 2002 Hong Kong	Rehabilitation ward	NA / *36.2*	>50 years, Admitted to study hospital, Fractured proximal femur	Hip fracture 100%
Lenze 2012 US	Skilled nursing facility	34.9 / *29*	≥ 60 years old, Admitted for post-acute rehabilitation after medical event, Consented	Cardiopulmonary 54%, Stroke 19%, Hip fracture 12%, Post cervical spine fusion 4%,

Study (first author, date, country)	Location of intervention	Mean length of stay in days IV/*UC*	Eligibility criteria	Diagnosis on admission
				Post colectomy 4%, Post repair of tibial fracture 8%
Salgado 1995 Australia	Nursing homes	36%<1 week, 18%<10 weeks, 10%<30 weeks / *10% < 10 weeks,* *90% not discharged and stayed in nursing home*	Had geriatric assessment, Could not be discharged home, Slight chance of improvement	Frail elderly
Young 2007 UK	Community hospitals	21 / 14	Lived within catchment, Medically stable, Needing post-acute rehabilitation,	Orthopaedic 41%, Respiratory 16%, Poor mobility 15%,

Study (first author, date, country)	Location of intervention	Mean length of stay in days IV/*UC*	Eligibility criteria	Diagnosis on admission
			Consented	Gastroenterology 7%, Cardiac illness 7%, Infection 1%, Other/missing 10%

Note. IQR = interquartile range; NA = not available; GP = general medical practitioner; kms = kilometres.

Team members, aspects of assessment, assessment timelines and intervention details are summarised in Table 3.5. More specific intervention information is in Table 3.6. In most studies reviewed, a multi-disciplinary team provided the rehabilitation intervention (Applegate et al., 1990; Crotty et al., 2005; Fleming et al., 2004; Salgado et al., 1995; Young et al., 2007). Physiotherapy and occupational therapy were the two disciplines specifically mentioned by Chong et al (2013) and Lenze et at (2012). Kuisma (2002) mentioned only physiotherapy input. One study did not report the inclusion of a physiotherapist and the intervention was carried out by nurses and doctors (Garasen et al., 2007).

Elements of a comprehensive geriatric assessment were reportedly to be completed in 49% of studies. Rubenstein et al (1991) defined a comprehensive geriatric assessment as "a multi-dimensional, multi-disciplinary diagnostic and therapeutic process conducted to determine the medical, mental, and functional problems of older people with frailty so that a co-ordinated and integrated plan for treatment and follow-up can be developed" (p. 1). A Cochrane review published in 2016 found that comprehensive geriatric assessment for older people being admitted to hospital is associated with a greater likelihood of living at home and not living in a nursing home one year later (Gardner et al., 2017). Potentially, a full comprehensive geriatric assessment may have improved discharge destinations.

Table 3.5

Team members and information about interventions in included studies

Study (first author, date, country)	Team members involved	Multi-dimensional geriatric assessment	Goal setting	Intervention therapy, duration, intensity, frequency	Control	Assessments
Applegate 1990 US	University faculty and fellow physicians, rehabilitation nurses, physiotherapists, occupational therapists, psychologists, social workers, nutritionists, speech therapy and audiologists	Yes	Yes	Three times daily combination of physiotherapy, occupational therapy or recreational therapy	Usual care provided by physicians	Baseline, six weeks, six months and one year
Chong 2013 Singapore	Physiotherapy, occupational therapy	No	Yes	Medical assessment on admission for falls,	Multidisciplinary team care with 2 x 30-minute sessions/daily Monday	Baseline, DC, six-months and one year

Study (first author, date, country)	Team members involved	Multi-dimensional geriatric assessment	Goal setting	Intervention therapy, duration, intensity, frequency	Control	Assessments
				Early assessment for complications, Combined physiotherapy and occupational therapy assess form with goal setting, 5/52 physiotherapy and occupational therapy guidelines with milestones, Post-operative hip precaution handout	to Friday and medical rounds x 3 weekly	
Crotty 2005 Australia	Transition care nurse coordinator, pharmacist, geriatrician, rehabilitation	Yes	Yes	Assessment by entire team on admission, Weekly case conferences,	Remained in hospital with normal discharge,	Baseline and four months

Study (first author, date, country)	Team members involved	Multi-dimensional geriatric assessment	Goal setting	Intervention therapy, duration, intensity, frequency	Control	Assessments
	medicine physician, physiotherapy social worker, general practitioner			Specialist medical staff visited weekly, Family meetings,	Not routinely assessed by specialists from geriatric team	
Fleming 2004 UK	Occupational therapy, community care officers, rehabilitation assistants, physiotherapy, general practitioner, district nursing	No	NA	Occupational therapists developed treatment plans, Treatment programs were tailored to individuals	Usual health and social care	Baseline, three months and one year
Garasen 2007 Norway	Nurses, doctors	No	NA	Focus to improve ADLs, no other information	Usual care	60 days and six months

Study (first author, date, country)	Team members involved	Multi-dimensional geriatric assessment	Goal setting	Intervention therapy, duration, intensity, frequency	Control	Assessments
Garasen 2008 Norway						
Kuisma 2002 Hong Kong	Physiotherapy	NA	NA	Home care group were study group and had 4.6 physiotherapy home visits, 1.5 community nurse visits	Rehabilitation institution group were control and had daily physiotherapy	DC, four, eight and twelve months
Lenze 2012 US	Occupational therapy, occupational therapy assistant, physical therapy, physical therapy assistant	NA	Yes	Enhanced medical rehabilitation – an approach to increase therapy intensity, Patient active time per session mean 47 minutes and mean 34.9 days of therapy	Standard of care treatment was usual care, Patient active time per session mean 21.5 minutes, Mean 29 days of therapy	Baseline and DC

Study (first author, date, country)	Team members involved	Multi-dimensional geriatric assessment	Goal setting	Intervention therapy, duration, intensity, frequency	Control	Assessments
Salgado 1995 Australia	GP, geriatricians, occupational therapy, nursing, physiotherapy, social work, other therapies if required	Yes	NA	Physiotherapy in the nursing home, visiting consultant geriatrician, occupational therapy, nurse and social worker visited at least once per week, Duration as long as necessary – three participants went home after 30 weeks	DC straight to residential care	Only looked at DC, mortality and duration before DC
Young 2007 UK	Geriatrician or GP led unit, multidisciplinary team	Yes	NA	Multi-disciplinary rehabilitation approach with individualised care plans, involvement of therapies, shared cover between Geriatrician and GPs, social services staff part of team	Usual care - multi-disciplinary team care	One week, three months and six months

Note. IV = intervention group; NA = data not available; UC = usual care.

Some details of the programs for the interventions were provided by the study authors (Table 3.6). These were often brief descriptions. Whether the interventions were delivered in a group or 1:1 programs was not always reported. The duration of sessions was mentioned by only 2 authors ((Chong et al., 2013; Lenze et al., 2012). The frequency of allied health sessions was detailed in 4 studies (Applegate et al., 1990; Chong et al., 2013; Kuisma, 2002; Salgado et al., 1995). There were no details about what the program included or whether the intervention was progressed in the majority of studies. Lenze et al (Lenze et al., 2012) reported that therapy was directed towards increasing intensity by increasing the participant's engagement in each therapy session. This program was described in greater detail by Hildebrand et al (2012). However, Hildebrand et al (2012) and Lenze et al (2012) described in general terms how the treatment was approached rather than the exact therapy content, intensity, duration and dosage.

Programs were tailored to the individual or to meet patient goals (Applegate et al., 1990; Chong et al., 2013; Fleming et al., 2004; Lenze et al., 2012; Young et al., 2007). Garasen et al (2007) reported a focus on activities of daily living and Salgado et al (1995) mentioned that the approach was slow stream rehabilitation. Program duration was described in varying ways from the average length of program (Applegate et al., 1990; Chong et al., 2013; Crotty et al., 2005; Garasen et al., 2007; Kuisma, 2002; Lenze et al., 2012; Young et al., 2007) to the number of days within three months (Fleming et al., 2004) and 0-30 weeks (Salgado et al., 1995). Lenze et al (2012) described that the average length of each session was 47 minutes. Chong et al (2013) reported sessions of 30 minutes.

Table 3.6

Rehabilitation program details

Study (first author, date, country)	1:1 or group session	Allied health discipline involved	Duration of session (minutes)	Frequency of sessions (class or 1:1)	Program inclusion or progression	Average length of program (days)
Applegate 1990 US	NA	Physiotherapy, Occupational therapy or Recreational therapy	NA	3 x daily	According to goals set	DC when goals attained (max 24.6 days)
Chong 2013 Singapore	NA	Physiotherapy, Occupational therapy	30	2 x daily Monday to Friday	According to goals set	35
Crotty 2005 Australia	NA	Allied health staff	NA	NA	NA	46
Fleming 2004 UK	NA	Physiotherapy,	NA	NA	According to individual needs	36 days within 3/12

Study (first author, date, country)	1:1 or group session	Allied health discipline involved	Duration of session (minutes)	Frequency of sessions (class or 1:1)	Program inclusion or progression	Average length of program (days)
		Occupational therapy, Community care officers, Rehabilitation assistants				
Garasen 2007 Norway Garasen 2008 Norway	NA	NA	NA	NA	Focus on ADLs	17.5
Kuisma 2002 Hong Kong	NA	Physiotherapy	NA	Daily	NA	36.2
Lenze 2012 US	1:1	Physiotherapy, Physiotherapy assistant,	47	NA	Enhanced medical rehabilitation approach	34.9

Study (first author, date, country)	1:1 or group session	Allied health discipline involved	Duration of session (minutes)	Frequency of sessions (class or 1:1)	Program inclusion or progression	Average length of program (days)
		Occupational therapy, Occupational therapy assistant			towards achieving patient goals	
Salgado 1995 Australia	NA	Physiotherapy Occupational therapy, Social work	NA	Weekly or need arose	Slow stream rehabilitation	0-30 weeks
Young 2007 UK	NA	Multi-disciplinary team	NA	NA	Individualised care plans	22

Note. DC = discharge; NA = data not available; ADLs = activities of daily living.

3.5.5 Outcomes and outcome measures

Table 3.7 shows the outcomes measured and the measurement tools. It also reports the major findings and identifies any specific methodological issues with the studies. The main outcomes were function, health-related quality of life, mental health, cognition, carer burden, service satisfaction, readmissions, discharge destination and mortality. The measurement tools were wide-ranging (Table 3.7).

3.5.5.1 Functional outcomes

Five of the included studies used the Barthel Index to quantify function (Chong et al., 2013; Crotty et al., 2005; Fleming et al., 2004; Lenze et al., 2012; Young et al., 2007). The Barthel Index was a measure developed in 1965 to evaluate a patient's ability to perform activities of daily living (Mahoney & Barthel, 1965). The original Barthel Index utilised ten items and scores were from 0-20. In 1979, the scale was modified (Granger, Dewis, Peters, Sherwood, & Barrett, 1979). The same ten items were still measured but scores were from 0-100. Three studies used the Modified Barthel Index (Chong et al., 2013; Crotty et al., 2005; Lenze et al., 2012) and two used the Barthel Index (Fleming et al., 2004; Young et al., 2007)). As the Modified Barthel Index cannot be directly compared to the Barthel Index (de Morton, Keating, & Davidson, 2008b), two separate data analyses were prepared using the software program of Revman (The Cochrane Collaboration, 2014).

Table 3.7

Outcome measures, outcomes and issues from included studies

Study (first author, date, country)	Outcomes measures	Nursing home admission	Function and other outcomes	Issues
Applegate 1990 US	ADL scale, CES-D scale, MMSE	6 (8%) of IV group and 17 (24%) of UC group at 6/52 which was significantly better for IV group, 8 (11%) IV and 14 (23%) UC at 6/12	ADL score at 6/12 significantly more improvement than UC, ADL score no significant different at 12/12	When all days in health facilities are considered for both groups, no significant difference, Significantly more IV group at home than UC at 6/52, 6/12 &1 12/12
Chong 2013 Singapore	Readmission, Mortality, Nursing home admission, MBI, MRFS,	6 (6.5%) IV group and 9 (12.9%) UC group nursing home admission '*after discharge'*, No significant difference	MRFS no significant difference, Pre-morbid gait no difference at DC, 6/12 or 12/12, Median LOS significantly less for IV group,	Maybe cross over contamination as in the same hospital although there were separate medical, nursing and rehabilitation teams, Little difference in functional outcomes,

Study (first author, date, country)	Outcomes measures	Nursing home admission	Function and other outcomes	Issues
	Cognitive performance scale, Geriatric Depression Scale 15, Scale to detect frailty and health instability, EQ5D VAS, Carer burden also assessed, PTCOVS		No other significant differences	More of the IV group (23.95%) were NWB at DC than control group (14.3%) but this was not significantly different, Similar functional gain with shorter LOS for IV group
Crotty 2005 Australia	MBI, AQoL, RCS,	104 (49%) of IV group and 62 (59%) of UC group at 4/12	BI no significant difference, AQoL no significant difference,	Participants recruited in second half of study stayed 28 days (median) compared with 58 days (median) for first half.

Study (first author, date, country)	Outcomes measures	Nursing home admission	Function and other outcomes	Issues
	Length of stay		RCS no significant difference, IV group median length of stay of 11 days less in care but took 21 days more to go to residential care than control group, spent 10.5 days less overall in hospital including readmission days, No other significant differences	Transitional unit was suitable and satisfactory for 2 of 3 randomised to receive it, 21% declined, Mortality substantial (87/320)
Fleming 2004 UK	BI, NEADL, GHQ-12, AMTS, Place of residence,	25 (31%) IV group and 25 (30%) UC group in institution (including hospital) at 3 months, 25 (31%) IV group and 21 (25%) UC group in	BI and NEADL no significant difference, GHQ-12 no significant difference, Place of residence no significant difference,	Care home rehabilitation service had low level of rehabilitation staff and true multi-disciplinary team did not exist, More economic analysis required to test if reduced hospital days

Study (first author, date, country)	Outcomes measures	Nursing home admission	Function and other outcomes	Issues
	Hospital bed days, Readmissions	institution including hospital at 12 months, Not significant difference	Hospital bed days decreased by mean 8.5 days, Readmissions decreased but not significantly	and increased care home days is worthwhile
Garasen 2007 Norway	Gerix ADL score, Readmissions, Mortality, Residence at six months	7 (9.7%) IV group and 5 (7.1%) UC group at 6 months, 10 (16.9%) of IV and 7 (14.6%) UC group at 12 months, Not significant difference	ADLs UC better, but not significantly better, If IV group were at home, they were significantly less likely to need home care	Intermediate care at a community hospital appeared to be effective for readmissions and home independence
Kuisma 2002 Hong Kong	Ambulation scores – five categories – community, household, walking	NA	Both groups improved but neither achieved pre-ambulatory status after one year,	The group chosen for home physiotherapy had to be carefully chosen as there needed to be a support person available

Study (first author, date, country)	Outcomes measures	Nursing home admission	Function and other outcomes	Issues
	on flat surface, transfer bed to chair and bed/chair bound		Home care group achieved significantly higher ambulation for community and household	
Lenze 2012 US	MBI, Gait speed – time to walk 6 metres, 6 minutes walking test, Rehabilitation Participation Scale, Working Alliance Inventory	NA	MBI not significant, Gait speed significant improvement IV group, 6 MWT significant improvement IV group, Rehabilitation Participation Scale higher intensity therapy with more engagement in the IV group	Very strict eligibility criteria in terms of cognitive status so recruitment was difficult, DC destination information not available

Study (first author, date, country)	Outcomes measures	Nursing home admission	Function and other outcomes	Issues
Salgado 1995 Australia	DC destination, Mortality rate, Weeks before discharge	21/33 (64%) IV group and 2/23 (9%) UC group discharged home	NA	Patient and carer ambivalence, Conflicts in management because of dual management of doctors, Nursing home staff found it easier to do everything for patients thus encouraging dependency
Young 2007 UK	BI, NEADL scale, Nottingham Health Profile, HADS, Service satisfaction measure, Hospital length of stay,	Discharged to a new place of care or died by discharge – 66/265 or 24.9% of IV group and 66/201 (32.8%) of UC group, Living at home at six months – 143/254 (56.3%) IV group and 101/194 (52.1%) of UC group,	NEADL significantly improvement IV group, HADS significant difference for change score of anxiety score of HADS at one-week post DC with UC group better, Patient satisfaction same for both groups, Similar lengths of stay,	Improved ADLs at 6/12 for IV group with better independence in up to three of the activities and this has been shown to be clinically important

Study (first author, date, country)	Outcomes measures	Nursing home admission	Function and other outcomes	Issues
	DC destination, Mortality, 6/12 residence status	Not significant	Similar discharges to new care home	

Note. ADL = activities of daily living; AMTS = adjusted abbreviated mental test score; AQoL = assessment of quality of life instrument; CES-D = center for epidemiologic studies depression scale; CHESS = changes in health, end-stage disease and signs and symptoms scale; CPS = cognitive performance scale; CRS – caregiver reaction assessment; DC = discharge; NEADL = Nottingham extended activities of daily living scale; DRS = depression rating scale; EuroQol VAS = EuroQol visual analogue scale; GHQ-12 = general health questionnaire; *inter*RAI minimum data set – home care, UK Version 2.03; GP = general medical practitioner; HADS = hospital anxiety and depression scale; IV = intervention group; LOS = length of stay; MCS = mental component score of the SF-36; MRFS = Montebello rehabilitation factor score; NA = data not available; NWB = non-weight bearing; PCS = physical component score of the SF-36; RCS = resident classification scale; UC = usual care group; 6MWT = six-minute walking test; PTCOVS = physiotherapy clinical outcome variables scale; CES-D scale = Center for Epidemiologic Studies depression scale; MMSE = mini-mental state examination.

Chong et al (2013) reported mean difference and standard deviations of the Modified Barthel Index at discharge. Crotty et al (2005) reported baseline and four-month Modified Barthel Index scores with standard deviations in addition to reporting the mean difference between the groups at four months. Four-month end scores and standard deviations for the intervention group and usual care group were used for the meta-analysis. Lenze et al (2012) reported similar data except at discharge. As reported by Herbert (2011), "Averaged across many trials, baseline differences will be zero. So, averaged across many trials, analyses of change scores and analyses of end scores will give the same result. Both give unbiased estimates of the average effect of intervention" (pg 102). End scores with standard deviations were used for Lenze et al (2012) and compared with mean difference and standard deviation as reported by Chong et al (2013). Meta-analysis suggests that there was no difference in Modified Barthel Index scores between the groups at this time (Figure 3.2). There were variations between the assessment periods and outcomes were reported in slightly different ways, but the studies were all assessing similar approaches and thus the meta-analysis has been included here. However, if there had been more clarity regarding the rehabilitation programs and a clear definition of 'physiotherapy', pooling of the results may have yielded more meaningful data.

There were two studies that used the Barthel Index rather than the Modified Barthel Index to quantify functional ability (Fleming et al., 2004; Young et al., 2007). However, Young et al (2007) quoted median scores with interquartile ranges at one week, three months and six-months post-randomisation and Fleming et al (2004) reported mean differences between groups at three-months. As the data were reported differently it was not possible to add findings to a useful meta-analysis in Revman 5.3 (The Cochrane Collaboration, 2014) and these data were not formally compared.

Fleming et al (2004) and Young et al (2007) both used the Nottingham extended activities of daily living scale to measure function. Both studies reported the mean

Study or Subgroup	Intervention group Mean	Intervention group SD	Intervention group Total	Usual care group Mean	Usual care group SD	Usual care group Total	Weight	Mean Difference IV, Random, 95% CI
Chong 2013	22.2	17.5	92	23.9	19.7	70	48.8%	-1.70 [-7.54, 4.14]
Crotty 2005	55.2	25.1	153	56.7	27.2	77	41.6%	-1.50 [-8.76, 5.76]
Lenze 2012	75	24.2	13	54.2	30.6	12	9.6%	20.80 [-0.94, 42.54]
Total (95% CI)			**258**			**159**	**100.0%**	**0.54 [-6.70, 7.78]**

Heterogeneity: Tau² = 19.08; Chi² = 3.91, df = 2 (P = 0.14); I² = 49%
Test for overall effect: Z = 0.15 (P = 0.88)

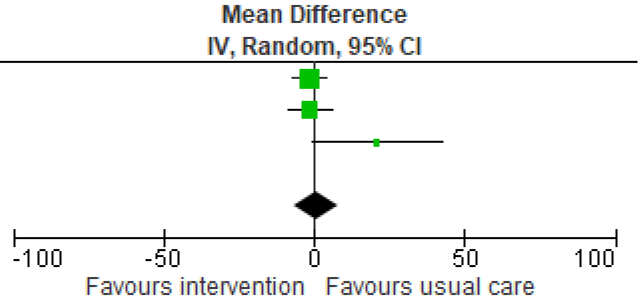

Figure 3.2 Meta-analysis of Modified Barthel Index.

differences between groups rather than mean change within the groups. Meta-analysis was not used to formally compare these data.

Seven included studies (Applegate et al., 1990; Chong et al., 2013; Crotty et al., 2005; Fleming et al., 2004; Kuisma, 2002; Lenze et al., 2012; Young et al., 2007) reported whether there was greater functional improvement in the intervention group than for usual care or whether the two groups were significantly different functionally post-intervention. Three studies found no statistically significant differences in function between the intervention and usual care groups (Chong et al., 2013; Crotty et al., 2005; Fleming et al., 2004). Applegate et al (1990) reported significantly more improvement in basic self-care activities of transferring, dressing and bathing for the intervention group when assessed at six-months. However, these differences were no longer evident at the one-year assessment. Kuisma (2002) found that a group who had physiotherapy home visits improved more than a live-in rehabilitation group for community and household ambulation. Lenze et al (2012) found that an intervention group had significantly more improvement in gait speed and distance walked in the 6-minute walk test than a usual care group. Young et al (2007) reported that the intervention groups from the five centres showed significant improvement on the Nottingham extended activities of daily living scale (NEADL) of 3.27 points in comparison with the usual care group. Young et al (2007) used the scoring of 0-66 for the NEADL rather than the conventional scoring of 0-22 (Harwood & Ebrahim, 2002; Wu, Chuang, Lin, Lee, & Hong, 2011). This meant that participants in the study Young et al (2007) were likely to have increased independence in up to three of the 22 items measured. The change was considered to be clinically significant and important (Cunliffe et al., 2004). Overall, two studies (Lenze et al., 2012; Young et al., 2007) reported functional improvement for the intervention group.

3.5.5.2 Health-related quality of life

Health-related quality of life measures used included the 12-item short survey (Chong et al., 2013), the assessment of quality of life instrument (Crotty et al., 2005) and Nottingham Health Profile (Young et al., 2007). There were no health-related quality of life measures used by more than one study so no meta-analysis to assess for effect size was performed. Chong et al (2013), Young et al (2007) and Crotty et al (2005) reported no statistically significant differences for health-related quality of life between the intervention group and usual care group.

3.5.5.3 Mental health

Mental health measures used were the Center for Epidemiologic Studies Depression Scale (Applegate et al., 1990), the Geriatric Depression Scale (Chong et al., 2013), General Health Questionnaire 12 point version (Fleming et al., 2004) and the Hospital Anxiety and Depression Scale (HADS) (Young et al., 2007). As there were no mental health instruments used by more than one study, no meta-analysis was performed to investigate pooled effect size. Young et al (2007) reported a statistically significant difference for the change scores at one-week post discharge between groups for the anxiety section of the HADS in favour of the usual care group. Applegate et al (1990) and Fleming et al (2004) reported no significant difference between groups for depression. Geriatric Depression Scale scores were not reported post intervention by Chong et al (2013).

3.5.5.4 Discharge destination

As illustrated in Tables 3.8 and 3.9 the timelines for reports of discharge destination varied from discharge to 12 months. Studies were grouped into four categories for meta-analysis (Figures 3.3, 3.4, 3.5 and 3.6) comparing rates of discharge to long-term care. The four groups were:

i. Discharge destination at discharge from live-in facility to six-weeks (Applegate et al., 1990; Salgado et al., 1995),
ii. Two to four-months (Crotty et al., 2005; Fleming et al., 2004; Garasen et al., 2007; Young et al., 2007),
iii. Six-months (Applegate et al., 1990; Garasen et al., 2007; Young et al., 2007) and
iv. One year following discharge (Applegate et al., 1990; Chong et al., 2013; Garasen et al., 2008).

Discharge destination at discharge to six-weeks to long-term care showed a statistically significant improvement in discharges to long-term care for the intervention groups (Figure 3.3). There were no significant findings for the other meta-analyses (Figures 3.4-3.6).

Table 3.8

Reported outcomes in nine included randomised controlled trials

		Reported discharge outcomes				Reported longer term outcomes (discharge to 12 months)				
	Functional outcome measure used	Functional outcome	Nursing home admission	Mortality	Readmission	Functional outcome	Nursing home admission	Mortality	Readmission	Length of follow-up (months)
Applegate 1990 US	ADL score	No	Yes 6/52	No	No	Yes	Yes	Yes	Yes	6 & 12
Chong 2013 Singapore	MRFS MBI	Yes	Yes (NA)	Yes (NA)	Yes	Yes	Yes	Yes (NA)	Yes	3 & 12 readmission, 6 & 12 function
Crotty 2005 Australia	MBI	No	No	No	No	Yes	Yes	Yes	Yes	4
Fleming 2004 UK	BI	No	No	No	No	Yes	Yes	Yes	Yes	3 & 12
Garasen 2007 & 2008	ADL score	No	No	No	No	No	Yes	Yes	Yes	2 & 12

		Reported discharge outcomes				Reported longer term outcomes (discharge to 12 months)				
	Functional outcome measure used	Functional outcome	Nursing home admission	Mortality	Readmission	Functional outcome	Nursing home admission	Mortality	Readmission	Length of follow-up (months)
Norway										
Kuisma 2002 Hong Kong	Ambulation	Yes	No	No	No	Yes	No	No	No	4,8 & 12
Lenze 2012 US	MBI Gait speed 6MWT	Yes	No	No	No	No	No	No	No	Discharge
Salgado 1995 Australia	No	No	Yes	Yes	No	No	No	No	No	Discharge
Young 2007 UK	BI	No	No	No	No	Yes	Yes	Yes	No	3 & 6

Note. ADL = activities of daily living; BI = Barthel index; IV = intervention group; MBI = modified Barthel index MDS-HC = *inter*RAI minimum data set – home care UK version 2.03; MRFS = Montebello rehabilitation factor score; NA = data not available; 6MWT = six-minute walking test.

Table 3.9

Timelines reported for discharge destination

Study (first author, date, country)	DC	1/52	6/52	3/12	4/12	6/12	12/12
Applegate 1990 US			✓ post allocation			✓ post allocation	
Chong 2013 Singapore							✓ Up to 12/12 post DC
Crotty 2005 Australia					✓ post allocation		
Fleming 2004 UK				✓ post allocation			✓ post allocation
Garasen 2007 Norway						✓ post DC	✓ post DC
Kuisma 2002 Hong Kong							

Lenze 2012 US		
Salgado 1995 Australia	✓	
Young 2007 UK	✓ post DC	✓ post allocation

Note. DC = discharge.

Study or Subgroup	Intervention group Events	Intervention group Total	Usual care group Events	Usual care group Total	Weight	Odds Ratio M-H, Random, 95% CI
Salgado 1995	3	33	15	23	44.8%	0.05 [0.01, 0.23]
Applegate 1990	6	78	17	77	55.2%	0.29 [0.11, 0.79]
Total (95% CI)		**111**		**100**	**100.0%**	**0.14 [0.03, 0.72]**
Total events	9		32			

Heterogeneity: Tau² = 1.05; Chi² = 3.58, df = 1 (P = 0.06); I² = 72%
Test for overall effect: Z = 2.34 (P = 0.02)

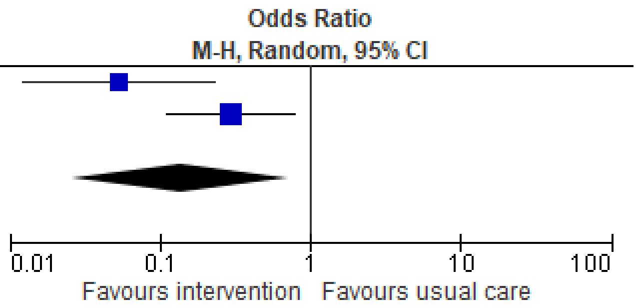

Figure 3.3 Admission to long-term care at discharge to six-weeks.

Study or Subgroup	Intervention group Events	Intervention group Total	Usual care group Events	Usual care group Total	Weight	Odds Ratio M-H, Random, 95% CI
Crotty 2005	104	212	62	105	40.9%	0.67 [0.42, 1.07]
Fleming 2004	25	81	25	84	20.8%	1.05 [0.54, 2.05]
Garasen 2007	3	72	1	70	1.8%	3.00 [0.30, 29.55]
Young 2007	38	265	35	201	36.5%	0.79 [0.48, 1.31]
Total (95% CI)		**630**		**460**	**100.0%**	**0.80 [0.59, 1.09]**
Total events	170		123			

Heterogeneity: Tau² = 0.00; Chi² = 2.50, df = 3 (P = 0.47); I² = 0%
Test for overall effect: Z = 1.42 (P = 0.16)

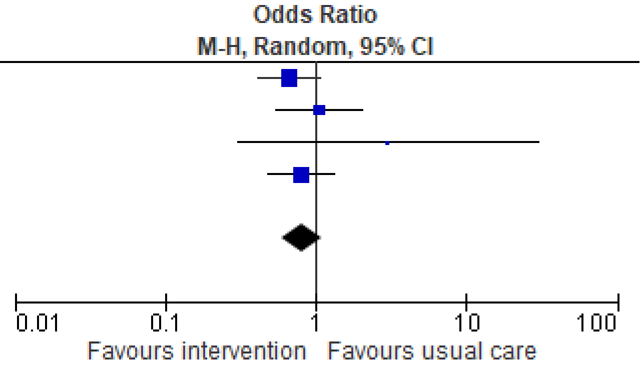

Figure 3.4 Admission to long-term care at 2-4 months.

Study or Subgroup	Intervention group Events	Intervention group Total	Usual care group Events	Usual care group Total	Weight	Odds Ratio M-H, Random, 95% CI
Applegate 1990	8	78	14	77	25.2%	0.51 [0.20, 1.31]
Garasen 2007	7	72	5	70	15.3%	1.40 [0.42, 4.64]
Young 2007	26	254	21	194	59.4%	0.94 [0.51, 1.73]
Total (95% CI)		**404**		**341**	**100.0%**	**0.86 [0.54, 1.37]**
Total events	41		40			

Heterogeneity: Tau² = 0.00; Chi² = 1.88, df = 2 (P = 0.39); I² = 0%
Test for overall effect: Z = 0.64 (P = 0.52)

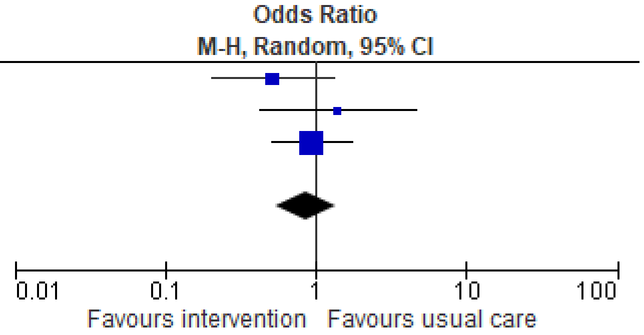

Figure 3.5 Admission to long-term care at six-months.

Study or Subgroup	Intervention group Events	Intervention group Total	Usual care group Events	Usual care group Total	Weight	Odds Ratio M-H, Random, 95% CI
Applegate 1990	7	78	15	77	35.7%	0.41 [0.16, 1.06]
Chong 2013	6	92	9	70	31.2%	0.47 [0.16, 1.40]
Garasen 2008	10	72	7	70	33.1%	1.45 [0.52, 4.06]
Total (95% CI)		**242**		**217**	**100.0%**	**0.65 [0.29, 1.43]**
Total events	23		31			

Heterogeneity: $Tau^2 = 0.22$; $Chi^2 = 3.59$, $df = 2$ ($P = 0.17$); $I^2 = 44\%$

Test for overall effect: $Z = 1.07$ ($P = 0.29$)

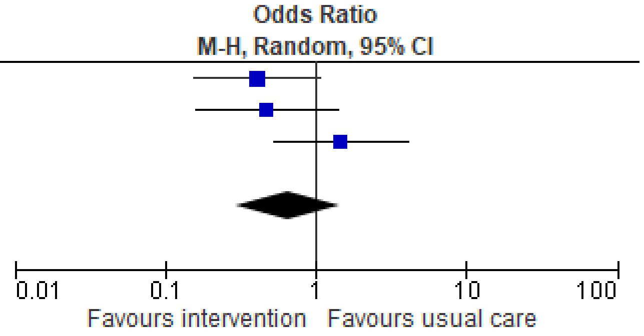

Figure 3.6 Participants admitted to long-term care at twelve-months.

3.6 Discussion

This critical evaluation of the published literature found emerging evidence of functional benefits and reduced nursing home admissions for low intensity, multi-disciplinary live-in slow stream rehabilitation programs. When compared with usual care, the addition of more rehabilitation after the acute care episode enabled some people to achieve a higher level of functional mobility and to return home. Minor functional benefits were found up to six-months post hospital discharge. Different therapeutic interventions, outcomes measures and assessment points, lack of information about dosage and intensity make comparison problematic. Meta-analysis of functional outcomes may have yielded less meaningful data than if there was clarity about the rehabilitation programs. Even where physiotherapy is the stated intervention, the actual treatment may have been different according to the context and country of practice. Less people from intervention groups than usual care were admitted to nursing homes at discharge from slow stream rehabilitation and at six-weeks. Over time the discharge home effect was lessened with no benefit seen at twelve months. This is not unexpected given the age, co-morbidities and frailty of the population involved in these studies.

Slow stream rehabilitation is an area of healthcare with few reviews of published literature. Most of the published studies on post-hospital rehabilitation were accounts of service development, program evaluations and observational studies rather than rigorous randomised controlled trials. Bachman et al reviewed geriatric inpatient rehabilitation (2010). The Bachmann et al review (2010) found that there was some evidence that geriatric inpatient rehabilitation may improve outcomes but that there needed to be more investigation in this area. Everink et al (2016) systematically analysed factors affecting home discharge after inpatient rehabilitation. Everink et al (2016) suggested that factors such as age, marital status, presence of depression, cognitive and functional status should be assessed at admission as these factors are relevant to discharge destination. Everink et al (2016) recommended that additional work was required to gather further evidence. Davis et al (2016) reviewed studies of interventions provided at the interface between health and aged care in Australia. Although most studies were looking at system outcomes (avoiding hospital admission) findings were that there were some positive outcomes especially when such interventions were provided in the home (Davis et al., 2016). There was an identified need for additional quality evidence (Davis et al., 2016).

The focus for the current review was on slow stream rehabilitation programs rather than inpatient programs for elderly people who had completed their hospital stay. Ward et al (2008) published a Cochrane review comparing different locations for geriatric rehabilitation outcomes. It aimed to compare care homes, hospital and home. However, after searching for relevant studies, none were found. No other systematic reviews were found of low intensity post hospitalisation geriatric rehabilitation programs.

The studies included in this review primarily compared one location for the rehabilitation program for the intervention group with a different location for the usual care group. These different locations may have confounded the results by introducing other variables into the mix (e.g. different staff attitudes depending on type of facility). When there is structural equivalence for participants in a study, the outcome can be attributed to the intervention rather than another variable (Kabisch, Ruckes, Seibert-Grafe, & Blettner, 2011). Studies included in this review compared groups of participants in general hospitals with community hospitals (Garasen et al., 2007; Young et al., 2007) or in a general hospital and a transitional care facility (Crotty et al., 2005). Others compared participants in a rehabilitation facility with those in a home environment (Applegate et al., 1990; Kuisma, 2002). In a further study the outcomes from participants in a care home were compared with those in a 'usual care' environment which was not described (Fleming et al., 2004) and it is not clear whether the settings were similar. When locations were different for intervention and usual care groups this may have affected the outcomes. Staff in a hospital environment often anticipate that most inpatients are discharged home (Kus, M, Strobl, & Grill, 2011). In contrast, staff in long-term care facilities may expect dependence rather than encourage independence (den Ouden et al., 2017; Salgado et al., 1995). It is therefore preferable for both intervention and usual care groups to be in similar locations.

A further challenge in this literature review was the varying terminology used. Terms such as subacute (Chong et al., 2013), post-acute (Lenze et al., 2012), intermediate care (Young et al., 2007) and slow stream rehabilitation (Salgado et al., 1995) do not always mean the same thing to different people or across international borders. This difficulty with terminology has also been recognised as a disadvantage for rehabilitation approaches across the world (World Health Organisation & World Bank 2011).

3.7 Limitations

Although the literature search for this study was extensive, comparatively few relevant studies were found. Publication bias may also have been an issue. A small number of investigations might have been missed due to the exclusion of studies not in English. The main outcomes of interest for this study were function and discharge destination. Due to the use of diverse functional measurement tools, meta-analysis could usefully analyse data from only a modest number of investigations. There were a few studies that provided data on the outcomes of re-admission to hospital and mortality. However, low participant numbers in these studies limited their generalisability. Power analysis was not completed in all studies so that it was not possible to be sure that the sample size was large enough to yield meaningful results beyond the effects of chance. In some studies that reported power analysis, adequate recruitment did not take place and there was an increased risk of a Type II error due to low participant numbers. There was a small risk of bias noted from the inclusion of one study (Salgado et al., 1995) with a lower quality score than others. In the small number of studies included in this review, therapeutic interventions were not detailed enough to replicate.

3.8 Conclusion

This systematic review of the literature showed that some interventions post-hospitalisation for frail older people have the potential to decrease long-term care admissions and increase independence at home. Detailed information regarding the most effective intervention components enabling replication was generally not available in published literature. The level of evidence for this body of work was generally low. Overall, this area of low intensity, slow stream rehabilitation has not been sufficiently researched with adequate methodological rigour. Identified research gaps include the need for additional good quality randomised controlled trials with exact intervention details including which therapy discipline as well as the duration, intensity and frequency of therapy activities. Studies with intervention and usual care groups in the same location also need to be conducted, to determine program outcomes.

In Chapter 2 it was noted that published literature has demonstrated that an increase of therapy in slow stream rehabilitation was associated with improved functional mobility (Chen, Heinemann, Granger, & Linn, 2002), reduced length of stay (Jette et al., 2005) and an increase in home discharge (Jung et al., 2016). Chapter 4 provides details of a study that aims to address the needs shown by this systematic review. The study will also increase therapy time with the aim of improving outcomes.

Chapter 4 Method

4.1 Introduction

This chapter provides the method for a randomised controlled trial (RCT) that aimed to assess the effect of providing additional functional training, compared to standard care, on the outcomes of patients admitted to the bed-based arm of the Transition Care Program at Bendigo Health. The primary objective was to assess the effect of the additional functional training on discharge destination. Human research ethics approval was obtained before commencement from both Bendigo Health Human Research Ethics Committee (002/2009) and the Health Sciences Human Research Ethics Committee at La Trobe University, Australia (FHEC09/99). The trial was registered with the Australian New Zealand Clinical Trials Registry with trial number ACTRN12609000242224. Reporting of the study complies with the CONSORT 2010 checklist (Consort, 2010).

4.2 Study design

A single blind parallel group RCT was used to compare the outcomes of clients on a Transition Care Program having usual care (Standard TCP) with the outcomes of the intervention group of Transition Care Program clients having usual care plus additional functional training (Functional Incidental Training – FIT group). A double-blind design could not be used because the participants needed to know which therapy group were allocated to. They knew whether they were doing additional exercise as they had the program details on the walls in their rooms. Details of their exercise program were in the training notebook in their room. In addition, each week the participants also had additional therapy time with two extra visits from the research assistant. The treating physiotherapists were not blinded as they saw the program details in the FIT group participant's rooms. The assessor remained blinded until after the final assessment.

The additional functional training was extra, partially supervised, functional exercise sessions, delivered by an allied health assistant, who was supervised by a registered physiotherapist (see section 4.4.2 for more details). Each training program for people in the intervention group was individualised according to the needs of the participant. The functional training intervention comprised of additional walking and repetitions of sitting to standing exercise. The full details are provided in section 4.6. It was given in addition to other therapies and normal ambulatory activities in residential care.

4.2.1 Eligibility criteria

The eligibility criteria for participants in this RCT were:

i. Assessment for, and acceptance of, a bed-based Transition Care Program place at Bendigo Health, Australia,
ii. Residence in the Bendigo area of central Victoria, Australia, and

iii. Willingness to participate in the study and being willing and able to sign the consent form.

To be eligible for the Transition Care Program people also needed to:

i. Have just completed an acute or sub-acute episode in hospital,
ii. Be medically stable,
iii. Be able to benefit from an additional period of low level intensity therapy, as advised by the Bendigo Health doctors, nurses or physiotherapists
iv. Require time to consider their long-term care opportunities, and
v. Be assessed by the aged care assessment team as requiring overnight assistance provided in residential care.

The aged care guideline for assessment was that people were over the age of 65 years or over the age of 50 years for Indigenous Australians (Commonwealth of Australia, 2014). People from Aboriginal and Torres Strait Islander communities have been assessed by the Australian Government as having special needs in this context (Department of Health, 2015a). Some indigenous people experience high rates of chronic diseases starting early in life, with resultant increased needs for care (Australian Institute of Health and Welfare, 2017e).

4.2.2 Sample size calculations

At the time of the sample size calculations for the design of this trial, the transition care program manager advised that the split between home and residential care discharges for the preceding year for live-in recipients was 70% residential care and

30% home. A statistician calculated the required sample size using a 2-sample Pearson's Chi-square test (Appendix 5). The aim of the study was to increase the proportion of participants discharged home to 60% with an alpha of 0.05 and power of 0.8. Attrition was expected to be 10%. The required sample size was 48 participants in each group.

4.2.3 Recruitment

Recruitment took place over an 18-month period from August 2009 to November 2010. Referrals for people thought to gain from the Transition Care Program were sent from the acute or subacute hospital staff to the intake workers who then assessed their eligibility. These were referrals for both live-in or home-based transitional care. A recruitment pamphlet to promote the research project was developed by the research team (Appendix 9). A supply of the pamphlets was given to the program intake workers for the Bendigo Health Transition Care Program by the researcher and were replaced as necessary. At the start of this project, there was one intake worker who assessed clients to identify whether they were appropriate for transition care. During the 24-month duration of the project, transition care staffing changed so that three workers were appointed to this position over the duration of the project. With each staffing change, the researcher met the new intake worker to provide written (Appendix 11) and verbal information about the project and to encourage their participation with handing out recruitment pamphlets. The most experienced registered physiotherapist working on the Transition Care Program trained the research assistants and ensured that they were competent.

The intake workers gave all potential project participants accepted on to Bendigo Health's bed-based Transition Care Program information about the project verbally and via the recruitment pamphlet (Appendix 9). If the candidate was interested to know more about participation in the study, the intake worker contacted the researcher and, with permission, provided the person's details to the researcher.

The researcher then visited the potential participant. These meetings took place either in the acute or sub-acute hospital before the person was transferred to the bed-based location and started their Transition Care Program. Otherwise they took place in the residential aged care facility where their Transition Care Program would occur after transfer. The time and location of the initial meeting between researcher and potential participant was dependent on how quickly the referral was sent, how quickly the transfer took place and how quickly a meeting could be organised. On average meetings between the researcher and potential participant took place within two days of the referral being received.

During the initial meeting, the project was explained to the potential participant in detail by the researcher. If they were in favour of participating, then a 'Participant Information and Consent Form' (PICF) (Appendix 6) was provided and explained to them. All questions were answered and discussed before the consent form was signed. If the person did not have adequate cognitive abilities to comprehend information about the project and to sign a consent form, the person's relatives were contacted and asked whether they would like their family member to participate. The family member had the authority to sign the PICF if the client had mild cognitive impairment, yet still indicated their willingness to participate. Some bed-based Transition Care Program clients made their decision about participating in the study immediately and independently following initial explanation by the researcher and signed the consent form. Others asked to keep the PICF to read and consider before deciding. A small number of people kept the form because they wished to discuss the project with their families prior to making a commitment. In two instances the researcher had contact with the family before the consent was signed. Following the signing of the consent form, the researcher contacted the treating TCP physiotherapists to advise them that the new participant had signed the consent form. The researcher then completed the Geriatric Depression Scale 15 (GDS15) (Section 4.3.3.4) and the Euro-Qol EQ5D-3L (Section 4.3.3.5) after the participant had signed the consent form. Group allocation was concealed from the researcher completing the assessments until all final assessments were completed.

4.2.4 Randomisation of participants to group

Randomisation was performed by an independent researcher from a different University not otherwise involved in the study. Each participant had an equal chance of being assigned to either the experimental or control group. An assigner (HM) set up 60 opaque envelopes with a piece of paper inside each one on which was written '0' or '1'. The '0' allocated the person to the usual care group and the '1' assigned them to the intervention group. A coin toss was used to designate the ordering of the envelopes. The envelopes were provided to the physiotherapists providing the standard Transition Care Program physiotherapy by the assigner (Appendix 14). This simple randomisation process ensured the random and concealed assignment of participants to treatment groups (Yunzhi, Ming, & Zheng, 2015).

After consent was provided, a TCP physiotherapist visited to perform the first assessment including the research functional outcome measures which were: the Berg Balance Scale (BBS) (Section 4.3.3.1 1), de Morton Mobility Index (DEMMI) (Section 4.3.3.2) and five times sit to stand test (FTSTS) (Section 4.3.3.3). After the completion of this first assessment, the next consecutively numbered envelope was allocated to the participant by their TCP physiotherapist. The TCP physiotherapist then contacted the assigner by email to advise which group the new participant was in. The TCP physiotherapist completing the research functional measures was not aware of group allocation at the time of assessment.

4.3 Outcomes and outcome measures

4.3.1 Primary outcome

The primary outcome of interest was discharge destination for people leaving bed-based Transition Care Program places. The discharge destination was where the person went to live at the cessation of transition care. It was either home or a residential aged care facility. This was the primary outcome of interest as people generally want to return home after hospitalisation and be independent (Szanton et al., 2014). Some argue that moving into residential care has deleterious effects for patients, their families and the broader community (Cesetti et al., 2017; Chappell et al., 2004; Jerez-Roig et al., 2017; Kojima, 2015; Theou et al., 2017). Moving into residential care may be stressful, signify loss of autonomy and sense of identity (Brownie et al., 2014) and lead to feelings of abandonment (Salgado et al., 1995). The decision about staying at home or relocating is complex with many factors to be considered including the person's wishes and recommendations of health service personnel (Roy, Dube, Despre, Freitas, & Legare, 2017). The health and wellbeing of the person at the centre of the decision is paramount in the decision regarding location of residence and there are still gaps in this area of research (Boland et al., 2017; Roy et al., 2017).

4.3.2 Secondary outcomes

The secondary outcomes were functional status, health-related quality of life and depression. The term 'functional status' in this context refers to motor skills necessary for such movements as rising from, and descending to, a chair (thereby having the ability to move to and from the bed, chair and toilet), walking fast and being able to change direction whilst walking (Lusardi, Pellecchia, & Schulman, 2003).

These variables were chosen because they have been shown to deteriorate or be less than ideal for older people in institutional care (Australian Institute of Health and Welfare, 2017b; Quehenberger, Cichocki, & Krajic, 2014; Yoon et al., 2016). It may be possible, with intensified rehabilitation, to improve one or more of these variables (Lee et al., 2012a; Quehenberger et al., 2014).

An additional secondary outcome of interest was the relationship between an older person's expected discharge destination and actual discharge destination following slow stream rehabilitation. This was an outcome of interest as globally there is a shift towards person-centred care, which arguably has the potential to improve health outcomes (World Health Organisation, 2016). In the past, older people may not have been actively involved in decision making regarding discharge destination at this transitional time (Dyrstad, Laugaland, & Storm, 2015; Dyrstad, Testad, Aase, & Storm, 2015). It was predicted that a strong positive relationship would exist between participant expectations and the actual discharge destination (Halawi et al., 2015).

4.3.3 Outcome measures

The outcome measures used to assess functional mobility were the Berg Balance Scale which evaluates balance (Berg, Wood-Dauphinee, Williams, & Gayton, 1989), the de Morton Mobility Index (de Morton, Davidson, & Keating, 2008a) to quantify mobility and the five times sit to stand test to measure lower extremity performance (Pedersen et al., 2015). The Geriatric Depression Scale 15 was used to screen for depression (Yesavage et al., 1983). The instrument used to measure health-related quality of life was the EuroQol EQ5D-3L (EuroQol Research Foundation, 2015). Frailty was measured using the Study of Osteoporotic Fractures Index (Ensrud et al., 2009; Ensrud et al., 2008). These outcome measures were assessed at admission to TCP, at discharge and at six-months after admission to the TCPprogram.

4.3.3.1 Berg Balance Scale

4.3.3.1.1 Scale description

The BBS is a 14-item scale that measures the postural control and stability of an older adult (Berg et al., 1989; Lusardi et al., 2003). Each question has a five-point ordinal scale ranging from 0-4. The lowest score represents the lowest level of function (unable/unsafe) and 4 represents the highest level of function (independent/safe). The score achievable is 0-56, by summing the 14 scores. The measure is freely available (Prost, 2018). The requirements of the test are a ruler, one standard chair with arms, a step and a stopwatch. The typical length of time that it takes to complete the test is 15-20 minutes. It is an easily administered physical performance test with no training required for the administrator (Hayes & Johnson, 2003).

4.3.3.1.2 Internal consistency of the BBS

The BBS had a high degree of internal consistency with a Cronbach's alpha of 0.95 when tested with 33 nursing home patients who had a mild to moderate degree of dementia (Telenius, Engedal, & Bergland, 2015b). When internal consistency of the BBS was tested with 12 community dwelling older volunteers (mean age 76 years) in Brazil, a Cronbach's alpha of 0.996 was reported (De Figueiredo, De Lima, Maciel, &

Guerra, 2009). No relevant recent studies with a similar cohort from Australia were identified.

4.3.3.1.3 Reliability of the BBS

Assessor training for using the BBS is not essential (De Figueiredo et al., 2009). De Figueiredo et al (2009) reported a study involving 18 examiners who had not previously used the BBS. Ten were recently qualified physiotherapists and 8 were physiotherapists with more than five years of clinical experience. In that investigation, 216 BBS examinations were undertaken by these examiners on 12 community dwelling older volunteers. The BBS scores from the physiotherapists were compared and an inter-rater reliability intra-class correlation coefficient (*ICC*) of 0.98 was found.

Inter-rater and intra-rater reliability of the BBS were also reported in a systematic review by Downs et al (2013). There were 668 participants from 11 studies involved in the review. Participant groups included older recipients of physiotherapy rehabilitation, older residents in residential aged care facilities and people with Multiple Sclerosis, Parkinson's disease, stroke and Spinal Cord Injuries. Meta-analysis of three studies including 101 patients resulted in a pooled estimate of the intra-rater reliability of 0.98, 95% CI [0.97, 0.99]. Five studies with 345 patients were pooled to establish an overall inter-rater reliability level, which was reported to be 0.97, 95% CI [0.96, 0.98].

4.3.3.1.4 Validity and interpretation of the BBS

There is a strong body of literature supporting the validity of the BBS. A cut-off score of 45 out of 56 was suggested as supporting independent safe ambulation by one study (Berg, Wood-Dauphinee, & Williams, 1992). If this score was not achieved, then the study recommended that prescription of a gait aid should be considered (Berg et al., 1992). A recent study (Eng & Louie, 2018) found that balance scores on admission to inpatient stroke rehabilitation significantly predicted community ambulation ability at discharge. This study had a cohort of 123 people with a mean age of 67 years. It found that an admission cut-off score of 29 predicted the regaining of community walking speed following 6-7 weeks of rehabilitation, sensitivity 0.86, specificity 0.84, area under the curve (AUC) 0.88, 95% CI [0.81, 0.95]. Stevenson et al (2010) investigated cut-off scores for the ability to walk unaided. This study had a cohort of 246 people with a mean age of 81 years. Approximately 50% were community dwelling and the participants had just completed a rehabilitation intervention. The cut-off BBS score for walking unaided was 49, sensitivity 63%, specificity 86%, agreement 75%, AUC 0.8, 95% CI [0.74, 0.87].

A further trial (Joa et al., 2015) explored using the Korean BBS and investigated cut-off scores dividing household walkers from community walkers. For a group of 124 patients with stroke, at least four weeks after hospital discharge. A cut-off score of 42 divided the two groups with a sensitivity of 92%, specificity of 89%, kappa value of

0.82 and the area under the receiver operator characteristic curve was 0.9, 95% CI [0.84, 0.96] (Joa et al., 2015).

Minimal detectable change, which is an expression of absolute reliability, was calculated for people following stroke using the BBS, (Liston & Brouwer, 1996; Stevenson, 2001). It has also been determined for people with Parkinson's disease (Steffen & Seney, 2008), Multiple Sclerosis (Learmonth, Paul, McFadyen, Mattison, & Miller, 2012; Winser et al., 2017), people of advanced age (Donoghue & Stokes, 2009) and for institutionalised older adults (Conradsson et al., 2007). For older people receiving physiotherapy rehabilitation the minimal detectable change, to be 95% confident that true change has occurred rather than measurement error, was shown to be dependent on their initial test score (Donoghue & Stokes, 2009). Where the patients score between 45-56 a change of 4 points needs to occur, where they initially score 35-44 a change of 5 points needs to be found, where they score between 25-34 the change needs to be 7 points and if the initial score is between 0-24 then the change needs to be 5 points (Donoghue & Stokes, 2009). This was the MDC that was used for the current study. A separate systematic review by Downs (2015) suggested that, for people with a BBS score over 20, an improvement of between three and seven points is clinically relevant. This was consistent with the report of Donoghue and Stokes (2009).

4.3.3.2 De Morton Mobility Index

4.3.3.2.1 Scale description

The DEMMI was developed by de Morton (2008a) to quantify mobility status in hospitalised elderly people. Further investigation has confirmed that it can accurately test and monitor slow stream rehabilitation patient mobility (de Morton et al., 2011a). The Modified Barthel Index, which is often used for measuring patient changes during slow stream rehabilitation, is less responsive than the DEMMI (de Morton et al., 2011a). The DEMMI does not show ceiling or floor effects when tested with a cohort of hospitalised participants undergoing geriatric evaluation and management (de Morton & Lane, 2010) or a cohort of hospitalised participants undergoing rehabilitation (New, Scroggie, & Williams, 2016). The measure is freely available.

The DEMMI is composed of 15 items that measure the full spectrum of mobility from bed mobility at the lowest level to jumping at the highest level. Three tasks involve bed mobility, three are chair-based tasks, four are static balance tests, two are walking and three are dynamic balance items. There are 11 items that are dichotomous (0 or 1) and four items that have three response choices (0, 1 or 2). Lower scores equate with unable, limited or needing assistance with the activity, whereas higher scores equate with better mobility. The total possible raw score ranges from 0-19. A conversion table enables conversion to an interval level DEMMI score of 0-100 (de Morton et al., 2015). The equipment required to administer the test is a bed or plinth, a standard chair with arms, a pen and a stopwatch. The test has been reported to take less than nine minutes to administer when using it with older adults in the acute hospital (de Morton, Davidson, & Keating, 2011b).

4.3.3.2.2 Internal consistency of the DEMMI

The internal consistency of the DEMMI was confirmed using Rasch analysis with 112 older patients on acute medical wards (de Morton et al., 2008a). Data from the model were assessed at baseline ($\chi^2 = 24.6$, $df = 30$, $p = 0.74$), at 48 hours ($\chi^2 = 36.37$, $df = 30$, $p = 0.20$) and subsequent 48 hours ($\chi^2 = 36.26$, $df = 28$, $p = 0.14$) to ensure that the DEMMI was internally consistent. Internal consistency was also investigated by Sommers et al (2015) for previously acutely ill patients ($n = 115$) who were discharged from an intensive care unit to the ward. A Cronbach's alpha of 0.98, 95% CI [0.97, 0.98] was reported. Internal consistency was also measured by New et al (2016) with a group of participants ($n = 365$, mean age 59 years) receiving rehabilitation and the Cronbach's alpha was 0.904, 95% CI [0.89, 0.92].

4.3.3.2.3 Reliability of the DEMMI

In a trial by de Morton (2011a), physiotherapist and allied health assistant administration of the DEMMI was compared. The level of training completed by the allied health assistants in the study by de Morton (2011a) was not specified. The study involved 11 health services and 696 older patients admitted for transition care with both physiotherapists and allied health assistants involved in assessing. At admission 1% of assessments were carried out by allied health assistants. At discharge 17% of assessments were completed by allied health assistants. De Morton et al (2011a) found that it made no difference whether a physiotherapist or an allied health assistant administered the measure.

In another study Braun et al (2015) compared DEMMI scores from two physiotherapists. Two physiotherapists, with 5 and 7 years' experience respectively and some familiarity with using the DEMMI, compared results of assessments. Thirty-three geriatric inpatients (mean age 79.5 years) receiving rehabilitation were assessed twice. Inter-rater reliability between the physiotherapists was calculated and the correlation between assessors was high (*ICC* = 0.94, 95% CI [0.88, 0.97]) (Braun et al., 2015).

4.3.3.2.4 Validity and interpretation of the DEMMI

A DEMMI score of approximately 60 has been found to be consistent with an ability to live in the community with assistance (de Morton et al., 2011c). Minimal detectable change for a geriatric evaluation and management population was investigated by de Morton and Lane (2010) and was found to be 10.5 points with 90% confidence. This was the MDC used for the current study. Mean scores for patients in low and high level residential care have been published by de Morton et al (2011a) and were 59 and 33 respectively.

4.3.3.3 Five times sit to stand

4.3.3.3.1 Scale description

The FTSTS measures dynamic balance and functional mobility (Goldberg, 2012; Goldberg, Chavis, Watkins, & Wilson, 2012). The FTSTS might also assist with measuring falls risk (Buatois, 2008), frailty (Batista et al., 2012), balance (Whitney et al., 2005), functional mobility (Goldberg et al., 2012; Zhang et al., 2013) and as a tool to exclude moderate cognitive impairment in primary care (Annweiler et al., 2011). It has also been used as part of a battery of physical performance measures in community living older people contributing to the prediction of disability (Guralnik, Ferrucci, Simonsick, Salive, & Wallace, 1995).

The FTSTS measures the time it takes for a person to move from sitting to stand five times from a standard chair. The height of the chair which the participant stands from varies from 40 to 48.3 cm high in reported studies (Csuka & McCarty, 1985; Duncan, Leddy, & Earhart, 2011; Guralnik et al., 1995; Lord, Murray, Chapman, Munro, & Tiedemann, 2002; Mong, Teo, & Ng, 2010; Ng, 2010; Schaubert & Bohannon, 2005; Wallmann, Evans, Day, & Neelly, 2013; Whitney et al., 2005). The influence of the height of the chair as well as arm position has been studied more recently by Ng et al (2015). The finding was that lower chair height increased the FTSTS time. The equipment required for the FTSTS is only a stopwatch or clock with a second hand and the required height chair. The FTSTS is quick to administer as it only requires the time to give instructions to the participant and to time sitting to standing five times.

Protocols for the FTSTS also vary as some researchers complete timing when the person has sat down (Annweiler et al., 2011; Duncan et al., 2011; Goldberg et al., 2012; Makizako et al., 2017; Puthoff & Saskowski, 2013; Schaubert & Bohannon, 2005; Wallmann et al., 2013; Whitney et al., 2005). Others continue timing until the person has their back on the seat backrest (Mong et al., 2010; Teo, Mong, & Shamay, 2013) and some complete the test when the person is standing at the fifth stand (Bohannon, Shove, Barreca, Masters, & Sigouin, 2007; Guralnik et al., 1994). Some do not specify the end of the test (Buatois, 2008; Csuka & McCarty, 1985; Goldberg, 2012; Guralnik et al., 1995; Lord et al., 2002).

The test is sometimes completed only once (Buatois, 2008; Schaubert & Bohannon, 2005; Wallmann et al., 2013; Whitney et al., 2005). Often it is demonstrated for the participant before they are tested (Duncan et al., 2011; Shubert, Schrodt, Mercer, Busby-Whitehead, & Giuliani, 2006). Some recommend repeating it three times with the best time included (Bohannon et al., 2007; Mong et al., 2010; Zhang et al., 2013) or with the mean of two tests (Goldberg, 2012; Puthoff & Saskowski, 2013). For this study the FTSTS was repeated only once due to patient low capacity.

In the current study a standard chair (45cms) was used, the test was completed once, the timing stopped when the person sat on the chair after the fifth repetition and a record was kept regarding whether or not arms were used to be able to stand.

4.3.3.3.2 Reliability of the FTSTS

Goldberg et al (2012) investigated 29 community dwelling females with a mean age of 73.6 years. Testing was completed twice with a one-minute gap between each test. The FTSTS intra-rater reliability measured by the *ICC* was high at 0.95, 95% CI [0.89, 0.97] (Goldberg et al., 2012). In a cohort of 24 post total knee replacement outpatients with a mean age of 72 years, test-retest reliability for two tests, 45-60 minutes apart, was 0.98, 95% CI [0.96, 0.99]. High test reliability suggested that there is no need for more than one test to be completed.

An inter-rater reliability ICC of 0.99 and intra-rater reliability ICC of 0.914-0.933 was reported in a study of healthy older adults with a mean age 56 years by Teo et al (2013). Wallmann et al (2013) reported excellent inter-rater reliability of *ICC* = 1.00, 95% CI [0.99, 1.00] when used by experienced therapists in a study involving 93 community dwelling elders with a mean age of 65 years. Training is not required to enable accurate measurement. When experienced therapists were compared to university students with no health background, a high level of reliability between assessments was found (*ICC* 0.99, p = ≤.001) (Teo et al., 2013).

4.3.3.3.3 Validity and interpretation of the FTSTS

The FTSTS has been validated for use in many different populations, including community-dwelling residents (Bohannon et al., 2007; Buatois, 2008; Guralnik et al., 1995), vestibular disorders (Whitney et al., 2005), Parkinson’s disease (Duncan et al., 2011), chronic stroke (Mong et al., 2010), cognitive dysfunction (Annweiler et al., 2011) and frail, older people (Goldberg, 2012; Teo et al., 2013).

The MDC was reported as 2.5 seconds with 95% confidence by Goldberg et al (2012) for older females (*n* = 29, mean age = 73.6 years) and 3.12 seconds with 95% confidence for people undergoing cardiac rehabilitation by Puthoff and Saskowski (2013) (*n* = 49, mean age = 68.7 years). The standard error of measurement (*SEM)* was calculated for the current study by the researcher ($SEM = SD * \sqrt{}(1\text{-}R)$) (Coaley, 2014). In the current study it was found to be 3.31 seconds and this was used in the results of this thesis in terms of comparability with MDC.

For 4,335 older community dwelling participants, it has been reported that those taking longer to complete the FTSTS had a greater risk of developing functional problems (Makizako et al., 2017). Makizako et al (2017) reported a cut-off point of ≥ 10 seconds predicting higher rates of disability in the following two year period. Andersson et al (2010) reported a cut-off point of > 13.6 seconds for a greater likelihood of increasing disability and morbidity. Zhang et al (2013) reported a cut-off point of > 16.6 seconds was associated with difficulties with instrumental activities of daily living in the three years following testing. Completing the FTSTS without using the hands has been reported as a predictor of being able to lead a functionally independent life (Cheng, Weng, Chang, Tan, & Tang, 2014; Pollock, Gray, Culham, Durward, & Langhorne, 2014).

4.3.3.4 Geriatric Depression Scale Short Form (GDS15)

4.3.3.4.1 Scale description

The Geriatric Depression Scale was developed by Yesavage et al (1983) primarily to screen for depression in older people aged 60 years and over. It was originally a 30-item questionnaire with 'yes' or 'no' answers referring to feelings during the week prior to testing. As it was found that patient fatigue may have been an issue when completing a 30-item scale a shorter version was developed in 1986 which could be completed in less time (Sheikh & Yesavage, 1986). This shorter scale retained the 15 questions from the original 30-item GDS that had the highest correlation with depressive symptoms (Sheikh & Yesavage, 1986). The short form is as good as the original long form of the GDS for screening for depression (Aikman & Oehlert, 2000). The scale is freely available in the public domain.

The GDS15 comprises 10 questions that indicate the presence of depression when they are answered positively and the remaining five questions indicate depression when they are answered negatively (Sheikh & Yesavage, 1986). The GDS15 takes between 5-7 minutes to complete and is scored from 0-15 (Greenberg, 2007). A score of 5-8 suggests mild depression, 9-11 suggests moderate depression and a score of 12-15 suggests severe depression (Greenberg, 2007). The only equipment required is a pen and paper. The GDS15 was designed to be simple to administer so that it would not require a skilled or trained interviewer (Yesavage et al., 1983). The scale can be self-completed or interviewer administered. When it is interviewer completed scores are likely to be lower than when it is self-administered (Cannon, Thaler, & Roos, 2002; de Waal, van der Weele, van der Mast, Assendelft, & Gussekloo, 2012; O'Neill, Rice, Blake, Walsh, & Coakley, 1992). In this current study, the GDS15 was interviewer administered. When participants were severely depressed, this information was passed to their care team.

4.3.3.4.2 Internal consistency of the GDS15

A systematic review of the GDS15 by Wancata et al (2006) found a sensitivity of 0.781, 95% CI [0.768, 0.785] and specificity of 0.743, 95% CI [0.741, 0.743] from the 21 included studies with patients from primary care, medical in-patients and residential care (Wancata et al., 2006). Pocklington et al (2016) conducted a systematic review of 23 studies involving 11,468 participants (aged > 55 years) and reported a pooled sensitivity of 0.89, 95% CI [0.90, 0.94] and pooled specificity of 0.77, 95% CI [0.65, 0.86].

Internal consistency of the GDS15 was reported as a Cronbach's alpha of 0.80, 95% CI [0.79, 0.81] when measured in a study involving 4253 people living in some form of care home with a mean age of 73.8 years (Nyunt, Fones, Niti, & Ng, 2009). The GDS15 was utilised with community-dwelling elderly patients who were functionally impaired and cognitively intact by Friedman et al (2005). This study looked at internal consistency and reported a Cronbach alpha coefficient for the total scale of 0.74 (Friedman, Heisel, & Delavan, 2005).

4.3.3.4.3 Reliability of the GDS15

Inter-rater reliability for the GDS15 has been reported by Nyunt et al (2009) as 0.94, 95% CI [0.90, 0.97] and intra-rater *ICC* was reported to be 0.83, 95% CI [0.81, 0.84]. In this study by Nyunt et al (2009), the GDS15 was administered by seven trained and experienced nurses to 4253 older people living in care homes.

4.3.3.4.4 Validity and interpretation of the GDS15

Minimal detectable change and clinically important change have not been established for the GDS15. Comparison of baseline with subsequent scores and a score decreasing towards a normal score of 0-4 is useful for measuring improvement. The *SEM* was calculated for this study (Section 4.8) and was found to be 1.44 points and this was used in the results in terms of comparability with MDC.

4.3.3.5 Euro-Qol (EQ5D-3L)

4.3.3.5.1 Scale description

The EQ5D-3L was developed in 1987 by the EuroQol Group which was formed by researchers from five European countries who wanted to create a ‘standardised non-disease-specific-instrument for describing and valuing health-related quality of life’ (The Euroqol Group, 1990, p. 200). The EQ5D-3L can be used in clinical and economic health care assessment in addition to population health investigations (The Euroqol Group, 1990). The EQ5D-3L three-level version was introduced in 1990

(Rabin, Oemar, & Oppe, 2011). The three-level version was used in the current study as the five-level version was not available (2009) (Herdman et al., 2011). The EQ5D-5L was introduced with the aim of improving sensitivity and decrease the ceiling effect of the EQ5D-3L (EuroQol, 2017) but was not accessible at the start of this study. The EQ5D-3L has been used successfully in a slow stream rehabilitation environment previously (Ariss et al., 2015). It has been validated in many different populations, including older people (Brazier, Walters, Nicholl, & Kohler, 1996; Coast, Peters, Richards, & Gunnell, 1998).

The EQ5D-3L consists of two pages (EuroQol Research Foundation, 2015). The first page consists of one question for each of five dimensions which include: mobility, self-care, usual activities, pain or discomfort and anxiety or depression. There are three levels suggested for each dimension. These are no problems, some problems and extreme problems. The person completing the measure indicates their health status by marking the box next to the most applicable statement (Rabin et al., 2011). The 'no problems' box is equated with a score of 1, 'some problems' equates to a score of 2 and 'extreme problems equates to a score of 3. Scores can thus be reported as a five number sequence and there are a possible 243 sequences which can be obtained (i.e. 11111 to 33333) (EuroQol Research Foundation, 2015).

An index score of -0.59 to 1.00, where -0.59 was a state worse than death and 1.00 was maximum well-being, was calculated from the utilisation of weights based on societal valuations of health states (Haywood, Garratt, Schmidt, & Mackintosh, 2004). This is referred to as time trade-off (TTO) (Oppe, Rand-Hendriksen, Shah, Ramos-Gon, & Luo, 2016). In the current study the time trade-off derived EQ5D-3L weights for Australia were utilised (Viney et al., 2011).

The EQ5D-3L also comprises a vertical, 20 cm visual analogue scale (VAS) labelled from 0-100, which asks for the respondent's self-rated overall health at that time. The upper end of the scale is labelled 'Best imaginable health state' and the bottom end is labelled 'Worst imaginable health state'. The person completing this page is asked to place a line from a box labelled 'Your own health state today' to the point on the scale indicating how good their health is at the time of measurement (Rabin et al., 2011). This instrument is suited for respondents to self-complete. It needs no training or experience and requires a pen, paper and a few minutes. Self-administration was compared with interviewer administration by Puhan et al (2011) and neither method was found to make a significant difference to the result. Telephone and patient-administration were found to produce similar results (Chatterji et al., 2017). However, Coast et al (1998) reported that with increasing age it is progressively more likely that interviewer administration will be required. Therefore, in this study the measure was interviewer administered.

4.3.3.5.2 Internal consistency of the EQ5D-3L

Test-retest reliability has been reported by Brazier et al (1996) when investigated in 377 community-dwelling older females aged 75 years and over (Spearmans rank correlation coefficient of 0.53 for the EQ5D-3L index and 0.67 for the visual analogue scale). An *ICC* of 0.83 was reported for a group of 237 adults who were broadly representative of the UK populiation (23% over 65 years) (Al-Janabi, Flynn, Peters, Bryan, & Coast, 2015). An The EQ5D-3L internal consistency was reported by Balestroni et al (2007) as a Cronbach's alpha of 0.73 when tested with 248 older cardiac rehabilitation patients. Construct validity has been discussed by Coast et al (1998) when the EQ5D-3L was used with a group of older acute care patients with good correlation with the Barthel Index. The EQ5D-3L was found to exhibit no floor effects when tested by Brazier et al (1996) in an older population. No ceiling effect was reported by Fang et al in a study involving 362 community-dwelling Chinese participants with Kashin-Beck Disease (endemic osteoarthropathy) (2016).

The test has been correlated with Parkinson's disease severity and disability by Schrag et al (2000). In the Schrag et al (2000) study, 124 people with Parkinson's disease completed the EQ5D-3L in addition to the PDQ-39 (a disease specific measure of quality of life) and the SF-36. The EQ5D-3L showed a strong positive correlation with the PDQ-39 (r = 0.75, p = < 0.0001) and a moderate positive correlation with the SF-36 (r = 0.61, p = < 0.0001).

4.3.3.5.3 Reliability of the EQ5D-3L

In a study comprising 101 older participants (mean age 82.6 years), with mild cognitive impairment, a Kendal's coefficient of concordance of 0.67 was reported for inter-rater reliability between self and proxy scores (Aguirre, Kang, Hoare, Edwards, & Orrell, 2016). Intra-rater reliability is yet to be established (EuroQol Research Foundation, 2017).

4.3.3.5.4 Validity and interpretation of the EQ5D-3L

In a cohort of 534 cancer patients (mean age 59 years) the minimal important difference was reported as more than 7 points on the EQ5D-3L VAS (Pickard, Neary, & Cella, 2007). The *SEM* as per Section 4.3.3.3.4 was calculated for use as the measure of minimal detectable change for the TTO in this study (.13) ($SEM = SD * \sqrt{(1-R)}$) (Coaley, 2014). Permission to use the EQ5D-3L scale in this study was given by the Euro-Qol organisation (Mandy Oemar, Communication Officer, EuroQol Group Foundation, personal communication, September 28, 2009).

4.3.3.6 Frailty Measures

Frailty and pre-frailty are associated with institutionalisation (Kojima, 2018). Kojima (2018) reported that older adults with this classification were five times and three times more likely to be institutionalised respectively than non-frail older adults. Comans et al (2016) showed that, in the six-months from TCP admission, readmission rates were considerably higher for recipients who were frail and pre-frail than robust (40% for frail, 39% pre-frail and 24% for robust recipients). The National Centre for Biotechnology Information, United States of America, (1991) has defined the term ‘frail elderly’ to be ‘older adults or aged individuals who are lacking in general strength and are unusually susceptible to disease or to other infirmity’. Fried et al (2001) defines frailty as a clinical syndrome in which three or more of five criteria are present. These criteria are unintentional weight loss of 10lbs (5kgs) or more in the past year, self-reported exhaustion, weak grip strength (lowest 20% by gender and body mass index), slow walking speed over 15 feet (slowest 20% by gender and height) and low levels of physical activity (kilocalories per week, slowest 20%) (Fried et al., 2001). The outcome measures already utilised in this study incorporated two of the three questions used to screen frailty using the Study of Orthopaedic Fractures Index frailty screen (Ensrud et al., 2009). These were the ability to stand up from a chair five times without using the arms within the FTSTS as well as lower energy levels when asked, 'Do you feel full of energy?' from the GDS15. An additional question was added to the battery of outcome measures asking if the participant had experienced weight loss (of more than 5% body weight in the last year unintentionally) at each assessment.

4.3.3.6.1 Study of Osteoporotic Fractures Index (SOF)

The Study of Osteoporotic Fractures Index quantifies frailty (Bilotta et al., 2012; Ensrud et al., 2009; Ensrud et al., 2008; Kojima, 2018). Ensrud et al (2008) advocated using this index which includes three aspects of frailty:

i. Weight loss of 5% or more body weight in the last year unintentionally,
ii. Unable to stand up from a chair five times without using the arms and
iii. Lowered energy level as measured as an answer of 'no' to the question on the Geriatric Depression Scale 'Do you feel full of energy?' (Ensrud et al., 2008).

The people who had not lost 5% of their body weight, were able to stand up from a chair five times without their arms and did not have a low energy level were categorised as "robust". Those who were identified to have one of these components were categorised as "pre-frail or intermediate". The people who had two or three components were categorised as “frail” (de Vries et al., 2011; Ensrud et al., 2008; Kiely, Cupples, & Lipsitz, 2009). It has been reported that higher rates of frailty as measured by the SOF index have been associated with higher risks of falling, disability, chronic medical conditions, physical function, overnight hospitalisation, admission to the emergency department and all-cause mortality (De Buyser et al., 2016; Ensrud et al., 2009; Ensrud et al., 2008; Kiely et al., 2009). The scale has been shown to be an independent predictor of several adverse health outcomes including hospitalisation, falls and death (Bilotta et al., 2012).

4.3.3.7 Continuation of exercise after discharge from slow stream rehabilitation

At the final assessment six-months after TCP admission, one additional question was asked of the participants, “Have you continued with the exercises given to you while you were on the Transition Care Program?” It was predicted that, if participants felt that their extra exercise during the Transition Care Program had been beneficial, they would continue to exercise when the intervention was completed. A recent systematic review reported facilitators and barriers to exercise for people with osteoporosis and osteopenia (Rodriques, Armstrong, Adachi, & MacDermid, 2017). This showed that the factors that facilitated exercise included:

i. Exercise that was easy and enjoyable,
ii. The expectation that there would be less pain and fatigue as a result,
iii. The ability to walk further or have less falls and
iv. External factors such as a therapist with a positive attitude to exercise.

4.4 Project staffing

4.4.1 Physiotherapy staff

The physiotherapy employees working on this Transition Care Program during the study varied, and all had extensive experience (refer to Table 4.1 for details). The physiotherapist most involved in this study had 23 years of experience as a clinician. Those less involved had 5-10 years of experience. There were two allied health assistants, one with 20 years of experience and the other had been working as an allied health assistant for five years.

4.4.2 Research assistant

An experienced and trained research assistant conducted the functional training intervention for the clients in the experimental group. To recruit an appropriate research assistant for the project, discussion took place between the researcher and the physiotherapy staff involved in the project at Bendigo Health. The most suitable and available person from the available staffing pool was invited to take the position. This person had a background of working as an allied health assistant at Bendigo Health. After two months she was no longer able to continue in this position. A fourth-year physiotherapy student next took over the position of research assistant (under close supervision of a physiotherapist) for two months while another research assistant was recruited. This time an advertisement was circulated with Bendigo Health and more broadly within Bendigo. Three interviews were performed and a replacement research assistant was appointed to start in two weeks. The third research assistant continued with the project until its completion 18 months later.

The physiotherapists were introduced to the research assistants and lines of reporting and communication were developed to ensure that each assistant worked under direct supervision of a registered physiotherapist and was closely monitored. Regular communication took place face to face, by mobile telephone and by email.

4.5 Usual Care

Both groups received standard physiotherapy within the Transition Care Program, which comprised twice weekly, individual, 30-40-minute treatments with a TCP physiotherapist who was an employee of Bendigo Health. The physiotherapist providing the usual care also worked with participants of the FIT group. The physiotherapy program was individualised. It was dependent on physiotherapy assessment findings and the goals set by the patient with the therapist. In addition, chair based, balance or hydrotherapy classes (generally run by the allied health assistant) were attended by the Transition Care Program clients, according to their needs. The allied health assistant also attended to the clients in other ways such as to provide equipment if required.

4.6 FIT intervention

The intervention group performed their usual Transition Care Program physiotherapy and, in addition, practiced their functional exercise program. Participants were encouraged to practice several times every day and these practice sessions were separate from the required walking to the meals room.

The functional exercise approach used was called Functional Incidental Training (FIT). A similar functional training intervention was developed by Schnelle and colleagues for rehabilitation in nursing homes (Schnelle et al., 1995). It was designed for frail nursing home residents and focused on frequent short bouts of functional exercise to counteract the inactivity and deconditioning that is common in this population (Schnelle et al., 1995).

The functional training instigated by Schnelle et al (2002) has been associated with improvements in endurance and muscle strength, fewer falls and improvements in measures of incontinence and agitation in residential care samples (Ouslander et al., 2005; Schnelle et al., 1995). The falls reduction with the functional training intervention reported by Schnelle et al (1995) needs to be interpreted with caution as the control group in that trial had an increased number of falls and the intervention group remained stable rather than improving. A similar intervention of walking for medical hospitalised patients found that people who had additional walking time during admission had more home discharges (Hastings, Sloane, Morey, Pavon, & Hoenig, 2014).

Usually functional training programs in these previously published trials were practiced four times daily, every two hours between the hours of 8.00am and 4.00pm for five days each week (Ouslander et al., 2005; Schnelle et al., 2002; Schnelle et al., 1995). In these trials the research staff delivered the additional functional exercises each day. The premise was that the exercise should gradually extend the person's exercise tolerance whilst maximising efficiency in the use of staff time (Ouslander et al., 2005; Schnelle et al., 1995). The exercises also needed to be functionally oriented to activities of daily living such as walking, standing and transferring, and be integrated into the continence care routine (Ouslander et al., 2005; Schnelle et al., 2002).

For the current study, the onus for practicing the functional training program was placed on the participants themselves as well as the therapy team. If participants required supervision when they mobilised, they asked care staff to assist with their exercise. Residential care staff were asked to encourage functional training practice, or actively assist if supervision was required, when they saw training program sheets placed on the walls of the participant's rooms. The aim was for FIT practice four times daily at any time of the day, 7 days per week. Walking to the dining room for meals or drinks was not included as part of the functional training practice time. The corridors in the facilities were measured and each 10 metres a sign was put on the wall so that the participant knew how far they were walking or wheeling in their wheelchair. This enabled the participant to aim for the target of their individualised program.

The baseline FIT program was developed by asking the person to walk as far as they were able to and the walking distance was set as at least 75% of this distance for each subsequent exercise episode. When walking was not possible due to a medical condition, self-propelling in a wheelchair was substituted for the locomotor component. The distance to be covered in the wheelchair was calculated in a similar manner. The sitting to standing component of the functional training program was developed by the person practising as many sit to stand repetitions as possible and then the program was set to 75% of this number.

On the first visit by the research assistant to the Transition Care Program, the functional training program was written on two pieces of paper in large font. The pages were put up on the walls of the bedroom and the bathroom of the person's room. The functional training program was also written into a FIT notebook or diary. Details about adherence to the program were written in the book by the research assistant and the participants. The book was placed in the person's room.

During the first visit, the research assistant made ongoing twice-weekly appointments with the participant. During the 30-minute visits, the research assistant walked with the participant and encouraged them to practise the sit to stand exercises as well as encouraging them to practice the other elements of their program four times daily. The staff were also asked to encourage the participants to continue with the exercises at least four times daily. Family and friends were also encouraged to assist or remind the participant to do the exercises four times per day and to fill in the data diary each time. The research assistants were the only people to formally supervise practise of the functional training program twice weekly. Other people only provided participants with encouragement to practise their exercises.

On the second weekly visit by the research assistant, the functional training program was reassessed and progressed under the supervision of a registered physiotherapist. Walking or wheeling distance as well as sitting to standing were checked and again the participant was encouraged to continue practice to at least 75% of their capacity and was regularly progressed as possible. Changes to the program were noted on the sheets in the participant's room on the walls and in the exercise diary.

Residential aged care facility staff, physiotherapists, allied health assistants, research assistant, family and participants were encouraged to write in the training notebook placed in the participant's room. Details about the program, program practice, changes or problems with the program were noted in the book.

4.7 Study procedure

Prior to the study commencement and following approval from the ethics committees of Bendigo Health and La Trobe University, protocols were written for staff involved in the project (Appendices 10, 11 and 12) as well as for the TCP physiotherapists as to the use of the BBS, DEMMI and FTSTS (Appendix 8). The TCP physiotherapists were advised of these protocols and discussion took place regarding method of implementation. To facilitate intra-rater reliability, training sessions took place with the TCP physiotherapists who would be involved with the initial assessments of the

BBS, DEMMI and FTSTS. Protocols for the research assistant were written and discussed with each of the three research assistants (Appendix 13).

To ensure that stakeholders were engaged in the study, meetings were arranged with all staff involved with this project within Bendigo Health. These meetings included the manager of the Transition Care Program at Bendigo Health, the Executive Director of the stream in which the Transition Care Program was conducted within the organisation, the intake workers for the Transition Care Program and the TCP physiotherapists involved in the project. Participants were placed in either a high-level care facility (named "Bethlehem") or low care facility (named "Bentleys") depending on their care needs during transition care. Face to face meetings were held more than once with the managers and staff of both residential aged care facilities to discuss the project and gain their support. Written information was also provided to the facility managers about the research project (Appendix 10). The staff were asked to encourage participants to practice their FIT programs if they saw the participant's program details on the paper on the bedroom or bathroom wall.

Participants were encouraged not to tell the independent assessor which group they were in or what exercise they had been doing during reassessment of the outcome measures to minimise the chance of the assessor becoming un-blinded.

The physiotherapists working in transition care did their regular assessments of both usual care and intervention group participants at the first visit. At that first physiotherapy appointment, they also completed the functional assessments for the trial. The assessments were written on paper, photocopied and sent immediately to the researcher who was blind to which group each Transition Care Program participant was assigned. The researcher then assessed baseline health-related quality of life and depression.

TCP physiotherapists alerted the researcher to when discharge was to occur. FIT program information and the exercise journals were removed from the participant’s room prior to the researcher doing the discharge assessment. The blinded researcher completed all follow-up assessments at six-months following admission to the TCP.

4.7.1 Process of the research project

The flowchart of the study process is summarised in Figure 4.1.

Figure 4.1 Study process flowchart.

4.8 Data analysis

All data were entered into a Microsoft Excel® spreadsheet and checked for completeness and accuracy. Data were then exported to the Statistical Package for Social Sciences (SPSS®) software version 25 (IBM®). Each variable was checked to ensure that the scores were valid. Data transformation was performed when needed. It is recommended that DEMMI Rasch scores are used for analysis (de Morton, Davidson, & Keating, 2007; de Morton et al., 2008a). Thus raw DEMMI data were converted to Rasch scores using the conversion table available in the publicly available measure (de Morton et al., 2007).

Before analysis, data were tested for normality using the Shapiro-Wilks test (Ghasemi & Zahediasi, 2012). Change data were also tested for normality using the Shapiro-Wilks test (Ghasemi & Zahediasi, 2012). All analyses incorporated the intention-to-treat principle, using all available data for each participant according to their original group assignment and regardless of their level of participation. Irrespective of whether the participants received the treatment scheduled in their randomly assigned group allocation, they were included in the evaluation and data analysis.

Descriptive analysis was used for general demographic participant characteristics. Mean and standard deviations are given where data were normally distributed. If the distribution was not normal, median and interquartile ranges were used. Nominal data were analysed using frequencies and proportions. Independent-samples t-tests were used to find differences between groups where data were normally distributed. Paired samples t-tests were used to determine differences within groups. A Chi-squared test was used for categorical data to find an association between variables. When at least 1 cell had a count of less than 5, a Fisher's exact test was used to determine independence of two categorical variables. To assess strength and linear direction of relationship between two continuous variables, a Pearson's correlation was used. For finding strength and direction of association where one variable was ordinal, a Spearman's rank order of correlation (rho) was used. Effect sizes were interpreted based on Cohen's recommendations (1977) where less than 0.2 represented a null effect size, .2 to .49 was a small effect size, .50 to .79 was a moderate effect size and scores of .8 or higher were a large effect size.

Pre-treatment scores were subtracted from post-treatment scores to calculate change for the BBS, DEMMI, and FTSTS, GDS15, EQ5D-VAS and EQ5D time trade-off. Nonparametric statistics used were the Mann-Whitney *U* test to compare between groups and Wilcoxon signed ranks test to find differences within groups (Nahm, 2016). A *p* value of <.05 was accepted as statistically significant (American Psychological Association, 2013). To avoid the risk of a type 1 error because of multiple statistical testing, Bonferroni's correction was utilised (Armstrong, 2014). The *p* value of .05 was divided by the number of comparisons being made, for example 0.05/3 = .01666. Changes within groups for nonparametric data where one variable was ordinal were analysed using a sign test (Lund & Lund, 2018). When minimal detectable data for similar cohorts of participants were not available, the standard error of measurement was calculated using data from participants in this study ($SEM = SD \sqrt{(1-R)}$) (de Vet et al., 2006). The SD was the standard deviation of the whole group at admission and R was the reliability of the measure. All data were analysed using SPSS® software version 25 (IBM®).

The next chapter will present the results from this randomised controlled trial.

Chapter 5 Results

This chapter reports the results of the study described in Chapter 4. The study was a randomised controlled trial (RCT). The Standard TCP group received the usual care. The intervention group, which was the Functional Incidental Training (FIT) group, received usual care with additional functional exercise such as walking and repeatedly standing up from a chair. The participants in both groups were frail, elderly, about to leave hospital and were allocated to transition care. This chapter will firstly present summaries of the demographic data and then the results for the RCT.

5.1 Sample characteristics

Figure 5.1 shows the flow of participants through the RCT. The study was initially discussed with 87 potential participants. All of these individuals had a live-in TCP place and agreed to consider participation in the study. There were 50 females and 37 males. Twenty-five declined participation (Table 5.1). The reasons for potential participants declining included a lack of interest in exercise, a preference not to participate in research, feeling tired or unwell.

Table 5.1

Reasons for potential participants declining

Reason for declining to participate	Not interested	Feeling too unwell	Not interested in exercise	Too tired
Participants (*n*)	13	8	3	1

One person from the transition care program was re-admitted to an acute hospital unit and one person died before the assessment and randomisation could be completed. Overall, 60 participants were recruited, consented, assessed and randomised. There were 47 participants who completed the six-month assessment (Figure 5.1). There were 28 participants in the intervention group and 32 in the usual care group. Although the aim was to recruit 48 participants in each group, recruitment needed to cease after 18 months due to the time constraints associated with this doctoral project.

5.1.1 FIT group participants

Twenty-eight participants were allocated to the FIT group that received the additional functional training. During the Transition Care Program, three FIT participants were readmitted to acute hospital and one FIT participant died. At the completion of the Transition Care Program 24 FIT participants were re-assessed. Between discharge and six-months, three additional participants died. At six-months the remaining 21 participants in the FIT group (75%) sample were re-assessed. Overall, for the FIT group, four participants (14%) died and three participants (11%) were readmitted to hospital during the six-month duration of the study.

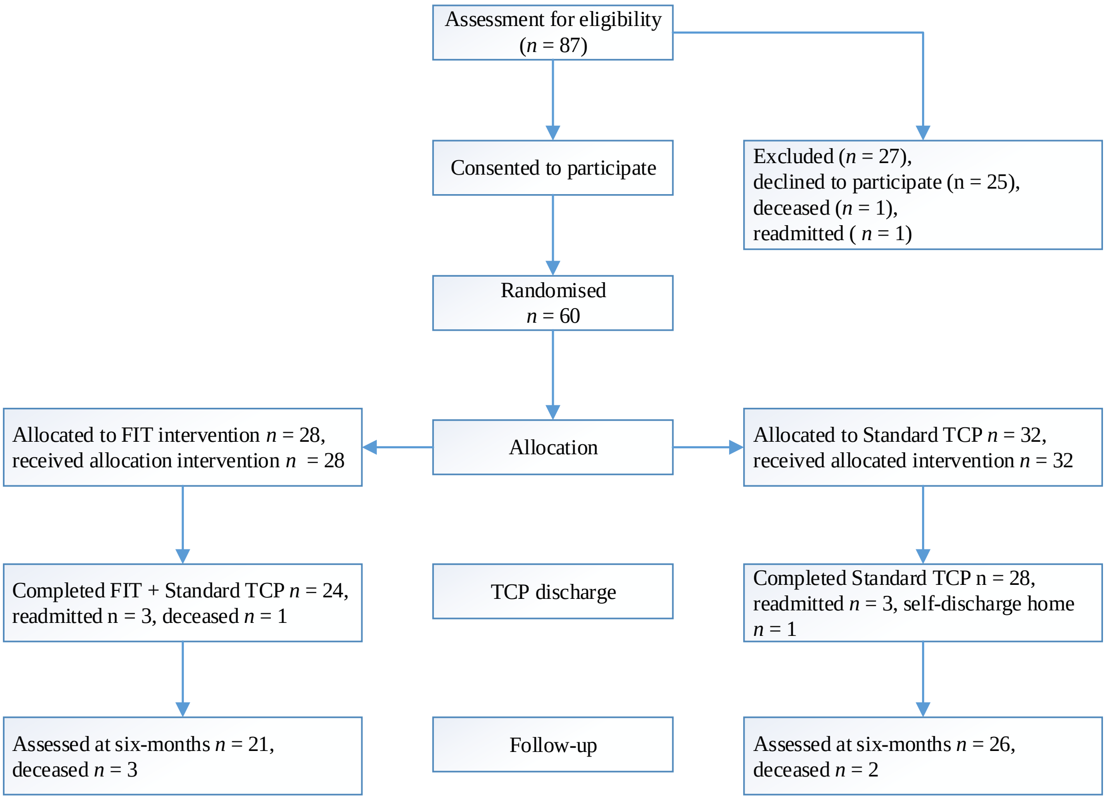

Figure 5.1. Flowchart showing participant progression through the study.

5.1.2 Standard TCP group participants

Thirty-two participants were randomly allocated to the Standard TCP group that received only usual care. During the Transition Care Program episode, three Standard TCP participants were readmitted to an acute hospital and one Standard TCP participant took their own discharge and went home against medical advice. At Transition Care Program completion 28 of the Standard TCP participants were re-assessed. A further two Standard TCP participants died prior to the six-month assessment. The six-month re-assessments were completed by 26 Standard TCP participants (81%). Overall, for the Standard TCP group, two participants (6%) died, one (3%) discharged himself and three participants (9%) were readmitted to an acute hospital.

5.2 Baseline demographic data for the sample

All participants in this study lived at home prior to their admission to Bendigo Health. The participants were recruited from the rehabilitation or acute ward of Bendigo Health at the point of their acceptance into the Transition Care Program. Baseline demographics and scores from secondary outcome measures from the participants are presented in Table 5.2. No statistically significant differences were found in demographic variables between the intervention and usual care groups, although the FIT group were slightly older (FIT group median 82 years, Standard TCP group median 80.5 years, Mann-Whitney U =514.5, p = .324) and had a marginally greater number of co-morbidities (FIT group median 8, Standard TCP group median 7, Mann-Whitney U = 536.5, p = .186).

Table 5.2

Baseline characteristics for the groups and overall sample

Item	FIT	Standard TCP	Total
Participants *n* (%)	28 (47)	32 (53)	60 (100)
Women *n* (%)	15 (54)	21 (66)	36 (60)
Age median (IQR)	82 (69.5 – 88.75)	80.5 (68.75 – 85.5)	81 (69.5 – 86)
Married *n* (%)	5 (18)	4 (13)	9 (15)
Support person at home *n* (%)	8 (29)	7 (22)	15 (25)
Primary diagnosis *n* (%)			
Orthopaedic	12 (43)	12 (28)	24 (40)
Medical	7 (25)	10 (31)	17 (28)
Frail	6 (21)	5 (16)	11 (18.3)
Number comorbidities mean ± *SD*	7.7 ± 3.1	6.9 ± 3.2	7.3 ± 3.2
Number medications (range)	7 (6 – 11)	9 (4 – 11)	9 (5 – 11)
TCP days ± *SD* (range)	65.7 ± 31.1 (12 – 148)	63.7 ± 32.5 (14 – 149)	64.7 ± 31.6 (12 – 148)

5.2.1 Age, co-morbidities and medications

Overall, the median age of participants was 81 years (interquartile range (IQR) 69.5–86 years). Two participants were 48 years. They were included because an additional program ‘TCP plus’ started whilst the RCT was in progress. TCP plus enabled people under the age of 50 years to be included. The median age for females was 82 years (IQR 77.25–86) and for males it was 80.5 years (IQR 68.75–85.5).

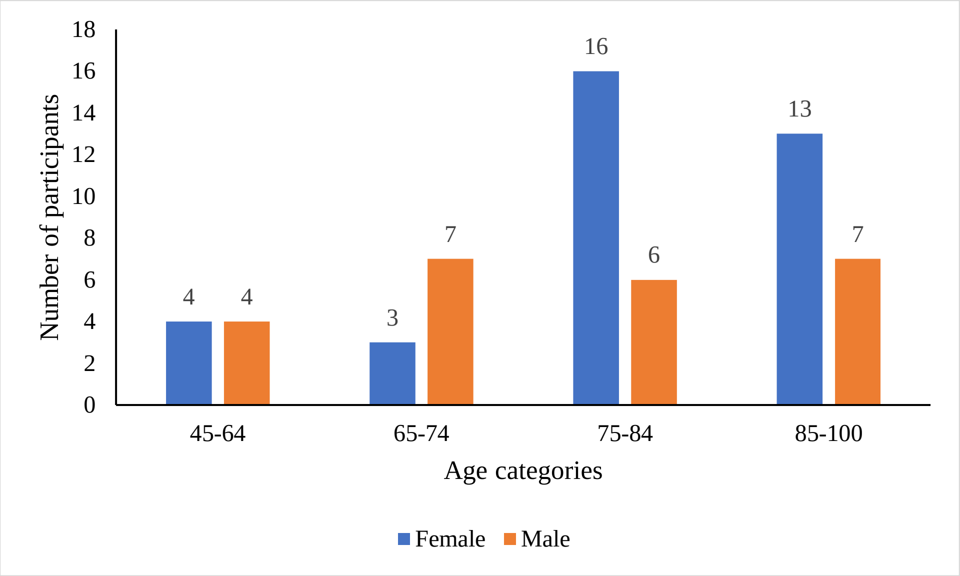

Figure 5.2. Participant age and gender.

The age category with the highest percentage of participants was 75–84 years (37%). This was followed by 85–100 years (33%) (Figure 5.2). The sample as a whole had a median of seven co-morbidities (IQR 5–9) and 60% were women. The majority of participants were not married (51 participants, 85%) although 15 (25%) had a support person at home. Support people ranged from partners, siblings and children to paid workers for those who had long-term chronic conditions requiring assistance. Gender mix and age of the study cohort were similar to published data for Australia TCPs (Australian Institute of Health and Welfare, 2014). The percentage of participants living alone (75%) was higher than TCP recipients in published data for Australia (50%) or Victoria (51%) (Australian Institute of Health and Welfare, 2014). Nevertheless, it was comparable with similar studies reported in Chapter 3 (section 3.5.3).

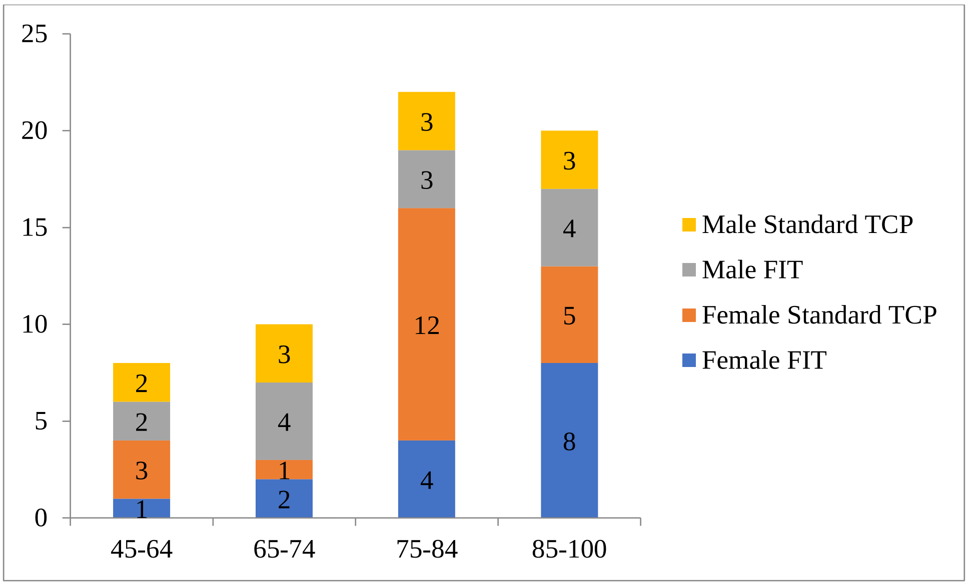

Figure 5.3. FIT and Standard TCP groups by age category and gender.

Figure 5.3 shows the FIT and Standard TCP groups by age category and gender. The largest group were females aged 75–84 years. The primary reason for initial hospitalisation for both groups was falls (28%). Other reasons for hospitalisation are summarised in Figure 5.4.

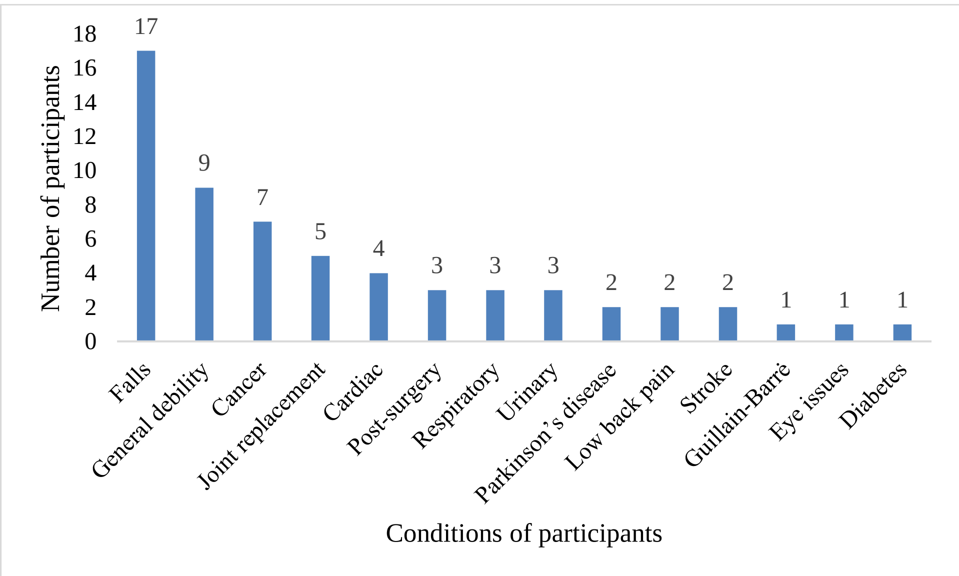

Figure 5.4. Reason for hospitalisation.

Those with a cancer diagnosis were not requiring palliative care. The median number of medications was similar for the groups (FIT group 7, IQR 6–11, Standard TCP group 9, IQR 4–11, Mann-Whitney U = 453.0, p = .941).

5.2.2 Participant length of stay in transition care

Data for length of stay in the TCP were normally distributed (Figure 5.5). Participants of the entire cohort in this study spent a mean of 64.7 days on the Transition Care Program (SD = 31.61, range 12–148 days). Mean days on the Transition Care Program were similar between the two groups. The FIT group spent, on average, two more days in the Transition Care Program than the Standard TCP group (65.7 for the FIT group, range 12–148 days, 63.7 for the Standard TCP group, range 14–128 days).

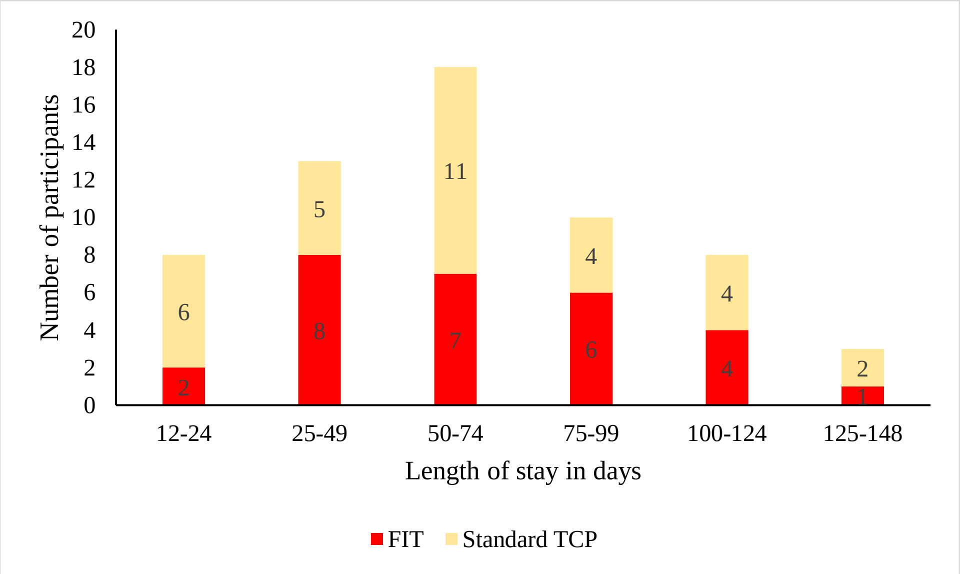

Figure 5.5. Length of stay in days by group.

There was a moderately strong negative association between age and the number of days spent in transition care (r_s = -.49, p < .001). Those in the oldest category (aged 85–100 years) had the shortest stay on the Transition Care Program followed by the next oldest TCP recipients (aged 75–84 years) (Figure 5.6). The mean number of days on the Transition Care Program and variance for each age group is shown in Table 5.3.

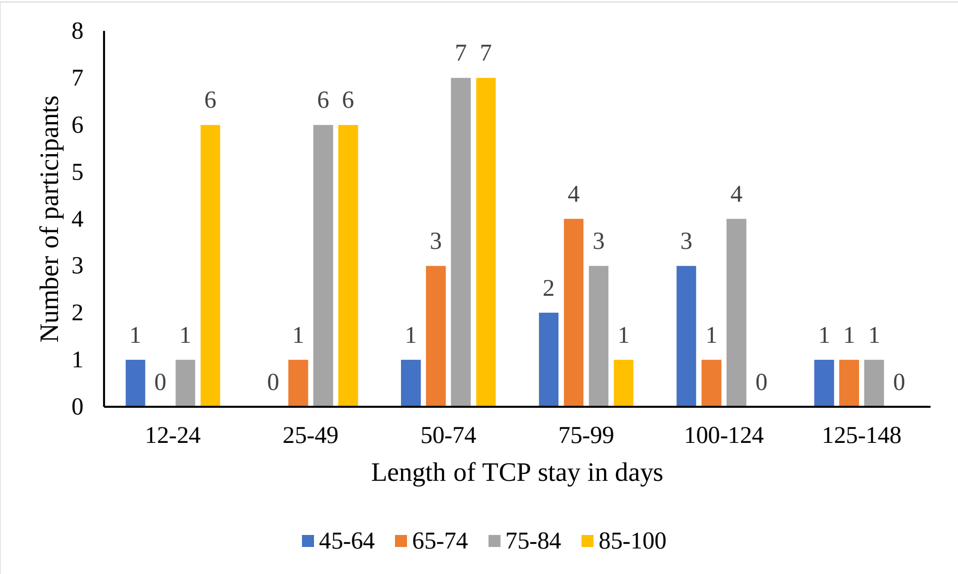

Figure 5.6. Length of stay on TCP in relation to age.

Table 5.3

Participant age and length of stay

Age in years	45 – 64 n = 8	65 – 74 n = 10	75 – 84 n = 22	85 – 100 n = 20
Mean length of stay in days (*SD*)	88.75 (35.34)	77.2 (24.95)	69.64 (29.81)	43.3 (23.02)

A Spearman's rank-order correlation showed no statistically significant correlation between discharge destination and length of stay (r_s = .19, p = .175). The relationship discharge destination (home, care) and having a support person at home (yes, no) was then tested for the entire group using a Chi-square test. The relationship between having a support person and a home discharge destination was found to be statistically significant (χ^2 = 8.39, df = 1, p = .004). The participants with no support person were fairly evenly divided between home or care as a discharge destination. Data for support person and residence are found in Table 5.4.

Table 5.4

Support person and residence

	Support person	No support person
Care	1	20
Home	13	19

When FIT and Standard TCP groups were examined separately using a Fisher's exact test, no relationship was seen at the group level (FIT group Fisher's exact test p = .069, Standard TCP Fisher's exact test p = .066).

Data regarding discharge destination by age category is shown in Figure 5.7. The groups with the greatest number of participants were Standard TCP participants aged 75–84 years who were discharged home (11 participants) and FIT participants aged 85–100 years who were discharged to residential care (8 participants). A Spearman's rank order correlation was run to test the association between discharge destination (home or care) and age. This showed a significant correlation between these variables (r_s = -.27, p = .046).

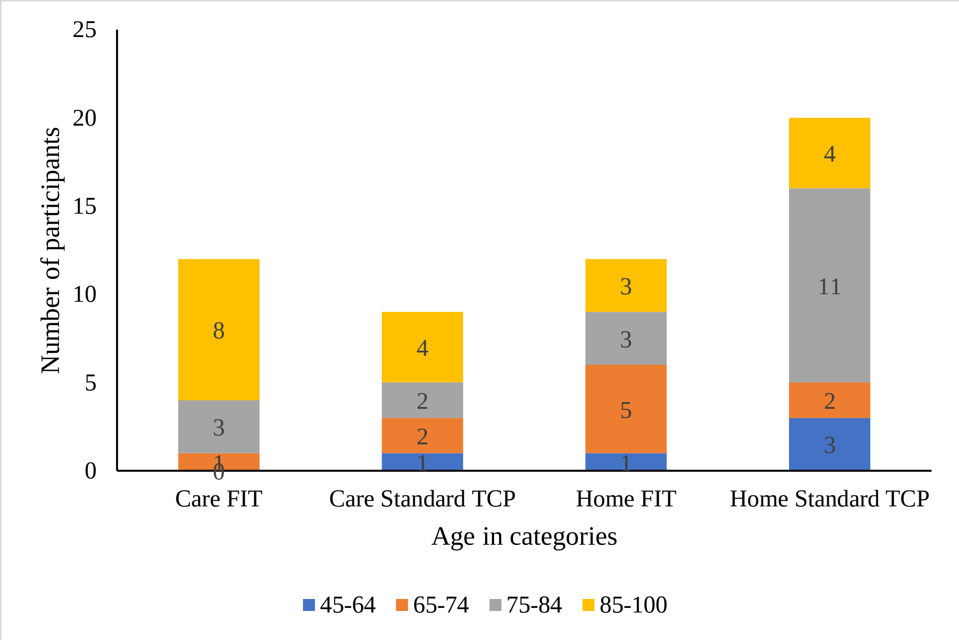

Figure 5.7. Discharges by age and FIT or Standard TCP group.

Data for the entire group by discharge destination, age category and sex are shown in Figure 5.8. This figure includes only the participants who were discharged home or into long-term care.

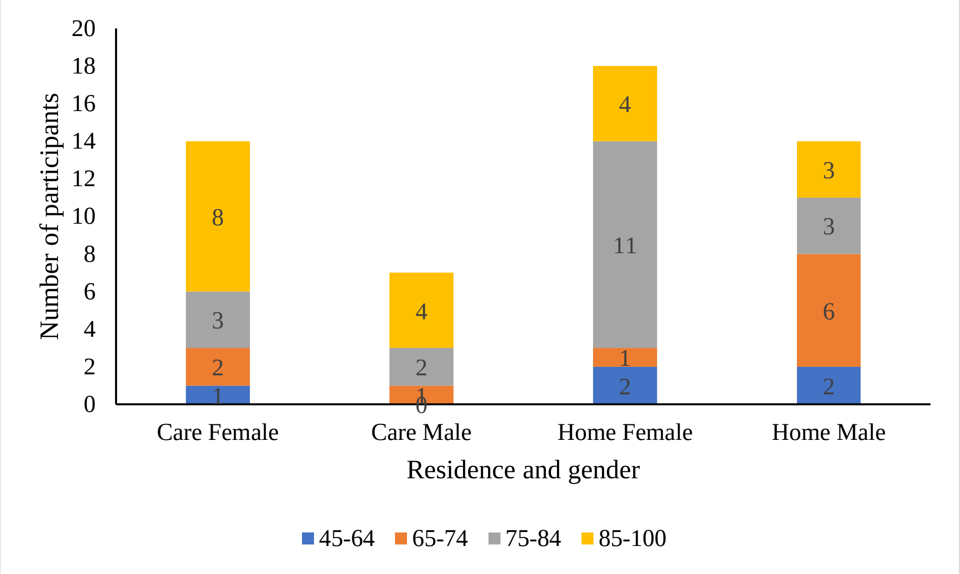

Figure 5.8. Discharge destination by gender and age in years.

The largest groups were female participants aged 75–84 years who were discharged home (11 participants) and female participants aged 85–100 years who were discharged into residential care (8 participants). Females were no more likely to be discharged home (35%) than males (27%) (χ^2 = .57, *df* = 1, *p* = .448).

5.2.3 FIT training notebook data

Seventeen of the training notebooks for the intervention group were returned to the researcher for analysis. There were 11 notebooks missing, either lost when participants relocated or kept by the participant. The number of recorded visits by the research assistant to the participants ranged from 4–25 with a mean of 13 visits per person. In terms of exercises, the range of repetitions of sitting to standing exercises was 2–10 at the commencement of the FIT programs. All except for three participants increased the number of repetitions for the sitting to standing exercise during their TCP admission. There was no apparent reason why these participants did not increase their repetitions. Their ages were 69, 87 and 94 years and length of intervention was 102, 57 and 51 days respectively. One was subsequently discharged to residential care and the others were discharged home. Improvements in sitting to standing repetitions ranged from 0–13 with a mean improvement of four repetitions.

The distance walked in metres was recorded for the majority of participants. For eight participants, the distance walked was noted relating to land marks rather than metres walked. Three participants walked unaided, one used a stick, one used a gutter frame, one used a wheelchair and the remaining 11 participants used four-wheeled walking frames.

Data from the 17 returned training notebooks showed that all except one participant was compliant with the FIT program. Adherence outside of the twice weekly research assistant visits was not recorded in the notebooks in most instances. Only two participants recorded in the book themselves each time that they practised their FIT program.

5.3 RCT results

5.3.1 Provision of additional functional training did not alter discharge destination compared to usual care

At the end of the TCP period there was no statistically significant difference between the two groups for the primary outcome measure which was discharge destination (home or long-term care), ($\chi^2 = 1.97$, $df = 1$, $p = .16$) (Table 5.5).

Table 5.5

Discharge destination by group

	FIT	Standard TCP
Home	12	20
Care	12	9

Twelve of the 24 participants who completed the FIT program and 19 of the 28 participants who received only usual care were discharged home (Figure 5.9). The participant who discharged himself home from the Standard TCP group was included in the discharge data in Table 5.5. Adding additional functional training to the Standard TCP did not alter the number of frail older participants discharged home when delivered with this level of intensity.

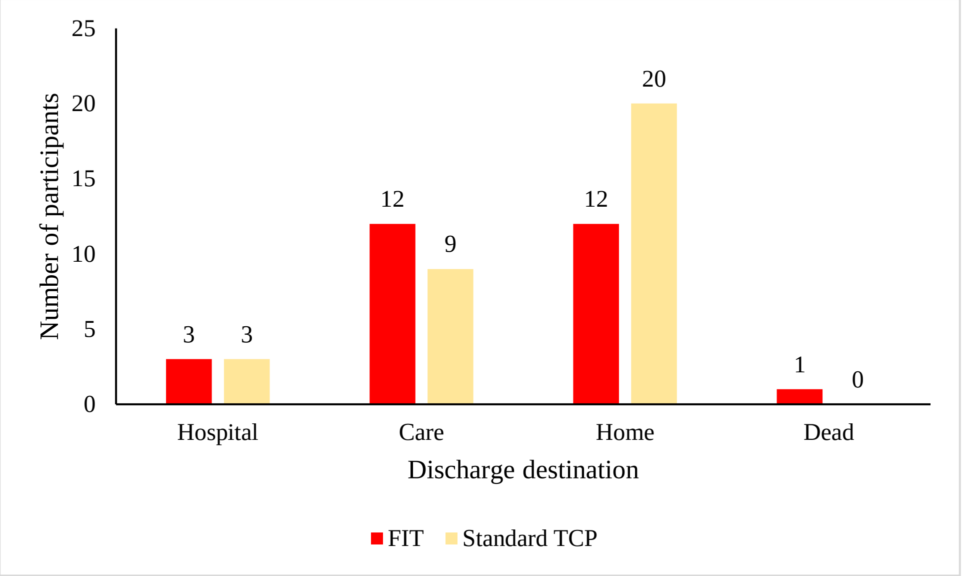

Figure 5.9. TCP discharge destination for FIT and Standard TCP groups.

5.3.2 Discharge destination was maintained to six-months

By six-months after admission, 11 of the 21 FIT group participants (52%) and 16 of the 26 Standard TCP group participants (62%) had returned home (Figure 5.10, Table 5.6). This difference between groups was found to be statistically significant when tested with a Chi-square test (χ^2 = 38.32, *df* = 1, *p* = .000). There was a strong relationship between discharge destination and six-month residence. The percentage of FIT participants living at home was maintained whilst the Standard TCP participants living at home decreased slightly.

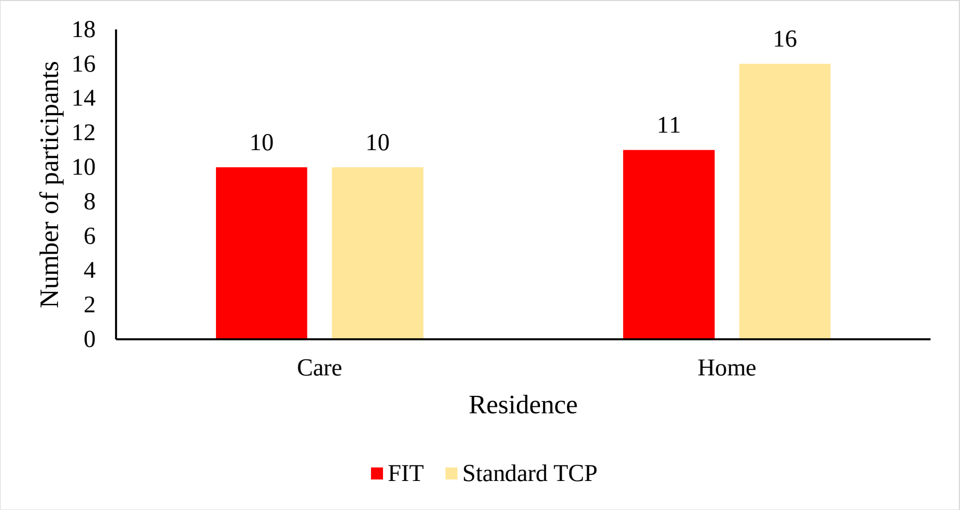

Figure 5.10. Residence of FIT and Standard TCP participants at six-months.

Table 5.6

Comparison of residence at discharge and six-months

	Six-months home	Six-months care
Discharge home	27	2
Discharge care	0	17

Table 5.7

Six-month residence by group

	FIT	Standard TCP
Home	10	16
Care	11	10

Six-month residence by group is reported in Table 5.7. There was a small reduction in participants living in both residential care (three participants died) and at home (two participants died, one was missing and two moved into residential care) at the six-month assessment.

Overall, there was a highly statistically significant association between discharge destination and six-month residence with most participants maintaining their discharge destination for up to six-months post-admission.

5.3.3 Discharge outcomes were comparable for home and care

Table 5.8 displays discharge outcomes for the variables of balance, function, lower limb strength, depression, health-related quality of life and discharge destinations for the entire group. There were no statistically significant differences for the entire group between participants discharged home or into care for any of the measures. There was considerable overlap in score for each outcome and discharge destination.

Table 5.8

Outcome measure scores and destination at discharge for entire group

Outcome	Measure and median score (IQR) on DC from TCP	Home *n* = 32	Care *n* = 21	Mann-Whitney *U*	*p*
Balance	BBS	50.5 (39.25 - 53)	47 (41.5 - 51.5)	371.5	.517
Function	DEMMI	67 (57 - 82.25)	62 (57 - 74)	366.5	.574
Lower limb performance	FTSTS	19.45 (14.94 – 24.46)	20.6 (14.49 – 29.64)	288.0	.383
Depression	GDS15	3 (2 - 5)	3 (2.5 - 8)	270.0	.224
Health-related quality of life	EQ5D-3L TTO	.70 (.62 - .83)	0.62 (.53 - .72)	415.0	.149
	EQ5D-3L VAS	72.5 (55.75 - 90)	70 (50 - 72.5)	437.5	.062

Note. Care = residential care; IQR = interquartile range; TCP = transition care program; BBS = Berg Balance Scale; DEMMI = de Morton Mobility Index; GDS15 = Geriatric Depression Scale 15; EQ5D-3L TTO = EuroQol three level time trade-off; EQ5D-3L VAS = EuroQol three level visual analogue scale.

5.3.4 Participant expected and actual discharge destination

5.3.4.1 Expected and actual discharge destination

There were 53 participants who were discharged to long-term care or home (including the participant who discharged himself home). The expected and actual discharge locations are shown in Table 5.9.

Table 5.9

Expected and actual discharge destination

		Expected				
		Home		Care		Total
		FIT	Standard TCP	FIT	Standard TCP	
Actual	Home	12	18	0	2	32
		FIT	Standard TCP	FIT	Standard TCP	
Actual	Care	6	7	6	2	21
Total		43		10		53

For the entire group, a statistically significant association was found between expected discharge destination and actual destination ((χ^2 = 8.40, *df* = 1, *p* = .004). Of the 53 participants with known discharge locations, 43 had been expecting to go home when asked at TCP admission and 30 of these 43 people actually did get home. There were 10 participants who expected to go into care when asked at TCP admission and of these 8 were discharged to care. For all participants, 72% (38/53) were discharged to the location that they expected. For the FIT group, a Fisher's exact test of association found a statistically significant association between expected discharge destination and actual destination, $p = .014$. This represented 75% (18/24) of the group being discharged to their expected location. For the Standard TCP group, a Fisher's exact test of association did not show any association between expected discharge destination and actual destination, $p = .568$. For the Standard TCP group, 69% (20/29) were discharged to the location they expected at TCP admission.

5.3.4.2 Participants remained at expected discharge location at six-months from admission

At six-months after admission to TCP, 70% (33/47) of the entire group were still living at the location they expected when asked at TCP admission. A Fisher's exact test of association for the entire group showed a statistically significant association between the expected discharge location and actual location of residence, $p = .007$ (Table 5.10).

For the FIT group, a Fisher's exact test showed a statistically significant association between expected discharge destination at admission to TCP and the participants' actual residence at six-months, $p = .035$ (Table 5.10). There were 71% (15/21) of participants who were still at the residence that they expected at six-months. For the Standard TCP group, the Fisher's exact test did not reveal an association between the expected discharge destination and actual residence at six-months, $p = .264$ (Table 5.10). There were 69% (18/26) of participants who were living at the residence that they expected.

Table 5.10

Expected and actual residence at six-months

		Expected				
		Home		Care		
		FIT	Standard TCP	FIT	Standard TCP	Total
Actual	Home	11	15	0	1	27
		FIT	Standard TCP	FIT	Standard TCP	20
Actual	Care	6	7	4	3	
	Total	39		8		47

Overall, the majority of participants were at the residence that they expected when asked at admission to transition care and this was maintained from discharge (72% of participants) to six-months (70% of participants) (*p* < .05). At discharge 28% of participants and at six-months 30% of participants were at an alternative form of residence.

5.3.5 Provision of additional functional training did not alter secondary outcomes compared to usual care

Gains in function, health-related quality of life and depression at each assessment which are summarised in this section were not significantly different between the two groups in this study (Figures 5.11-5.16). Scores for each outcome measure at admission, discharge and six-months are summarised in Table 5.11. Of note, the

DEMMI was normally distributed at admission only. Non-parametric analysis was therefore used to analyse this data.

Despite randomisation, at admission the Standard TCP group was statistically significantly better than the FIT group in terms of function and balance as measured on the DEMMI (U = 263.0, p = .006) and the BBS (U = 270.5, p = .014). At discharge, the Standard TCP group remained statistically significantly better on the DEMMI (U = 305.0, p = .033). There were no other significant differences found between the two groups at admission, discharge or six-months. These data are explored in detail following Table 5.11 and Figures 5.11–5.16.

Table 5.11

Scores for FIT and Standard TCP groups of outcome measures at three assessment points

	Admission		Discharge		Six-months	
Variable Median (IQR)	FIT	Standard TCP	FIT	Standard TCP	FIT	Standard TCP
BBS	34 (26 – 46)	44 (36 – 51)	45 (36 – 52)	48 (41.25 – 53)	45 (36 – 52)	50 (44 – 54)
DEMMI	53 (41 – 62)	62 (53 – 74)	62 (53 – 74)	67.0 (58.25 – 85)	62 (53 – 74)	67 (58.25 – 85)
FTSTS	22 (15.63 – 29.76)	19.5 (15 – 30)	17.16 (11.46 – 24.83)	18.4 (13.81 – 24.6)	14.41 (10.47 – 31.88)	14.78 (12.05 – 21.71)
GDS15	5 (3 – 7)	4 (2 – 7)	3 (2.25 – 4.75)	3.5 (2 – 7)	3 (2 – 4.75)	2 (1 – 5.75)
EQ5D-3L VAS	50 (46.25 – 70)	50 (50 – 73.75)	68 (50 – 80)	70 (50 – 80)	65.5 (50 – 80)	65 (50 – 80)

	Admission		Discharge		Six-months	
Variable Median (IQR)	FIT	Standard TCP	FIT	Standard TCP	FIT	Standard TCP
EQ5D-3L TTO	0.55 (0.28 – 0.66)	0.62 (0.52 – 0.71)	0.62 (0.29 – 0.74)	0.68 (0.61 – 0.84)	0.69 (0.53 – 0.81)	0.70 (0.59 – 0.96)

Note. Values are mean ± SD and median (interquartile range); BBS = Berg Balance Scale; DEMMI = De Morton Mobility Index; FTSTS = five times sit to stand test; GDS = Geriatric Depression Scale 15; EQ5D-3L = Euro-Qol EQ5D three level version; EQ5D-3L VAS = Euro-Qol visual analogue scale; TTO = Euro-Qol time trade-off.

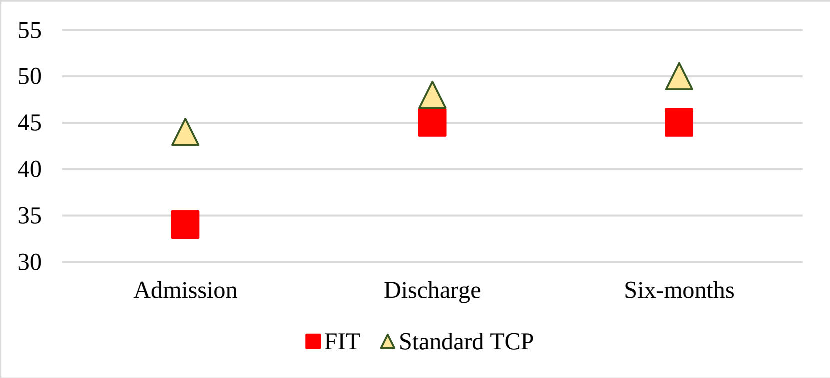

Figure 5.11. BBS median scores by group and assessment.

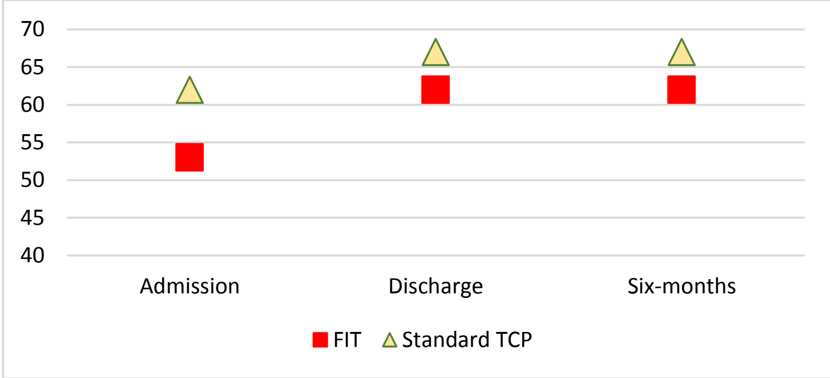

Figure 5.12. DEMMI median scores by group and assessment.

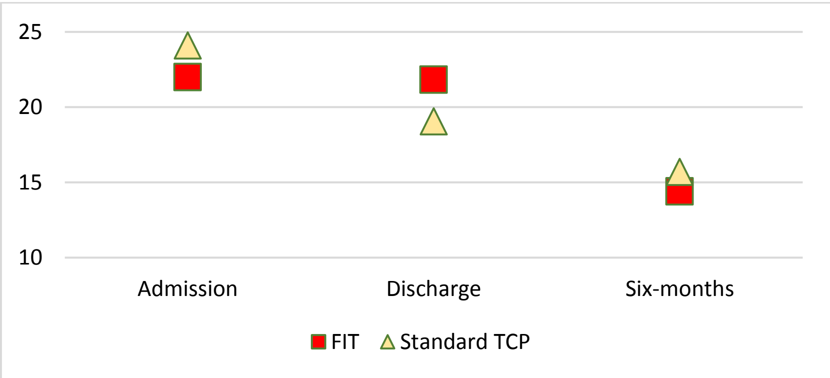

Figure 5.13. FTSTS median scores by group and assessment.

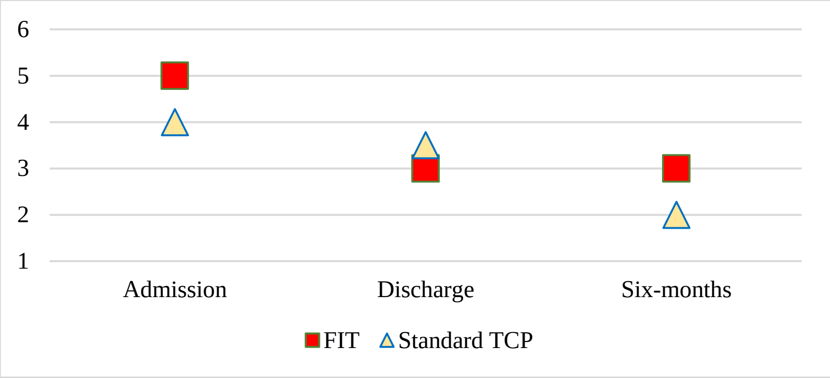

Figure 5.14. GDS15 median scores by group and assessment.

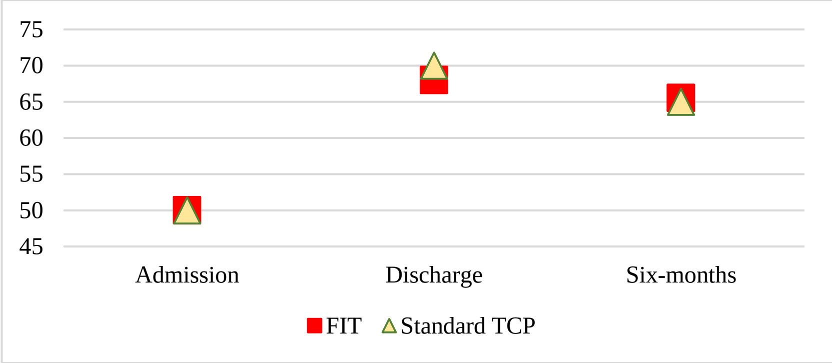

Figure 5.15. EQ5D-3L VAS median scores by group and assessment.

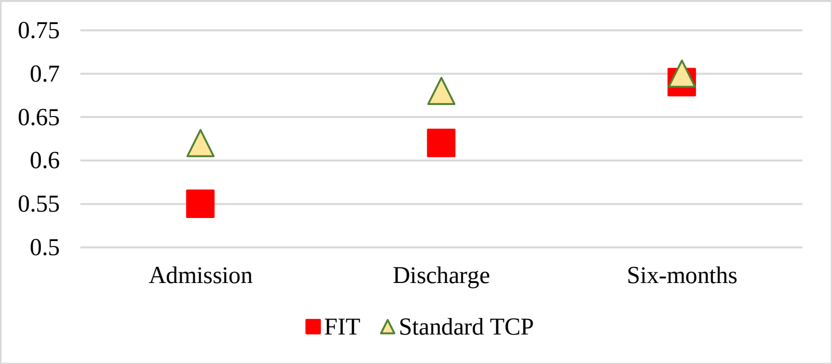

Figure 5.16. EQ5D-3L TTO median scores by group and assessment.

Table 5.12 shows a summary of these findings.

Table 5.12

Outcome measures with between groups statistical significance shown with a tick

	Admission	Discharge	6/12
BBS	✓ UC better	X	X
DEMMI	✓ UC better	✓ UC better	X
FTSTS	X	X	X
GDS15	X	X	X
EQ5D-3L	X	X	X
EQ5D-3L VAS	X	X	X
TTO	X	✓ UC better	X

Note. BBS = Berg Balance Scale; DEMMI = De Morton Mobility Index; FTSTS = five times sit to stand test; GDS = Geriatric Depression Scale 15; EQ5D-3L = Euro-Qol EQ5D three level version; EQ5D-3L VAS = Euro-Qol visual analogue scale; TTO = Euro-Qol time trade-off; ✓ = statistically significant; X = not statistically significant; UC = usual care group (Standard TCP group).

A summary of within group findings is given in Table 5.13. The FIT group significantly improved on the BBS, DEMMI and EQ5D-3L VAS from admission to discharge. The Standard TCP group showed also significant improvement for the BBS, DEMMI and EQ5D-3L TTO from admission to discharge. From admission to six-months the FIT group improved significantly on the BBS, DEMMI, FTSTS, GDS15 and the EQ5D-3L TTO. The Standard TCP group improved on the BBS, FTSTS, EQ5D-3L TTO and Usual Activity domain of the EQ5D-3L from admission to six-months.

Table 5.13

Within group improvements on outcome measures

	Admission to DC			Admission to 6/12			DC to 6/12		
Measure	All	FIT	Standard TCP	All	FIT	Standard TCP	All	FIT	Standard TCP
BBS	✓	✓	✓	✓	✓	✓	X	X	X
DEMMI	✓	✓	✓	✓	✓	X	X	X	X
FTSTS	✓	X	✓	✓	✓	✓	X	✓	X
GDS15	X	X	X	✓	✓	X	X	X	X
EQ5D-3L	X	X	X	✓Usual activities & self-care	X	✓Usual activities	X	X	✓ Usual activities
EQ5D-3L VAS	✓	✓	X	X	X	X	X	X	X
TTO	✓	X	✓	✓	✓	✓	X	X	X

Note. All = FIT and Standard TCP group; BBS = Berg Balance Scale; DEMMI = De Morton Mobility Index; FTSTS = five times sit to stand test; GDS = Geriatric Depression Scale 15; EQ5D-3L = Euro-Qol EQ5D three level version; EQ5D-3L

VAS = Euro-Qol visual analogue scale; TTO = Euro-Qol time trade-off; ✓ = statistically significant; X = not statistically significant.

5.3.5.1 Balance sub-analysis

Balance data from the BBS each time point are shown in Table 5.14 and Figure 5.11. Between group analysis using the Mann-Whitney *U* test showed a statistically significant difference between groups at baseline only (U = 336.0, Z = -1.46, p = .014). The Standard TCP group scored significantly better than the FIT group. At discharge and six-months there was no difference between groups (discharge U = 323.5, Z = -1.65, p = .098), six-months U = 336.0, Z = -1.46, p = .143). Although at admission the FIT group was less able than the Standard TCP group as measured on the BBS, at discharge, the two groups were comparable for balance.

Table 5.14

Balance scores (median and IQR) with statistical significance at three assessment points

	FIT median (IQR) *n* = 27	Standard TCP median (IQR) *n* = 32	Mann-Whitney *U* test, *p*
Baseline assessment	34 (26 – 46)	44 (36 – 52)	.014
TCP discharge assessment	45 (36 – 52)	48 (41.25 – 53)	.098
Six-month assessment	45 (36 – 52)	50 (44 – 54)	.143

Within the FIT group, using the Wilcoxon signed-rank test, there was a statistically significant improvement in balance from admission to discharge (Z = -3.84, p = .000) and from admission to the six-month assessment (Z = -4.17, p = .000). There was no significant change from discharge to the six-month assessment (Z = -.91, p = .364) showing that the early improvement was maintained. The Standard TCP group also showed significant improvement in balance from admission to discharge (Z = -4.06, p = .000) and from admission to the six-month assessment (Z = -2.81, p = .005). There was no statistically significant improvement from discharge to the six-month assessment (Z = -.11, p = .909) and scores were maintained. Median and IQR BBS change scores are shown in Table 5.15.

Table 5.15

Median change in balance by group for each assessment

	FIT (IQR) *n* = 27	Standard TCP (IQR) *n* = 32	Mann-Whitney *U* test, *P*
Baseline to TCP discharge assessment	7 (2 – 13)	3 (0 – 8)	0.07
TCP discharge to six-month assessment	0 (-2 – 3)	0 (-3 – 3.75)	.586
Baseline to six-month assessment	7 (2 – 14)	4 (0 – 8.75)	.069

5.3.5.2 Function sub-analysis

The DEMMI Rasch converted data were used for analysis of functional performance as recommended in the literature (de Morton et al., 2007, 2008a). Median and IQR data for the DEMMI is shown in Table 5.16 and Figure 5.12.

The Standard TCP group scored statistically significantly higher than the FIT group on the DEMMI at admission (U = 263.0, Z = -2.76, p = .006) and at discharge (U = 305.5, Z = -2.13, p = .033). There was no statistically significant difference found between groups at six-months (U = 317.5, Z = -1.73, p = .084). So, although the FIT group had statistically significantly lower scores on the DEMMI at baseline and discharge, they had improved such that their scores were comparable to the Standard TCP group at the six-month assessment.

Table 5.16

Function scores (median and IQR) at three assessment points

	FIT median (IQR) *n* = 27	Standard TCP median (IQR) *n* = 31	Mann-Whitney *U* test, *p*
Admission assessment	53 (41 – 62)	62 (53 – 74)	.006
TCP discharge assessment	62 (53 – 74)	67.0 (58.25 – 85)	.033
Six-month assessment	62 (53 – 74)	67 (58.25 – 85)	.084

Using the Wilcoxon signed-rank test for within group analysis with correction for multiple comparisons, the FIT group showed significant improvement in function from admission to discharge (Z = -3.79, p = .000) and from admission to the six-month assessment (Z = -4.02, p = .000). However, there was no change from discharge to the six-month assessment (Z = -1.69, p = .09). After adjustment for multiple comparisons, the Standard TCP group showed a significant change from admission to discharge (Z = -2.63, p = .009) but not from admission to the six-month assessment (Z = -2.18, p = .029) or from discharge to the six-month assessment (Z = -0.22, p = .826).

The median changes in DEMMI scores are shown in Table 5.17. The change data for the groups was not normally distributed. Using a Mann-Whitney *U* test, median change scores were compared and were not statistically significantly different between groups at any time point. The FIT group median improvement was 12 points (*IQR* 1.25 – 17.25) and the Standard TCP group median improvement was 7 points (*IQR* = 0 – 14)) from admission to six-months.

Table 5.17

Function median change score by group, assessment

	FIT (IQR) *n* = 28	Standard TCP (IQR) *n* = 31	Mann-Whitney *U* test, *p*
Baseline to TCP discharge assessment	10.5 (0 – 17.25)	5.0 (0 – 11.0)	.157
TCP discharge to six-month assessment	0	0	.372
Baseline to six-month assessment	12 (1.25 – 17.25)	7 (0 – 14)	.116

5.3.5.3 Sit to stand sub-analysis

There were three participants who were unable to complete the five times sit to stand at the initial assessment but were able to at later assessments (FIT group $n = 2$, Standard TCP group $n = 1$). Participant information by group is reported in Table 5.18. Median and IQR data is found in Tables 5.19 and 5.20 as well as Figure 5.13.

Table 5.18

Number of participants measured on FTSTS at each assessment

	Admission	Discharge	Six-months
FIT	2 participants missing, 2 unable, 24 measured	2 participants missing, 26 measured	2 participants missing, 26 measured
Standard TCP	1 participant unable, 31 measured	0 missing, 32 measured	0 missing, 32 measured

Some participants took an excessively long while to complete the FTSTS, i.e. from 86-106 seconds and they were thus outliers (1.5(IQR)). The data for these participants has been omitted from the data table as shown in Table 5.19 and then included in Table 5.20. This demonstrated that their inclusion made little difference to the data. As these participants were part of this study and this was real life data, the outliers have been included in all further data analysis. There were no significant differences between the groups at any assessment on the FTSTS.

Table 5.19

Median and IQR FTSTS scores by assessment for FIT and Standard TCP groups, outliers removed

	FIT median (IQR)	Standard TCP median (IQR)	Mann-Whitney *U* test, *p*
Admission assessment	22.0 (15.60 – 30)	24.1 (15.1 – 31.8)	.834
TCP discharge assessment	20.6 (14.65 – 27.4)	18.75 (14.31 – 24.16)	.694
Six-month assessment	13.6 (10.19 – 22)	16.53 (12.03 – 24.01)	.490

Table 5.20

Median and IQR FTSTS scores by assessment for FIT and Standard TCP groups, outliers included

	FIT median (IQR)	Standard TCP median (IQR)	Mann-Whitney *U* test, *p*
Admission assessment	22.0 (15.6 – 29.8)	24.1 (14.7 – 31.8)	.953
TCP discharge assessment	21.84 (15.51 – 28.50)	19.06 (14.4 – 24.6)	.373
Six-month assessment	14.41 (10.47 – 31.88)	15.71 (12.05 – 23.52)	.975

Within groups scores showed no statistically significant improvement for the FIT group from admission to discharge using the Wilcoxon signed-rank test ($Z = -1.22$, $p = .223$). From admission to the six-month assessment ($Z = -2.52$, $p = .012$) and discharge to the six-month assessment ($Z = -2.42$, $p = .016$) there was a statistically significant improvement for the FIT group. After adjustment for multiple comparisons, there was a statistically significant improvement for the Standard TCP group from admission to discharge, ($Z = -2.4$, $p = .016$) and from admission to the six-month assessment ($Z = -2.43$, $p = .015$). There was no significant improvement for the Standard TCP group from discharge to the six-month assessment ($Z = -1.28$, $p = .20$).

The change scores for each group between assessment points are in Table 5.21. These change scores were not normally distributed. Statistical significance between groups was calculated using Mann-Whitney *U* and there were no significant findings.

Table 5.21

FTSTS median score change by group, assessment

	FIT (IQR)	Standard TCP (IQR)	Mann-Whitney *U* test, *p*
Baseline to TCP discharge assessment, *n* = 55	-.16 (-1.87 – 0.1)	-1.8 (-6.54 – .55)	.281
TCP discharge to six-month assessment, *n* = 58	-1.72 (-5.0 – 0)	-.17 (-7.63 – .38)	.410
Baseline to six-month assessment, *n* = 55	-4.11 (-14.34 – -.38)	-3.9 (-12.28 – .13)	.552

5.3.5.4 Depression sub-analysis

Median and IQR data for depression in the two groups are found in Table 5.22 and Figure 5.14. There were no significant differences in depression between groups at any of the assessments.

Table 5.22

Depression scores (median and IQR) at three assessment points

	FIT median (IQR) n = 28	Standard TCP median (IQR) n = 32	Mann-Whitney U test, p
Admission assessment	5 (3 – 7)	4 (2 – 7)	.561
Discharge assessment	3 (2.25 – 4.75)	3.5 (2 – 7)	.834
Six-month assessment	3 (2 – 4.75)	2 (1 – 5.75)	.368

At the initial assessment the FIT group scored a median of five points on the GDS15 indicating mild depression (Greenberg, 2007). Using a multiple comparison correction ($p < .0166$), there was a statistically significant improvement from admission to the six-month assessment for the FIT group ($Z = -2.89$, $p = .004$). There was no statistically significant change in depression across the other assessments including from admission to discharge for the FIT group ($Z = -1.91$, $p = .056$). At the six-month assessment, the median depression score of three suggests that the participants were no longer depressed. The Standard TCP group median was below five points at each assessment indicating that the group as a whole were not uniformly depressed. There were no significant changes in depression for the Standard TCP group.

As noted previously in Chapter 4, participants scoring 0–4 points are likely not to be depressed, those scoring 5–8 points are likely to be suffering from mild depression, those scoring 9–11 points have moderate depression and those scoring 12–15 points show severe depression (Greenberg, 2007). Scores for the two groups in these categories at each assessment point are found in Table 5.23. There were no differences between the two groups in any of these categories, as shown in Table 5. 23.

Table 5.23

Depression level by group and assessment

	Admission assessment		Discharge assessment		Six-month assessment	
	FIT *n* = 28	Standard TCP *n* = 32	FIT *n* = 28	Standard TCP *n* = 32	FIT *n* = 28	Standard TCP *n* = 32
Not depressed (0 – 4 points)	13	18	21	19	21	23
Mild depression (5 – 8 points)	12	8	4	9	7	3
Moderate depression (9 – 11 points)	3	4	2	4	0	5
Severe depression (12 – 15 points)	0	2	1	0	0	1

The GDS15 can also be reported in terms of depression or no depression as seen in Table 5.25. GDS15 scores were transformed into categories of 0–4 and 5–15 where those scoring 5–15 may have signified depression (Pocklington et al., 2016).

There was no statistically significant difference between the two groups for depression / no depression at any assessment as seen in Table 5.24. The addition of the FIT intervention did not reduce depression (Table 5.24).

Table 5.24

Depression or not by group and assessment

		Depressed	Not depressed	χ^2	*P*
Admission	FIT	15	13	0.58	.448
	Standard TCP	14	18		
Discharge	FIT	7	21	1.64	.2
	Standard TCP	13	19		
Six-months	FIT	7	21	0.07	.85
	Standard TCP	9	23		

For the FIT group there were eight people no longer depressed when they were discharged from TCP and this was maintained until the six-month assessment. For the Standard TCP group there was one person who was no longer depressed when they were discharged from transition care and a further four were no longer depressed when tested at the six-month assessment. Median GDS15 score change for each group and assessment are shown in Table 5.25. There were no statistically significant changes in depression between the intervention and usual care group at any time point.

Table 5.25

Depression median change score by group and assessment

	FIT (IQR) *n* = 28	Standard TCP (IQR) *n* = 32	Mann-Whitney *U* test, *p*
Baseline to TCP discharge assessment	-1 (-3 – 1)	0 (-2 – 0)	.793
TCP discharge to six-month assessment	0 (-2 – 1)	0 (-2 – 0)	.533
Baseline to six-month assessment	-1 (-3 – 0)	-1 (-2.75 – 0)	.857

5.3.5.5 Health-related quality of life sub-analysis

5.3.5.5.1 Health-related quality of life visual analogue scale analysis

Median and IQR data for the assessment periods between groups for the EQ5D-3L VAS are reported in Table 5.26 and Figure 5.15. There were no significant differences in quality of life at any time point between the two groups.

Table 5.26

Health-related quality of life VAS scores (median and IQR) at three assessment points

	FIT median (IQR) *n* = 28	Standard TCP median (IQR) *n* = 32	Mann-Whitney *U* test, *p*
Admission	50 (46.25 – 70)	50 (50 – 73.75)	.844
TCP discharge assessment	68 (50 – 80)	70 (50 – 80)	.905
Six-month assessment	65.5 (50 – 80)	65 (50 – 80)	.94

For the FIT group there was a statistically significant improvement from admission to discharge for health-related quality of life on the EQ5D-3L VAS, ($Z = -2.56$, $p = .01$). There were no other statistically significant findings for the FIT or Standard TCP groups for the EQ5D-3L VAS. Median change by group at each assessment is shown in Table 5.27. The amount of change was comparable for the two groups.

Table 5.27

Health-related quality of life VAS median change score by group and assessment

	FIT (IQR) *n* = 28	Standard TCP (IQR) *n* = 32	Mann-Whitney *U* test, *p*
Baseline to TCP discharge assessment	2.5 (0 – 23.75)	5 (0 – 26)	.862
TCP discharge to six-month assessment	0 (17.5 – 3.75)	0 (-13.75 – 5)	.687
Baseline to six-month assessment	2.5 (0 – 20)	0 (0 – 20)	.701

5.3.5.5.2 Health-related quality of life five domains analysis

Data for the group as a whole for each of the five domains of the EQ5D-3L is presented in Table 5.28 and 5.29 according to the EuroQol User Guide (2015). There was no difference between groups for any of the domains either at discharge or at six-months as tested using the Mann-Whitney *U* test.

Scores within groups were examined using the Wilcoxon signed-rank test with a multiple comparison correction. Within the groups the only change for the five domains was a significant improvement for the Standard TCP group from admission to the six-month assessment on the usual activity domain (Z = -2.97, p = .003).

Table 5.29 shows that for both groups changes were not statistically significant. The domain of usual activities showed the greatest improvement for both groups from admission to six-months, even though it was small. The number of participants with no problems during this time increased from 3-11 for the FIT group and 8-18 for the Standard TCP participants.

Table 5.28

Health-related quality of life data for participants by group and domain at three assessment points

EQ5D-3L Dimension		Admission assessment FIT n = 28	Admission assessment Standard TCP n = 32	Discharge assessment FIT n = 28	Discharge assessment Standard TCP n = 32	Six-months assessment FIT n = 28	Six-months assessment Standard TCP n = 32
Mobility	No problems	6	9	7	14	11	14
	Some problems	20	23	20	18	17	18
	Severe problems	2	0	1	0	0	0
Self-care	No problems	8	17	11	19	13	21
	Some problems	17	14	15	13	14	11
	Severe problems	3	1	2	0	1	0
Usual activities	No problems	3	8	8	12	11	18
	Some problems	16	21	13	20	11	14
	Severe problems	9	3	7	0	6	0
Pain or discomfort	No pain	8	9	5	14	12	13
	Moderate pain	16	22	18	17	12	17
	Severe pain	4	1	5	1	4	2

EQ5D-3L Dimension		Admission assessment FIT *n* = 28	Admission assessment Standard TCP *n* = 32	Discharge assessment FIT *n* = 28	Discharge assessment Standard TCP *n* = 32	Six-months assessment FIT *n* = 28	Six-months assessment Standard TCP *n* = 32
Anxiety or depression	No problems	14	15	18	19	18	18
	Some problems	12	13	8	13	10	13
	Severe problems	2	4	2	0	0	1

Table 5.29

Health-related quality of life numbers of participants by group by problems/no problems and domains at three assessment points

		Admission		Discharge		Six-months	
		FIT	Standard TCP	FIT	Standard TCP	FIT	Standard TCP
		n = 28	*n* = 32	*n* = 28	*n* = 32	*n* = 28	*n* = 32
Mobility	No problems	6	9	7	14	11	14
	Problems	22	23	21	18	17	18
Self-care	No problems	8	17	11	19	13	21
	Problems	20	15	17	13	15	11
Usual activities	No problems	3	8	8	12	11	18
	Problems	25	24	20	20	17	14
Pain or discomfort	No problems	8	9	5	14	12	13
	Problems	20	23	23	18	16	19
Anxiety or depression	No problems	14	15	18	19	18	18
	Problems	14	17	10	13	10	14

5.3.5.5.3 Health-related quality of life time trade-off analysis

Quality of life data for each time period is reported in Table 5.30 and Figure 5.16. FIT group health-related quality of life scores were lower than Standard TCP scores at each assessment (indicating lower health-related quality of life for the FIT group). At discharge the Standard TCP group scored statistically higher than the FIT group.

Table 5.30

Health-related quality of life TTO scores for FIT and Standard TCP groups at three assessment points

	FIT median (*IQR*) *n* = 28	Standard TCP median (*IQR*) *n* = 32	Mann-Whitney *U* test, *p*
Admission assessment	0.55 (0.28 – 0.66)	0.62 (0.52 – 0.71)	.073
Discharge assessment	0.62 (0.29 – 0.74)	0.68 (0.61 – 0.84)	.040
Six-month assessment	0.69 (0.53 – 0.81)	0.70 (0.59 – 0.96)	.342

Using the Wilcoxon signed-rank test and multiple comparisons correction, the FIT group showed no significant improvement in the EQ5D-3L TTO score from admission to discharge (Z = 1.14, p = .253) or discharge to the six-month assessment (Z = -1.43, p = .153). However, there was a statistically significant improvement from admission to the six-month assessment (Z = -2.71, p = .007). The Standard TCP group increased statistically significantly from admission to discharge (Z = -2.62, p = .009) and admission to six-months (Z = -2.49, p = .013). There was no statistically significant change from discharge to the six-month assessment (Z = -.50, p = .616). Median change scores for the EQ5D-3L time trade-off for both groups are reported in Table 5.31.

Table 5.31

Health-related quality of life TTO median change score by group, assessment and significance

	FIT Median (*IQR*) *n* = 28	Standard TCP Median (*IQR*) *n* = 32	Mann-Whitney *U* test, *p*
Admission to TCP discharge assessment	0.04 (0.07 – 0.23)	0.08 (0.0 – 0.28)	.37
TCP discharge to six-months	0.0 (0.0 – 0.23)	0.0 (-0.06 – 0.12)	.5
Admission to six-month assessment	0.11 (0 – 0.21)	0.09 (0 – 0.23)	.988

The median EQ5D-3L TTO change scores between groups were not statistically significant as shown in Table 5.31. The greatest change (improvement) for the FIT group was from admission to six-months but for the Standard TCP group was from admission to discharge.

Not all outcome variables improved as a result of adding functional exercise to the standard transition care. Although the participants were randomised, they were not equal at baseline. The FIT group were less able as measured on balance and function at admission. The FIT group improved more than the Standard TCP group from admission to discharge on the EQ5D-3L VAS. Scores for the EQ5D-3L TTO and GDS15 improved more slowly, from admission to six-months for the FIT group.

In all cases the scores were maintained when retested at the six-month assessment.

5.3.6 Adding functional training was not associated with clinically significant changes

It is important to determine whether changes in health and wellbeing over an episode of care are clinically significant and make a noticeable difference to the person (Scott, 2011). For this reason, in addition to examining whether change in each of the variable over time was statistically significant we tested whether changes were clinically significant. To this end, as detailed in Chapter Four, the clinical significance was quantified using equations based upon minimal detectable change rates that were retrieved from the literature (BBS (Donoghue & Stokes, 2009), DEMMI (de Morton & Lane, 2010) and EQ5D-3L VAS (Pickard et al., 2007)). When minimal detectable change rates were not available for a similar cohort, it was calculated from data in this study (FTSTS, GDS15 and EQ5D-3L TTO). The minimal detectable changes were calculated from the trial data using the equation on page 171 in Chapter 4, section 4.8.

5.3.6.1 Minimal detectable change in balance at discharge and six-months

The MDC was derived from the data reported by Donoghue and Stokes (2009) as described on pages 139-140 of this thesis. BBS scores by categories, groups and time points are shown in Table 5.32 and Figure 5.17. The number of participants in each group achieving above the minimal detectable change as per Donoghue and Stokes (2009) at discharge from the TCP and six months from admission are seen in Tables 5.33 and 5.34. No between groups difference were seen at any time point, indicating that differences were not clinically significant.

Table 5.32

Balance scores by group and assessment

	Admission		Discharge		Six-months	
	FIT	Standard TCP	FIT	Standard TCP	FIT	Standard TCP
	n	*N*	*n*	*n*	*n*	*n*
0 – 24	6	1	2	1	2	2
25 – 34	8	5	2	0	3	0
35 – 44	5	10	8	7	8	7
45 – 56	8	16	15	24	14	23

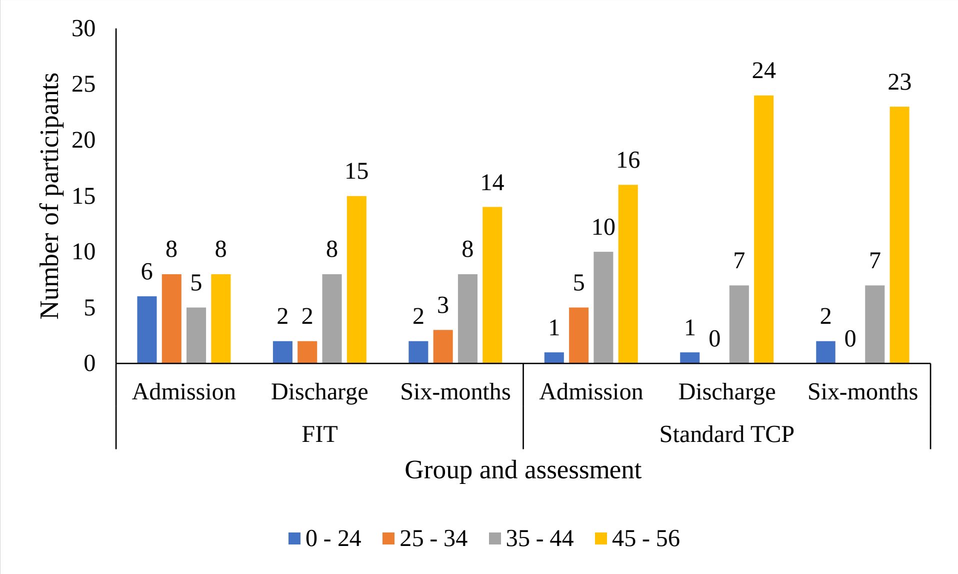

Figure 5.17. BBS scores by group, category and assessment.

Table 5.33

Balance improvement by MDC from admission to discharge

	Improved by MDC	Did not improve by MDC	Chi-square, *p*
FIT	16	11	.095
Standard TCP	12	20	

Table 5.34

Balance improvement by MDC from admission to six-months

	Improved by MDC	Did not improve by MDC	Chi-square, *p*
FIT	16	11	.477
Standard TCP	16	16	

5.3.6.2 Minimal detectable change in function at discharge and six-months

The MDC for the DEMMI was reported as 10.5 points by de Morton and Lane (2010) for a comparable sample. Tables 5.35 and 5.36 show the number of participants achieving this amount of change at discharge and six-months. There was a significant between groups difference at discharge in favour of the FIT group but not at the six-months re-assessment.

Table 5.35

Function improvement by MDC from admission to discharge

	Improved by MDC	Did not improve by MDC	Chi-square, *p*
FIT	14	14	.045
Standard TCP	8	24	

Table 5.36

Function improvement by MDC from admission to six-months

	Improved by MDC	Did not improve by MDC	Chi-square, *p*
FIT	15	13	.212
Standard TCP	12	20	

Twice as many of the FIT group achieved an MDC for function from admission to discharge in comparison with the Standard TCP group (50% for FIT group versus 25% of Standard TCP) (□2 = 4.02, p = .045).

5.3.6.3 Minimal detectable change in performance of sit to stand at discharge and six-months

Given no reference data in the literature, the *SEM* was used to determine MDC for this variable (see data analysis Chapter 4, section 4.8). The SEM of 3.31 seconds was used as the minimal detectable change (de Vet et al., 2006). Tables 5.37 and 5.38 show the numbers of participants in both groups achieving this change at discharge and six-months. No between groups difference were seen at any time point, indicating that differences were not clinically significant.

Table 5.37

Sit to stand improvement by MDC from admission to discharge

	Improved by MDC	Did not improve by MDC	Chi-square, *p*
FIT	5	19	.098
Standard TCP	13	18	

Table 5.38

Sit to stand improvement by MDC from admission to six-months

	Improved by MDC	Did not improve by MDC	Chi-square, *p*
FIT	11	15	.851
Standard TCP	16	15	

Records were also kept of whether participants were able to stand independently or needed the assistance of their hands on the chair to push up into standing. Figure 5.18 shows the number of participants able to stand independently at each assessment period. This measure may be of clinical importance to carers and participants with regard to their independence. There was no statistically significant difference found between groups for standing without using the hands as shown in Tables 5.39, 5.40 and 5.41.

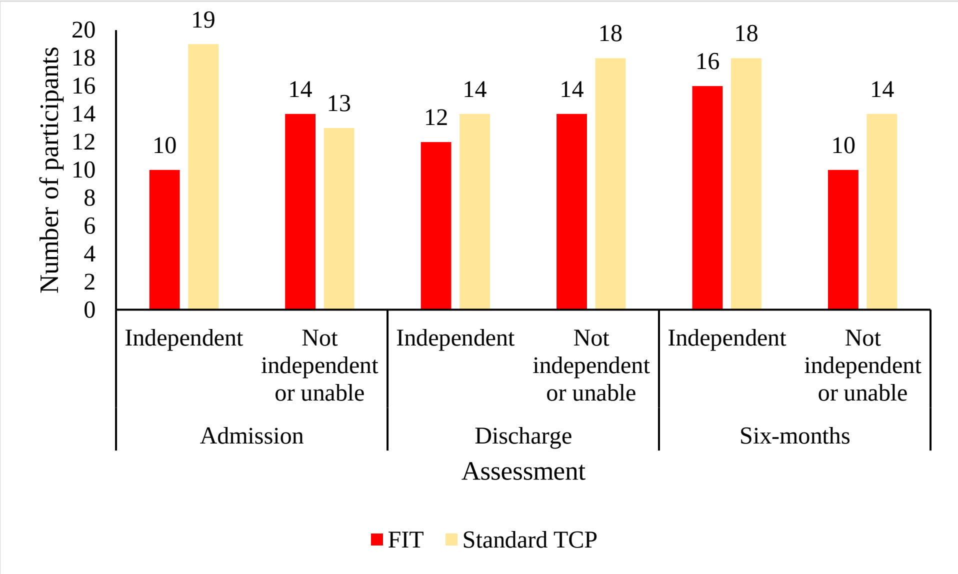

Figure 5.18. FTSTS independence for two groups.

Table 5.39

Ability to complete sit to stand independently at admission

	Independent	Not independent or unable	Chi-square, *p*
FIT	10	14	.189
Standard TCP	19	13	

Table 5.40

Ability to complete sit to stand independently at discharge

	Independent	Not independent or unable	Chi-square, *p*
FIT	12	14	.855
Standard TCP	14	18	

Table 5.41

Ability to complete sit to stand independently at six-months

	Independent	Not independent or unable	Chi-square, *p*
FIT	16	10	.684
Standard TCP	18	14	

5.3.6.4 Minimal detectable change for depression at discharge and six-months

As the MDC has not been established for the GDS15 for a similar cohort, the *SEM* of 1.44 points as calculated from this study was used. MDC changes are reported in Tables 5.42 and Table 5.43.

Table 5.42

Depression improvement by MDC from admission to discharge

	Improved by MDC	Did not improve by MDC	Chi-square, *p*
FIT	10	18	.714
Standard TCP	10	22	

Table 5.43

Depression improvement by MDC from admission to six-months

	Improved by MDC	Did not improve by MDC	Chi-square, *p*
FIT	13	15	.651
Standard TCP	13	18	

A Chi-square test of association was conducted to investigate the relationship between participants attaining the MDC and their grouping. No between groups difference were seen at any time point, indicating that differences were not clinically significant.

5.3.6.6 Health-related quality of life (time-trade off) minimal detectable change at discharge and six-months

No participants achieved the SEM (≥.13) for this variable (Tables 5.46 and 5.47).

Table 5.46

Health-related quality of life TTO improvement by MDC from admission to discharge

	Improved by MDC	Did not improve by MDC	Chi-square, *p*
FIT	0	28	.368
Standard TCP	0	32	

Table 5.47

Health-related quality of life TTO improvement by MDC from admission to six-months

	Improved by MDC	Did not improve by MDC	Chi-square, *p*
FIT	0	28	.964
Standard TCP	0	32	

Overall, there were no significant findings between groups for MDC except for function measured by the DEMMI at discharge when more of the FIT group achieved noticeable change than the Standard TCP group.

5.3.6.5 Minimum detectable change of health-related quality of life visual analogue scale at discharge and six-months

The minimal important finding was defined as a change of 7 points by Pickard et al (2007). Both groups improved comparably on the EQ5D-3L VAS as shown in Tables 5.44 and Table 5.45. No between groups differences were seen at any time point, indicating that differences were not clinically significant.

Table 5.44

Health-related quality of life VAS improvement by MDC from admission to discharge

	Improved by MDC	Did not improve by MDC	Chi-square, *p*
FIT	13	15	.782
Standard TCP	16	16	

Table 5.45

Health-related quality of life VAS improvement by MDC from admission to six-months

	Improved by MDC	Did not improve by MDC	Chi-square, *p*
FIT	13	15	.835
Standard TCP	14	18	

5.3.7 Changes in frailty with transition care

5.3.7.1 Most participants in the bed-based transition care program were frail or pre-frail

At baseline there were 28 frail participants, 25 pre-frail participants and 7 robust participants in the sample as a whole. Thus, the majority of participants were frail or pre-frail (n = 53 out of 60) at admission to transition care.

5.3.7.2 Frailty level for participants decreased during the six-months of the study

As shown in Figure 5.19, for the sample as a whole, the number of participants meeting the definition of frail or pre-frail decreased from admission to six-months after admission. There was a statistically significant improvement in the level of frailty, as tested on the sign test, from admission to the six-month assessment (p = .002).

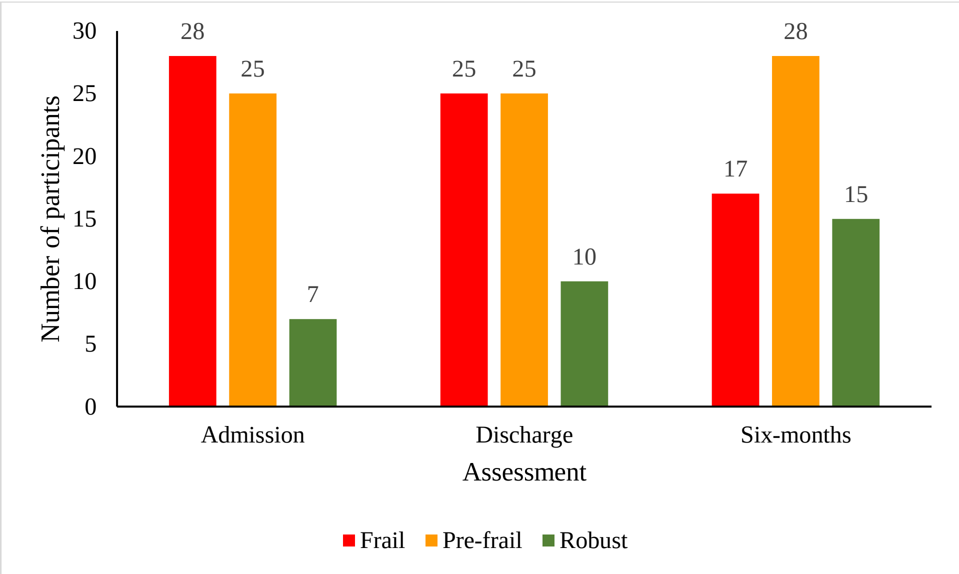

Figure 5.19. Frailty level at each assessment.

5.3.7.3 The intervention group showed greater improvement in frailty from admission to six-months

The numbers of frail, pre-frail and robust participants by group and assessment are shown in Figure 5.20. Change in frailty level from admission to six-months is shown in Table 5.48.

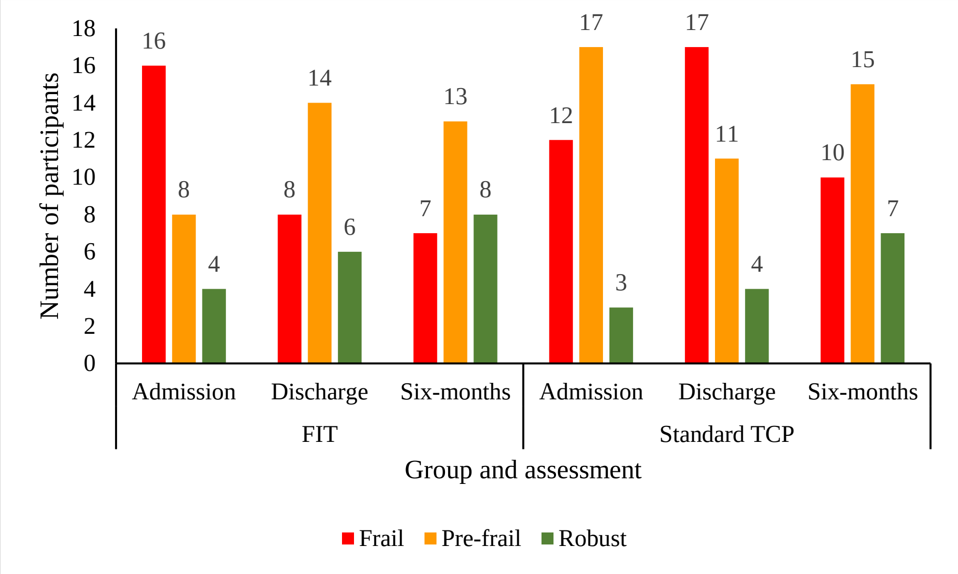

Figure 5.20. Frailty level by group and assessment.

Table 5.48

Group frailty changes from admission to six-months

		FIT *n* = 28 (%)	Standard TCP *n* = 32 (%)
Admission to six-month assessment	No change	14 (50.0)	21 (65.6)
	Worsened	2 (7.1)	3 (9.4)
	Improved	12 (42.9)	8 (25.0)

There was a statistically significant improvement in frailty for the FIT group as tested on a sign test from admission to six-months (p = .003). There was no statistically significant change for the Standard TCP group.

For the FIT group, at discharge and six-months there were less than half the number of frail participants in comparison with at admission (admission frail n = 16, discharge frail n = 8, six-months frail n = 7). In addition, there were twice as many participants who were classified as robust at six-months in comparison with admission (admission robust n = 4, six-months robust n = 8). The Standard TCP group showed no statistically significant improvement in changes of frailty level.

5.3.7.4 Frailty level was associated with functional performance, health-related quality of life and depression at discharge and six-month assessments

Frailty was correlated in some instances with outcome variables as shown in Table 5.49. For each outcome variable, the scores changed in the predicted direction, with the classification of frail, pre-frail or robust. As balance, function and health-related quality of life increased (improved) it was less likely that the participant was pre-frail or frail.

Function, as measured by the BBS, DEMMI and FTSTS, was significantly correlated with frailty at each time point (Table 5.49). Health-related quality of life was weakly yet positively correlated with frailty at admission and six-months but not at discharge. It appeared that there was a greater association between function, health-related quality of life and frailty than there was for depression and frailty.

Table 5.49

Correlations between function, quality of life and depression at each assessment

Timeframe	Variable	Measure	Spearman's rho	*p*
Admission	Balance	BBS	.39	.002*
	Function	DEMMI	.48	.000*
	Lower limb performance	FTSTS	-.32	.016*
	Depression	GDS15	-.15	.239
	Health-related quality of life	EQ5D-3L VAS	.22	.086
		TTO	.28	.032*
Discharge	Balance	BBS	.29	.027*
	Function	DEMMI	.31	.015*
	Lower limb performance	FTSTS	-.31	.018*
	Depression	GDS15	-.06	.623
	Health-related quality of life	EQ5D-3L VAS	.25	.058
		TTO	.19	.142
Six-months	Balance	BBS	.54	.000*
	Function	DEMMI	.52	.000*
	Lower limb performance	FTSTS	-.35	.007*
	Depression	GDS15	-.15	.257
	Health-related quality of life	EQ5D-3L VAS	.37	.003*
		TTO	.28	.031*

Note. A positive change in FTSTS score is a reduction in the time taken.

5.3.7.5 Frail participants at discharge were more likely to be institutionalised

At discharge, 11 of the 21 participants transferred into long-term institutional care were assessed as frail. There was no association found between their discharge destination (home or care) and frailty (yes or no) using a Chi-square test of association (χ^2 = .71, *df* = 1, *p* = .4) (Figure 5.21 and Table 5.50).

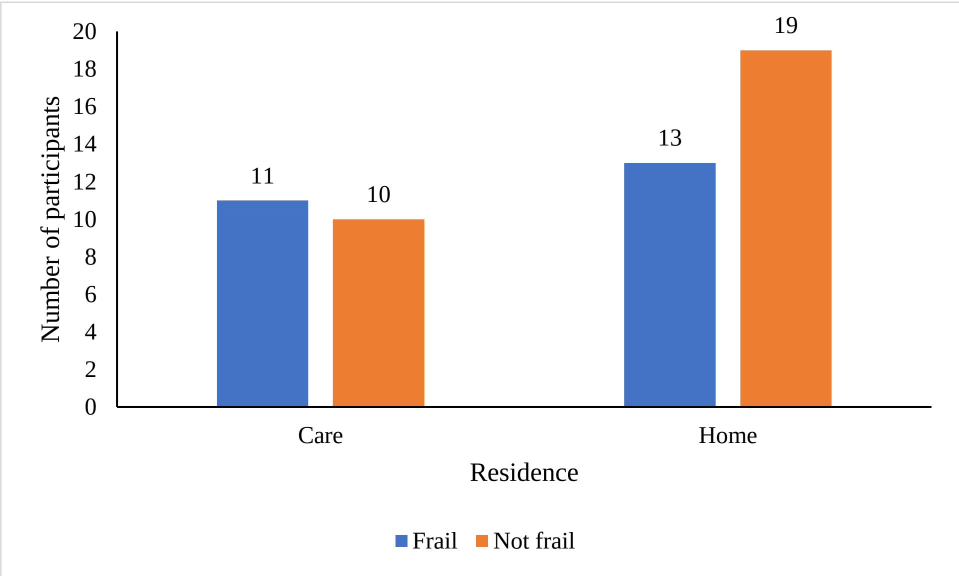

Figure 5.21. Discharge frailty and discharge destination.

Table 5.50

Frailty and residence at discharge and six-months

		Home	Care	Chi-square, *p*
Frail at discharge	Yes	13	11	.400
	No	19	10	
Frail at six-months	Yes	8	6	.978
	No	19	14	

At the six-month assessment, there were 14 participants in the entire sample who were classified as frail. Of these, six participants were in long-term care. There was no association between frailty (yes or no) and residence (home or care) using a Chi-square test of association (χ^2 = .001, *df* = 1, *p* = .978). Frailty level and residence at six-months is shown in Figure 5.22. There was no association between living in care and frailty at discharge or at six-months.

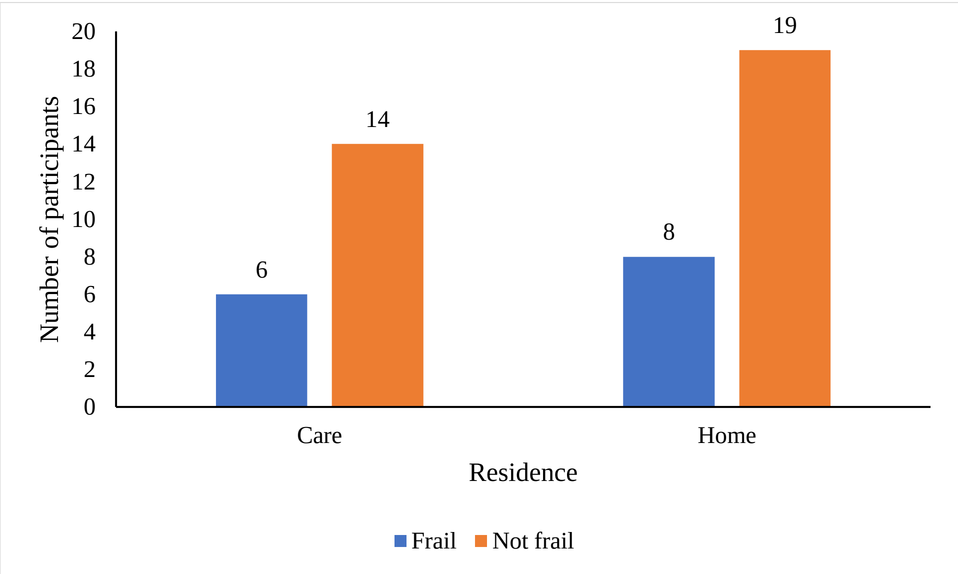

Figure 5.22. Six-month frailty and destination.

5.3.8 Exercise continuation was higher in the FIT group

Participants were asked at the final assessment if they had continued to exercise since their discharge from the TCP. No significant difference between the FIT and Standard TCP groups was found with regards to exercise continuation ($\chi^2 = 1.27$, $df = 1$, $p = .259$). Nineteen participants in the entire sample did not continue to exercise and 26 participants did continue to exercise (Figure 5.23). The number of participants in the FIT group that continued to exercise was twice the number that did not continue (14 versus 7).

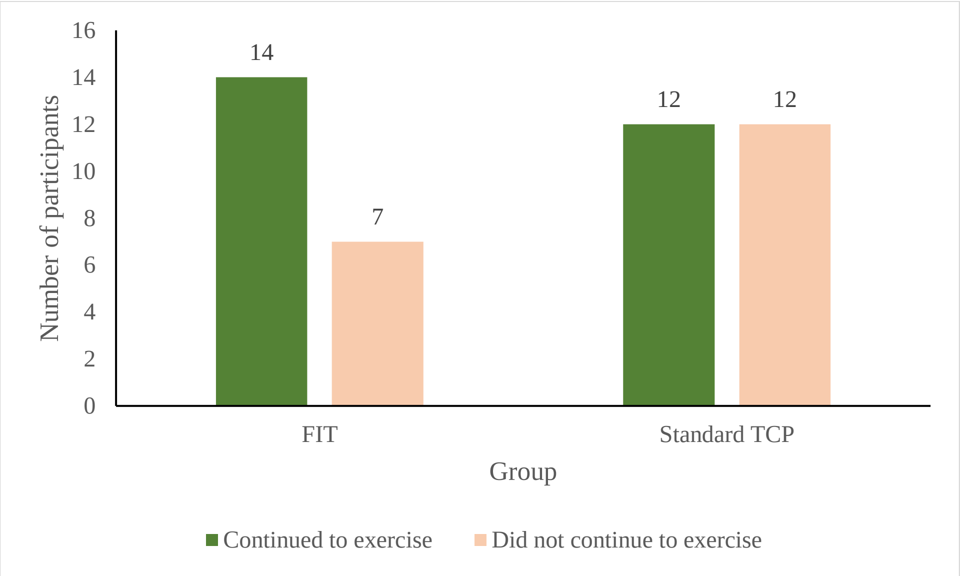

Figure 5.23. Continuity of exercise post study completion by group.

The additional functional exercise for live-in recipients of TCP in this RCT did not enable more frail older people to be discharged home.

Chapter 6 discusses the findings from this research project, with key themes, strengths, limitations and clinical recommendations.

Chapter 6 Discussion, future directions and conclusions

6.1 Synopsis

After hospitalisation, frail older people are often discharged to slow stream rehabilitation programs, where they receive physiotherapy and other forms of physical training to maximise the chances of being discharged home (Parker, Hill, Cobden, Davidson, & McBurney, 2015). Such programs also aim to optimise function, health and wellbeing (NHS Benchmarking Network, 2017). Despite this routine practice of ‘transition care’ world-wide (Hakkarainen, Ayoung-Chee, Alfonso, Arbabi, & Flum, 2015; Orvik et al., 2016), few RCTs have been carried out evaluating outcomes in the Australian context. Using a RCT design, this thesis examined the extent to which a comparatively intensive physiotherapy transition care program enabled elderly Australians to return home after an acute admission.

A UK review showed that an intermediate transition care approach facilitates helped to reduce dependency in some frail older people (NHS Benchmarking Network, 2017). These post hospital care programs that incorporated physical activity as part of a range of integrated services also assisted with patient flow through the public health system (NHS Benchmarking Network, 2017). The US discharges more than a fifth of Medicare funded patients to one of four forms of post-acute care (inpatient rehabilitation facilities, skilled nursing facilities, long-term acute care hospitals or home health) (Tian, 2016). According to interviewed healthcare executives, these healthcare options in the US were not always well understood by either the health service providers or recipients (Deloitte Center for Health Solutions, 2016). The post-acute care landscape in the US was seen as 'fragmented and siloed' (Deloitte Center for Health Solutions, 2016). In the Netherlands, evaluation of an implemented national program of geriatric rehabilitation in skilled nursing facilities also found decreased levels of dependency at discharge when people had received transition care programs including physical activity (Holstege et al., 2017). In New Zealand, intermediate care programs of this type have been established in some parts of the country to provide some older people with longer periods of rehabilitation-assisted recovery in residential care after hospital discharge (Parsons et al., 2012). Training is also provided for some New Zealand carers to enable frail older people to return home and to live as independently as possible (Associate Minister of Health, 2017).

This final chapter discusses the result of our Australian research to better understand the extent to which transition care programs influence discharge destination, function, health-related quality of life and depression outcomes. A particular focus is the effect of providing more physical training during the transition care episode. As well as discussing the key themes to emerge, the strengths and limitations of the research are detailed. Recommendations for future clinical practice and research are also given.

6.2 Key results

6.2.1 Discharge destination after transition care

The main finding of this randomised trial was that providing additional physiotherapy exercises during transition care was not associated with a statistically significant increase in home discharge destinations in frail older adults. Whether or not the participants performed additional walking and sitting to standing tasks, a similar proportion returned home after transitional care. The potential reasons for the comparable findings for the two groups are summarised in Table 6.1 and discussed further below.

Table 6.1

Potential reasons for comparable between-group findings from the RCT

Item number	Interpretation
i.	The additional physiotherapy exercises in the intervention group might not have had enough frequency, intensity, duration or effective content
ii.	Randomisation resulted in groups that were comparable for gender, age, co-morbidities, health-related quality of life and depression although the usual care group had slightly better balance and function at the pre-test
iii.	The sample size might have been inadequate to reveal differences between groups, especially as both groups had more home discharges than historic data suggested
iv.	The physiotherapy intervention might have benefitted from delivery by registered physiotherapists and increased supervision of assistants
v.	Contamination could have occurred in the residential care home setting. Other residents in the care home from the control group

might have increased their physical activity levels when they observed intervention group participants increasing their activity. Staff may also have encouraged more activity

vi. Other factors

6.2.1.1. Intensity, duration and effective content

The increased physiotherapy exercises in the intervention group in the current study involved walking more each day and repeatedly performing the task of moving from sitting to standing each day for an average of nine weeks. Participants in the intervention group also took part in the regular physiotherapy treatment during this time. This included 1:1 treatments, exercise classes and hydrotherapy, as required, in order to meet their therapy goals. It could be speculated that outcomes in the intervention group may have been improved with the inclusion of additional physical activities as demonstrated from recent international studies such as:

i. Multicomponent classes with strengthening, aerobic, flexibility and balance at a moderate intensity, two to three times weekly for 35-45 minutes (participants in long-term care) (de Souto Barreto et al., 2016),

ii. Challenging, progressive, individualised specific balance classes with small groups (8 participants), high ratio therapist to participant (1:4), three times weekly for two weeks (older inpatient rehabilitation participants) (Treacy, Schurr, Lloyd, & Sherrington, 2015),

iii. Challenging, high intensity, progressive, individualised, strengthening exercise classes with small groups (3-6 participants), high ratio therapist to participant

(1:3), twice weekly for 12 weeks (participants in long-term care) (Telenius, Engedal, & Bergland, 2015a),

iv. Multicomponent classes incorporating strengthening, balance, co-ordination and endurance exercises five days per week for 24 weeks (frail, community-dwelling participants) (Tarazona-Santabalbina et al., 2016) or twice per week for three months (3-8 participants in long-term care) (Arrieta et al., 2018b) and

v. Strengthening exercise classes, three times per week, 30-45 minutes long for up to five months (frail participants living in long-term care, community or assisted living) (Theou et al., 2011).

Paper and pen recording of exercise practice was not successful in providing sufficient documentation to understand the amount of exercise that was performed by intervention participants. Incorporation of further or different functional activities into the daily transition care physical training program might also have led to statistically significant improvement for the intervention group. Fifteen years ago, the original international implementation of increasing the exercise levels of institutionalised residents (the FIT program) aimed to improve participant function (Ouslander et al., 2005; Schnelle et al., 2002). For example, in the trial by Schnelle (2002) the therapy was provided for eight months. It led to either improvement, or arrested decline, in function for participants in permanent care. Functional incidental training, as it was originally conceptualised (Schnelle et al., 1995), did not specifically aim for home discharge for participants. In contrast, the hypothesis in the current study was that additional functional exercise training would increase functional capacity and this would increase the likelihood of returning home. This prediction was made because functional capacity was previously seen to be a major predictor of home discharge following residential care slow stream rehabilitation (Abrahamsen et al., 2014).

Notably, in the current study home discharge rates increased to 60% compared to the historical data of 30% from Bendigo Health, where the current study was conducted. However, the rate of improvement was not different between groups in the current study. The control group participants did surprisingly well, possibly because of natural improvement (Mallinson et al., 2014) or because contamination occurred (see below). For all of Australia, the rate of discharge home from live-in transition care has been reported as 18.6% (Victoria 9.5%) (Australian Institute of Health and Welfare, 2014).

6.2.1.2 Group comparability at baseline

In this small pilot randomised trial, balance and function were different between groups at the pre-test, even though other variables were well matched. This introduced a confounding factor from commencement that could have impacted the discharge destination outcome of the entire study. Block randomisation could have helped to ensure that groups were more equal in number from the outset (Kim & Shin, 2014), although this would not necessarily have ensured that they were equal in co-morbidities or functional capacity. Despite valid randomisation procedures, differences in groups may still occur by chance (Dettori, 2010). Potentially, matching participants on all variables may also have ensured comparability (Saint-Mont, 2015).

However, in practice, this would have increased the recruitment time considerably, which was not possible in the constraints of the timelines available for this PhD study.

6.2.1.3 Low study power

This small pilot randomised trial might not have had enough power to detect differences in discharge destination, due to comparatively small samples and wide inter-individual differences in each group. A post-hoc analysis after the RCT was unlocked and investigators un-blinded showed that if there had been an extra seven participants in the Standard TCP group who had gone home then the difference between groups for the primary outcome variable would have been statistically significant in favour of the usual care group. This would have required a much larger sample size of 48 people per group, which was beyond the scope of the current PhD investigation. The time constraints of this PhD study were such that recruitment could not continue until this size of group was recruited. As both groups showed an increase in home discharge, greater numbers would have been required to show improvement. If contamination across the groups receiving the intervention in the same environment was the main issue, it is also possible that greater numbers of participants may not have shown great improvement in discharge home for the intervention group than the usual care group.

6.2.1.4 Delivery of therapy by assistants

It is also possible that outcomes were equivocal because un-registered therapists delivered the daily walking and sitting to standing exercises in the intervention group.

The support worker delivering the intervention in this study was a trained allied health assistant (Department of Health, 2012). This is not an unusual situation in regional Victoria (Department of Health and Human Services, 2018a). In addition, support workers are well utilised within intermediate care in the UK (Nancarrow, Shuttleworth, Tongue, & Brown, 2004). In the UK they work in various positions ranging from the provision of personal care to inclusion in multidisciplinary teams (Nancarrow et al., 2004; NHS Benchmarking Network, 2017).

Allied health assistants are a normal part of the transition care team in regional Victoria, Australia (see section 2.2.3.4). In 2007, the Industry Skills Council initiated the Certificate IV in Allied Health Assistance (Department of Education and Training, 2013) formalising training. More recently the Victorian Department of Health developed and published a 'Supervision and delegation framework for Allied Health Assistants' (Department of Health, 2012) to provide guidance and clarification on roles with appropriate delegation and supervision. As a result of the introduction of assistants into care programs, both patients and allied health professionals noted improved outcomes (Lizarondo, Kumar, Hyde, & Skidmore, 2010). In the current study, the registered physiotherapists directly specified and delegated to the assistants the tasks that were required. The assistants were considered to have the required skills to carry out the activities. The physiotherapist maintained the responsibility for supporting and supervising the allied health assistant throughout and had direct contact as required. Nevertheless, the skills and expertise of a registered physiotherapist cannot be under-estimated and it is possible that using more highly qualified personnel could have improved outcomes.

6.2.1.5 Potential for contamination

Both groups investigated in this study received physiotherapy in the same environment. This may have led to contamination of physical activity methods across groups. Residential care staff may have encouraged other residents in the usual care group to exercise if they thought that increased exercise would be beneficial. When the research assistant visited facilities to supervise and progress the functional exercise program, sometimes they were in public areas and the extent to which usual care group participants may have watched, replicated or even participated when the exercise took place is unknown. The possibility of contamination and the safety aspect of including additional participants were discussed with the research assistant and joining in was discouraged. Nonetheless, contamination may still have occurred and some members of the control group could have engaged in more activity thus contributing to an improvement in functional capability. The literature confirms that where an intervention and usual care group are not completely separated, contamination can be an issue (Peri et al., 2008). The suggestion was made by Peri et al (2008) that randomisation to a facility rather than within a facility could minimise contamination. This was not possible in this study in regional Victoria.

6.2.1.5 Other factors

There may be other factors that contributed to the lack of significant findings regarding discharge destination. There was no formal assessment of motivation or apathy regarding exercise practice at the start of this study and these aspects also had the potential to confound findings (Franco et al., 2015). In addition, there were wide inter-individual differences in age, co-morbidities, function at baseline, medications and family support that introduced wide variability within and between groups. Data comparing functional outcomes for those discharged home or into care in the current study clearly showed wide variability in individual results (see section 5.3.3). For example, some people who had poor physical function at discharge went home whilst others with better physical function were admitted to long-term care, regardless of group allocation. Whilst older age was not a factor in admission to care in this study, previously published literature showed that older age, poor cognitive status, lack of a partner or social support and co-morbidities (Abrahamsen et al., 2014; Kool et al., 2017; Luppa et al., 2010) were associated with residential outcomes for frail elderly after hospitalisation. Some of these other factors must have been involved in the relocation decisions for participants in the current study.

Social circumstances had recently changed for some of the participants, including death of a spouse. Seventy-five percent of participants were living alone at baseline. Living alone, as a factor on its own, is associated with both mortality and relocation to residential care (Pimouguet et al., 2016) and may have been a contributing factor to institutionalisation of participants. The number of co-morbidities is also an associated factor for relocation (Middleton, Li, Kuo, Ottenbacher, & Goodwin, 2018). Participants in this study had a mean of 7 co-morbidities, well over the rate of 5 morbidities mentioned in the aged care trial by Middleton et al (2018). Despite this, many of the participants in the current study were discharged home.

6.2.2 Groups had comparable outcomes for the secondary variables of function, health-related quality of life and depression

Adding more functional training to the standard transition care program did not significantly improve any of the secondary outcome variables. This differs from prior international trials that showed functional improvement in favour of the intervention group (Applegate et al., 1990; Lenze et al., 2012; Young et al., 2007). However, these results must be looked at within the specific context of a RCT in a regional Victoria healthcare facility. The current study compared extra functional exercise coupled with a full post-acute care team approach which included multi-disciplinary assessment and treatment regime, individualised care plans, geriatrician involvement and extra health professional services as needed. The usual care group also had a full post-acute similar service except that they did not get the extra functional exercise. Other studies compared a multi-disciplinary approach including elements of comprehensive geriatric assessment with a group having usual care such as an extended stay in a general hospital (Applegate et al., 1990; Young et al., 2007). None of the previous studies had the same design as the current study.

Of general interest, the entire cohort of participants in the current study improved from admission to six-months for function and depression although health-related quality of life did not change. Notably, the scores for function and balance were significantly lower for the FIT group at admission yet by six-months the groups were comparable. This implies that the rate of improvement in the intervention group was greater than for the control group, as they started from a lower base. At discharge and six-months there was no longer any significant difference between the groups on any measure.

The overall maintenance or improvement of balance, function, lower limb performance and depression up to six-months after admission to the transition care program was a positive finding. The expectation was that function would decrease, especially for the participants admitted to residential care (Jerez-Roig et al., 2017). Jerez-Roig et al (2017) found that function deteriorated over a period of two years for a group of 280 adults (mean age 80.4 years) in Brazilian nursing homes. Function worsened most quickly during the first six-months before the decline plateaued (Jerez-Roig et al., 2017). Australian residential care data showed that many residents in care are depressed on admission (Australian Institute of Health and Welfare, 2017b) and remain depressed (Australian Institute of Health and Welfare, 2013a). Residential care residents with depression have higher care needs (Australian Institute of Health and Welfare, 2013a). Participants in the current study who were admitted to long-term care did not appear to be depressed as measured on the GDS15 at their admission to care or at their follow-up assessment at six-months from TCP admission. Functional decline and depression have been found to predict 12-month mortality in nursing home residents (Yeh et al., 2014) and the modification of these factors in this study may have been beneficial to participants.

There were no statistically significant differences between groups in this study for any of the variables at discharge or at six-months after admission to transition care.

However, close to half of the participants improved above the minimum amount of change which could have been attributed to measurement error when assessed at six-months in their balance, function, lower limb strength, depression and health related quality of life (as measured by the visual analogue scale), This ensured that actual patient improvement had taken place for that variable as scored on the chosen instrument (Steffen & Seney, 2008).

6.3 Participant expectations correlated with discharge destination

Knowing the expected discharge destination early in an admission for a TCP recipient could enable family members, caregivers and services time to be prepared for the next stage whether it will be discharge home or relocation into permanent care. The positive correlation between participant discharge expectations and the actual discharge destination was consistent with a previous study (Halawi et al., 2015). Halawi et al (2015) reported that participant discharge destination expectation was an important factor in the prediction of discharge destination for total joint arthroplasty patients (2015). This fits with the move towards person-centred care (World Health Organisation, 2016) and patients being involved in decision making and goal setting which may have a positive impact on their rehabilitation outcomes (Rose, Rosewilliam, & Soundy, 2017). A recent Australian study reported that goal setting and attainment involving recipients of inpatient geriatric evaluation and management (n = 127, mean age 82.4 years) was more likely to be associated with a positive discharge destination than changes in function (Black, Nicholas, Cotton, & Brock, 2018). It is recognised that not all patient goals are achievable or possible and negotiation between clinician and patient may be required to set realisable goals (Reuben & Tinetti, 2012). In the end, good health care is about getting services in place that are satisfactory for the patient (Reuben & Tinetti, 2012). It has been suggested that the aim of health care is to maintain quality of life, prevent disability and early death whilst working towards personal patient growth, meaningful activities and outcomes with strong therapeutic service relationships (Mold, 2017).

6.4 Changes in frailty

Frailty can be associated with mortality, multiple morbidities, institutionalisation and hospitalisation (Joosten, Demuynck, Detroyer, & Milisen, 2014; Kojima, 2018; Murad & Kitzman, 2012; St. John, Tyas, Giriffith, & Menec, 2017; Theou et al., 2017). A previous Australian TCP study reported high rates of frailty in participants (Comans et al., 2016). As the cohort in this study were elderly, had been hospitalised and had multiple morbidities they were expected, and were found to be, predominantly frail and were likely to be at risk of institutionalisation.

Frailty levels in this trial decreased for FIT participants as shown at the six-month re-assessment. This decrease was a major positive finding and provides evidence that the intervention may have been important for participants. Potentially, targeting frail and pre-frail participants for additional functional exercise during their transitional care episode can improve outcomes without adverse events.

As balance, function and lower limb strength improved in this study, the level of frailty decreased. Similar reductions in frailty with improved functional ability has also been shown in published studies (Cameron et al., 2015; de Labra, Guimaraes-Pinheiro, Maseda, Lorenzo, & Millan-Calenti, 2015; Ferreira et al., 2018).

Comparability between studies of frailty and function is still somewhat difficult in that there are variations in frailty definitions and measures (Arjunan et al., 2018). What remains unclear is the optimal intensity, frequency and exact composition of exercise to be the most effective at reducing frailty in older adults. Programs in the literature have been very variable with some involving multi-domain interventions (Dedeyne, Deschodt, Verschueren, Tournoy, & Vielen, 2017) in comparison to the one in this mono-domain study focussing only on low intensity functional exercise.

Improved perception of health-related quality of life was associated with decreased levels of frailty at six-months in the current study. Similar findings have been reported in the Canadian literature (Bagshaw et al., 2015). For example, Bagshaw et al (2015) found that participants who were frail continued to have lower health-related quality of life at both six and twelve-months post-illness. This was not surprising as frailty is associated with adverse events including functional dependence and disability and is associated with incident dementia (Bagshaw et al., 2015; Kojima, 2018; Rogers, Steptoe, & Cadar, 2017; Theou et al., 2017). It has also been reported that the frailty measure that is used also affects findings with regard to health-related quality of life (Buckinx et al., 2017b) so that there may be mixed findings until there is consistency in the frailty measure used.

Depression was not associated with frailty in the current study. This is a finding that warrants further study as it is contrary to the literature (Collard et al., 2017; Soysal et al., 2017). It is not clear why participants in the current study did not show increasing depression rates with increasing frailty. Soysal et al (2017) found that approximately 40% of those who were depressed were likely to be frail. In addition, approximately 40% of those who were frail were likely to be depressed (Soysal et al., 2017). In the current study more than half of those who were depressed at admission were frail. More than half of those who were frail at admission were also depressed at admission. At six-months, the rate of depression was less than 20% for those who were frail. The rate of frailty for those who were depressed at six-months was also less than 20%.

Frailty and living in residential care were not correlated in this study. In the literature, the two have been found to be related (Kojima, 2018; Theou et al., 2017). The varying frailty measurement tools in use (Buckinx et al., 2017b) may affect the comparability of findings across studies investigating residential care and frailty. In the current study, the SOF frailty measure was used which is brief but has been found to be predictive of important geriatric outcomes such as osteoporotic fractures (Li et al., 2017), adverse events and health service usage (Kiely et al., 2009). It has also been found as a good instrument to measure frailty which is easy to use clinically (Kiely et al., 2009).

6.5 Additional functional exercise did not improve exercise continuation

The assumption was made that, if participants got used to exercising and enjoyed the process and the benefits, they would continue. A systematic review focussing on what behavioural change techniques increased physical activities and self-efficacy reported that further investigation is required to find out what older adults want from participating in physical activity (French, Olander, Chisholm, & McSharry, 2014). The suggestion by French et al was that the benefits of exercise to the older person were not as important as the enjoyment and social aspect of the activity (2014). Another systematic review studying perceptions of physical activity participation for older adults found that there were a range of barriers and enablers (Franco et al., 2015). There was an understanding by the older participants of the physical and mental health benefits as well as the importance of interaction with others. Issues with pain, discomfort, co-morbidities, the environment and apathy were also reported (Franco et al., 2015). One of the barriers to continuation of exercise with the current study was that the provided exercise was 1:1 rather than in a group situation, which did not provide the positive aspect of participants socially interacting with their peers.

6.3 Study strengths and limitations

The current study aimed to double the proportion that went home, from 30-60%. This was not unreasonable aim as the prior literature showed 80% discharged home after nursing home intermediate care in Norway (Abrahamsen et al., 2014) and 72% from the US skilled nursing facilities (Kramer et al., 2015). The RCTs published by Applegate et al (1990) and Fleming et al (2004) aimed to reduce nursing home placements and change the balance of discharge to 30% care and 70% home. In addition, this rate of improvement was achieved by the usual care group in the current study, who actually did better than predicted. Why the usual care group participants in the current study had such good outcomes remains unclear. Both the Standard TCP and FIT groups had the same basic transition care approach. There were no adverse events with the application of the additional functional training. Both groups achieved similar results for function, health-related quality of life and depression by discharge from transition care. Other factors were responsible for the greater discharge to care for the FIT group besides the variables being measured. These factors may have been contributing co-morbidities, social or other care issues as discussed at section 6.2.1.5.

The intervention as implemented in the current study appeared to be enough to alter frailty yet not enough to alter discharge destination. This again reflects that the decision for an elderly person to relocate to residential care is multifaceted involving varying factors that were not investigated in the current study.

There were improvements in the outcomes measures for both groups. It is unknown if greater adherence with more supervision, frequency or exercise intensity may have enhanced the findings. It is not clear precisely how the current study program compared to published similar studies. The added functional exercise program for the current study was specified. However, as only a maximum of two sessions per week were directly supervised, and the required details were not always noted, it is not possible to be sure about adherence to the program, the intensity, frequency or content.

The majority of the initial functional assessments were completed by the physiotherapists delivering the standard TCP physiotherapy programs. To maximise reliability of the measures these therapists completed an inter-rater reliability workshop which was provided by the research physiotherapist prior to the study commencing. In addition, protocols for completing the outcome measures were written and discussed with all staff prior to study commencement to ensure consistency of approach by all those involved.

There were a small number of additional limitations. It was not possible to blind the participants or the physiotherapists to group allocation due to the nature of the intervention. The participants were aware that they were doing extra exercise as they had training notices and diaries in their bedrooms and had extra visits from the research assistant each week to go through exercises separately to the physiotherapist. The physiotherapists were aware which participants were in the intervention group because they could also see the documentation in the bedrooms and also had regular contact with the research assistant. However, the researcher remained blinded to group allocation until all six-month assessments had been completed. Complete documentation of programs in the training notebooks by research assistants, staff and participants was not adhered to during the study. The researcher did not monitor details in the notebooks to maintain blinding until the study was finished. As a result, some data were not recorded.

Participants were asked whether they had lost 5% or more of their body weight in the previous year unintentionally. The participant responses may or may not have been correct and the participants were not weighed for study purposes. This part of the frailty assessment was reliant on participant's memory and perceptions.

Using the SOF frailty index with the three items determining frailty may not have elicited as accurate a picture of frailty as if a more detailed frailty definition had been utilised. It is recognised that the frailty evaluation tool that is used affects the rate of frailty that is found (Buckinx et al., 2017b; Nolan et al., 2016).

6.4 Clinical recommendations

Potentially the functional training as it was provided in the current study did not provide a sufficient training stimulus, and was not adhered to closely enough, to make obvious change to participants or measured variables. Understanding the barriers and motivating factors for each participant exercising may have enabled solutions to be identified and implemented. Implemented solutions may then possibly have increased adherence and led to improved outcomes.

Barriers for institutionalised older people exercising are varied and individualised (Holmes, Galik, & Resnick, 2017). They include physical problems such as pain, history of a sedentary lifestyle, fear of falling as well as environmental issues (Chen, 2010). Apathy and depression are known to be problems for some older women that prevent participation in exercise (Aily, Carnaz, Farche, & Takahashi, 2017). Lack of encouragement was reported as a barrier to older Africans in nursing homes taking part in exercise (Aro, Agbo, & Omole, 2018).

In the current study, nursing home staff were in the facility each day with residents and were asked to encourage participants to exercise. Yet it is unknown whether this actually occurred as nurse behaviour was not monitored. In an observational study, some nursing staff were seen to 'take-over' half of nursing home resident's activities of daily living rather than encouraging independence (den Ouden et al., 2017). Nursing staff in that study rarely watched over the resident performing their activities of daily living even when the residents were capable of exercising if supervised (den Ouden et al., 2017). It has been reported that the rehabilitative approach in a nursing home is not optimal and changes need to be made to prevent the further functional decline of residents (Laffron de Mazieres et al., 2017).

To improve physical exercise and activity levels, solutions which could be implemented include the development of facility specific peer (resident) exercise champions to encourage other residents to exercise. Adherence to exercise programs has been found to increase when peers are involved (Burton et al., 2018). Volunteer health coaches could be recruited and trained to discuss exercise barriers and enablers with elderly people. Small increases in physical activity levels have been reported as a result of health coaching (Oliveira, Sherrington, Amorim, Dario, & Tiedemann, 2017).

Documenting exercise adherence in the current study using pen and paper did not provide adequate evidence of exercise adherence. The use of wearable technology may improve accuracy of recording of exercise adherence (Lambert et al., 2017). Using technology in this way is still an area under scrutiny and long-term effects of usage are still unknown (Sullivan & Lachman, 2017). There are several motivational components available with wearable technology including goal setting, health coaching, action planning and social factors such as competition with peers (Sullivan & Lachman, 2017). Use of technology such as fitness trackers with institutionalised older people may increase accuracy of exercise recording as well as increasing activity levels.

The findings from this study could be used to further streamline discharge planning from transition care. Asking cognitively aware live-in TCP recipients soon after admission where they expect to be discharged appears to be worthwhile to get an indication of preference. When participants are ready to be discharged either to care or home, then they are discharged. There may be a small number of recipients who are not ready to be discharged at 12-weeks. They may still be improving and may be deemed to have further potential for improvement. The current study showed that between discharge and six-months some participants continued to improve. For such people, ongoing low intensity, longer duration programs for up to six-months may be warranted.

6.5 Future research directions

Several ideas for future research have been generated as a result of this thesis. Considerable numbers of studies have been published regarding optimal exercise programs and outcomes for older people living in the community (Olanrewaju, Kelly, Cowan, Brayne, & Lafortune, 2016) and permanently in residential care (Arrieta, Rezola-Pardo, Gil, Irazusta, & Rodriguez-Larrad, 2018a; Kocica et al., 2018). At this point, it appears that there have been only a few RCTs researching the optimal programs and outcomes for older people in live-in slow stream rehabilitation (see Chapter 3). There is arguably a need for additional study of slow stream rehabilitation programs including larger numbers of recruits, clearly specified exercise programs, assessments at similar time points, with both groups in the same environment, using wearable technology to record activity and making use of consistent outcome measures. This is an important and growing area of the health care continuum as the Australian Government plans changes to services to enable older people to be at home to age in place (Department of Health, 2016). More home care packages and less residential care places have been planned for 2022 (Department of Health, 2016). These changes may lead to an increase in the number of people of older people who will need to be discharged home following slow stream rehabilitation and models of care need to be optimised to enable this to take place.

Further research investigating the ideal level of supervision for low intensity physical exercise programs in residential care to maximise adherence appears to be warranted. The current study expected staff and family members to encourage participants to exercise frequently and provided twice weekly 30-minute supervised exercise training sessions. It is unknown whether this encouragement actually occurred. Given that other studies have found that one of the barriers to continued exercise in residential care is apathy (Aily et al., 2017; Franco et al., 2015), potentially formalising encouragement from staff and family members may provide the impetus required to increase adherence.

Abrahamsen et al (2016) and Cameron et al (2013) suggested the need for provision of longer term and lower intensity interventions for some frail, older patients following hospitalisation. Continuing low dose therapies for longer periods for participants who still have potential to recover but are improving more slowly may increase discharge rates to home in the longer term and decrease dependency further. Abrahamsen et al (2016) found that after six-months, patients who were slower to recover and were given additional lower intensity treatment had achieved to the same level as those who recovered quickly (within 14 days). Those slower to recover were older, had more home services and lower Barthel Index scores. In the current study, those who were older experienced the shortest time in transition care. A pilot study could assess whether providing a longer duration lower intensity program in Australia for people who are likely to recover more slowly affects discharge destination.

This study found that actual discharge destination was positively associated with expected discharge destination when participants were asked about this at admission to transition care. Further investigation aiming to optimise discharge planning and ensuring that the right health services are available at program completion is worthwhile. Black et al (2018) found that discharge destination was related more to goal setting and attainment than functional improvement for a cohort in geriatric evaluation and management. A similar study could investigate a cohort in transitional care investigating early goal setting regarding discharge destination.

The current study took place in regional Victoria, Australia. Further research is needed on aged care rehabilitation in this setting as well as more rural and remote communities. This study took place in a centre involving some participants who normally lived in a rural environment. Residents outside of metropolitan Australia have a shorter life expectancy with less use and access to health services (Australian Institute of Health and Welfare, 2017f). Sometimes the requisite primary health service supports are not locally available (Thomas, Wakerman, & Humphreys, 2015). At times family caregivers live at a distance (Warburton, Scharf, & Walsh, 2016) and more older people are living alone (de Vaus & Qu, 2015). Further research could investigate the impact of extrinsic factors such as rurality and geographical location of residence in addition to intrinsic physical and mental health factors necessitating a move to institutionalisation.

6.6 Conclusions

i. There is considerable variation in the application of transition care exercise programs across regional Victoria, in content, delivery, teams and environmental context.

ii. Published literature regarding slow stream rehabilitation showed emerging evidence of the potential to reduce admissions to residential care and to increase participant independence.

iii. The RCT in this thesis showed that adding functional exercise during slow stream transition care did not increase the number of frail older people who returned home, compared to a usual care group. Fifty percent of the intervention group and 70% of the usual care group returned home and the difference between groups was not statistically significant.

iv. The findings of the RCT in this thesis might have been related to the exercises in the intervention group being of insufficient frequency, dosage, intensity or content to effect major change.

v. The findings of the RCT might also have been a product of the lower power of the study, associated with small sample sizes in each group.

vi. The RCT showed that functional exercise during a slow stream transition care rehabilitation program increased the number of frail older people who returned home in comparison with historical Bendigo Health data.

vii. The usual care group in the RCT showed an unexpectedly high rate of discharge home.

viii. For both groups there was a significant positive relationship between participants' expected discharge destination at admission and their actual discharge destination.

ix. There were no differences in balance, function, lower limb performance, health-related quality of life or depression between those discharged home or to residential care.

x. In the RCT for this thesis, adding functional exercise during a slow stream transition care rehabilitation program did not alter balance, function, lower limb performance, health-related quality of life or depression. The results were not statistically or clinically significant.

xi. In the RCT for this thesis, adding functional exercise during a slow stream transition care rehabilitation program was associated with reduced frailty levels.

xii. In the RCT for this thesis, adding functional exercise did not alter exercise continuation after the study.

Appendices

Appendix 1 Permissions

Permission to use Figure 1.2 Visual representation of slow stream rehabilitation framework.

Tiago Jesus <tiagojesus_vfr@hotmail.com>
Thu 15/02, 9:28 PM
Hi Carol,

Sure you can.

Your adaptation, though, has HRQoL as both a mediating and final outcome – does not make full sense.
The psychosocial outcomes you eliminated were further developed here
https://www.ncbi.nlm.nih.gov/pubmed/25952588
Best

Tiago Jesus, Ph.D, OT
Associate Post-doctoral Fellow. Global Health and Tropical Medicine (GHTM) & WHO Collaborating Centre for Health Workforce Policy and Planning, Institute of Hygiene and Tropical Medicine - NOVA University of Lisbon (IHMT-UNL), Rua da Junqueira 100, Lisbon 1349-008, Portugal

https://www.researchgate.net/profile/Tiago_Jesus3
PubMed: "Jesus TS"

CAROL JANE PARKER
tiagojesus_vfr@hotmail.com

Hi,

I am writing up my PhD thesis about post-acute slow stream rehabilitation and was interested to find your paper in the Archives of Physical Medicine and Rehabilitation, 2015;96:960-9, Postacute Rehabilitation Quality of Care: Toward a Shared Conceptual Framework.

I have also, of course, referenced you as the owner. However, I am wondering if you would be able to give me formalised permission to use the Figure for me to add to the thesis?
I will look forward to hearing from you.

Regards, Carol

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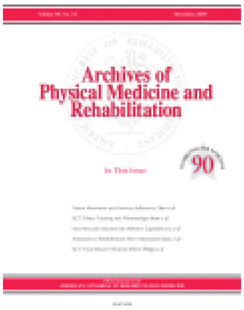

Title:	Randomized Controlled Trial of the Effect of Additional Functional Exercise During Slow-Stream Rehabilitation in a Regional Center
Author:	Carol Parker,Keith Hill,Janet Cobden,Megan Davidson,Helen McBurney
Publication:	Archives of Physical Medicine and Rehabilitation
Publisher:	Elsevier
Date:	May 2015

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Appendix 2 Publication Parker, Hill, Cobden, Davidson and McBurney 2015

Reprinted from *Archives of Physical Medicine and Rehabilitation*, Parker, C. P., Hill, K., Cobden, J., Davidson, M & McBurney, H. (2015). Randomised Controlled Trial of the Effect of Additional Functional Exercise During Slow-Stream Rehabilitation in a Regional Center. *Archives of Physical Medicine and Rehabilitation,* DOI: 10.1016/j.apmr.2014.12.012. Copyright © (2017). Reprinted by permission of Elsevier.

The six pages that follow this are the journal article above (pages 831-836).

Archives of Physical Medicine and Rehabilitation

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Archives of Physical Medicine and Rehabilitation 2015;96:831-6

ORIGINAL RESEARCH

Randomized Controlled Trial of the Effect of Additional Functional Exercise During Slow-Stream Rehabilitation in a Regional Center

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From [a]La Trobe University, Bundoora, Victoria; [b]Curtin University, Perth, Western Australia; [c]Inglewood and Districts Health Service, Inglewood, Victoria; and [d]Monash University, Melbourne, Victoria, Australia.

Abstract

Objective: To evaluate whether adding functional exercise training to standard physiotherapy during residential slow-stream rehabilitation (SSR) improves discharge outcomes and functional ability.

Design: Randomized controlled trial.

Setting: A regional hospital.

Participants: Older people (N=60) admitted to SSR.

Intervention: All participants received standard physiotherapy. An individualized functional incidental training (FIT) program was implemented for intervention participants consisting of 4 extra episodes of functional exercise daily for the period of SSR. Research assistants visited twice weekly to practice and progress FIT programs.

Main Outcome Measures: Outcome measures included discharge destination, participant-expected discharge destination, and functional tests of the Berg Balance Scale (BBS), de Morton Mobility Index (DEMMI), and 5 times sit-to-stand test (FTSTS) at admission and discharge.

Results: Fifty-two participants completed the study. At baseline, the SSR group achieved higher scores on the BBS, DEMMI, and FTSTS. There was no significant difference in discharge destination between groups ($P=.305$). The difference in functional change between groups from admission to discharge on the BBS, DEMMI, and FTSTS was not significant. Participant-expected discharge destination was significantly associated with eventual discharge destination ($\chi^2_1=8.40$, $P=.004$).

Conclusions: Adding FIT to standard physiotherapy did not improve discharge outcomes and did not have a statistically significant effect on function, but may have a small effect on balance. Patient expected and actual discharge destinations were associated.

Archives of Physical Medicine and Rehabilitation 2015;96:831-6

From 2010 to 2050 it is expected that the world population of people aged ≥65 years will grow from an estimated 524 million (8%) to 1.5 billion (16%).[1] In Australia, as in the United States[2] and the United Kingdom,[3] older people are admitted to the hospital in greater numbers than their younger counterparts. From 2011 through 2012, 39% of all Australians leaving hospital and 48% of hospital patient-days were recorded for those older than 65 years.[4] During hospital admission, the functional abilities of older people may decline,[5] which may lead to a transition from the hospital to a residential aged-care facility rather than back into the community.[6] Those people moving to long-term care tend to have longer hospital lengths of stay.[6]

One of the responses of the Australian Government to these increasing needs for elderly health care has been to commence the Transition Care Program (slow-stream rehabilitation [SSR]). Admission to SSR may take place when medical stability is achieved at the completion of an acute or subacute episode in the hospital for originally community-dwelling older people. A short-term low-level package of individualized services including at least some therapy, nursing support, or personal care is provided.

Presented to the Asia/Oceania Regional Congress of Gerontology and Geriatrics, October 25, 2011, Melbourne, Victoria, Australia; La Trobe University, December 7, 2011, Melbourne, Victoria, Australia; University of Queensland, November 19, 2012, Brisbane, Queensland, Australia; and Victorian Government Department of Health, May 24, 2013, Echuca, Victoria, Australia.

Australian New Zealand Clinical Trials Registry No.: ACTRN12609000242224.

Disclosures: none.

0003-9993/15/$36 - see front matter © 2015 by the American Congress of Rehabilitation Medicine

http://dx.doi.org/10.1016/j.apmr.2014.12.012

SSR is goal oriented and time limited, and aims to maximize functional recovery while giving people time to consider their long-term care options,[7] therefore possibly delaying the need for admission into residential aged-care facilities. To access SSR, an aged care assessment needs to be conducted that determines a need for residential aged care.[8] The SSR program can be provided at home in the community or in a home-like residential setting when overnight care is necessary.

In Victoria, 27.4% of people leaving the SSR have been discharged back into the community with or without services.[9] This is a lower percentage than those found in other parts of Australia and is considered at least in part to be because Victorian participants tended to be more disabled. Although discharge back into the community is related to several factors, functional capacity appears to be the best single predictor,[10] with those people entering high-level residential care having the lowest functional abilities.[9] For frail older people who have had an acute or subacute hospital episode of care, important changes in function might influence their level of dependence and ability to return home.

Functional exercise for some older people has been found to be more effective with longer preserved effects than resistance exercise when activities of daily living and independence are the focus.[11] Functional incidental training (FIT) was an approach developed by Schnelle et al[12] for frail nursing-home patients and focused on frequent short bouts of functional exercise because of the inactivity and deconditioning common in this population. FIT has been associated with improvements in measures of endurance, muscle strength, and prevention of decline in mobility as well as improvements in measures of incontinence and agitation in residential care samples.[12,13]

The aim of this study was to investigate whether adding functional exercise (using a FIT program) to the standard physiotherapy program during a residential SSR episode would assist more people to be discharged home. A secondary aim was to assess whether participant-expected discharge destination (PEDD) at admission to SSR was relevant to final discharge destination. A further aim was to assess whether the addition of FIT led to statistically significant or clinically important changes in function. We hypothesized that more people in the FIT group would be discharged home and that the FIT participants would achieve greater increases in their functional scores than the participants in the standard Transition Care Program (TCP).

Methods

This study was a randomized controlled trial that took place in a regional center in Victoria, Australia. There were 39 residential SSR places available. Participation requirements were written consent, residence in the local area, and acceptance of a residential SSR place. Eligibility for an SSR place included admission to the hospital from living independently at home, completion of a hospital care episode, medical stability, and an assessment that further personal care service was required to be provided in residential aged care.[14] Participants were also assessed as potentially benefiting from time to consider care options and additional therapeutic services. No diagnostic groups were excluded, and age of eligibility was not specified. People with cognitive impairment were eligible. Cognitive status of potential participants was measured by assessing health professionals using the Mini-Mental State Examination before referral to the researcher.

Ethics approval was received from La Trobe University and Bendigo Health. The study was registered with the Australian New Zealand Clinical Trials Registry.

Recruitment took place over an 18-month period. Assessment took place at admission to residential SSR and at discharge. Initial assessments were completed before randomization by the treating physiotherapist. Training was undertaken to facilitate interrater reliability. Randomization, using random numbers designating group and inserted in sealed opaque envelopes, was undertaken by an independent researcher with no patient contact.

It was not possible to blind the participants or therapists to group allocation during the intervention. Both groups received individualized standard physiotherapy programs within the SSR dependent on initial physiotherapist assessment findings. Standard physiotherapy comprised twice-weekly 1:1 treatments with a physiotherapist as well as appropriate classes such as chair based, balance, or hydrotherapy. Both groups were treated by the same physiotherapists, who were encouraged to treat all participants equally regardless of group. The FIT group also received an individualized functional exercise program. The initial FIT program was developed by the participant's physiotherapist and primarily targeted walking and sitting-to-standing exercises that participants were encouraged to practice 4 times daily, in addition to necessary movement such as moving to and from the meal room. The distance a participant could walk was measured, and the number of sit-to-stand repetitions that could be accomplished was counted, with the aim being for 75% of this amount to be achieved at each exercise session. The FIT was delivered by a research assistant who was a trained allied health assistant. The research assistant visited the participants twice weekly for 30 minutes to practice the FIT, in addition to reassessing weekly and updating the target walking distance and number of sit-to-stand exercises. Staff in the care homes were asked to remind individuals in the FIT group to do their exercises. Details regarding the program were written on posters on the participant's individual bedroom and bathroom wall and inside a book placed in the bedroom with written and regularly updated instructions.

Outcome measures

The primary outcome measures were discharge destination and PEDD, which participants were asked on admission to nominate as home or long-term care.

Secondary outcome measures of function were the de Morton Mobility Index (DEMMI), the Berg Balance Scale (BBS), and the 5 times sit-to-stand test (FTSTS). The DEMMI is a clinician-observed functional measure of 15 items, with a raw score of 0 to 19, which is then Rasch converted to a score of 0 to 100, where higher scores indicate better performance.[15] Absolute interrater and intrarater reliability were found to be 9.51 and 7.54 points, respectively, on the 100-point scale, as expressed as minimal detectable change with 90% confidence when tested with elderly acute medical patients.[16] Minimum clinically important differences have been calculated in a geriatric evaluation and management cohort of patients by the distribution-based method by

List of abbreviations:

BBS	**Berg Balance Scale**
DEMMI	**de Morton Mobility Index**
FIT	**functional incidental training**
FTSTS	**5 times sit-to-stand test**
PEDD	**participant-expected discharge destination**
SSR	**slow-stream rehabilitation**
TCP	**Transition Care Program**

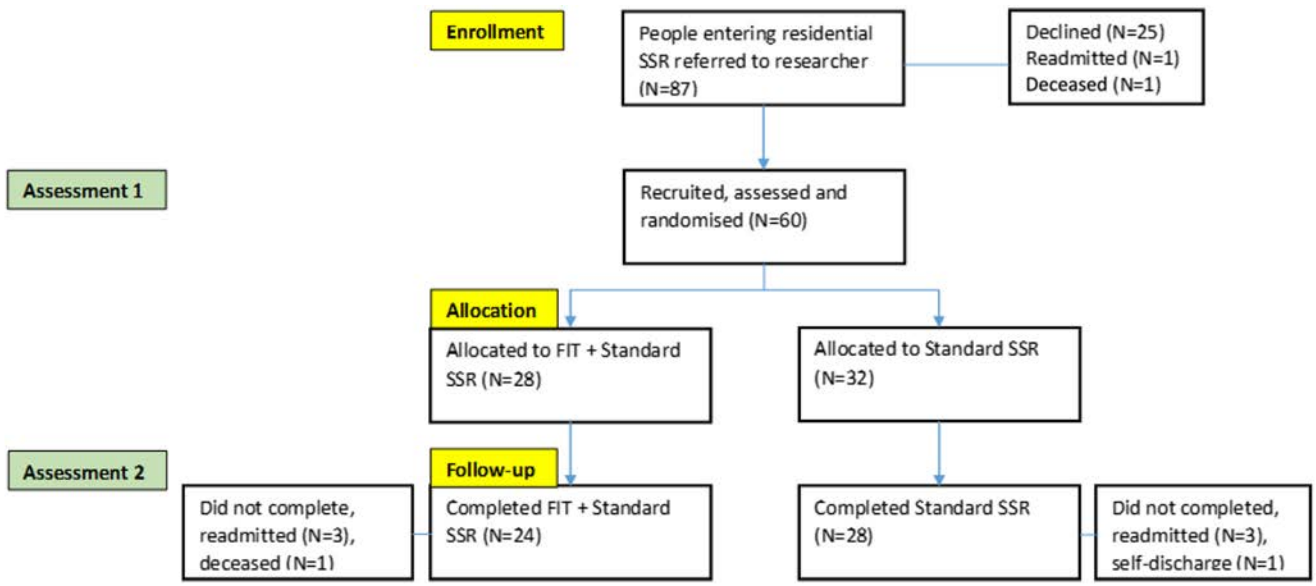

Fig 1 Consolidated Standards of Reporting Trials flowchart of study.

Norman et al,[17] and have been reported as 8.4 points on the DEMMI interval scale.[18] A DEMMI score of approximately 60 has been found to be consistent with the ability to live in the community with assistance.[19]

The BBS is a 14-item scale that can be used to measure postural control and stability of an older adult.[20,21] It has a score of 0 to 56, with higher scores indicating better performance.[22] Inter- and intrarater reliability coefficients are reported as .98 and .99, respectively, with a high degree of internal consistency (Cronbach α=.96).[21] For those people living in residential care facilities, a change of 8 points on the BBS has been reported to provide 95% confidence that there has been a real functional change.[23] A cutoff score of 45 out of 56 has been suggested as supporting independent safe ambulation.[24]

The FTSTS is a measure of timed sitting to standing from a chair that is 43- to 47-cm high.[25] The time from when individuals initially leave the chair until they sit down after 5 repetitions is recorded. When the FTSTS was used with older participants, intraclass correlation coefficients of .99 for interrater reliability and .91 to .93 for intrarater reliability have been reported.[26] Minimally clinically important change in people with chronic low back pain has been reported to range from 4.1 to 9.8 seconds, or 19% to 45% of the mean baseline score.[27]

Discharge assessments were undertaken by the researcher who was blind to group allocation. Participants were encouraged not to tell the assessor which group they were in or what exercise they had been doing, to minimize the chance of the assessor becoming unblinded.

Table 1 Baseline findings

Item	FIT Group	Standard SSR Group	Total
Participants	28 (47)	32 (53)	60 (100)
Women	15 (54)	21 (66)	36 (60)
Age (y)	79.5±12.4 (48–98)	77.1±11.2 (48–92)	78.2±11.7 (48–98)
Married	5 (18)	4 (13)	9 (15)
Primary diagnosis			
Orthopedic	12 (43)	12 (38)	24 (40)
Medical	7 (25)	10 (31)	17 (28)
Frail	6 (21)	5 (16)	11 (18.3)
No. of comorbidities	7.7±3.1	6.9±3.2	7.3±3.2
No. of medications	7 (6–11)	9 (4–11)	9 (5–11)
Days of SSR	65.7±31.1 (12–148)	63.7±32.5 (14–128)	64.7±31.6 (12–148)
PEDD home	21 (75)	28 (87.5)	49 (81.7)
BBS	34 (26–46)	44 (36–52)	40.5 (31.8–48.3)
DEMMI	51.4±17.3	64.3±17.2	58.2±18.3
FTSTS (s)	22 (15.6–29.8)	24.1 (14.7–31.8)	21.9 (15–30)

NOTE. Values are n (%), mean ± SD (range), mean ± SD, and median (interquartile range).

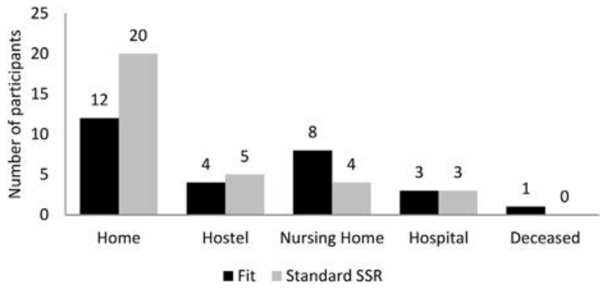

Fig 2 Discharge destination for FIT and standard SSR groups.

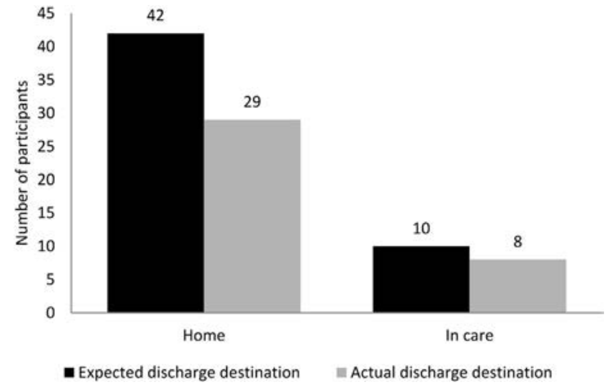

Fig 3 PEDD at time of admission to SSR and actual discharge destination.

Data analysis

Data were analyzed using PASW Statistics 18.[a] All analyses were based on the intention-to-treat principle using all available data on each participant according to the participant's original group assignment and regardless of his/her level of participation.

To decide sample size, previous local data regarding patient discharge were used. It was assumed that a clinically important change would be demonstrated if the rate of discharge home were to be doubled. With the use of nonparametric binomial tests to assess whether the observed distribution of a dichotomous variable is the same as expected from a specified binomial distribution, it was ascertained that a total sample size of 50 participants (25 participants per group) would be sufficient, allowing for a 10% attrition rate (also based on local data).

Missing data are not likely to be random, as most data are missing either because of death or hospital readmission. As a result, where missing assessment measures occurred, the last observation was carried forward.

Before analysis, data were tested for normality using the Shapiro-Wilk test. Where nonnormal distribution was identified and no useful arithmetic transformation was found, nonparametric tests were used for data analysis. Independent-samples *t* tests to compare groups were used where data were normally distributed. Prescores were taken from postscores to calculate change on the BBS, DEMMI, and FTSTS. These data were tested for normality. Differences between change scores for the groups were tested using the Mann-Whitney *U* test where change score distributions were not normally spread.

The proportion of persons in each group whose scores on the BBS, DEMMI, and FTSTS improved by a clinically important amount was identified and tested using the Mann-Whitney *U* test.

Results

Eighty-seven cognitively intact people agreed to discuss the study with the researcher. Of these, 60 participants were recruited, consented, assessed, and randomized. Figure 1 shows the progress of study participants through the study, with 52 participants (87%) completing the discharge assessment. Baseline findings are presented in table 1.

Participants had an average age of 78 years, an average of 7 comorbidities, and 60% were women. Most participants (85%) had no partner at home. Across the 2 groups, participants stayed an average of 65 days in SSR. At baseline, the standard SSR group achieved higher scores than the FIT group on the BBS, DEMMI, and FTSTS.

For the primary outcome measure of discharge destination, a greater percentage of the standard SSR group was discharged home (63%) than the FIT group (43%), although this was not statistically significant ($\chi^2_1 = 1.97$, $P = .16$) (fig 2).

PEDD was significantly associated with eventual discharge destination ($\chi^2_1 = 8.40$, $P = .004$) (fig 3). Of the 52 participants who were still on the program at discharge from SSR, 42 (81%) expected to go home when asked at SSR admission, and 29 (69%) of these 42 people actually were discharged home. There were 10 participants (10%) who expected to go into residential care at SSR admission, and of these, 8 (80%) were discharged to residential care.

Between-group results from the functional outcome measures at admission and discharge are found in table 2. Median values are presented because the change data were not normally distributed for the BBS, DEMMI, or FTSTS.

There were no significant differences found between the groups for functional change on these measures from admission to discharge using the Mann-Whitney *U* test (BBS $U = .07$, DEMMI $U = .157$, FTSTS $U = .288$).

No statistically significant differences between the groups was found for the proportion achieving at least a minimal clinically important change for the BBS, DEMMI, and FTSTS (table 3).

Table 2 Between-group (FIT and standard SSR) results for functional outcome measures from admission to discharge

Functional Outcome Measures	FIT Change Admission to Discharge	Standard SSR Change Admission to Discharge	Mann-Whitney *U* Test
BBS	7 (2–13)	3 (0–8)	.07
DEMMI	10.5 (0–17)	5 (0–11)	.157
FTSTS	−0.159 (−1.87 to 0.1)	−1.8 (−6.54 to .55)	.288

NOTE. Values are median (interquartile range) or as otherwise indicated.

Table 3 Minimal clinically important changes and statistical significance for BBS, DEMMI, and FTSTS from admission to discharge

Minimal Clinically Important Changes	FIT (%)	Standard SSR (%)	Independent-Samples Mann-Whitney *U* Test
BBS change ≥8 points	46.4	25	.085
DEMMI change ≥8.4 points	53.6	46.9	.189
FTSTS faster by ≥4.1s	42.9	31.3	.323

Discussion

The addition of a functional exercise intervention for older people recovering from hospital admission did not result in a higher proportion of patients being discharged home. The PEDD question did appear to have relevance to the final discharge destination, as found in other studies,[28] and warrants further investigation. Of interest for further study would be the additional evaluation of expert therapist opinion regarding expected patient destination at admission.

Despite randomization, the FIT group was less able at baseline as measured functionally at admission to SSR. The function of both the FIT and standard SSR groups improved as shown by the median improvements of the BBS, DEMMI, and FTSTS, but change was not significantly different between the groups. The between-group improvement in scores on the BBS showed a trend toward significance ($P=.007$), with the FIT group achieving a median change of 4 points more than the standard TCP group. The percentages of participants in the FIT group who achieved at least a minimally clinically important functional change on the BBS, DEMMI, and FTSTS were higher than those of participants in the standard TCP group, although these differences were also not significant. Twenty-one percent more FIT group participants than standard TCP group participants (46.4% vs 25%) achieved the minimally clinically important change of ≥8 points on the BBS.

Because this study was powered to look at discharge outcomes, more participants may have been required to investigate functional change, but it cannot be ruled out that FIT may have had a beneficial effect on participant function.

Study limitations

Although the sample size for this study was originally decided on the basis of local attrition rate (10%), the attrition rate of 17% found here was considerably higher. The reported attrition rate for Victorian SSRs overall[9] is 23.5%. High attrition is largely due to the frailty and comorbidities found in this population that may lead to readmission or death. However, because of the larger sample size recruited than required, the sample size in this study was not considered a factor in the study findings.

Where data were missing, the last observations were brought forward. However, because this may have been due to readmission and deteriorating health, missing scores may, in reality, have worsened.

A further study limitation was that the treating physiotherapists were aware of group allocation, which may have led to differences in treatment regimens. Detailed information regarding the individualized standard physiotherapy treatment was not collected. In addition, since neither incidences of FIT nor standard physiotherapy interventions were always supervised, adherence could not be measured reliably.

Other study limitations that may have affected outcomes are that the FIT program was not as comprehensive or intense as it needed to be, and adherence was too low. The lower functional ability of the FIT group at admission also may have had an impact.

Conclusions

The addition of FIT to standard SSR did not lead to more people discharged home in this study. Asking people early after admission to SSR about their expected discharge destination may assist with discharge planning. Implementing a FIT program during SSR may have a small effect on balance as measured by the BBS.

Supplier

a. PASW Statistics 18; IBM Corp.

Keywords

Aged; Exercise therapy; Frail elderly; Physical therapists; Rehabilitation; Residential facilities

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References

1. National Institute on Aging. Global health and aging. Washington (DC): U.S. Department of Health and Human Services; 2011.
2. Wier L, Pfuntner A, Maeda J, et al. Healthcare Cost and Utilization Project. Statistics on hospital-based care in the United States, 2009. Available at: http://hcup-us.ahrq.gov/reports/factsandfigures/2009/section1_TOC.jsp. Accessed December 12, 2014.
3. Cornwell J, Levenson R, Sonola L, Poteliakhoff E. Continuity of care for older hospital patients, a call for action. London: The Kings Fund; 2012.
4. Australian Institute of Health and Welfare. Australian hospital statistics 2011-12. Canberra: AIHW; 2013.
5. Covinsky K, Palmer R, Fortinsky R, et al. Loss of independence in activities of daily living in older adults hospitalized with medical illnesses: increased vulnerability with age. J Am Geriatr Soc 2003;51:451-8.
6. Karmel R, Gibson D, Lloyd J, Anderson P. Transitions from hospital to residential aged care in Australia. Australas J Ageing 2009;28:198-205.
7. Department of Health and Ageing. National evaluation of the Transition Care Program: final evaluation report. Canberra: DOHA; 2008.
8. Commonwealth of Australia. Transition Care Program guidelines, 2011. Available at: http://webarchive.nla.gov.au/gov/20120317043407/http://www.yourhealth.gov.au/internet/main/publishing.nsf/content/ageing-transition-guidelines.htm. Accessed January 19, 2015.
9. Australian Institute of Health and Welfare. Older people leaving hospital: a statistical overview of the Transition Care Program in 2008-2009. Canberra: AIHW; 2011.
10. Campbell S, Seymour D, Primrose W, et al. A multi-centre European study of factors affecting the discharge destination of older people

admitted to hospital: analysis of in-hospital data from the ACMEplus project. Age Ageing 2005;34:467-75.

11. de Vreede P, Samson M, van Meeteren N, Duursma S, Verhaar H. Functional-task exercise versus resistance strength exercise to improve daily function in older women: a randomized, controlled trial. J Am Geriatr Soc 2005;53:2-10.
12. Schnelle J, MacRae P, Ouslander J, Simmons S, Nitta M. Functional incidental training, mobility performance, and incontinence care with nursing home residents. J Am Geriatr Soc 1995;43:1356-62.
13. Schnelle J, Alessi C, Simmons S, Al-Samarrai N, Beck J, Ouslander J. Translating clinical research into practice: a randomized controlled trial of exercise and incontinence care with nursing home residents. J Am Geriatr Soc 2002;50:1476-83.
14. Commonwealth of Australia. Aged care assessment program guidelines, January 2014. Available at: https://www.dss.gov.au/our-responsibilities/ageing-and-aged-care/for-providers/guidance-for-providers/aged-care-assessment-programme-guidelines. Accessed January 19, 2015.
15. de Morton N, Davidson M, Keating J. The de Morton Mobility Index (DEMMI): an essential health index for an ageing world. Health Qual Life Outcomes 2008;6:63-78.
16. de Morton N, Davidson M, Keating J. Reliability of the de Morton Mobility Index (DEMMI) in an older acute medical population. Physiother Res Int 2011;16:159-69.
17. Norman G, Sloan J, Wyrwich K. Interpretation of changes on health related quality of life: the remarkable universality of half a standard deviation. Med Care 2003;41:582-92.
18. de Morton N, Lane K. Validity and reliability of the de Morton Mobility Index in the subacute hospital setting in a geriatric evaluation and management population. J Rehabil Med 2010;42:956-61.
19. de Morton N, Meyer C, Moore K, Dow B, Jones C, Hill K. Validation of the de Morton Mobility Index (DEMMI) with older community care recipients. Australas J Ageing 2011;30:220-5.
20. Lusardi M, Pellecchia G, Schulman M. Functional performance in community living older adults. J Geriatr Phys Ther 2003;26:14-22.
21. Berg K, Wood-Dauphinee S, Williams J, Gayton D. Measuring balance in the elderly: preliminary development of an instrument. Physiother Can 1989;41:304-11.
22. Harada N, Chiu V, Fowler E, Lee M, Reuben D. Physical therapy to improve functioning of older people in residential care facilities. Phys Ther 1995;75:830-9.
23. Conradsson M, Lundin-Olsson L, Lindelot N, et al. Berg Balance Scale: intrarater test-retest reliability among older people dependent in activities of daily living and living in residential care facilities. Phys Ther 2007;87:1155-63.
24. Berg K, Wood-Dauphinee S, Williams J. Measuring balance in the elderly: validation of an instrument. Can J Public Health 1992; 83(Suppl 2):S7-11.
25. Bohannon R. Reference values for the five-repetition sit-to-stand test: a descriptive meta-analysis of data from elders. Percept Mot Skills 2006;103:215-22.
26. Teo T, Mong Y, Shamay N. The repetitive five-times-sit-to-stand test: its reliability in older adults. Int J Ther Rehabil 2013;20:122-30.
27. Andersson E, Lin C, Smeets R. Performance tests in people with chronic low back pain—responsiveness and minimal clinically important change. Spine 2010;35:E1559-63.
28. Blackman-Weinberg C, Crook J, Roberts J, Weir R. Longitudinal study of inpatients admitted to a general activation service: variables that predict discharge to a patient's discharge goal location. Arch Phys Med Rehabil 2005;86:1782-7.

Appendix 3 Systematic review search strategy

The search strategy used for Chapter 3 Outcomes of additional exercise during slow stream rehabilitation: systematic review and critical evaluation of the literature is found below in Table A3.1.

Table A3.1

Key search terms for systematic review (Embase 1947 to 2018 April 27)

Set	Search	Results
001	Aged/	165781
002	"older adult".mp.	819
003	Geriatric.mp. or geriatrics/	6262
004	Elderly care/ or aging/ or older.mp.	52824
005	1 or 2 or 3 or 4	195706
006	Hospital discharge/ or "post discharge".mp	11066
007	Postacute.mp.	146
008	"post acute care".mp. or subacute care/	234
009	Aftercare.mp. or aftercare/	376
010	6 or 7 or 8 or 9	11671
011	"integrated care".mp.	584
012	"residential rehabilitation".mp.	26
013	"intermediate care".mp	141
014	Transition care/ or "transition* care".mp	705
015	"slow stream rehabilitation".mp	0
016	"care home rehabilitation".mp	0
017	"skilled nursing facility*".mp	339
018	"community hospital".mp. or community hospital/	824
019	11 or 12 or 13 or 14 or 15 or 16 or 17 or 18	2571
020	Exercise/ or exercise*.mp.	28634
021	"functional training".mp. or functional training/	117
022	"physical therapy".mp or physiotherapy/	4700
023	"functional therapy".mp.	18
024	"functional exercise".mp.	109
025	20 or 21 or 22 or 23 or 24	4583239758
026	Randomized controlled trial/	045858
027	5 and 10 and 19 and 25 and 26	0
	Limit 27 to (human and English language and aged >65 years)	0

Appendix 4 Human Research Ethics Committee approvals

Ethics approvals were granted from all relevant ethics committees for each study.

Chapter 2

Faculty Human Ethics Committee, La Trobe University: FHEC11/66

Chapter 4

Faculty Human Ethics Committee, La Trobe University: FHEC09/99

Human Research Ethics Committee, Bendigo Health: HREC 002/2009

La Trobe University
Faculty of Health Sciences

MEMORANDUM

TO: Professor Keith Hill
Dr Helen McBurney
School of Physiotherapy

SUBJECT: *Reference:* **FHEC11/66**

Student Name/ Other Investigator: Carol Parker

Title: **Transition Care Program - Models and Processes in regional Victoria**

DATE: 11 May, 2011

The Acting Chair of the Faculty Human Ethics Committee has reviewed this application and granted provisional approval without further review on the grounds that it is a negligible risk application. Participants will be asked to provide answers to a series of questions that fall within their professional role. No personal information will be sought by the researchers.

Please provide a copy of the Participant Information Statement, Consent Form and Withdrawal of Consent Form on official school letterhead.

Please provide your amendments in a memorandum. It is not necessary to resubmit the entire application again.

If you have a student/s involved in this project, a copy of this memorandum is enclosed for you to forward to the student(s) concerned.

Timothy M Bach, PhD
Acting Chair
Faculty Human Ethics Committee
Faculty of Health Sciences

La Trobe University
Faculty of Health Sciences
MEMORANDUM

TO: Dr Helen McBurney
Dr Keith Hill
School of Physiotherapy

SUBJECT: *Reference:* **FHEC09/99**

Student or Other Investigator: Carol Parker

Title: **Does functional incidental training affect discharge destination for bed based transition care program clients in regional Victoria?**

DATE: 16 June, 2009

The Faculty Human Ethics Committee's (FHEC) reviewers have considered and approved the above project. You may now proceed.

Please note that the Informed Consent forms need to be retained for a minimum of 5 years. Please ensure that each participant retains a copy of the Informed Consent form. Researchers are also required to retain a copy of all Informed Consent forms separately from the data. The data must be retained for a period of 5 years.

Please note that any modification to the project must be submitted in writing to FHEC for approval. You are required to provide an annual report (where applicable) and/or a final report on completion of the project. A copy of the progress/final report can be downloaded from the following website:
www.latrobe.edu.au/rgso/forms-resources/forms/ethic-prog-final.rtf.

Please return the completed form to The Secretary, FHEC, Faculty of Health Sciences Office, La Trobe University, Victoria 3086.

If you have a student/s involved in this project, a copy of this memorandum is enclosed for you to forward to the student(s) concerned.

Natalie Humphries
Secretary
Faculty Human Ethics Committee
Faculty of Health Sciences

CONFIDENTIAL

PO Box 126
Bendigo 3552

Human Research Ethics Committee
Phone: (03) 5454 6412
Fax: (03) 5454 6420

http: www.bendigohealth.org.au/HREC

2.04.09

Carol Parker
CHERC
Bendigo Health
PO Box 126
Bendigo
Vic 3552

Dear Carol,

Re: Study Title: Does the addition of Functional Incidental Training to standard Physiotherapy treatment affect function, depression and quality of life for bed based Transition Care Program clients in regional Victoria?

HREC Reference Number: 002/2009

Thank you for your recent correspondence addressing the concerns expressed by Bendigo Health's Human Research Ethics Committee regarding the above study. I am pleased to advise you that as it meets the requirements of the 2007 National Statement on Ethical Conduct in Human Research, the HREC has approved the above project. The project has been approved for the period 02/04/2009-02/04/2011.

Would you please note that the following standard conditions apply:

a. *Limit of Approval*: approval is limited strictly to the research proposal as submitted in your application. In addition, approval by the HREC *does not* guarantee that an individual BHCG unit or service will agree to provide resources or support to your research. Such assistance will need to be negotiated separately.
b. *Variation to Project*: any subsequent variations or modifications you might wish to make to your project must be notified formally to the committee for further consideration and approval. If the committee considers that the proposed changes are significant, you may be required to submit a new application for approval of the revised project.
c. *Incidents of Adverse Effects*: researchers must report immediately to the committee anything which might affect the ethical acceptance of the protocol including adverse effects on subjects or unforeseen events that might affect continued ethical acceptability of the project.
d. *Progress Reporting*: please be aware that the Human Research Ethics Committee requires all researchers to submit a report on each of their projects yearly, or at the conclusion of the project if it continues for less than a year. Failure to submit a progress report may mean approval for this project will lapse. **The first progress report for this project is due on 02/04/2010.**
e. Auditing: all projects may be subject to audit by members of the committee.

If you have any further queries on these matters, or require additional information, please contact me on 5454 – 6412, or e-mail: SAMcCarthy@bendigohealth.org.au. Human Research Ethics Committee information and application forms are available on the Committee's website, http://www.bendigohealth.org.au/HREC.

Yours sincerely

Sally McCarthy
Secretary
Human Research Ethics Committee
Bendigo Health Care Group

Appendix 5 Sample size calculation

Dichotomous Outcomes

ENTER DATA HERE ... (all items are compulsory)	proportion in control group (%):	30
	proportion in experimental group (%):	60
	alpha (suggest 5%):	5
	power (suggest 80%):	80
	dropouts (%):	10
ANSWER IS RETURNED HERE ...	n (per group):	48

Appendix 6 Participant information and consent forms

Participants for the study in Chapters 2 and 4 received a participant information and consent form.

School of Physiotherapy
Faculty of Health Sciences

Victoria 3086 Australia
T +61 3 9479 5815
F +61 3 9479 5768
E physiotherapy@latrobe.edu.au
www.latrobe.edu.au/physiotherapy

Participant Information Sheet

Project Title: Transition Care Program – Models and Processes in regional Victoria
Chief Investigator / Supervisor: Keith Hill
Position: Professor
School: Musculoskeletal Research Centre
Contact Details: Phone: 03 94953233
Email: keith.hill@latrobe.edu.au

Student: Carol Parker
Course of Study: PhD
School: Physiotherapy
Contact Details: Phone: 03 5454 6413
Email: cparker@bendigohealth.org.au

Description of Project:
The aim of this project is to investigate and describe the models and processes of the Transition Care Programs currently running in regional Victoria.

Research Procedures:
As the coordinator of a TCP, you are being asked to participate in a semi-structured interview. The (semi-structured) interview will take place over the phone or face to face and, with your permission, will be audio recorded. It is expected that the interview will take approximately 45 minutes. The interview will then be transcribed and all persons and places de-identified at this stage. The transcript will be returned to you for verification and then returned in a stamped addressed envelope to the researcher. All transcripts will then be analysed for common themes. The findings will be written up for publication in a thesis, journal and/or conference presentation.

Risks/Discomfort to Participants:
There are no foreseen risks to participation in this project. All individuals and facilities will be de-identified at all times and information aggregated. All interviews will remain confidential to the interviewee and researchers.

Use of Data:
De-identified interview transcripts will be kept on a password protected computer. The hard copy of the interviews will be kept in a securely locked cabinet at the University for five years and then shredded. Participants will be provided with a copy of the final report on request to the researchers.

Benefits:
There are no benefits to you for being involved in this research. However, this study will identify the differences and similarities between Transition Care Programs being run in Victoria currently as a background to a larger study which is investigating the addition of

Functional Incidental Training to standard physiotherapy for bed-based clients on the Transition Care Program in regional Victoria. Results of these studies may be of benefit to future users of the Transitional Care programs, as results may inform future improvements or changes to the program.
There are no disadvantages, penalties or adverse consequences for not participating or for withdrawing prematurely from this research.

Any questions regarding this project may be directed to Carol Parker, on (03) 5454 6413.

If you have any complaints or queries that the investigator has not been able to answer to your satisfaction, you may contact the Secretary, Faculty of Health Sciences Human Ethics Committee, La Trobe University, Victoria, 3086, Mr Neil McDonald, Phone: 9479-2357 e-mail: n.mcdonald@latrobe.edu.au

You have the right to withdraw from active participation in this project at anytime and, further, to ask that data arising from your participation are not used in the research project provided that this right is exercised within four weeks of the completion of your participation in the project. **You are asked to notify the investigator by e-mail or telephone that you wish to withdraw your consent for your data to be used in this research project.**

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Faculty of Health Sciences

Victoria 3086 Australia
T +61 3 9479 5815
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E physiotherapy@latrobe.edu.au
www.latrobe.edu.au/physiotherapy

Participant Consent Form

Project Title: Transition Care Program – Models and Processes in regional Victoria

I ______________________________ have read, or have had read to me, and understood **the participant information sheet,** and any questions I have asked have been answered to my satisfaction. I agree to participate in the project, realising that I may withdraw at any time and may request that no data arising from my participation are used, up to four weeks following the completion of my participation in the research. I agree that research data provided by me or with my permission during the project may be included in a thesis, presented at conferences and published in journals on the condition that neither my name nor any other identifying information is used.

Name of Participant (block letters):
Signature: **Date:**

Name of Investigator (block letters):
Signature: **Date:**

Attachment E

Participant Information and Consent Form

Bendigo Health Care Group

Full Project Title: Does the addition of Functional Incidental Training to standard Physiotherapy treatment affect function, depression and quality of life for Bed Based Transition Care Patients in regional Victoria?

Principal Researcher: Carol Parker, PhD student, La Trobe University

Associate Researchers: Helen McBurney, Keith Hill, School of Physiotherapy, La Trobe University

1. Introduction

You are invited to take part in this research project. Your details have been obtained from the Transition Care Program Assessment staff. This is because a research project is taking place into the effect of additional physical activity on the functional abilities of people who are on the Transition Care Program in a bed-based place and you have been referred for a place on this program. The research project aims to compare the effects of extra physical activity with the normal amount of physical activity to see if there are any benefits.

This Participant Information and Consent Form tells you about the research project. It explains what is involved to help you decide if you want to take part.

Please read this information carefully. Ask questions about anything that you don't understand or want to know more about. Before deciding whether or not to take part, you might want to talk about it with a relative, friend or your local health worker.

Participation in this research is voluntary. If you don't wish to take part, you don't have to.

If you decide you want to take part in the research project, you may be asked to sign the consent section. By signing it you are telling us that you:

- Understand what you have read;
- Consent to take part in the research project;
- Consent to be involved in the procedures described;
- Consent to the use of your personal and health information as described.

You will be given a copy of this Participant Information and Consent Form to keep.

2. What is the purpose of this research project?

- Some people will be accepted on the Transition Care Program into a bed-based place. They may go to a hostel or nursing home for a few weeks after completing their inpatient stay. These people will receive physiotherapy treatment while they are staying there. As part of this study some of these people will be offered more physical activity and additional supervision whilst exercising. The aim of this project is to see whether this will make any difference to the abilities of the person at the end of their stay. Approximately 50 people will take part in this study over a period of two years. The study will take place in Bendigo.
- There will be two different groups of people involved in the study. One group will be those people that receive normal physiotherapy and the other group will be those people that receive normal physiotherapy and additional physical activity.
- The results of this research will be used by the researcher, Carol Parker, as part of her studies, to obtain a doctorate. No funding has been received for this project.

3. What does participation in this research project involve?

Procedures

- Participants will need to read and sign this consent form;
- There will be three assessment periods – one at the start, at discharge and at six months. At these times there will be five tests completed. Some of these will require some minor physical activity to test your physical abilities. In total these tests should be completed within approximately 40 minutes;
- These tests can be completed at a venue of your choosing as no complicated equipment is necessary;
- For those people who accept a Transition Care Program bed-based place and agree to participate there will be two versions of physiotherapy treatment. All people will be entered into one of these two groups but the groups will be randomly chosen;
- At the completion of the study a final report will be provided to all participants;
- There will be no payment for participation in this research.

4. What are the possible benefits?

- The possible benefits of this study include the possibility that different forms of physiotherapy treatment may make a difference to physical abilities at the time of discharge from the program. This may affect the level of independence and thus possibly the final residential destination at the completion of the Transition Care Program.

5. What are the possible risks?

For some people there may be additional physical activity asked of them for most days of their stay on the Transition Care Program. This will be undertaken as part of a planned activity program tailored to suit the individual participant in terms of the amount and type of activity. If any participant complains of any problems with the extra activity and has any ill effects these will be reported to the treating physiotherapist and, if necessary, the treatment can be altered. At all times the participants will be involved in their treatment and their wishes will be listened to.

6. Do I have to take part in this research project?

Participation in any research project is voluntary. If you do not wish to take part, you do not have to. If you decide to take part and later change your mind, you are free to withdraw from the project at a later stage.

If you decide to leave the project, the researchers would like to keep the personal and/or health information about you that has been collected. This is to help them make sure that the results of the research can be measured properly. If you do not want them to do this, you must tell them before you withdraw from the research project.

Your decision whether to take part or not, or to take part and then withdraw, will not affect your relationship with the researchers or medical facilities.

7. How will I be informed of the final results of this research project?

At the completion of the project a summary of the results will be forwarded to you. The results may also be published or presented at a conference. This summary will not be sent to you until the study is completed and the results are analysed. This may be in 2011.

8. What will happen to information about me?

- The project documentation will be stored in a secure, lockable location on the campus of the hospital and will only be accessible to the researchers;
- Computer files will be password protected;
- The data will be de-identified;
- Consent forms will be kept according to the Public Records Office of Victoria Standards (15 years for clinical trial data following publication);
- Participants are being asked to consent to this specific project only;
- This research does not involve the establishment of a databank;
- Any information obtained in connection with this research project that can identify you will remain confidential and will only be used for the purpose of this research project;
- In any publication and/or presentation, information will be provided in such a way that you cannot be identified.

9. Can I access research information kept about me?

In accordance with relevant Australian and/or Victorian privacy and other relevant laws, you have the right to access the information collected and stored by the researchers about you. Please contact one of the researchers named at the end of this document if you would like to access your information.

In addition, in accordance with regulatory guidelines, the information collected in this research project will be kept for at least 15 years.

10. Is this research project approved?

The ethical aspects of this research project have been approved by the Human Research Ethics Committee of Bendigo Health Care Group and La Trobe University.

This project will be carried out according to the **National Statement on Ethical Conduct in Human Research** (2007) produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies.

11. Who can I contact?

The person you may need to contact will depend on the nature of your query. Therefore, please note the following:

For further information or appointments:

If you want any further information concerning this project or if you have any problems which may be related to your involvement in the project (for example, feelings of distress), you can contact the principal researcher, Carol Parker on 5454 6413 or Helen McBurney on 5454 7021. These numbers can be contacted on a 24-hour basis and a message can be left.

For complaints:

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about being a research participant in general, then you may contact:

Name: Sally McCarthy

Position: Bendigo Health HREC Secretary

Telephone: (03) 5454 6412

You may also contact:

Name: Natalie Humphries

Position: La Trobe University HREC Secretary

Telephone: (03) 9479 3573.

Attachment E

Participant Information and Consent Form

Full Project Title: Does the addition of Functional Incidental Training to standard Physiotherapy treatment affect function, depression and quality of life for Bed Based Transition Care Patients in regional Victoria?

Principal Researcher: Carol Parker, CHERC, Bendigo Health, PO Box 126, Bendigo, VIC 3552
Telephone: 03 5454 6413
Email: cparker@bendigohealth.org.au

Associate Researchers: Helen McBurney, Keith Hill

I have read, or have had this document read to me in a language that I understand, and I understand the purposes, procedures and risks of this research project as described within it.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I freely agree to participate in this research project, as described.

I understand that I will be given a signed copy of this document to keep.

Participant's name (printed) …………………………………………………

Signature Date

Declaration by researcher: I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Researcher's name (printed) …………………………………………………

Signature Date

Note: All parties signing the consent section must date their own signature.

Attachment E

Participant Information and Consent Form

Full Project Title: Does the addition of Functional Incidental Training to standard Physiotherapy treatment affect function, depression and quality of life for Bed Based Transition Care Patients in regional Victoria?

Principal Researcher: Carol Parker CHERC, Bendigo Health, PO Box 126, Bendigo, VIC 3552
Telephone: 03 5454 6413
Email: cparker@bendigohealth.org.au

Associate Researchers: Helen McBurney, Keith Hill

Acknowledgement section to be used by a Third Party (i.e. on behalf of adult participants who cannot consent for themselves)

I have read or have had this document read to me in a language I understand, and I understand the purposes, procedures and risks of this research project as described within it.

I acknowledge that the researchers would like to enrol ________________ in this research project, according to the conditions outlined in this document.

I have had an opportunity to ask questions and I am satisfied with the answers I have received.

I understand that I will be given a signed copy of this document to keep.

Participant's name (printed) …………………………………………………

Name of person providing Third Party acknowledgement (printed) ……………………………

Relationship to participant: …………………………………………………

Signature Date

Declaration by researcher*: I have given a verbal explanation of the research project, its procedures and risks and I believe that the participant has understood that explanation.

Researcher's name (printed) …………………………………………………

Signature Date

Note: All parties signing the consent section must date their own signature.

Appendix 7 Letter and questionnaire for TCP co-ordinators

17th May, 2011

Carol Parker
RMB 2350
Eaglehawk VIC 3556

NAME
PLACE

Dear ***NAME***,

I am a PhD student and am just completing a randomised controlled trial which is investigating the addition of Functional Training to standard physiotherapy for bed based clients on the Transition Care Program in regional Victoria. As part of the background to this trial I am wishing to look at the models and processes of the Transition Care Programs currently running in regional Victoria.

I would like to invite the Transition Care Program co-ordinator from ***PLACE*** to participate in this background part of the trial. The information gained from interviewing the co-ordinator will be transcribed and all persons and places will be de-identified at this stage. The transcript will be returned for verification to the co-ordinator and I would request that it be returned to me with any corrections. The transcripts will then be analysed for common themes prior to being written up as part of my thesis as well as for publication and/or conference presentation.

I would be happy to discuss this further if you have any concerns or questions either by email, cparker@bendigohealth.org.au or phone on 0419 119281 or 03 5454 6413.

I look forward to hearing from you.

Yours sincerely,

Carol Parker

Semi-Structured Interview Proforma

Can you give me a general description of the TCP program in your region?

Prompt Questions Regarding TCP Models, March 2011

1. How many TCP beds do you have in your region and what is the breakdown of bed based and community based?
2. How long has your program been running? Have you just been made aware of new beds to start in your area? If so, how many? Where? What is the breakdown of bed based and community?
3. Do you feel that you will have adequate beds with any extra beds which have been allocated? What is your average occupancy rate (bed-based and community based)?
4. What disciplines of therapy do you provide and what EFT of each do you provide? Do you have a ratio of EFT per TCP place in either bed-based or community based?
5. Do you have a geriatrician/rehabilitation consultant in your team? If not, would you consider this to be a desirable addition to your program?
6. Are allied health, medical and nursing services provided for bed based and community TCP people? If not, would you consider this to be a desirable addition to your program (include reasons)?
7. Are the allied health and nursing staff a designated team or sub-contracted on an as needs basis? What do you perceive to be the benefits and drawbacks of how this operates in your program?
8. Do staff rotate in and out of TCP? If they rotate, how long are the rotations? What do you perceive to be the benefits and drawbacks of how this operates in your program?

9. Are the TCP beds in a RACF or Acute ward or elsewhere? Do you consider this to be the best arrangement for locations of these beds? What are the advantages and disadvantages of this arrangement?
10. How are the beds managed? Do you have a case manager on each site or is there a case manager based at a distance who covers several different areas?
11. What is the organisational/management structure of TCP?
12. How is the TCP funding managed?
13. Do you have a satisfactory database for collection of Victorian Integrated Non-Admitted Health Minimum Dataset (VINAH)?
14. Are all of the different programs in your area quite clear about which patients should go to which program e.g. Transition Care Program, Post Acute Care, Hospital in the Home, Community Aged Care Packages etc.? Are there written guidelines?
15. Do TCP staff attend discharge planning meetings or do you have a discharge planner in each area? What do you perceive to be the benefits and drawbacks of how this operates in your program?
16. Do you have rehabilitation beds? If not, do you feel that some TCP beds are used as a default rehabilitation bed?
17. Do you feel that some of your TCP clients are on the program while they await a bed in a RACF?
18. Do all TCP clients have an improvement goal or are some on the program aiming to maintain? Are there advantages or disadvantages of this?

Appendix 8 Outcome measure protocol for residential TCP FIT project

- Outcome measures to be done in the order of Berg, DEMMI followed by the sit to stand

- Equipment necessary includes a stool, ruler, blank forms and pen, stopwatch, standard chair with arms and bed

- Equipment (except bed and chair) will be stored in the equipment store room at Bentleys and Bethlehem with signs on them as to their use

- Between each outcome measure allow a few minutes recovery before the next measure

Notes to accompany the outcome measures;

1) Berg Balance Scale

Standing unsupported – use normal stance and check that the back of the legs are not touching the chair

Transfer – from chair to bed and back again

Standing unsupported with eyes closed – use normal stance and get balance first before closing eyes and standing still for 10 seconds

Reaching forward with outstretched arm while standing – use normal stance and measure in cms

Pick up object from the floor from a standing position – use a pen not a shoe/slipper

Turning to look behind over left and right shoulder while standing – use normal stance and put up some fingers behind the person’s shoulder, encourage them to turn and count your fingers and report the number to you

Turn 360 degrees – use gait aid if the person uses one

Place alternate foot on step or stool while standing unsupported – demonstrate this first, use alternate feet, put full foot on the step each time, have the stool next to the wall with a chair behind

Standing unsupported one foot in front – using gait aid for score of '0' and '1' only

2) DEMMI – wearing the shoes the person is comfortable wearing

Bridge – any clearance is counted as able

Roll onto side – using bed pole is okay

Chair – sit unsupported, sit to stand and sit to stand without using arms – has already been done in the Berg

Static balance (no gait aid) – stand unsupported, stand feet together – has already been done in the Berg

Static balance stand on toes – set up first with support then remove support

Static balance tandem stand with eyes closed – set up first with support then remove support

Dynamic balance – no gait aid, pick up pen from floor – has already been done in the Berg

3) Five times sit to stand test

Using standard chair – 45 cms

Instructions should be 'I will say 'ready, steady, go'. When I say 'go' I want you to stand up fully and sit down again 5 times as quickly as you can. Don't sit down completely each time and please keep your arms folded all the time if you are able to'.

Document if arms of the chair are used.

A Research Project in the Transition Care Program to see if extra exercise makes a difference

This research project will be looking at whether increasing the exercise you do while you are on the Transition Care Program in a residential aged care facility will make a difference to your balance, walking, function, depression, and quality of life.

This project involves both Bendigo Health and La Trobe University.

If you would like to take part in this research project please contact the researcher, Carol Parker on 5454 6413 or discuss this further with your Transition Care Program assessor.

The aim of this project is to improve the abilities of older people after an episode of being in hospital

Bendigo Health

LA TROBE UNIVERSITY

RESEARCH PROJECT

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TRANSITION CARE PROGRAM

RESEARCH PROJECT

Exercise and Energise!

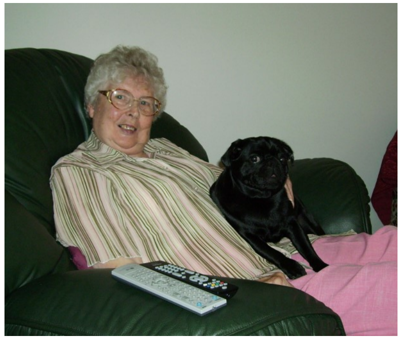
Tel: 5454 6413 Carol Parker

What is this Research Project?

This research project is designed to see if extra physical activity will make a difference to people who have been accepted into a place on the Transition Care Program and who will be moving to a residential aged care facility for a few weeks. During these few weeks in care these people will be receiving treatment designed to help them to get as well as possible. One of the treatments that they will be receiving will be physiotherapy. If you agree to participate in this research project you may receive the normal physiotherapy or you may receive the normal physiotherapy plus some additional activity. In every case the treatment will be designed individually to suit you and will be carefully graded to your ability level.

What will it involve?

If you agree to join the project and agree to sign a consent form there will be some initial information collected about you such as your age and medical problems. Then we will measure your physical abilities looking at your balance and walking as well as your quality of life. These tests will take about 40 minutes and will be repeated again after discharge and at 6 months.



While you are in the residential aged care facility on the Transition Care Program you will do your normal exercises and you may be asked to complete some extra exercises 4 times every day.

What else do I need to know?

There is no payment involved in joining the project.

If you don't want to join, it will not affect your place on the Transition Care Program.

If you do join and then want to leave the project that is also allowed.

The extra exercise will be mostly walking and practicing sitting to standing.

If you are interested please tell your Transition Care Program assessor and they will ask the researcher to contact you.

RESEARCH PROJECT

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Appendix 10 Information for residential care staff

Transition Care Program Research Project

The Transition Care Program (TCP) is targeted towards older people who have completed an acute or sub-acute hospital episode of care and require additional, although short-term, active services and support to reach their maximum potential. This additional care is goal oriented and time limited. The outcomes of transitional care should include the prevention or minimisation of inappropriate extended hospital length of stay and premature admission to residential aged care facilities.

Functional Training (FIT) is defined as 'Care processes that are designed to increase activity and functional ability with emphasis placed on the repetition of exercises that are specific to the functional skills involved with toileting and other activities of daily living'.

For this study FIT will be instituted to be undertaken four times daily from Monday to Friday and on weekends if possible. There will be notices with the FIT program in the clients' rooms on the bedroom and bathroom walls. There will be a red book in each client's room on the program which will detail their program and will have space for comments regarding their program where anyone can write. The client will have their normal physio weekly but will be seen by a physio implementer twice weekly in addition. The FIT program is likely to change weekly as the person's abilities change. The resident Leisure Therapist/Recreation Therapist will also be asked to remind participants to do their exercise. Reminders to the participants will be given by the staff involved in the program, as well as other care staff. Exercise will include sitting to standing and walking primarily.

If you have any concerns please contact the researcher, physio or university supervisor:

Researcher – Carol Parker, 5454 6413, 0419 119281

Physio – Janet Cobden, 5454 9106, 0447 357485

Supervisor – Helen McBurney, 5454 7021

Appendix 11 Information for transition care assessors

Bed Based TCP Research Project

- Robert or Shelley will hand out the information flyer to people who have signed up to be part of the bed-based TCP program. They will explain to the person that they will not receive any less service if they agree to participate in the project. Some people will receive more services and the other people will receive the same service.

- During the assessment the TCP assessor will decide whether the person has any cognitive issues. They will decide whether the person is able to fully understand the information given to them regarding the TCP program and research project enabling them to provide informed consent.

- If the person has cognitive issues the TCP assessor will be in contact with the next of kin to enable them to sign for the person to access TCP. The TCP assessor will ask the next of kin if they agree for their contact details to be given to the researcher.

- If the next of kin is agreeable the TCP assessor will email the details of the person, their location and if necessary and applicable, the details of the next of kin to cparker@bendigohealth.org.au . If necessary the details can be phoned through on 5454 6413 Monday – Thursday and 5436 1328 on Fridays.

- If there are any issues that need to be discussed please phone on the above numbers.

Appendix 12 Information for transition care study team

Protocol for Residential TCP Functional Training (FIT) Project

- Robert or Shelley to hand out flyers to those patients that accept residential TCP places.
- If patient is happy to consider the project, Robert/Shelley to forward client details to Carol.
- Carol will visit the patient asap and, if the consent is signed, do EuroQol and GDS.
- Details of patient with scores to be inserted into Excel.
- Let TCP physios know which patients have signed consent forms.
- TCP physios will complete Berg, DEMMI and sit to stand outcome measures.
- Outcome measures to be done in the order of Berg, DEMMI followed by the sit to stand.
- Stool, ruler and stopwatch will be required in addition to checking the chair height is 45 cm.
- Details of scores including name to be sent to Carol electronically for insertion into Excel.
- Photocopies of the original measures to be sent to Carol.
- Carol to forward names of participants to Helen.
- Patients randomized by Hele

- Helen will contact the TCP physios regarding the status of all participants – whether on FIT or not.
- TCP physios will set up FIT program.
- Physios will contact the implementer electronically and give them the details regarding name, location and FIT program (See Implementer Protocol).
- Staff to also encourage FIT with participants.
- Expected that each patient will have two visits of 30 minutes per week of supervised FIT.
- TCP physios to contact Carol and implementer as soon as the discharge date is determined.
- TCP physios to complete discharge assessment as normal including DEMMI, Berg and Sit to stand.
- Results of assessment to be sent to Carol electronically.
- FIT documentation (red book and papers from bedroom and bathroom walls) to be removed from patient's room by TCP physios during final assessment.
- Carol to do discharge assessments as well as 6/12 assessments.

Appendix 13 Allied health assistant protocol

Physio Implementer Protocol

Principles

Each participant will get a maximum of two 30-minute sessions per week with the implementer.

Other incidental activity to be carried out as possible.

- A TCP Physio will set up the initial functional training (FIT) program, discuss with the participant and give the program to the implementer.
- The implementer will write out the program on two sheets of paper and put them up on the participant's bedroom and bathroom walls.
- The implementer will set up a red book in each participant's room with their name and initial program written down in it.
- During two sessions weekly the implementer will encourage the participant to walk/wheel and practice the sit to stands as per the program.
- During the walk/wheel the implementer will not engage in social conversation except to monitor and encourage the participant.
- During the first session, the program will be set up for the next few weeks e.g. appointments to be made at 10.00am every Tuesday and Thursday to maximise availability of both parties. Appointments will be written on the sheet provided and put up next to the FIT program.
- If the participant is not available at the appointment time, if it is possible, organise another appointment before the next organised time.
- If one participant is not available during a visit to a facility do not re-visit a participant who has already been visited that day.
- Each visit to the participant and how far was walked/wheeled and how many sit to stands were achieved, plus comments will be recorded in the red book in the participant's room.
- During the second session weekly the participants will be assessed regarding their maximal walk/wheel distance and the maximum number of sit to stands

- Before assessing, make it clear to the participant what the assessment is going to involve i.e. 'I want you to walk/wheel as far as you are able to without getting distressed or causing pain. I am not going to encourage you or talk to you while you are walking. When you have walked/wheeled as far as you are able to, then just tell me and stop and I will record the distance that you have walked/wheeled' and 'I want you to stand right up from the chair and sit down again as many times as you are able to. I am not going to talk to you or encourage you. When you have had enough just tell me and stop'. There should be a five minute break between the walking/wheeling and sitting to standing.
- Document in the book if arms are used during the sit to stand exercise.
- If the participant is not available for checking on the second session of the week, the participant is to be assessed when the implementer can next visit, as soon as possible.
- From the assessment, 75% of the maximum walk/wheel and sit to stands will be used as a baseline for the next week. However, 75% is the minimum distance or number expected, if more can be achieved that is encouraged.
- The changes will be noted on the papers in the bedroom and bathroom.
- The changes will also be recorded in the red book in the participant's room.
- If there are any issues or problems contact Janet Cobden on 5454 9106 or 0417 352972, Carol Parker on 5454 6413 or 0419 119281 or Helen McBurney on 5454 7021.
- The Physio will contact the implementer and Carol when the when the discharge date is determined.
- Papers for FIT will be removed from the participant's room prior to discharge by the TCP physio completing the final assessment.
- The red book will be returned to the Physio.

Appendix 14 Information regarding participant randomisation

Participant Allocation advice to the recruiting therapist

Participants have been randomly allocated by Helen to either

- “FIT” – receives usual care on the TCP and also receives additional Functional training or
- “No FIT” – receives usual care on the TCP but gets no additional FIT.

The allocation is indicated on a small piece of paper in a sealed envelope. The envelope is to be opened by either Janet or Gemma ONLY after ALL consent and assessment for the study has been completed.

If the participant is to receive FIT then Janet or Gemma will contact Jo electronically with the participants name, residence and details regarding the FIT program for implementation.

Whatever the participant is allocated to for Carol’s study, Janet & Gemma will ensure that they receive usual care and will ensure that Carol is notified as soon as discharge from the TCP is discussed.

Each time you use an envelope please tell Helen (by e-mail) the name of the participant. This will ensure Helen has a master list of all participants and their group allocation.

When you have used the first 10 envelopes let Helen know (by e-mail) and she will provide the next 10. If you lose any envelopes, again contact Helen as she has a list of the allocation for each participant number.

References

Aberga, A., & Ehrenberga, A. (2017). Inpatient geriatric care in Sweden - important factors from an interdisciplinary team perspective. *Archives of Gerontology and Geriatrics, 72*, 113-129. doi:10.1016/j.archger.2017.06.002

Abrahamsen, J., Haugland, C., Nilsen, R., & Ranhoff, A. (2014). Predictors for return to own home and being alive at 6 months after nursing home intermediate care following acute hospitalization. *European Geriatric Medicine, 5*, 108-112. doi:10.1016/j.eurger.2013.10.012

Abrahamsen, J., Haugland, C., Nilsen, R., & Ranhoff, A. (2016). Three different outcomes in older community-dwelling patients receiving intermediate care in nursing home after acute hospitalization. *Journal of Nutrition, Health and Aging, 20*(4), 446-452. doi:10.1007/s12603-015-0592-y

Abrahamsen, J., Rozzini, R., Boffelli, S., Cassinadri, A., Ranhoff, A., & Trabucchi, M. (2015). Comparison of Italian and Norweigian postacute care settings for older patients in need of further treatment and rehabilitation after hospitalization. *Journal of Aging Research and Clinical Practice, 4*(4), 218-225. doi:10.14283/jarcp.2015.75

Admi, H., Shadmi, E., Baruch, H., & Zisberg, A. (2015). From research to reality: minimizing the effects of hospitalization on older adults. *Rambam Maimonides Medical Journal, 6*(2), E0017. doi:10.5041/RMMJ.10201

Age UK. (2017a). *Briefing: Health and Care of Older People in England 2017*. Retrieved from https://www.ageuk.org.uk/Documents/EN-GB/For-professionals/Research/The_Health_and_Care_of_Older_People_in_England_2016.pdf?dtrk=true

Age UK. (2017b). Intermediate care and reablement. In Age UK (Ed.), (Vol. Factsheet 76). London.

Agency for Healthcare Research and Quality. (2017). Trends in hospital inpatient stays in the United States, 2005-2014 *HCUP Statistical Brief No 225.* Retrieved from https://www.hcup-us.ahrq.gov/reports/statbriefs/sb225-Inpatient-US-Stays-Trends.pdf

Aguirre, E., Kang, S., Hoare, Z., Edwards, R., & Orrell, M. (2016). How does the EQ-5D perform when measuring quality of life in dementia against two other dementia-specific outcome measures? *Quality of Life Research*, *25*(1), 45-49. doi:10.1007/s11136-015-1065-9

Aiken, L., Sloane, d., Bruyneel, L., Van den Heede, K., Griffiths, P., Busse, R., . . . Sermeus, W. (2014). Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. *Lancet*, *383*, 1824-1830. doi:10.1016/S0140-6736(13)62631-8

Aikman, G., & Oehlert, M. (2000). Geriatric Depression Scale: long form versus short form. *Clinical Gerontologist*, *22*(3), 63-70.

Aily, J., Carnaz, L., Farche, A., & Takahashi, A. (2017). Perception of barriers to physical exercise in women population over 60. *Motriz: J. Phys. Ed.*, *23*(2), 1-6. doi:10.1590/S1980-6574201700020012

Al-Janabi, H., Flynn, T., Peters, T., Bryan, S., & Coast, J. (2015). Test-retest reliability of capability measurement in the UK general population. *Health Economics*, *24*, 625-630. doi:10.1002/hec.3100

American Psychological Association. (2013). *Publication manual of the American Psychological Association* (7th ed.). Washington, DC: American Psychological Association.

Andersson, E., Lin, C., & Smeets, R. (2010). Performance tests in people with chronic low back pain - responsiveness and minimal clinically important change. *Spine, 35*(26), E1559-E1563.

Andersson, L., Marcusson, J., & Wressle, E. (2014). Health-related quality of life and activities of daily living in 85-year-olds in Sweden. *Health and Social Care in the Community, 22*(4), 368-374. doi:10.1111/hsc.12088

Annweiler, C., Schott, A., Abellan van Kan, G., Rolland, Y., Blain, H., Fantingo, B., . . . Beauchet, O. (2011). The five-times-sit-to-stand test, a marker of global cognitive functioning among community-dwelling older women. *The Journal of Nutrition, Health and Aging, 15*(4), 271-276.

Anpalahan, M., & Gibson, S. (2008). Geriatric syndromes as predictors of adverse outcomes of hospitalization. *Internal Medicine Journal, 38*, 16-23. doi:10.1111/j.1445-5994.2007.01398.x

Applegate, W., Miller, S., Graney, M., Elam, J., Burns, R., & Akins, D. (1990). A randomized, controlled trial of a geriatric assessment unit in a community rehabilitation hospital. *New England Journal of Medicine, 322*, 1572-1578. doi:10.1056/NEJM199005313222205

Ariss, S., Enderby, P., Smith, T., Nancarrow, S., Bradburn, M., Harrop, D., . . . Campbell, M. (2015). Secondary analysis and literature review of community rehabilitation and intermediate care: an information resource. *Health Services and Delivery Research, 3*(1). doi:10.3310/hsdr03010

Arjunan, A., Peel, N., & Hubbard, R. (2018). Feasibility and validity of frailty measurement in geriatric rehabilitation. *Australasian Journal on Ageing*, 1-3. doi:10.1111/ajag.12502

Armstrong, R. (2014). When to use the Bonferroni correction. *Opthalmic and Physiological Optics, 34*, 502-508. doi:10.1111/opo.12131

Aro, A., Agbo, S., & Omole, O. (2018). Factors influencing regular physical exercise among the elderly in residential care facilities in a South African health district. *African Journal of Primary Health Care & Family Medicine, 10*(1). doi:10.4102/phcfm. 10i1.1493

Arrieta, H., Rezola-Pardo, C., Gil, S., Irazusta, J., & Rodriguez-Larrad, A. (2018a). Physical training maintains or improves gait ability in long-term nursing home residents: A systematic review of randomized controlled trials. *Maturitas, 109*, 45-52. doi:10.1016/j.maturitas.2017.12.003

Arrieta, H., Rezola-Pardo, C., Zarrazquin, I., Echeverria, I., Yanguas, J., Iturburu, M., . . . Irazusta, J. (2018b). A multicomponent exercise program improves physical function in longterm nursing home residents: A randomized controlled trial. *Experimental Gerontology, 103*, 94-100. doi:10.1016/j.exger.2018.01.008

Associate Minister of Health. (2017). *Healthy Ageing Strategy*. Wellington, New Zealand.

Australian Bureau of Statistics. (2016). Population by age and sex, Australia, States and Territories. Retrieved from http://www.abs.gov.au/AUSSTATS/abs@.nsf/Previousproducts/3101.0Feature%20Article1Jun%202016

Australian Bureau of Statistics. (2017). Australia age structure in 2017. Retrieved from http://www.abs.gov.au/websitedbs/d3310114.nsf/home/Population%20Pyramid%20-%20Australia

Australian Institute of Health and Welfare. (2011a). *Older people leaving hospital: a statistical overview of the Transition Care Program in 2008-09*. Retrieved from Canberra:

Australian Institute of Health and Welfare. (2011b). *Older people leaving hospital: a statistical overview of the Transition Care Program in 2008-2009*. Retrieved from Canberra:

Australian Institute of Health and Welfare. (2012). *Older people leaving hospital A statistical overview of the Transition Care Program 2009–10 and 2010–11*. Retrieved from Canberra:

Australian Institute of Health and Welfare. (2013a). *Depression in residential aged care 2008 - 2012*. Retrieved from Canberra:

Australian Institute of Health and Welfare. (2013b). *Development of nationally consistent subacute and non-acute admitted patient care data definitions and guidelines* (Cat. no. HSE 135). Retrieved from Canberra, Australia:

Australian Institute of Health and Welfare. (2013c). *Movement between hospital and residential aged care 2008–09*. Retrieved from Canberra:

Australian Institute of Health and Welfare. (2014). *Transition care for older people leaving hospital 2005-06 to 2012-13*. Retrieved from Canberra:

Australian Institute of Health and Welfare. (2015). *Australia's welfare 2015*. Retrieved from Canberra, Australia:

https://www.aihw.gov.au/getmedia/692fd1d4-0e81-41da-82af-be623a4e00ae/18960-aw15.pdf.aspx?inline=true

Australian Institute of Health and Welfare. (2016a). *Australia's health 2016*. Retrieved from Canberra: https://www.aihw.gov.au/reports/australias-health/australias-health-2016/contents/summary

Australian Institute of Health and Welfare. (2016b). *Australia's hospitals 2014-2015 at a glance*. Retrieved from Canberra, Australia: https://www.aihw.gov.au/getmedia/c3639246-e544-4672-8856-1a37721d6832/20135.pdf.aspx?inline=true

Australian Institute of Health and Welfare. (2017a). *Admitted patient care 2015–16 Australian hospital statistics*. Retrieved from Canberra:

Australian Institute of Health and Welfare. (2017b, 16/8/2017). Aged care overview. Retrieved from https://www.aihw.gov.au/reports-statistics/health-welfare-services/aged-care/overview

Australian Institute of Health and Welfare. (2017c). *GEN fact sheet 2015–16: People leaving aged care.* Retrieved from Canberra:

Australian Institute of Health and Welfare. (2017d). *Hospital resources 2015 - 2016*. Retrieved from Canberra:

Australian Institute of Health and Welfare. (2017e). *Pathways to permanent residential aged care in Australia: a Pathways in Aged Care (PIAC) analysis of people's aged care program use before first entry to permanent residential aged care in 2013 - 14*. Retrieved from Canberra, Australia: https://www.aihw.gov.au/reports/aged-care/permanent-residential-aged-care-2013-14/contents/table-of-contents

Australian Institute of Health and Welfare. (2017f). Rural & remote health.

Avalere Health LLC. (2015). *Optimal nurse staffing to improve quality of care and patient outcomes*. Retrieved from Washington, US:

Bachmann, S., Finger, C., Huss, A., Egger, M., Stuck, A., & Clough-Gorr, K. (2010). Inpatient rehabilitation specifically designed for geriatric patients: systematic review and meta-analysis of randomised controlled trials. *British Medical Journal, 340*, 1718-1722. doi:10.1136/bmj.c1718

Bagshaw, S., Stelfox, T., Johnson, J., McDermid, R., Rolfson, D., Tsuyuki, R., . . . Majumdar, S. (2015). Long-term association betwen frailty and health-related quality of life among survivors of critical illness: a propective multicenter cohort study. *Critical Care Medicine, 43*(5), 973-982. doi:10.1097/CCM.0000000000000860

Baillie, L., Gallini, a., Corser, R., Elworthy, G., Scotcher, A., & Barrand, A. (2014). Care transitions for frail, older people from acute hospital wards with an integrated healthcare system in England: a qualitative case study. *International Journal of Integrated Care, 14*. doi:10-1-114776

Balestroni, G., Omarini, G., & P, O. (2007). EuroQol-5D for quality of life assessment in cardiac rehabilitation. *Italian Journal of Occupational Medicine and Ergonomics, 29*(3), B56-62.

Barclay, S., Froggatt, K., Crang, C., Mathie, E., Handley, M., Iliffe, S., . . . Goodman, C. (2014). Living in uncertain times: trajectories to death in residential care homes. *British Journal of General Practice*, e576-583. doi:10.3399/bjgp14X681397

Batista, F., de Oliveira Gomes, G., Neri, A., Guariento, M., Cintra, F., de Sousa, M., & D'Elboux, M. (2012). Relationship between lower-limb muscle strength and frailty among elderly people. *Sao Paulo Medical Journal, 130*(2), 102-108.

Bauer, M., Fitzgerald, L., Haesler, E., & Manfrin, M. (2009). Hospital discharge planning for frail older people and their family. Are we delivering best practice? A review of the evidence. *Journal of Clinical Nursing, 18,* 2539-2546. doi:10.1111/j.1365-2702.2008.02685.x

Bayer, A., & Harper, L. (2000). *Fixing to stay. A national survey of housing and home modification issues*. Retrieved from Washington DC, US:

Berg, K., Wood-Dauphinee, S., & Williams, J. (1992). Measuring balance in the elderly: validation of an instrument. *Canadian Journal of Public Health, 83*(Supplement 2), S7-S11.

Berg, K., Wood-Dauphinee, S., Williams, J., & Gayton, D. (1989). Measuring balance in the elderly: preliminary development of an instrument. *Physiotherapy Canada, 41*(6), 304-311.

Bilotta, C., Nicolini, P., Case, A., Pina, G., Rossi, S., & Vergani, C. (2012). Frailty syndrome diagnosed according to the Study of Osteoporotic Fractures (SOF) criteria and adverse health outcomes among community-dwelling older outpatients in Italy. A one-year prospective cohort study. *Archives of Gerontology and Geriatrics, 54,* e23-e28. doi:10.1016/j.archger.2011.06.037

Black, S., Nicholas, C., Cotton, S., & Brock, K. (2018). Determining discharge destination in geriatric evaluation and management units: is progressive goal attainment a better early indicator of discharge destination than improvement in functional independence measure scores? *Geriatrics and Gerontology International*. doi:10.1111/ggi.13308

Bohannon, R., Shove, M., Barreca, S., Masters, L., & Sigouin, C. (2007). Five-repetition sit-to-stand test performance by community-dwelling adults: a preliminary investigation of times, determinants, and relationship with self-reported physical performance. *Isokinetics and Exercise Science, 15*, 77-81.

Boland, L., Legare, F., Perez, M., Garvelink, M., McIsaac, D., Guerard, G., . . . Stacey, D. (2017). Impact of home care versus alternative locations of care on elder health outcomes: an overview of systematic reviews. *BioMed Central Geriatrics, 17*(20). doi:10.1186/s12877-016-0395-y

Bolderston, A. (2012). Conducting a Research Interview. *Journal of Medical Imaging and Radiation Sciences, 43,* 66-76. doi:10.1016/j.jmir.2011.12.002

Borenstein, M., Heges, L., Higgins, J., & Rothstein, H. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research Synthesis Methods, 1*, 97-111. doi:10.1002/jrsm.12

Boyd, C., Fried, L., Guralnik, J., & Bandeen-Roche, K. (2009). Functional decline and recovery of activities of daily living among hospitalized, disabled older women: the Women's Health and Aging Study *Journal of the American Geriatrics Society, 57*(10), 1756-1766.

Boyd, C., Landefeld, S., Counsell, S., Palmer, R., Fortinsky, R., Kresevic, D., . . . Covinsky, K. (2008). Recovery in activities of daily living among older adults following hospitalization for acute medical illness. *Journal of the American Geriatrics Society, 56*(12), 2171-2179. doi:10.1111/j.1532-5415.2008.02023.x.

Braun, T., Schulz, R., Reinke, J., van Meeteren, N., de Morton, N., Davidson, M., . . . Gruneberg, C. (2015). Reliability and validity of the German translation of the de Morton Mobility Index (DEMMI) performed by physiotherapists in patients admitted to a sub-acute inpatient geriatric rehabilitation hospital. *BMC Geriatrics, 15*(58). doi:10.1186/s12877-015-0035-y

Brazier, J., Walters, S., Nicholl, J., & Kohler, B. (1996). Using the SF-36 and Euroqol on an elderly population. *Quality of Life Research, 5*(2), 195-204.

Britt, H., Miller, G., Henderson, J., Bayram, c., Harrison, C., Valenti, L., . . . Charles, J. (2015). *General practice activity in Australia 2014 - 2015*. Retrieved from Sydney: purl.library.usyd.edu.au/sup/9781743324523

Britten, N. (1995). Qualitative interviews in medical research. *British Medical Journal, 311*, 251-253.

Brownie, S., Horstmanshof, L., & Garbutt, R. (2014). Factors that impact residents' transition and psychological adjustment to long-term aged care: a systematic literature review. *International Journal of Nursing Studies, 51*, 1654-1666. doi:10.1016/j.ijnurstu.2014.04.011

Brusco, N., Taylor, N., Hornung, I., Schaffers, S., Smith, A., & de Morton, N. (2012). Factors that predict discharge destination for patients in transitional care: a prospective observational cohort study. *Australian Health Review, 36*, 430-436. doi:10.1071/AH11052

Buatois, S. (2008). Five times sit to stand test is a predictor of recurrent falls in healthy community-living subjects aged 65 and older. *Journal of the American Geriatrics Society, 56*(8), 1575-1576.

Buckinx, F., Moutonc, A., Reginster, J., Croisier, J., Dardenne, N., Beaudart, C., . . . Bruyere, O. (2017a). Relationship between ambulatory physical activity assessed by activity trackers and physical frailty among nursing home residents. *Gait and Poster, 54*, 56-61. doi:10.1016/j.gaitpost.2017.02.010

Buckinx, F., Reginster, J., Gillain, S., Pertermans, J., Brunois, T., & Bruyere, O. (2017b). Prevalence of frailty in nursing home residents according to various diagnostic tools. *The Journal of Frailty and Aging, 6*(3), 122-128. doi:10.14283/jfa.2017.20

Buijck, B., Zuidema, S., Spruit-van Eijk, M., Bor, H., Gerritsen, D., & Koopmans, R. (2012). Is patient-grouping on basis of condition on admission indicative for discharge destination in geriatric stroke patients after rehabilitation in skilled nursing facilities? The results of a cluster analysis. *BMC Health Services Research, 12*, 443-410.

Burke, R., Jones, C., Coleman, E., Falvey, J., Stevens-Lapsley, J., & Ginde, A. (2017a). Use of post-acute care after hospital discharge in urban and rural hospitals. *American Journal of Accountable Care, 5*(1), 16-22.

Burke, R., Lawrence, E., Ladebue, A., Ayele, R., Lippmann, B., Cumbler, E., . . . Jones, J. (2017b). How hospital clinicians select patients for skilled nursing facilities. *Journal of the American Geriatrics Society, 65*, 2466-2472. doi:10.1111/jgs.14954

Burke, R., Whitfield, E., Hittle, D., Min, S., Levy, C., Prochazka, A., . . . Ginde, A. (2016). Hospital readmission from post-acute cre facilities: risk factors, timing, and outcomes. *Journal of the American Directors Association, 17*, 249-255. doi:10.1016/j.jamda.2015.11.005

Burton, E., Farrier, K., Hill, K., Codde, J., Airey, P., & Hill, A. (2018). Effectiveness of peers in delivering programs or motivating older people to increase their participation in physical activity: Systematic review and meta-analysis. *Journal of Sports Sciences, 36*(6), 666-678. doi:10.1080/02640414.2017.1329549

Cai, Y., Venkatachalam, I., Tee, N., Tan, T., Korup, A., Wong, S., . . . Marimuthu, K. (2017). Prevalence of healthcare-associated infections and antimicrobial use among adult inpatients in Singapore acute-care hospital: results from the first national point prevalence survey. *Clinical Infectious Diseases, 64*(S2), S61-67. doi:10.1093/cid/cix103

Cameron, I., Fairhall, N., Gill, L., Lockwood, K., Langron, C., Aggar, C., . . . Kurrle, S. (2015). Developing interventions for frailty. *Advances in Geriatrics*. doi:10.1155/2015/845356

Cameron, I., Fairhall, N., Langron, C., Lockwood, K., Monaghan, N., Aggar, C., . . . Kurrle, S. (2013). A multifactorial interdisciplinary intervention reduces frailty in older people: randomized trial. *BMC Medicine, 11*(65). doi:10.1186/1741-7015-11-65

Campbell, S., Seymour, D., Primrose, W., Lynch, J., Dunstan, E., Espallargues, M., . . . The Acmeplus Project Team. (2005). A multi-centre European study of factors affecting the discharge destination of older people admitted to hospital: analysis of in-hospital data from the ACMEplus project. *Age and Ageing, 34*.

Campbell, S., Seymour, G., & Primrose, W. (2004). A systematic literature review of factors affecting outcome in older medical patients admitted to hospital. *Age and Ageing, 33*(2), 110-115.

Cancer Council Australia. (2017). Palliative care. Retrieved from http://www.cancer.org.au/about-cancer/treatment/palliative-care.html

Cannon, B., Thaler, T., & Roos, S. (2002). Oral versus written administration of the Geriatric Depression Scale. *Aging and Mental Health, 6*(4), 418-422.

Centers for Medicare & Medicaid Services. (2015). *Medicare coverage of Skilled Nursing Facility care* Baltimore, US: Medicare.gov Retrieved from https://www.medicare.gov/Pubs/pdf/10153.pdf.

Centre for Evidence-Based Physiotherapy. (1999). PEDro scale. Retrieved from https://www.pedro.org.au/wp-content/uploads/PEDro_scale.pdf

Cesetti, G., Vercovelli, F., & Ruini, C. (2017). The promotion of well-being in aging individual living in nursing homes: a controlled pilot intervention with narrative strategies. *Clinical Gerontologist, 40*(5), 380-391. doi:10.1080/07317115.2017.1292979

Chappell, N., Dlitt, B., Hollander, M., Miller, J., & McWilliam, C. (2004). Comparative costs of home care and residential care. *The Gerontologist, 44*(3), 389-400.

Chatterji, R., Naylor, J., Harris, I., Armstrong, E., Davidson, E., Ekmejian, R., & Descallar, J. (2017). An equivalence study: are patient completed and telephone interview equivalent modes of administration for the EuroQol survey? *Health and Quality of Life Outcomes, 15*(18). doi:10.1186/s12955-017-0596-x

Chen, C., Heinemann, A., Granger, C., & Linn, R. (2002). Functional gains and therapy intensity during subacute rehabilitation: a study of 20 facilities.

Archives of Physical Medicine and Rehabilitation, 83, 1514-1523. doi:10.1053/apmr.2002.35107

Chen, Y. (2010). Perceived barriers to physical activity among older adults residing in long-term care institutions. *Journal of Clinical Nursing, 19*, 432-439. doi:10.1111/j.1365-2702.2009.02990.x

Cheng, Y., Weng, S., Chang, S., Tan, S., & Tang, Y. (2014). Evaluating functional independence in older adults using subscales of the Berg Balance Scale. *Journal of Clinical Gerontology and Geriatrics, 5*, 111-116. doi:10.1016/j.jcgg.2014.05.001

Chong, T., Chan, G., Feng, L., Goh, S., Hew, A., Ng, T., & Tan, B. (2013). Integrated care pathway for hip fractures in a subacute rehabilitation setting. *Annals of the Academy of Medicine, Singapore, 42*(11), 579-584.

Coaley, K. (2014). *An introduction to psychological assessment and psychometrics* (M. Carmichael Ed. 2nd ed.). London: Sage Publications UK.

Coast, J., Peters, T., Richards, S., & Gunnell, D. (1998). Use of the Euroqol among elderly acute care patients. *Quality of Life Research, 7*(1), 1-10.

Cohen, H., Feussner, J., Weinberger, M., Carnes, M., Hamdy, R., Hsieh, F., . . . Lavori, P. (2002). A controlled trial of inpatient and outpatient geriatric evaluation and management. *New England Journal of Medicine, 346*, 905-912. doi:10.1056/NEJMsa010285

Cohen, J. (1977). *Statistical power analysis for behavioural sciences*. New York: Academic Press.

Collard, R., Arts, M., Schene, A., Naarding, P., Voschaar, R., & Comijs, H. (2017). The impact of frailty on depressive disorder in later life: findings from the

Netherlands study of depression in older persons. *European Psychiatry, 43*, 66-72. doi:10.1016/j.eurpsy.2017.01.003

Comans, T., Peel, N., Cameron, I., Gray, L., & Scuffham, P. (2015). Healthcare resource use in patients of the Australian Transition Care Program. *Australian Health Review, 39*, 411-416. doi:10.1071/AH14054

Comans, T., Peel, N., Hubbard, R., Mulligan, A., Gray, L., & Scuffham, P. (2016). The increase in healthcare costs associated with frailty in older people discharged to a post-acute transition care program. *Age and Ageing, 45*, 317-320. doi:10.1093/ageing/afv196

Commonwealth of Australia. (2014). *Aged care assessment program guidelines January 2014*. Canberra: Commonwealth of Australia Retrieved from http://www.health.gov.au/internet/main/publishing.nsf/Content/51ACA5BA256EF30CCA257BF00018CD36/$File/FINAL%20-%20ACAP%20Guidelines%202014%20-%20Website%20Accessibility%20check%20-%2020%20Jan%2014.pdf.

Conradsson, M., Lundin-Olsson, L., Lindelot, N., Littbrand, H., Malmqvist, L., Gustafson, Y., & Rosendahl, E. (2007). Berg Balance Scale: intrarater test-retest reliability among older people dependent in activities of daily living and living in residential care facilities. *Physical Therapy, 87*(9), 1155-1163.

Consort. (2010). Consort checklist of information to include when reporting a randomised trial. Retrieved from http://www.consort-statement.org/

Counsell, S., Holder, C., Liebenauer, L., Palmer, R., Fortinsky, R., Kresevic, D., . . . Landefeld, S. (2000). Effects of a multicomponent intervention on functional outcomes and process of care in hospitalized older patients: a randomised controlled trial of acute care for elders (ACE) in a community hospital. *Journal of the American Geriatrics Society, 48*, 1572-1581.

Covinsky, K., Palmer, R., Fortinsky, R., Counsell, S., Stewart, A., Kresevic, D., . . . Landefeld, C. (2003). Loss of independence in activities of daily living in older adults hospitalized with medical illnesses: increased vulnerability with age. *Journal of the American Geriatrics Society, 51*, 451-458.

Covinsky, K., Pierluissi, E., & Johnston, C. (2011). Hospitalization-associated disability "She was probably able to ambulate, but I'm not sure". *Journal of the American Medical Association, 306*(16), 1782-1793. doi:10.1001/jama.2011.1556

Crotty, M., Whitehead, C., Wundke, R., Giles, L., Ben-Tovim, D., & Phillips, P. (2005). Transitional care facility for elderly people in hospital awaiting a long term care bed: randomised controlled trial. *BMJ Online first*, 1-5. doi:10.1136/bmj.38638.441933.63

Csuka, M., & McCarty, D. (1985). Simple method for measurement of lower extremity muscle strength. *The American Journal of Medicine, 78*, 77-81.

Cunliffe, A., Gladman, J., Husbands, S., Miller, P., Dewey, M., & Harwood, R. (2004). Sooner and healthier: a randomised controlled trial and interview study of an early discharge rehabilitation service for older people. *Age and Ageing, 33*, 246-252. doi:10.1093/ageing/afh076

Dahl, U., Johnsen, R., Saetre, R., & Steinsbekk, A. (2015a). The influence of an intermediate care hospital on health care utilization among elderly patients - a retrospective comparative cohort study. *BMC Health Service Research, 15*(48). doi:10.1186/s12913-015-0708-4

Dahl, U., Steinsbekk, A., & Johnsen, R. (2015b). Effectiveness of an intermediate care hospital on readmissions, mortality, activities of daily living and use of health care services among hospitalized adults aged 60 years and older - a controlled observational study. *BMC Health Service Research, 15*(351). doi:10.1186/s12913-015-1022-x

Daniels, L., Sorita, A., Kashiwagi, D., Okubo, M., Small, E., Polley, E., & Sawatsky, A. (2018). Characterizing potentially preventable admissions: a mixed methods study of rates, associated factors, outcomes, and physician decision-making. *Journal of General Internal Medicine*. doi:10.1007/s11606-017-4285-6

Dantas, I., Santan, R., Sarmento, J., & Aguiar, P. (2016). The impact of multiple chronic diseases on hospitalizations for ambulatory care sensitive conditions. *BMC Health Service Research, 16*(348). doi:10.1186/s12913-016-1584-2

Davis, J., Morgans, A., & Stewart, J. (2016). Developing an Australian health and aged care research agenda: a systematic review of evidence at the subacute interface. *Australian Health Review, 40*, 420-427. doi:10.1071/AH15005

Dawda, P., & Russell, L. (2014). *Sub-acute care: an international literature review*. Retrieved from Canberra: https://rsph.anu.edu.au/research/projects/sub-acute-care-international-literature-review

De Buyser, S., Petrovic, M., Taes, Y., Toye, K., Kaufman, J., Goemaere, S., & Lapauw, B. (2016). *Validation of the Study of Osteoporotic Fractures (SOF) frailty index as predictor of long-term mortality in ambulatory older men.* Paper presented at the International Conference on Frailty & Sarcopenia Research.

De Figueiredo, K., De Lima, K., Maciel, A., & Guerra, R. (2009). Interobserver reproducibility of the Berg Balance Scale by novice and experienced physiotherapists. *Physiotherapy Theory and Practice, 25*(1), 30-36.

de Labra, C., Guimaraes-Pinheiro, c., Maseda, A., Lorenzo, T., & Millan-Calenti, J. (2015). Effects of physical exercise interventions in frail older adults: a systematic review of randomized controlled trials. *BMC Geriatrics, 15*(154). doi:10.1186/s12877-015-0155-4

de Morton, N. (2009). The PEDro scale is a valid measure of the methodological quality of clinical trials: a demographic study. *Australian Journal of Physiotherapy, 55*, 129-133. doi:10.1016/S0004-9514(09)70043-1

de Morton, N., Brusco, N., Wood, L., Lawler, K., & Taylor, N. (2011a). The de Morton Mobility Index (DEMMI) provides a valid method for measuring and monitoring the mobility of patients making the transition from hospital to the community: an observational study. *Journal of Physiotherapy, 57*, 109-116. doi:10.1016/S1836-9553(11)70021-2

de Morton, N., Davidson, M., & Keating, J. (2007). de Morton Mobility Index (DEMMI). Retrieved from https://static-content.springer.com/esm/art%3A10.1186%2F1477-7525-6-63/MediaObjects/12955_2008_465_MOESM1_ESM.pdf

de Morton, N., Davidson, M., & Keating, J. (2008a). the de Morton Mobility Index (DEMMI): an essential health index for an ageing world. *Health and Quality of Life Outcomes, 6*, 63-78. doi:10.1186/1477-7525-6-63 de Morton, N., Davidson, M., & Keating, J. (2011b). Reliability of the de Morton Mobility Index (DEMMI) in an older acute medical population. *Physiotherapy Research International, 16*, 159-169. doi:10.1002/pri.493

de Morton, N., Keating, J., & Davidson, M. (2008b). Rasch analysis of the Barthel Index in the assessment of hospitalized older patients after admission for an acute medical condition. *Archives of Physical Medicine and Rehabilitation, 89*(4), 641-647. doi:10.1016/j.apmr.2007.10.021

de Morton, N., & Lane, K. (2010). Validity and reliability of the de Morton Mobility Index in the subacute hospital setting in a geriatric evaluation and management population. *Journal of Rehabilitation Medicine, 42*(10), 956-961. doi:10.2340/16501977-0626

de Morton, N., Meyer, C., Moore, K., Dow, B., Jones, C., & Hill, K. (2011c). Validation of the de Morton Mobility Index (DEMMI) with older community care recipients. *Australasian Journal on Ageing, 30*(4), 220-225. doi:10.1111/j.1741-6612.2010.00497.x

de Morton, N., Nolan, J., O'Brien, M., Thomas, S., Govier, A., Sherwell, K., . . . Markham, N. (2015). A head-to-head comparison of the de Morton Mobility Index (DEMMI) and Elderly Mobility Scale (EMS) in an older acute medical population. *Disability and Rehabilitation, 37*(20), 1881-1887. doi:10.3109/09638288.2014.982832

de Souto Barreto, P., Morley, J., Chodzko-Zajko, W., Pitkala, K., Weening-Djiksterhuis, E., Rodriguez-Manas, L., . . . Rolland, Y. (2016). Recommendations on physical activity and exercise for older adults living in long-term care facilities: a taskforce report. *Journal of the American Directors Association, 17*, 381-392. doi:10.1016/j.jamda.2016.01.021

de Vaus, D., & Qu, L. (2015). *Demographics of living alone*. Retrieved from Melbourne, Australia:

de Vet, H., Terwee, C., Ostelo, r., Beckerman, H., Knol, d., & Bouter, L. (2006). Minimal changes in health status questionnaires: distinction between minimally detectable change and minimally important change. *Health and Quality of Life Outcomes, 4*(54). doi:10.1186/1477-7525-4-54

de Vries, N., Staal, J., Ravensberg, C., Hobbelen, J., Olde Rikkert, M., & Nijhuis-van der Sanden, M. (2011). Outcome instruments to measure frailty: a systematic review. *Ageing Research Reviews, 10*, 104-114.

de Waal, M., van der Weele, G., van der Mast, R., Assendelft, W., & Gussekloo, J. (2012). The influence of the administration method on scores of the 15-item Geriatric Depression Scale in old age. *Psychiatry Research, 197*, 280-284.

Dedeyne, L., Deschodt, M., Verschueren, S., Tournoy, J., & Vielen, E. (2017). Effects of multi-domain interventions in (pre) frail elderly on frailty, functional, and cognitive status: a systematic review. *Clinical Interventions in Aging, 12*, 873-896. doi:10.2147/CIA.S130794

Deloitte Center for Health Solutions. (2016). *Viewing post-acute care in a new light: Strategies to drive value*. Retrieved from New York, US: https://www2.deloitte.com/us/en/pages/life-sciences-and-health-care/articles/post-acute-care-management-strategies.html

den Ouden, M., Kuk, N., Zwakhalen, S., Bleijlevens, M., Meijers, J., & Harmers, J. (2017). The role of nursing staff in the activities of daily living of nursing home residents. *Geriatric Nursing, 38*, 225-230. doi:10.1016/j.gerinurse.2016.11.002

Department of Education and Training. (2013). HLT42512 - Certificate IV in Allied Health Assistance Retrieved from https://training.gov.au/Training/Details/HLT42512

Department of Health. (2009). *Intermediate care – halfway home*. Retrieved from London, UK: http://webarchive.nationalarchives.gov.uk/20130124050747/http:/www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/@pg/documents/digitalasset/dh_103154.pdf

Department of Health. (2012). *Supervision and delegation framework for allied health assistants*. Retrieved from Melbourne, Victoria: https://www.sarrah.org.au/sites/default/files/images/framework-for-web-060612.pdf

Department of Health. (2013a). *Planning the future of Victoria's sub-acute service system*. Retrieved from Melbourne, Australia: https://www2.health.vic.gov.au/hospitals-and-health-services/patient-care/rehabilitation-complex-care/subacute-planning

Department of Health. (2013b). *The Victorian health services governance handbook*. Retrieved from Melbourne, Australia: https://www2.health.vic.gov.au/hospitals-and-health-services/boards-and-governance/education-resources-for-boards

Department of Health. (2015a). *Aged care assessment programme guidelines*. Retrieved from Canberra: https://agedcare.health.gov.au/programs-services/guidelines/aged-care-assessment-and-approval-guidelines

Department of Health. (2015b). *Transition Care Programme guidelines*. Canberra: Australian Government Retrieved from https://agedcare.health.gov.au/programs-services/flexible-care/transition-care-programme.

Department of Health. (2016). *2015–16 Report on the Operation of the Aged Care Act 1997*. Retrieved from Canberra: https://agedcare.health.gov.au/sites/g/files/net1426/f/documents/12_2016/2015-16_report-on-the-operation-of-the-aged-care-act-1997.pdf

Department of Health. (2017a). *2016–17 Report on the Operation of the Aged Care Act 1997*. Retrieved from Canberra: https://www.gen-agedcaredata.gov.au/www_aihwgen/media/ROACA/2016-17_Report_on_the_Operation_of_the_Aged_Care_Act_1997.pdf

Department of Health. (2017b). Transition Care Programme. Retrieved from https://agedcare.health.gov.au/programs-services/flexible-care/transition-care-programme

Department of Health and Ageing. (2005). *Transition Care Programme Guidelines*. Canberra: Australian Government.

Department of Health and Human Services. (2017a). Accessing palliative care. Retrieved from https://www2.health.vic.gov.au/hospitals-and-health-services/patient-care/end-of-life-care/palliative-care/palliative-care-access

Department of Health and Human Services. (2017b). Admitted rehabilitation. Retrieved from https://www2.health.vic.gov.au/hospitals-and-health-services/patient-care/rehabilitation-complex-care/admitted-rehabilitation

Department of Health and Human Services. (2017c). *Department of Health and Human Services policy and funding guidelines 2017*. Retrieved from Melbourne, Victoria: https://www2.health.vic.gov.au/about/policy-and-funding-guidelines>.

Department of Health and Human Services. (2017d). Geriatric evaluation and management. Retrieved from https://www2.health.vic.gov.au/hospitals-and-health-services/patient-care/rehabilitation-complex-care/geriatric-evaluation-gem

Department of Health and Human Services. (2017e). Hospital in the Home. Retrieved from https://www2.health.vic.gov.au/hospitals-and-health-services/patient-care/acute-care/hospital-in-the-home

Department of Health and Human Services. (2017f). Older people in hospital. Retrieved from https://www2.health.vic.gov.au/hospitals-and-health-services/patient-care/older-people

Department of Health and Human Services. (2017g). Rehabilitation and complex care. Retrieved from https://www2.health.vic.gov.au/hospitals-and-health-services/patient-care/rehabilitation-complex-care

Department of Health and Human Services. (2017h). Transition Care Program client information and agreement. In V. S. Government (Ed.). Melbourne.

Department of Health and Human Services. (2018a). Allied health assistant workforce. Retrieved from https://www2.health.vic.gov.au/health-workforce/allied-health-workforce/victorian-assistant-workforce-model

Department of Health and Human Services. (2018b). Health Independence Program. Retrieved from https://www2.health.vic.gov.au/hospitals-and-health-services/patient-care/rehabilitation-complex-care/health-independence-program

Department of Health and Human Services. (2018c). Hospitals and health services. Retrieved from https://www2.health.vic.gov.au/hospitals-and-health-services

Department of Health and Human Services. (2018d). Short-term supports. Retrieved from https://www2.health.vic.gov.au/hospitals-and-health-services/patient-care/acute-care/hospital-in-the-home

Department of Human Services. (2005). *Well for life evaluation. Highlights from the evaluation - phase one projects*. Retrieved from Melbourne:

Dettori, J. (2010). The random allocation process: two things you need to know. *Evidence-Based Spine-Care Journal*, *1*(3), 7-9. doi:10.1055/s-0030-1267062

Dixon, S., Kaambwa, B., Nancarrow, S., Martin, G., & Bryan, S. (2010). The relationship between staff skill mix, costs and outcomes in intermediate care services *BMC Health Service Research*, *10*(221).

Doi, S., & Barendregt, J. (2013). Not PEDro's bias: summary quality scores can be used in meta-analysis. *Journal of Clinical Epidemiology*, *66*, 940-941. doi:10.1016/j.jclinepi.2013.03.001

Donoghue, D., & Stokes, E. (2009). How much change is true change? the minimum detectable change of the Berg Balance Scale in elderly people. *Journal of Rehabilitation Medicine, 41*(5), 343-346.

Douglas, H., Raban, M., Walter, S., & Westbrook, J. (2017). Improving our understanding of multi-tasking in healthcare: drawing together the cognitive psychology and healthcare literature. *Applied Ergonomics, 59*, 45-55. doi:10.1016/j.apergo.2016.08.021

Downs, S. (2015). The Berg Balance Scale. *Journal of Physiotherapy*, *61*, 46.

Downs, S., Marquez, J., & Chiarelli, P. (2013). The Berg Balance Scale has high intra- and inter-rater reliability but absolute reliability varies across the scale: a systematic review. *Journal of Physiotherapy, 59*, 93-99.

Duncan, R., Leddy, A., & Earhart, G. (2011). Five times sit-to-stand test performance in Parkinson's Disease. *Archives of Physical Medicine and Rehabilitation, 92*, 1431-1436.

Dyrstad, D., Laugaland, K., & Storm, M. (2015). An observational study of older patients' participation in hospital admission and discharge - exploring patient and next of kin perspectives. *Journal of Clinical Nursing, 24*, 1693-1706.

Dyrstad, D., Testad, I., Aase, K., & Storm, M. (2015). A review of the literature on patient participation in transitions of the elderly. *Cognition, Technology and Work Journal*, *17*, 15-34. doi:10.1007/s10111-014-0300-4

Ellis, G., & Langhorne, P. (2005). Comprehensive geriatric assessment for older hospital patients. *British Medical Bulletin, 71*, 45-59. doi:10.1093/bmb/ldh033

Ellis, G., Whitehead, M., Robinson, D., O'Neill, D., & Langhorne, P. (2011). Comprehensive geriatric assessment for older adults admitted to hospital:

meta-analysis of randomised controlled trials. *British Medical Journal, 343*, 1-10. doi:10.1136/bmj.d6553

Eng, J., & Louie, D. (2018). Berg Balance Scale score at admission can predict walking suitable for community ambulation at discharge from inpatient stroke rehabilitation. *Journal of Rehabilitation Medicine, 50*, 37-54. doi:10.2340/16501977-2280

Ensrud, K., Ewing, S., Cawthon, P., Fink, H., Taylor, B., Cauley, J., . . . Cummings, S. (2009). A comparison of frailty indexes for the prediction of falls, disability, fractures, and mortality in older men. *Journal of the Amerian Geriatrics Society, 57*, 492-498.

Ensrud, K., Ewing, S., Taylor, B., Fink, H., Cawthon, P., Stone, K., . . . Cummings, S. (2008). Comparison of 2 frailty indexes for prediction of falls disability, fractures, and death in older women. *Archives of Internal Medicine*, *168*(4), 382-389.

EuroQol. (2017). EQ-5D-5L. Retrieved from https://euroqol.org/eq-5d-instruments/eq-5d-5l-about/

EuroQol Research Foundation. (2015). *EQ-5D-3L user guide*. Retrieved from Rotterdam, The Netherlands: http://www.euroqol.org/about-eq-5d/publications/user-guide.html

EuroQol Research Foundation. (2017). Search for EQ-5D publications. Retrieved from https://euroqol.org/search-for-eq-5d-publications/

Eurostat. (2017, 16/11/17). Hospital discharges, in-patients, 2010 and 2015. Retrieved from http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Hospital_discharges,_in-patients,_2010_and_2015_(per_100_000_inhabitants)_HLTH17.png

Everink, I., van Haastregt, J., van Hoof, S., Schols, J., & Kempen, G. (2016). Factors influencing home discharge after inpatient rehabilitation of older patients: a systematic review. *BMC Geriatrics, 16*(5). doi:10.1186/s12877-016-0187-4

Falvey, J., Burke, R., Malone, D., Ridgeway, K., McManus, B., & Stevens-Lapsley, J. (2016). Role of physical therapists in reducing hospital readmissions: optimizing outcomes for older adults during care transitions from hospital to community. *Physical Therapy, 96*(8), 1125-1134. doi:10.2522/ptj.20150526

Fang, H., Farooq, U., Wang, D., Yu, F., Younus, M., & Guo, X. (2016). Reliability and validity of the EQ‐5D‐3L for Kashin–Beck disease in China. *SpringerPlus, 5*(1924). doi:10.1186/s40064-016-3613-3

Ferreira, C., dos Santos Teixeira, P., dos Santos, G., Maya, A., do Brasil, P., Souza, V., . . . Nobrega, O. (2018). Effects of a 12-week exercise training program on physical function in institutionalized frail elderly. *Journal of Aging Research*. doi:10.1155/2018/7218102

Fisher, R., & Zorzitto, M. (1983). Placement problem: diagnosis, disease or term of denigration? *Canadian Medical Association Journal, 129*(4), 331-334.

Fleming, S., Blake, H., Gladman, J., Hart, E., Lymbery, M., Dewey, M., . . . Miller, P. (2004). A randomised controlled trial of a care home rehabilitation service to reduce long-term institutionalisation for elderly people. *Age and Ageing, 33*, 384-390. doi:10.1093/ageing/afh126

Forder, J. (2009). Long-term care and hospital utilisation by older people: an analysis of substitution rates. *Health Economics, 18*, 1332-1338. doi:10.1002/hec.1438

Franco, M., Tong, A., Howard, K., Sherrington, C., Ferreira, P., Pint, R., & Ferreira, M. (2015). Older people's perspectives on participation in physical activity: a systematic review and thematic synthesis of qualitative literature. *British Journal of Sports Medicine, 49*, 1268-1276. doi:10.1136/bjsports-2014-094015

Frank, A. (2004). Intermediate care: a flawed substitute for rehabilitation. *British Medical Journal, 329*, 360.

French, D., Olander, E., Chisholm, A., & McSharry, J. (2014). Which behaviour change techniques are most effective at increasing older adults' self-efficacy and physical activity behaviour? A systematic review. *Annals of Behavioural Medicine, 48*, 225-234. doi:10.1007/s12160-014-9593-z

Fried, L., Tangen, C., Walston, J., Newman, A., Hirsch, C., Gottdiener, J., . . . McBurnie, M. (2001). Frailty in older adults: evidence for a phenotype. *Journal of Gerontology, 56A*(3), M146-M156.

Friedman, B., Heisel, M., & Delavan, R. (2005). Psychometric properties of the 15-item Geriatric Depression Scale in functionally impaired, cognitively intact, community-dwelling elderly primary care patients. *Journal of the American Geriatrics Society, 53*(9), 1570-1576.

Garasen, H., Windspoll, R., & Johnsen, R. (2007). Intermediate care at a community hospital as an alternative to prolonged general hospital care for elderly patients: a randomised controlled trial. *BMC Public Health*. doi:10.1186/1471-2458-7-68

Garasen, H., Windspoll, R., & Johnsen, R. (2008). Long-term patients' outcomes after intermediate care at a community hospital for elderly patients: 12-month follow-up of a randomized controlled trial. *Scandinavian Journal of Public Health, 36*, 197-204. doi:10.1177/1403494808089685

Gardner, D., Tsiachristas, A., Langhorne, P., Burke, O., Harwood, R., S, C., . . . Shepperd, S. (2017). Comprehensive geriatric assessment for older adults admitted to hospital (Review). *Cochrane Database of Systematic Reviews, 9*(No.: CD006211.). doi:10.1002/14651858.CD006211.pub3

Gaughan, J., Gravelle, H., Santos, R., & Siciliani, L. (2017). Long-term care provision, hospital bed blocking, and discharge destination for hip fracture and stroke patients. *International Journal of Health Economics and Management, 17*, 311-331. doi:10.1007/s10754-017-9214-z

Gaughan, J., Gravelle, H., & Siciliani, L. (2015). Testing the bed-blocking hypothesis: does nursing and care home supply reduce delayed hospital discharges? *Health Economics, 24*(S1), 32-44. doi:10.1002/hec.3150

Ghasemi, A., & Zahediasi, S. (2012). Normality Tests for Statistical Analysis: A Guide for Non-Statisticians. *International Journal of Endocrinology and Metabolism, 10*(2), 486-489. doi:10.5812/ijem.3505

Goh, S. (2012). Post acute care of the elderly in Singapore. What factors influence use of services. *Asia Pacific Journal of Social Work and Development, 21*(1), 31-53. doi:10.1080/21650993.2011.9756095

Goldberg, A. (2012). The five-times-sit-to-stand-test (FTSST), the short version of the activities-specific balance confidence (ABC) scale, and fear of falling predict step execution time (SET) in older adults. *Archives of Gerontology and Geriatrics, 54*, 434-439.

Goldberg, A., Chavis, M., Watkins, J., & Wilson, T. (2012). The five-times-sit-to-stand test: validity, reliability and detectable change in older females. *Aging, Clinical and Experimental Research, 24*(4), 339-344.

Goncalves-Bradley, D., Lannin, N., Clemson, L., Cameron, I., & Shepperd, S. (2016). Discharge planning from hospital (Review). *Cochrane Database of Systematic Reviews*(1). doi:10.1002/14651858.CD000313.pub5

Gougeon, L., Johnson, J., & Morse, H. (2017). Interprofessional collaboration in health care teams for the maintenance of community-dwelling seniors' health and well-being in Canada: A systematic review of trials. *Journal of Interprofessional Education and Practice, 7*, 29-37. doi:10.1016/j.xjep.2017.02.004

Granger, C., Dewis, L., Peters, N., Sherwood, C., & Barrett, J. (1979). Stroke rehabilitation: analysis of repeated Barthel Index measures. *Archives of Physical Medicine and Rehabilitation, 60*(1), 14-17.

Green, J., Young, J., & Forster, A. (2006). Background to the post-acute care trial of community hospital rehabilitation for older people. *International Journal of Therapy and Rehabilitation, 13*(2), 66-73. doi:10.12968/ijtr.2006.13.2.21355

Green, J., Young, J., Forster, A., Mallinder, K., Bogle, S., Lowson, K., & Small, N. (2005). Effects of locality based commuity hospital care on independence in older people needing rehabilitation: randomised controlled trial. *BMJ Online first*. doi:10.1136/bmj.38498.387569.8F

Green, M., Dorling, D., Minton, J., & Pickett, K. (2017). Could the rise in mortality rates since 2015 be explained by changes in the number of delayed discharges of NHS patients? *Journal of Epidemiology and Community Health, 71*, 1068-1071. doi:10.1136/jech-2017-209403

Greenberg, S. (2007). The Geriatric Depression Scale: short form. *The American Journal of Nursing, 107*(10), 60-69.

Griffiths, P., Edwards, M., Forbes, A., Harris, R., & Ritchie, G. (2007). Effectiveness of intermediate care in nursing-led in-patient units (Review). *Cochrane Database of Systematic Reviews*(2), Art. No.: CD002214. doi:10.1002/14651858.CD002214.pub3

Guba, E., & Lincoln, Y. (1994). *Competing paradigms in qualitative research. Handbook of qualitative research*. Thousand Oaks: Sage Publications.

Guilherme, L., Soares, L., Japiassu, A., Gomes, L., & Pereira, R. (2017). Post-acute care facility as a discharge destination for patients in need of palliative care in Brazil. *American Journal of Hospice and Palliative Medicine, 1*(5). doi:10.1177/1049909117691280

Guralnik, J., Ferrucci, L., Simonsick, E., Salive, M., & Wallace, R. (1995). Lower-extremity function in persons over the age of 70 years as a predictor of subsequent disability. *the New England Journal of Medicine, 332*, 556-561.

Guralnik, J., Simonsick, E., Ferrucci, L., Glynn, R., Berkman, L., Blazer, D., . . . Wallace, R. (1994). A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission. *Journal of Gerontology, 49*(2), M85-M94.

Haight, B., Barba, B., Courts, N., & Tesh, A. (2002). Thriving: a life span theory. *Journal of Gerontological Nursing, 28*(3), 14-22.

Hakkarainen, T., Ayoung-Chee, P., Alfonso, R., Arbabi, S., & Flum, D. (2015). Structure, process, and outcomes in skilled nursing facilities: understanding what happens to surgical patients when they cannot go home. A systematic review. *Journal of Surgical Research, 193*, 772-780. doi:10.1016/j.jss.2014.06.002

Halawi, M., Vovos, T., Green, C., Wellman, S., Attarian, D., & Bolognesi, M. (2015). Patient expectation is the most important predictor of discharge destination after primary total joint arthroplasty. *The Journal of Arthroplasty, 30*, 539-542.

Hall, C., Peel, N., Comans, T., Gray, L., & Scuffham, P. (2012). Can post-acute care programmes for older people reduce overall costs in the health system? A case study using the Australian Transition Care Programme. *Health and Social Care in the Community, 20*(1), 97-102. doi:10.1111/j.1365-2524.2011.01024.x

Harwood, R., & Ebrahim, S. (2002). The validity, reliability and responsiveness of the Nottingham Extended Activities of Daily Living scale in patients undergoing total hip replacement. *Disability and Rehabilitation, 24*(7), 371-377. doi:10.1080/09638280110101541

Hastings, S., Sloane, R., Morey, M., Pavon, J., & Hoenig, H. (2014). Assisted early mobility for hospitalized older veterans: preliminary data from the STRIDE program. *Journal of the American Geriatrics Society, 62*, 2180-2184. doi:10.1111/jgs.13095

Hayes, K., & Johnson, M. (2003). Measures of adult general performance tests. *American College of Rheumatology, 49*(5S), S28-S42.

Haywood, K., Garratt, A., Schmidt, L., & Mackintosh, A. (2004). *Health status and quality of life in older people: a structured review of patient-reported health instruments*. Retrieved from Oxford, UK: http://phi.uhce.ox.ac.uk/

Herbert, R., Jamtvedt, G., Birger Hagen, K., & Mead, J. (2011). *Practical evidence-based physiotherapy* (2nd ed.): Elservier Health Sciences.

Herdman, M., Gudex, C., Lloyd, A., Janssen, M., Kind, P., Parkin, D., . . . Badia, X. (2011). Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). *Qualify of Life Research, 20*, 1727-1736. doi:10.1007/s11136-011-9903-x

Herfjord, J., Heggestad, T., Ersland, H., & Ranhoff, A. (2014). Intermediate care in nursing home after hospital admission: a randomized controlled trial with one year follow-up. *BMC Research Notes, 7*(889).

Hildebrand, M., Host, H., Binder, E., Carpenter, B., Freedland, K., Morrow-Howell, N., . . . Lenze, E. (2012). Measuring treatment fidelity in a rehabiliation intervention study. *American Journal of Physical Medicine and Rehabilitation, 91*(8), 715-724. doi:10.1097/PHM.0b013e31824ad462

Holmes, S., Galik, E., & Resnick, B. (2017). Factors that Influence physical activity among residents in assisted living. *Journal of Gerontological Social Work, 60*(2), 120-137. doi:10.1080/01634372.2016.1269035

Holstege, M., Caljouw, M., Zekveld, I., van Balen, R., de Groot, A., van Haastregt, J., . . . Achterberg, W. (2017). Successful geriatric rehabilitation: effects on patients' outcome of a national program to improve quality of care, the SINGER study. *Journal of the American Directors Association, 18*, 383-387. doi:10.1016/j.jamda.2016.10.011

Institute of Medicine. (2006). *Genes, behavior, and the social environment: moving beyond the nature/nurture debate*. Washington, US: National Academies Press.

Jerez-Roig, J., de Brito Macedo Ferreira, L., de Araujo, J., & Lima, K. (2017). Functional decline in nursing home residents: a prognostic study. *Plos One, 12*(5). doi:org/10.1371/journal.pone.0177353

Jesus, T., & Hoenig, H. (2015). Postacute rehabilitation quality of care: toward a shared conceptual framework. *Archives of Physical Medicine and Rehabilitation, 96*, 960-969. doi:10.1016/j.apmr.2014.12.007

Jette, D., Warren, R., & Wirtalla, C. (2005). The relation between therapy intensity and outcomes of rehabilitation in skilled nursing facilities. *Archives of Physical Medicine and Rehabilitation, 86*(3), 373-379. doi:10.1016/j.apmr.2004.10.018

Joa, K., Kwon, S., Choi, J., Hong, S., Kim, C., & Jung, H. (2015). Classification of walking ability of household walkers versus community walkers based on K-BBS, gait velocity and upright motor control. *European Journal of Physical Rehabilitation Medicine, 51*(5), 619-625.

Johnson, R., & Bibbo, J. (2014). Relocation decisions and constructing the meaning of home: a phenomenological study of the transition into a nursing home. *Journal of Aging Studies, 30*, 56-63. doi:10.1016/j.jaging.2014.03.005

Joosten, E., Demuynck, M., Detroyer, E., & Milisen, K. (2014). Prevalence of frailty and its ability to predict in hospital delirium, falls, and 6-month mortality in hospitalized older patients. *BMC Geriatrics, 14*(1). doi:10.1186/1471-2318-14-1

Jung, H., Trivedi, A., Grabowski, D., & Mor, V. (2016). Does more therapy in skilled nursing facilities lead to better outcomes in patients with hip fracture? *Physical Therapy, 96*(1), 81-89. doi:10.2522/ptj.20150090

Kabisch, M., Ruckes, C., Seibert-Grafe, M., & Blettner, M. (2011). Randomized controlled trials. *Deutsches Ärzteblatt International, 108*(39), 663-668. doi:10.3238/arztebl.2011.0663

Kalisch, B., Lee, S., & Dabney, B. (2013). Outcomes of inpatient mobilzation: a literature review. *Journal of Clinical Nursing, 23*, 1486-1501. doi:0.1111/jocn.12315

Karampampap, K., Frumento, P., Ahlbom, A., & Modig, K. (2017). Does a hospital admission in old age denote the beginning of life with a compromised health-related quality of life? A longitudinal study of men and women aged 65 years and above participating in the Stockholm Public Health Cohort. *BMJ Open, 6*. doi:10.1136/bmjopen-2015-010901

Karppi, P. (1995). Effects of a geriatric inpatient unit on elderly homecare patients: a controlled trial. *Aging Clinical and Experimental Research, 7*(3), 207-211.

Katikireddi, S., & Christopher, G. (2009). Planning a patient's discharge from hospital. *British Medical Journal, 338*(a2694), 472-476. doi:10.1136/bmj.a2

Kauffman, T., Scott, R., Barr, J., & Moran, M. (2014). *A comprehensive guide to geriatric rehabilitation* (3rd Edition ed.): Elsevier Health Sciences, UK.

Kauh, B., Polak, T., Hazelett, S., Hua, K., & Allen, K. (2005). A pilot study: post-acute geriatric rehabilitation versus usual care in skilled nursing facilities. *Journal of the American Directors Association, 6*, 321-326. doi:10.1016/j.jamda.2005.04.008

Keeler, E., Guralnick, J., Tian, H., Wallace, R., & Reuben, D. (2010). The impact of functional status on life expectancy in older persons. *Journals of Gerontology: Medical Sciences, 65*(7), 727-733. doi:10.1093/gerona/glq029

Kiely, D., Cupples, A., & Lipsitz, L. (2009). Validation and comparison of 2 frailty indexes: the MOBILIZE Boston study. *Journal of the Amerian Geriatrics Society*, *57*(9), 1532-1539.

Kim, J., & Shin, W. (2014). How to do random allocation (randomization). *Clinics in Orthopedic Surgery, 6*, 103-109. doi:10.4055/cios.2014.6.1.103

Kirby, S., Dennis, S., Jayasinghe, U., & Harris, M. (2010). Patient related factors in frequent readmissions: the influence of condition, access to services and patient choice. *BMC Health Service Research*, *10*, 216.

Kocica, M., Stojanovicc, Z., Nikolicd, D., Lazovicd, M., Grbicg, R., Dimitrijevica, L., & Milenkovic, M. (2018). The effectiveness of group Otago exercise program on physical function in nursing home residents older than 65 years: A randomized controlled trial. *Archives of Gerontology and Geriatrics*, *75*, 112-118. doi:10.1016/j.archger.2017.12.001

Kojima, G. (2015). Prevalence of frailty in nursing homes: a systematic review and meta-analysis. *Journal of the American Directors Association*, *16*, 940-945. doi:10.1016/j.jamda.2015.06.025

Kojima, G. (2018). Frailty as a predictor of nursing home placement among community-dwelling older adults: a systematic review and meta-analysis. *Journal of Geriatric Physical Therapy, 41*(1), 42-48. doi:10.1519/JPT.0000000000000097

Kok, L., Berden, C., & Sadiraj, K. (2015). Costs and benefits of home care for the elderly versus residential care: a comparison using propensity scores. *European Journal of Health Economics, 16*, 119-131. doi:10.1007/s10198-013-0557-1

Kool, J., Oesch, P., & Bachmann, S. (2017). Predictors for living at home after geriatric inpatient rehabilitation: a prospective cohort study. *Journal of Rehabilitation Medicine, 49*, 185-190. doi:10.2340/16501977-2182

Kosse, N., Dutmer, A., Dasenbrock, L., Bauer, J., & Lamoth, C. (2013). Effectiveness and feasibility of early physical rehabilitation programs for geriatric hospitalized patients: a systematic review. *BMC Geriatrics, 13*(107). doi:10.1186/1471-2318-13-107

Kramer, A., Lin, M., Fish, R., & Min, S. (2015). *Refinement of community discharge, potentially avoidable readmission, and functional outcome SNF quality measures, for fiscal years 2011, 2012 and 2013*. Retrieved from Washington: http://www.medpac.gov/docs/default-source/contractor-reports/refinement-of-community-discharge-potentially-avoidable-readmission-and-functional-outcome-snf-quali.pdf?sfvrsn=0

Kroneman, M., Boerma, W., van den Berg, M., Groenewegen, P., de Jong, J., & van Ginneken, E. (2016). *Netherlands Health system review*. Retrieved from http://www.euro.who.int/__data/assets/pdf_file/0016/314404/HIT_Netherlands.pdf

Kuisma, R. (2002). A randomized, controlled comparison of home versus institutional rehabilitation of patients with hip fracture. *Clinical Rehabilitation, 16*, 553-561. doi:10.1191/0269215502cr525oa

Kumpers, S., Allen, K., Campbell, L., Dieterich, A., Glasby, J., Kagialiaris, G., . . . Wagner, L. (2010). *Prevention and rehabilitation within long-term care across Europe*. Retrieved from Berlin, Copenhagen and Vienna, Europe: http://interlinks.euro.centre.org/sites/default/files/WP3_Overview_FINAL_04_11.pdf

Kus, S., M, M., Strobl, R., & Grill, E. (2011). Patient goals in post-acute geriatric rehabilitation: goal attainment is an indicator for improved functioning. *Journal of Rehabilitation Medicine*, *43*, 156-161. doi:10.2340/16501977-0636

Laffron de Mazieres, C., Morley, J. E., Levy, C., Agenes, F., Barbagallo, M., Cesari, M., . . . Rolland, Y. (2017). Prevention of functional decline by reframing the role of nursing homes? *Journal of the American Directors Association*, *18*, 105-110. doi:10.1016/j.jamda.2016.11.019

Lambert, T., Harvey, L., Avdalis, C., Chen, L., Jeyalingam, S., Pratt, C., . . . Lucas, B. (2017). An app with remote support achieves better adherence to home exercise programs than paper handouts in people with musculoskeletal conditions: a randomised trial. *Journal of Physiotherapy*, *63*, 161-167. doi:10.1016/j.jphys.2017.05.015

Landis, J., & Koch, G. (1977). The measurement of observer agreement for categorical data. *Biometrics*, *33*(1), 159-174.

Learmonth, Y., Paul, L., McFadyen, A., Mattison, P., & Miller, L. (2012). Reliability and clinical significance of mobility and balance assessments in multiple sclerosis. *International Journal of Rehabilitation Research*, *35*(1), 69-74.

Lee, G. (2010). Predictors of adjustment to nursing home life of elderly residents: a cross-sectional survey. *International Journal of Nursing Studies, 47*, 957-964. doi:10.1016/j.ijnurstu.2009.12.020

Lee, T., Cho, E., Yim, E., Lee, H., Ko, Y., Kim, B., & Kim, S. (2015). Activities of daily living in nursing home and home care settings: a retrospective 1-year cohort study. *Journal of the American Directors Association, 16*, 114-119. doi:10.1016/j.jamda.2014.07.013

Lee, W., Cheng, Y., Liu, C., Peng, L., Liu, L., & Chen, L. (2012a). Dose-dependent effect of rehabilitation in functional recovery of older patients in the post-acute care unit. *Archives of Gerontology and Geriatrics, 54*, e290-293. doi:10.1016/j.archger.2011.11.012

Lee, W., Peng, L., Cheng, Y., Liu, C., Chen, L., & Yu, H. (2011). Effectiveness of short-term interdisciplinary intervention on postacute patients in Taiwan. *Journal of the American Directors Association, 12*, 29-32. doi:10.1016/j.jamda.2010.01.002

Lee, Y., Lin, C., Jseng, Y., Luo, T., Hung, P., Wu, M., & Tang, Y. (2012b). Predictive factors for patients discharged after participating in a post-acute care program. *Journal of Clinical Gerontology and Geriatrics, 3*, 25-28. doi:10.1016/j.jcgg.2011.11.008

Lenze, E., Host, H., Hildebrand, M., Morrow-Howell, N., Carpenter, B., Freedland, K., . . . Binder, E. (2012). Enhanced medical rehabilitation increases therapy intensity and engagement and improves functional outcomes in postacute rehabilitation of older adults: a randomized-controlled trial. *Journal of the*

American Directors Association, 13, 708-712. doi:10.1016/j.jamda.2012.06.014

Leung, g., Katz, P., Karuza, J., Arling, g., Chan, A., Berall, A., . . . Naglie, G. (2016). Slow stream rehabiliation: a new model of post-acute care. *Journal of the American Directors Association, 17*, 238-243. doi:10.1016/j.jamda.2015.10.016

Li, G., Thabane, L., Papaioannou, A., Ioannideis, G., Levine, M., & Adachi, J. (2017). An overview of osteoporosis and frailty in the elderly. *BMC Musculoskeletal Disorders*. doi:10.1186/s12891-017-1403-x

Li, Y., Cai, X., Mukamel, D., & Glance, L. (2010). The volume-outcome relationship in nursing home care An examination of functional decline among long-term care. *Medical Care, 48*, 52-57.

Li, Y., Cai, X., Yin, J., Glance, L., & Mukamel, D. (2012). Is higher volume of postacute care patients associated with a lower rehospitalization rate in skilled nursing facilities? *Medical Care Research and Review, 69*(1), 103-118. doi:10.1177/1077558711414274

Liberati, A., Altman, D., Tetzlaff, J., Mulrow, C., Gotzsche, P., Ioannidis, J., . . . Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *Plos Medicine, 6*(7). doi:10.1371/journal.pmed.1000100

Lindenberg, K., Nitz, J., Rahmann, A., & Bew, P. (2014). Predictors of discharge destination in a geriatric population after undergoing rehabilitation. *Journal of Geriatric Physiotherapy, 37*(2), 92-98.

Liston, R., & Brouwer, B. (1996). Reliability and validity of measures obtained from stroke patients using the balance master. *Archives of Physical Medicine and Rehabilitation, 77*(5), 425-430.

Lizarondo, L., Kumar, S., Hyde, L., & Skidmore, D. (2010). Allied health assistants and what they do: A systematic review of the literature. *Journal of Multidisciplinary Healthcare, 3*, 143-153. doi:10.2147/JMDH. S12106

Lohse, K., Lang, C., & Boyd, L. (2014). Is more better? Using metadata to explore dose-response relationships in stroke rehabilitation. *Stroke, 45*, 2053-2058. doi:10.1161/STROKEAHA.114.004695

Lord, S., Murray, S., Chapman, K., Munro, B., & Tiedemann, A. (2002). Sit-to-stand performance depends on sensation, speed, balance, and psychological status in addition to strength in older people. *Journal of Gerontology, 57A*(8), M539-M543.

Lund, A., & Lund, M. (2018). Laerd Statistics. Retrieved from https://statistics.laerd.com/premium/index.php

Luppa, M., Luck, T., Wyerer, S., Konig, H., Brahler, E., & Riedel-Heller, S. (2010). Prediction of institutionalization in the elderly. A systematic review. *Age and Ageing, 39*, 31-38. doi:10.1093/ageing/afp202

Lusardi, M., Pellecchia, G., & Schulman, M. (2003). Functional performance in community living older adults. *Journal of Geriatric Physical Therapy, 26*(3), 14-22.

MacArthur, I., & Hendry, A. (2017). *The 'Intermediate Care Hospital:' facility bed-based rehabilitation for elderly patients*. Retrieved from Brazil:

Mahoney, F., & Barthel, D. (1965). Functional evaluation: the Barthel Index. *Maryland State Medical Journal, 14,* 56-61.

Makizako, H., Shimada, H., Doi, T., Tsutsumimoto, K., Nakakubo, S., Hotta, R., & Suzuki, T. (2017). Predictive cutoff values of the five-times sit-to-stand test and the time 'up and go' test for disability incidence in the older people dwelling in the community. *Physical Therapy, 97,* 417-424.

Mallinson, T., Deutsch, A., Bateman, J., Tseng, H., Manheim, L., Almagor, O., & Heinemann, A. (2014). Comparison of discharge functional status after rehabilitation in skilled nursing, home health, and medical rehabilitation settings for patients after hip fracture repair *Archives of Physical Medicine and Rehabilitation, 95*, 209-217. doi:10.1016/j.apmr.2013.05.031

Manville, M., Klein, M., & Bainbridge, L. (2014). Improved outcomes for elderly patients who received care on a transitional care unit. *Canadian Family Physician, 60*(5), e263-271.

Martinez-Velilla, N., Cadore, D., A, C.-H., Idoate-Saralegui, F., & Izquierdo, M. (2015). Physical activity and early rehabilitation in hospitalized elderly medical patients: systematic review of randomized clinical trials. *The Journal of Nutrition, Health and Aging, 20*(7), 738-751.

Martinez, N., Martorell, C., Espinosa, L., Marasignan, V., Domenech, S., & Inzitari, M. (2015). Impact of Qigong on quality of life, pain and depressive symptoms in older adults admitted to an intermediate care rehabilitation unit: a randomized controlled trial. *Aging, Clinical and Experimental Research, 27*(2), 125-130. doi:10.1007/s40520-014-0250-y

McCallum, J., Simons, L., Simons, J., & Friedlander, Y. (2005). Patterns and predictors of nursing home placement over 14 years: Dubbo study of elderly Australians. *Australasian Journal on Ageing, 24*(3), 169-173. doi:10.1111/j.1741-6612.2005.00116.x

Medicare. (2017a). Skilled nursing facility (SNF) care. Retrieved from https://www.medicare.gov/coverage/skilled-nursing-facility-care.html

Medicare. (2017b). What's home health care? Retrieved from https://www.medicare.gov/what-medicare-covers/home-health-care/home-health-care-what-is-it-what-to-expect.html

MedPAC. (2017a). *Inpatient rehabilitation facilities payment system*. Retrieved from Washington DC: http://www.medpac.gov/docs/default-source/payment-basics/medpac_payment_basics_17_irf_final93a311adfa9c665e80adff00009edf9c.pdf?sfvrsn=0

MedPAC. (2017b). *Skilled nursing facility services payment system*. Retrieved from Washington DC: http://www.medpac.gov/docs/default-source/payment-basics/medpac_payment_basics_17_snf_finalb4a411adfa9c665e80adff00009edf9c.pdf?sfvrsn=0

Metadata Online Registry. (2017). Separation. Retrieved from http://meteor.aihw.gov.au/content/index.phtml/itemId/327268

Mickan, S., & Rodger, S. (2005). Effective health care teams: a model of six characteristics developed from shared perceptions. *Journal of Interprofessional Care, 19*(4), 358-370. doi:10.1080/13561820500165142

Middleton, A., Li, S., Kuo, Y., Ottenbacher, K., & Goodwin, J. (2018). New institutionalization in long-term care after hospital discharge to skilled nursing facility. *Journal of the American Geriatrics Society, 66*(56-63). doi:10.1111/jgs.15131

Moen, K., Ormstad, H., Wang-Hansen, M., & Brovold, T. (2017). Physical function of elderly patients with multimorbidity upon acute hospital admission versus 3 weeks post-discharge. *Disability and Rehabilitation, 8*, 1-8. doi:10.1080/09638288.2017.1294211

Mold, J. (2017). Goal-directed health care: redefining health and health care in the era of value-based carere. *Cureus, 9*(2). doi:10.7759/cureus.1043

Mong, Y., Teo, T., & Ng, S. (2010). 5-repetition sit-to-stand test in subjects with chronic stroke: reliability and validity. *Archives of Physical Medicine and Rehabilitation, 91*, 407-413.

Monitor. (2015). *Moving healthcare closer to home: literature review of clinical impacts*. Retrieved from London, UK: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/459268/Moving_healthcare_closer_to_home_clinical_review.pdf

Moseley, A., Herbert, R., Maher, C., Sherrington, C., & Elkins, M. (2011). Reported quality of randomized controlled trials of physiotherapy interventions has improved over time. *Journal of Clinical Epidemiology, 64*, 594-601. doi:10.1016/j.jclinepi.2010.08.009

Muindi, F., & K'Obonyo, P. (2015). Quality of work life, personality, job satisfaction, competence, and job performance: a critical review of literature. *European Scientific Journal, 11*(26), 223-240.

Muller, L., Collier, J., Wells, Y., Bauer, M., & Petroulakis, F. (2017). *Review of the Victorian Transition Care Program*. Department of Health and Human Services. Victoria.

Murad, K., & Kitzman, D. (2012). Frailty and multiple comorbidities in the elderly patient with heart failure: implications for management. *Heart Failure Reviews, 17*(0), 581-588. doi:10.1007/s10741-011-9258-y

Murad, Y. (2012). Skilled nursing facilities and post acute care. *Gerontology and Geriatric Research, 1*(1). doi:10.4172/2167-7182.1000101

My Aged Care. (2015). Palliative care. Retrieved from https://www.myagedcare.gov.au/end-life-care/palliative-care

My Aged Care. (2017a). After hospital care (transition care). Retrieved from https://www.myagedcare.gov.au/after-hospital-care-transition-care

My Aged Care. (2017b). Comprehensive assessment with an ACAT. Retrieved from https://www.myagedcare.gov.au/eligibility-and-assessment/acat-assessments

Nahm, F. (2016). Nonparametric statistical tests for the continuous data: the basic concept and the practical use. *Korean Journal of Anaesthesiology, 69*(1), 8-14. doi:0.4097/kjae.2016.69.1.8

Nancarrow, S. (2004). Improving intermediate care: giving practitioners a voice. *Journal of Integrated Care, 12*(1), 33-41. doi:10.1108/14769018200400007

Nancarrow, S., Shuttleworth, P., Tongue, A., & Brown, L. (2004). Support workers in intermediate care. *Health and Social Care in the Community, 13*(4), 338-344. doi:10.1111/j.1365-2524.2005.00563.x

National Audit Office. (2016). *Discharging older patients from hospital*. Retrieved from London, England: https://www.nao.org.uk/wp-content/uploads/2015/12/Discharging-older-patients-from-hospital.pdf

National Institute for Health. (2015). Skilled nursing or rehabilitation facilities. *MedlinePlus.* Retrieved from https://medlineplus.gov/ency/patientinstructions/000435.htm

National Institute for Health and Care Excellence. (2017). *Intermediate care including reablement* Retrieved from London: nice.org.uk/guidance/ng74

National Seniors Australia. (2012). *The health of senior Australians and the out-of-pocket healthcare costs they face*. Retrieved from https://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0ahUKEwi13tntycnWAhVPNrwKHbS8AEwQFggrMAE&url=https%3A%2F%2Fses.library.usyd.edu.au%2Fbitstream%2F2123%2F9194%2F1%2Fpacnsahealthoop.pdf&usg=AFQjCNEBxAz5A7GRRAl43eZyazqV_EY53A

National Statistics. (2017). Hospital Admitted Patient Care Activity. Retrieved from https://www.google.com.au/search?q=hosp-epis-stat-admi-summ-rep-2016-17&ie=utf-8&oe=utf-8&client=firefox-b-ab&gfe_rd=cr&dcr=0&ei=GSuVWoPGJvPc8wf4rKq4Cw

New, P. W., Scroggie, G. D., & Williams, C. M. (2016). The validity, reliability, responsiveness and minimal clinically important difference of the de Morton mobility index in rehabilitation. *Disability and Rehabilitation, 39*(10), 1039-1043. doi:10.1080/09638288.2016.1179800

Ng, S. (2010). Balance ability, not muscle strength and exercise endurances, determines the performance of hemiparetic subjects on the timed-sit-to-stand test. *American Journal of Physical Medicine and Rehabilitation, 89*, 497-504.

Ng, S., Cheung, S., Lai, L., Liu, A., Leong, S., & Fong, S. (2015). Five times sit-to-stand test completion times among older women: influence of seat height and arm position. *Journal of Rehabilitation Medicine, 47*, 262-266. doi:10.2340/16501977-1915

NHS Benchmarking Network. (2017). *National audit of intermediate care - summary report England*. Retrieved from Manchester, UK: https://s3.eu-west-2.amazonaws.com/nhsbn-static/NAIC%20(Providers)/2017/NAIC%20England%20Summary%20Report%20-%20upload%202.pdf

NHS England. (2016). *Commissioning guidance for rehabilitation*. Retrieved from England: https://www.england.nhs.uk/wp-content/uploads/2016/04/rehabilitation-comms-guid-16-17.pdf

Nolan, M., Power, D., Long, J., & Horgan, F. (2016). Frailty and its association with rehabilitation outcomes in a post-acute older setting. *International Journal of Therapy and Rehabilitation, 23*(1), 33-40. doi:10.12968/ijtr.2016.23.1.33

Nyunt, M., Fones, C., Niti, M., & Ng, T. (2009). Criterion-based validity and reliability of the Geriatric Depression Screening Scale (GDS-15) in a large validation sample of community-living Asian older adults. *Aging and Mental Health, 13*(3), 376-382. doi:10.1080/13607860902861027

O'Brien, B., Harris, I., Beckman, T., Reed, D., & Cook, D. (2014). Standards for reporting qualitative research: a synthesis of recommendations. *Academic Medicine, 89*(6), 1245-1251. doi:10.1097/ACM.0000000000000388

O'Neill, D., & Coughlan, T. (2001). General hospital resources consumed by an elderly population awaiting long-term care *Irish Medical Journal, 94*(7), 206-208.

O'Neill, D., Rice, I., Blake, P., Walsh, B., & Coakley, D. (1992). The Geriatric Depression Scale: rater-administered or self-administered? *International Journal Of Geriatric Psychiatry, 7*(7), 511-515.

OECD. (2017a). *Health care utilisation: hospital aggregates*. Retrieved from Paris, France: http://stats.oecd.org/Index.aspx?DataSetCode=SHA

OECD. (2017b). *Health expenditure and financing*. Retrieved from Paris, France: http://stats.oecd.org/Index.aspx?DataSetCode=SHA

OECD Health Policy Studies. (2014). *Geographic variations in health care: what do we know and what can be done to improve health system performance?* Retrieved from

Okuno, Y., Miyasaka, T., & Dobashi, K. (2012). Factors influencing the outcome of acute rehabilitation: functional independence measure assessment at discharge. *Journal of Physical Therapy Science, 24*, 491-494.

Olanrewaju, O., Kelly, S., Cowan, S., Brayne, C., & Lafortune, L. (2016). Physical activity in community dwelling older people: a systematic review of reviews of interventions and context. *Plos One, 11*(12). doi:10.1371/journal.pone.0168614

Oliveira, J., Sherrington, C., Amorim, A., Dario, A., & Tiedemann, A. (2017). What is the effect of health coaching on physical activity participation in people aged 60 years and over? A systematic review of randomised controlled trials. *British Journal of Sports Medicine, 51*, 1425-1432. doi:10.1136/bjsports-2016-096943

Olsberg, D., & Winters, M. (2005). *Ageing in place: intergenerational and intrafamilial housing transfers and shifts in later life*. Retrieved from Melbourne: https://www.ahuri.edu.au/__data/assets/pdf_file/0011/2180/AHURI_Final_Report_No88_Ageing_in_place_intergenerational_and_intrafamilial_housing_transfers_and_shifts_in_later_life.pdf

Oltmann, S. (2016). Qualitative Interviews: A Methodological Discussion of the Interviewer and Respondent Contexts. *Forum Qualitative Social Research, 17*(2), 15.

Oppe, M., Rand-Hendriksen, K., Shah, K., Ramos-Gon, J., & Luo, N. (2016). EuroQol protocols for time trade-off valuation of health outcomes. *PharmacoEconomics, 34*, 993-1004. doi:10.1007/s40273-016-0404-1

Orvik, A., Nordhus, G., Axelsson, S., & Axelsson, R. (2016). Interorganizational collaboration in transition care - a study of a post-discharge programme for elderly patients. *International Journal of Integrated Care*, *16*(2), 1-11. doi:10.5334/ific.2226

Ostir, G., Berges, I., Yong-Fang, K., Goodwin, J., Fisher, S., & Guralnik, J. (2013). Mobility activity and its value as a prognostic indicator of survival in hospitalized older patients. *Journal of the American Geriatrics Society, 61*(4), 551-557. doi:10.1111/jgs.12170

Ouslander, J., Griffiths, P., McConnell, e., Riolo, L., Kutner, M., & Schnelle, J. (2005). Functional incidental training: a randomized, controlled crossover trial in Veterans Affairs nursing homes. *Journal of the American Geriatrics Society, 53*, 1091-1100.

Ovretveit, J. (2011). *Evidence: does clinical coordination improve quality and save money* (Vol. 1). London, UK: The Health Foundation.

Palladino, R., Lee, J., Ashworth, M., Triassi, M., & Millett, C. (2016). Associations between multimorbidity, healthcare utilisation and health status: evidence from 16 European countries. *Age and Ageing, 45*, 431-435. doi:10.1093/ageing/afw044

Parker, C., Hill, K., Cobden, J., Davidson, M., & McBurney, H. (2015). Randomized controlled trial of the effect of additional functional exercise during slow-stream rehabilitation in a regional center. *Archives of Physical Medicine and Rehabilitation, 96*, 831-836. doi:10.1016/j.apmr.2014.12.012

Parsons, M., Senior, H., Herse, N., Chen, M., Jacobs, S., Vanderhoorn, S., . . . Anderson, C. (2012). The Assessment of Services Promoting Independence and Recovery in Elders Trial (ASPIRE): a pre-planned meta-analysis of three independent randomised controlled trial evaluations of ageing in place initiatives in New Zealand. *Age and Ageing*(722-728). doi:10.1093/ageing/afs113

Patomella, A., Sandman, P., Bergland, A., & Edvardsson, D. (2016). Characteristics of residents who thrive in nursing home environments: a cross-sectional study. *Journal of Advanced Nursing, 72*(9), 2153-2161. doi:10.1111/jan.12991

Pedersen, M., Petersen, J., Bean, J., Damkjaer, L., Juul-Larsen, H., Andersen, O., . . . Bandholm, T. (2015). Feasibility of progressive sit-to-stand training among older hospitalized patients. *PeerJ*. doi:10.7717/peerj.1500

Peel, N., Hubbard, R., & Gray, L. (2013). Impact of post-acute transition care for frail older people: a prospective study. *Journal of Frailty and Aging, 2*(3), 165-171. doi:10.14283/jfa.2013.24

Peri, K., Kerse, N., Robinson, E., Parson, M., Parson, J., & Latham, N. (2008). Does functionally based activity make a difference to health status and mobility? A randomized controlled trial in residential care facilities (The Promoting Independent Living Study; PILS). *Age and Ageing, 37*, 57-63.

Pickard, A., Neary, M., & Cella, D. (2007). Estimation of minimally important differences in EQ-5D utility and VAS scores in cancer. *Health and Quality of Life Outcomes, 5*(70). doi:10.1186/1477-7525-5-70

Pimouguet, C., Rizzuto, D., Schon, P., Shakersain, B., Angeleman, S., Lagergren, M., . . . Xu, W. (2016). Impact of living alone on institutionalization and mortality: a population-based longitudinal study. *European Journal of Public Health,, 26*(1), 182-187. doi:10.1093/eurpub/ckv052

Pioli, G., Frondini, C., Lauretani, F., Davoli, M., Pellicciotti, F., Martini, E., . . . Lunardelli, M. (2011). Time to surgery and rehabilitation resources affect outcomes in orthogeriatric units. *Archives of Gerontology and Geriatrics, 55*, 316-322. doi:10.1016/j.archger.2011.11.010

Pitzul, K., Wodchis, W., Carter, M., Kreder, H., Voth, J., & Jagla, S. (2016). Post-acute pathways among hip fracture patients: a system-level analysis. *BMC Health Service Research, 16*(275). doi:10.1186/s12913-016-1524-1

Plochg, T., Delnoij, D., van der Kruk, T., Janmaat, T., & Klazinga, N. (2005). Intermediate care: for better or worse? Process evaluation of an intermediate care model between a university hospital and a residential home. *BMC Health Service Research, 5*(38). doi:doi:10.1186/1472-6963-5-38

Pocklington, C., Gilbody, S., Manea, L., & McMillan, D. (2016). The diagnostic accuracy of brief versions of the Geriatric Depression Scale: a systematic review and meta-analysis. *INternational Journal of Psychiatry, 31*, 837-857. doi:10.1002/gps.4407

Pollock, A., Gray, C., Culham, E., Durward, B., & Langhorne, P. (2014). Interventions for improving sit-to-stand ability following stroke (Review). *Cochrane Database of Systematic Reviews*(5). doi:10.1002/14651858.CD007232.pub4.

Poulos, C., & Eagar, K. (2007). Determining appropriateness for rehabilitation or other subacute care: is there a role for utilisation review? *Australia and New Zealand Health Policy, 4*(3). doi:10.1186/1743-8462-4-3

Productivity Commission. (2017a). *Report on Government Services 2017 Chapter 14*. Retrieved from Canberra: http://www.pc.gov.au/research/ongoing/report-on-government-services/2017/community-services/aged-care-services

Productivity Commission. (2017b). *Report on Government Services Chapter 12*. Retrieved from Canberra http://www.pc.gov.au/research/ongoing/report-on-government-services/2017/health/public-hospitals/rogs-2017-volumee-chapter12.pdf

Prost, E. (2018). Berg Balance Scale. Retrieved from geriatrictoolkit.missouri.edu/Berg-Balance-Scale.doc

Puhan, M., Ahuja, A., Natta, M., Ackatz, L., & Meinert, C. (2011). Interviewer versus self-administered health-related quality of life questionnaires - does it matter? *Health and Quality of Life Outcomes, 9*(May), 30.

Puthoff, M., & Saskowski, d. (2013). Reliability and responsiveness of gait speed, five times sit to stand and hand grip strength for patients in cardiac rehabilitation. *Cardiopulmonary Physical Therapy Journal, 24*(1), 31-37.

Pynoos, J. (2018). The future of housing for the elderly: four strategies that can make a difference. *Public Policy and Aging Report, 0*(0), 1-4. doi:10.1093/ppar/pry006

Quehenberger, V., Cichocki, M., & Krajic, K. (2014). Sustainable effects of a low-threshold physical activity intervention on health-related quality of life in residential aged care. *Clinical Interventions in Ageing, 9*, 1853-1864. doi:10.2147/CIA.S70359

Rabin, R., Oemar, M., & Oppe, M. (2011). *EQ-5D-3L user guide*. Retrieved from Rotterdam, The Netherlands:

Reichardt, L., Aarden, J., van Seben, R., van der Schaaf, M., Engelbert, R., Bosch, J., & Buurman, B. (2016). Unravelling the potential mechanisms behind hospitalization-associated disability in older patients; the Hospital-Associated Disability and impact on daily Life (Hospital-ADL) cohort study protocol. *BMC Geriatrics*. doi:10.1186/s12877-016-0232-3

Reuben, D., & Tinetti, M. (2012). Goal-oriented patient care - an alternative health outcomes paradigm. *the New England Journal of Medicine, 366*(9), 777-779. doi:10.1056/NEJMp1113631

Rodriques, I., Armstrong, J., Adachi, J., & MacDermid, J. (2017). Facilitators and barriers to exercise adherence in patients with osteopenia and osteoporosis: a systematic review. *Osteoporosis International, 28*, 735-745. doi:10.1007/s00198-016-3793-2

Rogers, N., Steptoe, A., & Cadar, D. (2017). Frailty is an independent predictor of incident dementia: evidence from the English Longitudinal Study of Ageing. *Nature, 7*(15746). doi:10.1038/s41598-017-16104-y

Rojas-Garcia, A., Turner, S., Pizzo, E., Hudson, E., Thomas, J., & Raine, R. (2018). Impact and experiences of delayed discharge: a mixed-studies systematic review. *Health Expectations, 21*, 41-56. doi:10.1111/hex.12619

Rose, A., Rosewilliam, S., & Soundy, A. (2017). Shared decision making within goal setting in rehabilitation settings: a systematic review. *Patient Education and Counseling, 100*, 65-75. doi:10.1016/j.pec.2016.07.030

Roy, N., Dube, r., Despre, C., Freitas, A., & Legare, F. (2017). Choosing between staying at home or moving: a systematic review of factors influencing housing decisions among frail older adults. *Plos One, 13*(1). doi:10.1371/journal.pone.0189266

Rubenstein, L., Josephson, K., Wieland, D., English, P., Sayre, J., & Kane, R. (1984). Effectiveness of a geriatric evaluation unit. *the New England Journal of Medicine, 311*, 1664-1670. doi:10.1056/NEJM198412273112604

Rubenstein, L., Stuck, A., & Siu, A. (1991). Impacts of geriatric evaluation and management programs on defined outcomes: overview of the evidence. *Journal of the American Geriatrics Society, 39*(S1), 8S-16S. doi:10.1111/n.1532-5415.1991.tb05927.x

Ruderman, M., Ohlott, P., Panzer, K., & King, S. (2002). Benefits of mutliple roles for managerial women. *Academy of Management Journal, 45*(2), 369-386.

Russo, P., Prinzi, G., Kisialious, A., Cardaci, V., Stirpe, E., Conti, V., . . . Bonassi, S. (2017). Action plans and coping strategies in elderly COPD patients influence the result of pulmonary rehabiliation: an observational study. *European Journal of Physical Rehabilitation Medicine, 17*. doi:10.23736/S1973-9087.17.04501-4

Sager, M., Franke, T., Inouye, S., Landefeld, S., Morgan, T., Rudberg, M., . . . Winograd, C. (1996). Functional outcomes of acute medical illness and hospitalization in older persons. *Archives of Internal Medicine, 156*, 645-652.

Saint-Mont, U. (2015). Randomization does not help much, comparability does. *Plos One*. doi:10.1371/journal.pone.0132102

Saletti-Cuesta, L., Tutton, E., Langstaff, D., & Willett, K. (2016). Understanding informal carers' experiences of caring for older people with a hip fracture: a systematic review of qualitative studies. *Disability and Rehabilitation, 40*(7), 740-750. doi:10.1080/09638288.2016.1262467

Salgado, R., Ehrlich, F., Banks, C., Browne, E., Buckman, S., & Burraston, B. (1995). A mobile rehabilitation team program to assist patients in nursing homes rehabilitate and return to their homes. *Archives of Gerontology and Geriatrics, 20*, 255-261. doi:10.1016/0167-4943(95)00621-Q

Saltvedt, K., Mo, E., Fayers, P., Kaasa, S., & Sletvold, O. (2002). Reduced mortality in treating acutely sick, frail older patients in a geriaric evaluation and management unit. A prospective randomized trial. *Journal of the American Geriatrics Society, 50,* 792-798. doi:10.1046/j.1532-5415.2002.50202.x

Schaubert, K., & Bohannon, R. (2005). Reliability and validity of three strength measures obtained from community-dwelling elderly persons. *Journal of Strength and Conditioning Research, 19*(3), 717-720.

Schnelle, J., Alessi, C., Simmons, S., Al-Samarrai, N., Beck, J., & Ouslander, J. (2002). Translating clinical research into practice: a randomized controlled trial of exercise and incontinence care with nursing home residents. *Journal of the American Geriatrics Society, 50*, 1476-1483.

Schnelle, J., MacRae, P., Ouslander, J., Simmons, S., & Nitta, M. (1995). Functional incidental training, mobility performance, and incontinence care with nursing home residents. *Journal of the American Geriatrics Society, 43*(12), 1356-1362.

Schoo, A., Lawn, S., & Carson, D. (2016). Towards equity and sustainability of rural and remote health services access: supporting social capital and integrated organisational and professional development. *BMC Health Service Research, 16*(111). doi:10.1186/s12913-016-1359-9

Schrag, A., Selai, C., Jahanshahi, M., & Quinn, N. (2000). The EQ-5D - a generic quality of life measure is a useful instrument to measure quality of life in patients with Parkinson's disease. *Journal of Neurology, Neurosurgery and Psychiatry, 69*, 67-73.

Scott, I. (2011). Cautionary tales in the clinical interpretation of trials assessing therapy-induced changes in health status. *The International Journal of Clinical Practice, 65*(5), 536-546. doi:10.1111/j.1742-1241.2011.02654.x

Sheikh, J., & Yesavage, J. (1986). Geriatric depression scale (GDS) recent evidence and development of a shorter version. *Clinical Gerontologist, 5*(1), 165-173.

Shubert, T., Schrodt, L., Mercer, V., Busby-Whitehead, J., & Giuliani, C. (2006). Are scores on balance screening tests associated with mobility in older adults? *Journal of Geriatric Physical Therapy, 29*(1), 33-39.

Shyu, Y., Lian, O., Wu, C., Su, J., Cheng, H., Chou, S., & Yang, C. (2005). A pilot investigation of the short-term effects of an interdisciplinary intervention program on elderly patients with hip fracture in Taiwan. *Journal of the American Geriatrics Society, 53*, 811-818. doi:10.1111/j.1532-5415.2005.53253.x

Siebens, H., Sharkey, P., Aronow, H., Horn, S., Munin, M., DeJong, G., . . . Radnay, C. (2012). Outcomes and weight-bearing status during rehabilitation after arthroplasty for hip fractures. *American Academy of Physical Medicine and Rehabilitation, 4*, 548-555. doi:10.1016/j.pmrj.2012.05.001

Singapore Government. (2017). Analysis of revenue and expenditure Retrieved from https://www.singaporebudget.gov.sg/data/budget_2017/download/FY2017_Analysis_of_Revenue_and_Expenditure.pdf

Sommers, J., Vredeveld, T., Horn, J., Engelbert, R., Lindeboom, R., & Schaaf, M. (2015). Psychometric properties of the de Morton Mobility Index in ICU patients. *Critical Care, 19*(Supplement 1), 475. doi:doi: 10.1186/cc14555

South Australian Health. (2017). Statewide rehabilitation triage/referral. Retrieved from http://www.sahealth.sa.gov.au/wps/wcm/connect/beec515a-0569-4b43-9f17-03551b59a243/Statewide%2BRehabilitation%2BTriage%2BReferral.pdf?MOD=AJPERES&CACHE=NONE&CONTENTCACHE=NONE

Soysal, P., Veronese, N., Thompson, T., Kahl, K., Fernandes, B., Prina, A., . . . Stubbs, B. (2017). Relationship between depression and frailty in older adults: A systematic review and meta-analysis. *Ageing Research Reviews*, *36*, 78-87. doi:10.1016/j.arr.2017.03.005

St. John, P., Tyas, S., Giriffith, L., & Menec, V. (2017). The cumulative effect of frailty and cognition on mortality – results of a prospective cohort study. *International Psychogeriatrics*, *29*(4), 535-543. doi:10.1017/S1041610216002088

Steffen, T., & Seney, M. (2008). Test-retest reliability and minimal detectable change on balance and ambulation tests, the 36-item short-form health survey, and the unified parkinson disease rating scale in people with parkinsonism. *Physical Therapy*, *88*(6), 733-746.

Stevenson, T. (2001). Detecting change in patients with stroke using the Berg balance Scale. *Australian Journal of Physiotherapy*, *47*(1), 29-38.

Stevenson, T., Connelly, D., Murray, J., Huggett, D., & Overend, T. (2010). Threshold Berg Balance Scale scores for gait-aid use in elderly subjects: a secondary analysis. *Physiotherapy Canada*, *62*(2), 133-140.

Stewart, A., & Painter, P. (1997). Issues in measuring physical functioning and disability in arthritis patients. *10*(6).

Stoye, G. (2017). *UK health spending*. Retrieved from London, UK: https://www.ifs.org.uk/uploads/publications/bns/BN201.pdf

Strasser, D., Falconer, J., Herrin, J., Bowen, S., Stevens, A., & Uomoto, J. (2005). Team functioning and patient outcomes in stroke rehabilitation. *Archives of Physical Medicine and Rehabilitation, 86*, 403-409. doi:10.1016/j.apmr.2004.04.046

Sullivan, A., & Lachman, M. (2017). Behavior change with fitness technology in sedentary adults: a review of the evidence for increasing physical activity. *Frontiers in Public Health, 4*(289). doi:10.3389/fpubh.2016.00289

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. doi:10.1016/j.cnur.2014.02.002

Tarazona-Santabalbina, F., Gomez-Cabrera, C., Perez-Ros, P., Martinez-Arnau, F., Cabo, H., Tsaparas, K., . . . Vina, J. (2016). A multicomponent exercise intervention that reverses frailty and improves cognition, emotion, and social networking in the community-dwelling frail elderly: a randomized clinical trial. *Journal of the American Medical Directors Association, 17*(5), 426-433. doi:10.1016/j.jamda.2016.01.019

Telenius, E., Engedal, K., & Bergland, A. (2015a). Effect of a high-intensity exercise program on physical function and mental health in nursing home residents with dementia: an assessor blinded randomized controlled trial. *Plos One*. doi:10.6084/m9.figshare.1314600

Telenius, E., Engedal, K., & Bergland, A. (2015b). Inter-rater reliability of the Berg Balance Scale, 30 s chair stand test and 6 m walking test, and construct validity of the Berg Balance Scale in nursing home residents with mild-to-moderate dementia. *BMJ Open*. doi:10.1136/bmjopen-2015-008321

Teo, T., Mong, Y., & Shamay, N. (2013). The repetitive five-times-sit-to-stand test: its reliability in older adults. *International Journal of Therapy and Rehabilitation, 20*(3), 122-130.

The Cochrane Collaboration. (2014). Review Manager (RevMan) (Version 5.3). Copenhagen, Denmark: The Nordic Cochrane Centre,.

The Euroqol Group. (1990). EuroQol* - a new facility for the measurement of health-related quality of life. *Health Policy, 16*(3), 199-208.

Theou, O., Sluggestt, J., Bell, S., Lalic, S., Cooper, T., Robson, L., . . . Visvanathan, R. (2017). Frailty, hospitalization, and mortality in residential aged care. *Journal of Gerontology Series A Biological Sciences and Medical Sciences, 0*(0), 1-7. doi:10.1093/gerona/glx185

Theou, O., Stathokostas, L., Roland, K., Jakrobi, J., Patterson, C., Vangervoort, A., & Jones, G. (2011). The effectivenemss of exercise interventions for the management of frailty: a systematic review. *Journal of Aging Research, 2011*. doi:10.4061/2011/569194

Thomas, D. (2017). Feedback from research participants: are member checks useful in qualitative research? *Qualitative Research in Psychology, 14*(1), 23-41. doi:10.1080/14780887.2016.1219435

Thomas, S., Wakerman, J., & Humphreys, J. (2015). Ensuring equity of access to primary health care in rural and remote Australia - what core services should be locally available? *International Journal for Equity in Health, 14*(111). doi:10.1186/s12939-015-0228-1

Tian, W. (2016). *An all-payer view of hospital discharge to postacture care, 2013*. Retrieved from Rockville, Maryland:

Tinney, J., Dow, B., Fearn, M., Dowson, L., Hempton, C., Hill, K., . . . de Mel, G. (2007). *Best Practice in Person-Centred Health Care for Older Victorians study*. Retrieved from Melbourne, Victoria:

Treacy, D., Schurr, K., Lloyd, B., & Sherrington, C. (2015). Additional standing balance circuit classes during inpatient rehabilitation improved balance outcomes: an assessor-blinded randomised controlled trial. *Age and Ageing, 44*, 580-586. doi:10.1093/ageing/afv019

Tricco, A., Antony, J., Ivers, N., Ashoor, H., Khan, P., Blondal, E., . . . Strauss, S. (2014). Effectiveness of quality improvement strategies for coordination of care to reduce use of health care services: a systematic review and meta-analysis. *Canadian Medical Association Journal, 186*(15), E568-E578. doi:10.1503/cmaj.140289

Turner-Stokes, L., Paul, S., & Williams, H. (2006). Efficiency of specialist rehabilitation in reducing dependency and costs of continuing care for adults with complex acquired brain injuries. *Journal of Neurology, Neurosurgery and Psychiatry, 77*, 634-639. doi:10.1136/jnnp.2005.073411

University of Sydney. (2018a). PEDro physiotherapy evidence database. Frequently asked questions. Retrieved from https://www.pedro.org.au/english/faq/#question_five

University of Sydney. (2018b). PEDro statistics. Retrieved from https://www.pedro.org.au/english/downloads/pedro-statistics/

UpToDate. (2017). Hospital discharge and readmission. Retrieved from https://www.uptodate.com/contents/hospital-discharge-and-readmission

Van Craen, K., Braes, T., Wellens, N., Denhaerynck, K., Flamaing, J., Moons, P., . . . Milisen, K. (2010). The effectiveness of inpatient geriatric evaluation and management units: a systematic review and meta-analysis. *Journal of the American Geriatrics Society, 58*, 83-92. doi:10.1111/j.1532-5415.2009.02621.x

Vasilevskis, E., Ouslander, J., Mixon, A., Bell, S., Jacobsen, J., Sarah, A., . . . Schnelle, J. (2017). Potentially avoidable readmissions of patients discharged to post-acute care: perspectives of hospital and skilled nursing facility staff. *Journal of the American Geriatrics Society, 65*, 269-276. doi:10.1111/jgs.14557

Vaughan, L., Leng, X., La Monte, M., Tindle, H., Cochrane, B., & Shumaker, S. (2016). Functional independence in late-life: maintaining physical functioning in older adulthood predicts daily life function after age 80. *Journals of Gerontology: Medical Sciences, 71*(S1), S79-S86. doi:10.1093/gerona/glv061

Viney, R., Norman, R., King, M., Cronin, P., Street, D., Knox, S., & Ratcliffe, J. (2011). Time trade-off derived EQ-5D weights for Australia. *Value in Health, 14*, 928-936.

Vinokur-Kaplan, D. (1995). Treatment teams that work (and those that don't): an application of Hackman's group effectiveness model to indeisiplinary teams in psychiatric hospitals. *Journal of Applied Behavioral Science, 31*(3), 303-327.

Wallmann, H., Evans, N., Day, C., & Neelly, K. (2013). Interrater reliability of the five-times-sit-to-stand test. *Home Health Care Management and Practice, 25*(1), 13-17.

Wancata, J., Alexandrowicz, R., Weiss, M., & Friedrich, F. (2006). The criterion validity of the Geriatric Depression Scale: a systematic review. *Acta Psychiatrica Scandinavica, 114*, 398-410.

Wang, P., Yap, P., Koh, g., Chong, J., Davies, L., Dalakoti, M., . . . Luo, N. (2016). Quality of life and related factors of nursing home residents in Singapore. *Health and Quality of Life Outcomes, 14*(112). doi:10.1186/s12955-016-0503-x

Wang, S., Zhao, Y., & Zang, X. (2015). Continuing care for older patients during the transitional period. *Chinese Nursing Research, 1*, 5-13. doi:10.1016/j.cnre.2014.11.001

Warburton, J., Scharf, T., & Walsh, K. (2016). Flying under the radar? Risks of social exclusion for older people in rural communities in Australia, Ireland and Northern Ireland. *Sociologia Ruralis, 57*(4), 459-480. doi:10.1111/soru.12129

Ward, D., Drahota, A., Gal, D., Severs, M., & Dean, T. (2008). Care home versus hospital and own home environments for rehabilitation of older people (review). *Cochrane Database of Systematic Reviews*(4). doi:10.1002/14651858.CD003164.pub2

Weeks, L., McInnis-Perry, g., MacQuarrie, C., & Jovanovic, S. (2016). Insights into roles for health-care professionals in meeting the needs of older adults and unpaid caregivers during health-care transitions. *Canadian Journal of Nursing Research, 48*(3-4), 70-79. doi:10.1177/0844562116676579

Whitney, S., Wrisley, D., Marchetti, G., Gee, M., Redfern, M., & Furman, J. (2005). Clinical measurement of sit-to-stand performance in people with balance disorders: validity of data for the five-times-sit-to-stand test. *Physical Therapy, 85*(10), 1034 - 1045.

Winser, S., Smith, C., Hale, L., Claydon, L., Whitney, S., Klatt, B., . . . Heyman, R. (2017). Psychometric properties of a core set of measures of balance for people with cerebellar ataxia secondary to multiple sclerosis. *Archives of Physical Medicine and Rehabilitation, 98*, 270-276. doi:10.1016/j.apmr.2016.07.023

World Health Organisation. (2009). Topic 4: Being an effective team player. Retrieved from http://www.who.int/patientsafety/education/curriculum/who_mc_topic-4.pdf

World Health Organisation. (2016). *Framework on integrated, people-centred health services*. Retrieved from http://apps.who.int/gb/ebwha/pdf_files/WHA69/A69_39-en.pdf?ua=1

World Health Organisation, & World Bank (2011). *World report on disability Chapter 4 Rehabilitation*. Retrieved from Geneva, Switzerland: https://www.ncbi.nlm.nih.gov/books/NBK304079/pdf/Bookshelf_NBK304079.pdf

Wu, C., Chuang, L., Lin, K., Lee, S., & Hong, W. (2011). Responsiveness, minimal detectablechange, and minimal clincally important difference of the Nottingham extended activities of daily living scale in patients with imporved performance after stroke rehabilitaiton. *Archives of Physical Medicine and Rehabilitation, 92*(8), 1281-1287. doi:10.1016/j.apmr.2011.03.008

Wysocki, A., Thomas, K., & Mor, V. (2015). Functional improvement among short-stay nursing home residents in the MDS 3.0. *Journal of the American Directors Association, 16*(6), 470-474. doi:10.1016/j.jamda.2014.11.018

Yeh, K., Lin, M., Liu, L., Chen, L., Pen, L., & Chen, L. (2014). Functional decline and mortality in long-term care settings: static and dynamic approach. *Journal of Clinical Gerontology and Geriatrics, 5*, 13-17. doi:10.1016/j.jcgg.2013.08.001

Yesavage, J., Brink, T., Rose, T., Lum, O., Huang, V., Adey, M., & V, L. (1983). Development and validation of a geriatric depression screening scale: a preliminary report. *Journal of Psychiatric Research, 17*(1), 37-49.

Yoon, J., Brown, R., Bowers, B., Sharkey, S., & Horn, S. (2016). The effects of the Green House nursing home model on ADL function trajectory: A retrospective longitudinal study. *International Journal of Nursing Studies, 53*, 238-247. doi:10.1016/j.ijnurstu.2015.07.010

Young, J. (2009). The development of intermediate care services in England. *Archives of Gerontology and Geriatrics, 49*(Supplement 2), S21-S25.

Young, J., Gladman, J., Forsyth, D., & Holditch, C. (2015). The second national audit of intermediate care. *Age and Ageing, 44*, 182-184. doi:10.1093/ageing/afu174

Young, J., Green, J., Forster, A., Small, N., Lowson, K., Bogle, S., . . . Rowe, J. (2007). Postacute care for older people in community hospitals: a multicenter randomized, controlled trial. *Journal of the American Geriatrics Society, 55*, 1995-2002. doi:10.1111/j.1532-5415.2007.01456.x

Young, J., Robinson, M., Chell, S., Sanderson, D., Chaplin, S., Burns, E., & Fear, J. (2005). A prospective baseline study of frail older people before the introduction of an intermediate care service. *Health and Social Care in the Community, 13*(4), 307-312.

Yunzhi, L., Ming, Z., & Zheng, S. (2015). The pursuit of balance: An overview of covariate-adaptive randomization techniques in clinical trials. *Contemporary Clinical Trials, 45*, 21-25.

Zasadzka, E., Kropinska, S., Pawlaczyk, M., Krzyminska-Siemaszko, R., Lisinski, P., & Wieczorowska-Tobis, K. (2016). Effects of inpatient physical therapy on the functional status of elderly individuals. *Journal of Physical Therapy Science, 28*, 426-431. doi:10.1589/jpts.28.426

Zhang, F., Ferrucci, L., Culham, E., Metter, E., Guralnik, J., & Deshpande, N. (2013). Performance on five times sit-to-stand task as a predictor of subsequent falls and disability in older persons. *Journal of Aging and Health, 25*(3), 478-492.

Zisberg, A., Shadmi, E., Gur-Yaish, N., Tonkikh, O., & Sinoff, G. (2015). Hospital-associated functional decline: the role of hospitalization processes beyond individual risk factors. *Journal of the American Geriatrics Society, 63,* 55-62.