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# Investigating Community Stroke Rehabilitation and Falls Programs in Australia and New Zealand

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2017 Winston Churchill Travel Award Fellowship

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# Acknowledgements

I would like to thank the Winston Churchill Memorial Trust for awarding me this Fellowship which has given me a fantastic opportunity to travel to Australia and New Zealand to investigate practice in implementing stroke rehabilitation in the community and falls programmes. My aim through observing methods and practices is to encourage the adoption of some of the techniques in Australia and New Zealand in order to improve stroke care in the North East of England.

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#### Abbreviations

ESD- Early Supported Discharge

MDT-multidisciplinary team

FROP-COM-Falls risk for older people in the Community

FIM-Functional Independence Mobility

TUG-Timed up and go

GEM@ Home-Geriatric Evaluation and Management

SOP-Stepping on Programme

OEP-Otago Exercise Programme

PARQ-Physical activity readiness questionnaire.

GP-General practitioner

## Author Profile

My original back ground was as a Postdoctoral Research Scientist before qualifying as a Physiotherapist. I graduated as a Physiotherapist from the University of Teesside in 2013. I initially worked in the private sector in the U.K. health service in an orthopaedic and musculoskeletal outpatients department. I joined the NHS as a Band 5 Physiotherapist in 2015, I have worked in a pulmonary and cardiovascular in patient setting and in a nurse and physiotherapy team providing cardiopulmonary rehabilitation in the community in the North East of England. The Band 5 rotation allowed me to work in a split ward and community based stroke service and neurological outpatients department. It was during my time working with stroke survivors that I became interested in falls prevention and ways to improve physical activity in stroke survivors. Research indicates that the North East is the second highest area in England for social deprivation (Stroke Association 2016). Individuals in the North East of England are twice as likely to experience a stroke compared to less socially deprived areas of England (Stroke Association 2016).

My experience within the NHS has forged an interest in ways to enable stroke survivors to access safe and appropriate exercise. I have seen a need to develop appropriate intervention and pathways to maintain rehabilitation gains thus potentially reducing falls within the population of stroke survivors in the population.

## Executive Summary

I undertook the Winston Churchill Fellowship Award 2017 to investigate falls programmes and community stroke rehabilitation in Australia and New Zealand.

The Fellowship was undertaken to answer the following questions

- Would Falls prevention programmes in Australia be appropriate to apply to stroke patients in the U.K.?
- How can the mobility and function of stroke survivors be improved during the rehabilitation process to enable them to reduce their falls risk?
- How can stroke survivors in the community be better supported to maintain their function and improve physical activity?
- How can stroke survivors undergo better transition from a ward environment to the community to enable them to adapt to a normalised environment?

This report is an analysis of the research themes, practices and community falls and exercise programs which were driving the implementation of methods and practices in Australia and New Zealand. The aim is to use the observations to inform stroke and falls programmes in the North East of England. The report is a synthesis and analysis of current evidence, UK guidelines, sites visited and themes identified.

## Findings

- Community falls programmes which incorporated educational components and behaviour changes with an emphasis on functional goals specific to the individual, with a social aspect, appear to engender more engagement.
- Stroke circuit classes, run in the community by Exercise Physiologists and health trainers who have received training in stroke, appear to be an effective long term intervention for stroke survivors to maintain physical activity.
- Community based stroke circuit classes appear to be effective engendering long-term benefit to survivors in maintaining physical activity. The classes I observed were run in the community by Exercise Physiologists and Health Trainers trained in all aspects of physical management of strokes.
- Early identification of falls and appropriate interventions in the Primary Care system may be a way of reducing or managing falls to enable patients to access services in a timely manner.
- Falls education needs to be promoted at a University level to enable student Physiotherapists and graduate Physiotherapists to relate clinical findings to falls risk.
- University based exercise and falls clinics offer a specialist service to appropriate clients and enable therapy students to gain experience in a non-hospital environment.
- Alternative methods to improve engagement in physical activity and falls prevention such as health coaching, social media, apps and easily accessible on line resources, are being increasingly promoted.

## Recommendations

- There is a need for clear falls intervention pathways between the health and the social care sector in the North East of England to prevent falls.
- There is a need for evidence based clinically effective falls programmes to be implemented in the community. Individuals need to be given methods to incorporate activities into daily living which maintain balance and strength.
- The Primary Care System should have an integrated system to screen for individuals at risk of falling. Patients should be referred or sign posted to the appropriate intervention or service.
- Publicity monitors in public areas such as General Practitioner (GP) surgeries and hospital waiting areas as well as individual bedside monitors could be used to provide falls information and simple exercises.

- Falls programmes should be implemented in stroke rehabilitation and assessed for effectiveness.
- Best practice interventions to improve the long-term physical activity in stroke patients needs to be identified.
- Physiotherapists are in an ideal position to facilitate and provide support to stroke survivors and community and leisure providers to drive a collaborative process to enable implementation of interventions suitable for stroke survivors and be a key contact between the health care system and the leisure, community and social care providers.
- Universities providing Physiotherapy courses could develop balance and strength clinics as part of student placements. Students would gain clinical experience and clients would benefit from access to specialist services in a non-medical environment.

## Introduction

According to the World Health Organisation falls are the second leading cause of accidental or unintentional injury worldwide. A fall is defined as an event which results in a person coming to rest inadvertently on the ground or floor or other lower level.

Adults over 65 years of age suffer the greatest number of fatal falls with 37.3 million recorded falls per annum that are severe enough to require medical attention (WHO accessed on the 28/8/17 <http://www.who.int/mediacentre/factsheets/fs344/en/>). The cost of treating falls related injuries within the NHS is significant. There are 255,000 falls related emergency hospital admissions per year for older people in England and the annual cost of hip fractures due to falls in the UK is estimated at being around £2 billion (Public Health England 2017). Falls have an additional effect on productivity costs in terms of carer time and absence from work (Snooks et al 2011). Falls are the most common cause of death from injury in the over 65s.

Stroke survivors are at greater risk of falling both as inpatients and through their post stroke life (Weerdesteyn et al 2008). Stroke survivors can experience compromised mobility, reduced strength, poor balance and cognitive changes, with 55% to 73% of stroke survivors experiencing a fall one year after their stroke (Verheyden et al 2013).

Falls not only have physical consequences, such as reduced mobility, but they also have psychosocial consequences leading to fear of falling and lack of confidence in independent mobility as well as social isolation and consequent reduction in physical activity. Implementation of methods to address increased falls risk in stroke survivors is needed.

A systematic Review and meta-analysis identified that falls interventions were no more effective than usual care in reducing falls risk in stroke survivors (Batchelor et al 2010) This suggests that an exercise only approach may not reduce falls in stroke survivors and other factors need to be

taken into account to address this issue. There is a need for further research and evaluation of falls prevention in stroke survivors.

The Fellowship research project was carried out in Australia and New Zealand, both countries have developed community based falls programs as well as having a strong back ground in physiotherapy led stroke and falls research.

The Fellowship research was informed by the identification of falls prevention programs in the community which have been shown to reduce falls in Australia based on the current evidence. I identified and visited community based exercise programs providing exercise programs in an elderly population. Hospital sites and care facilities providing client responsive falls and stroke community rehabilitation programs were visited.

The aim of the research was to identify new methods and ideas of addressing falls and stroke rehabilitation. I met leading researchers in the field to discuss and identify falls prevention strategies and developing areas of research in stroke rehabilitation. Various sites were visited in the states of Victoria, New South Wales and Queensland in Australia and in Auckland in New Zealand. A combination of acute and regional health care providers, community providers and University institutions were visited.

## Aims

The aims of the Fellowship are to

- Inform current clinical practice in falls prevention and falls prevention in stroke rehabilitation.
- To develop a multi modal falls exercise program for stroke patients in the community.
- To build links between the clinical and community services to enable stroke survivors to improve physical activity levels in the long term and to reduce falls risk in the North East of England.

## Approach

- I will be presenting the Report findings at the Chartered Society of Physiotherapy North East Regional Network.
- I will be applying to implement the LIFE programme in North Tees and Hartlepool NHS Foundation Trust to assess its effectiveness in falls prevention in Stroke patients

- I aim to improve links between Health service, social care and community providers to promote long-term physical activity in stroke survivors, and investigate ways to encourage and maintain activity levels in stroke survivors.
- I aim to develop links between health care, social care and exercise providers to promote appropriate training to up skill health trainers and exercise providers in the community and to provide interventions that incorporate evidence based balance and strength exercises to address falls.

## Observations

### Transitioning patients from a ward environment to a home environment.

The UK Stroke NICE guidelines state that “hospitals should have systems in place to ensure that people after stroke and their families and carers feel adequately informed prepared and supported” (NICE 2013). This statement was demonstrated by Echuca Regional Health.

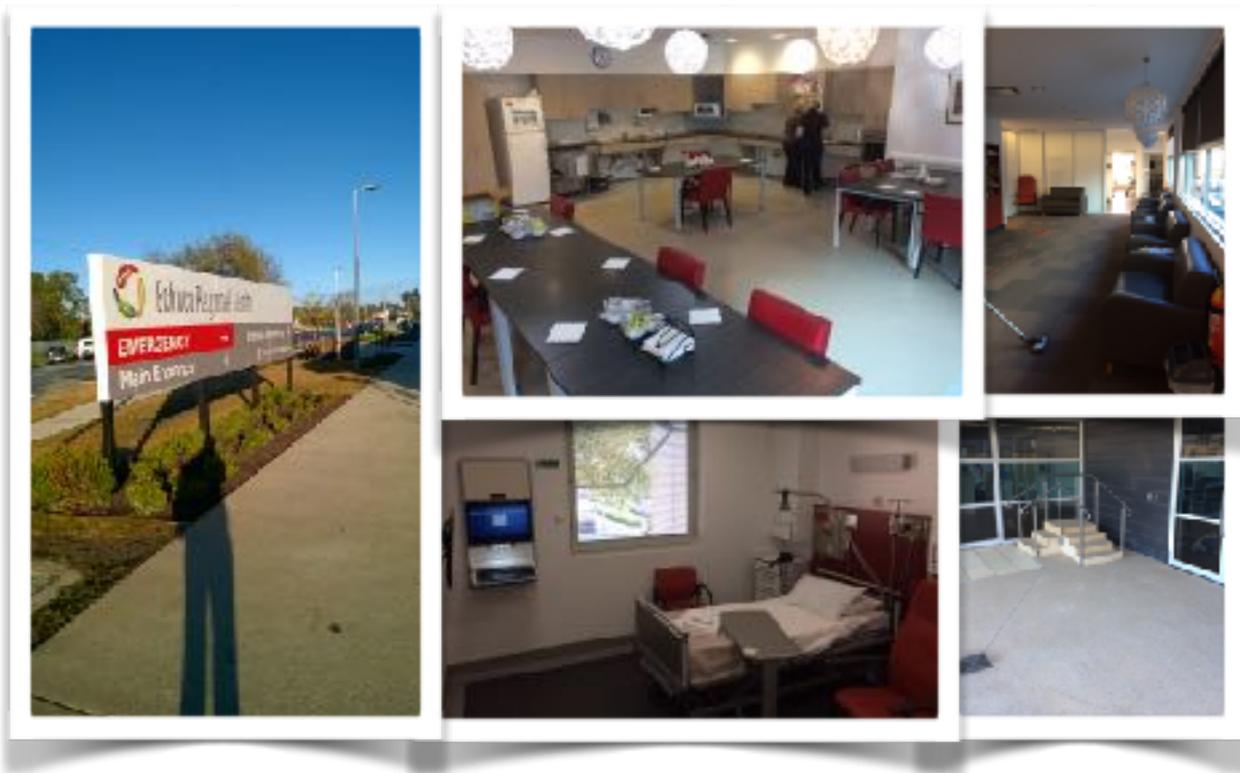
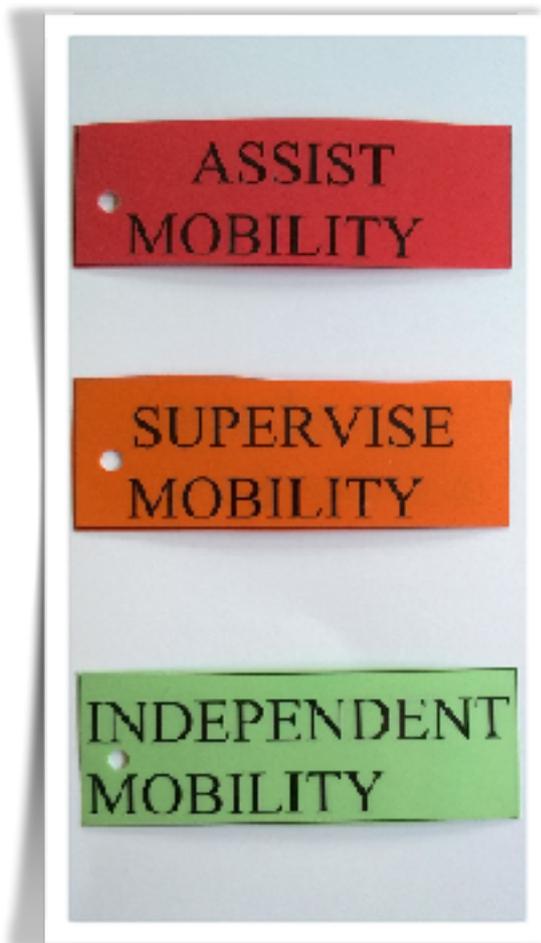


FIGURE 2) ECHUCA REGIONAL HEALTH SHOWING THE REHABILITATION WARD DINING ROOM, SOCIAL AREA, INDIVIDUAL ROOM AND OUTDOOR MOBILITY AREA.

On admission to the ward patients are seen by a designated key contact person (KCP). The KCP facilitates the patient journey starting early discharge planning and acts as an intermediary between the patient and clinical staff. Clear lines of communication are thus achieved, the patient, family and their carer have one allotted key member of staff they can communicate with. The KCP is a member of the nursing staff or a senior allied health professional, steps are put into place to provide the same level of cover when the KCP is not available.



On admission to the rehabilitation ward the KCP discusses what is expected from the patient and how they will engage in the rehabilitation process. Patients are expected to bring in day clothes and have mealtimes in the common dining area. The aim is to equip them for return to a home environment by providing a normalised environment rather than a ward based environment. The rehabilitation ward has a central common dining room and communal area, a therapy gym and an outdoor area for mobility. The rehabilitation complex is purpose built on a circular format. This allows a central communal hub and ease of movement through the ward. Integral to the development of the rehabilitation ward was an understanding of needs of the patient within their home environment. Ward staff shadowed community staff to gain an understanding of the patient's needs to enable the patient to cope at home.

FIGURE 3) TRAFFIC LIGHT SYSTEM FOR MOBILITY AIDS USED FOR EASY IDENTIFICATION OF THE PATIENT'S MOBILITY USED ON THE REHABILITATION WARD AT ECHUCA REGIONAL

#### HEALTH REHABILITATION WARD

The Geriatric Evaluation and Management (GEM) @home program run by Echuca Health Care is a program for sub-acute care of chronic or complex conditions associated with ageing, cognitive dysfunction, chronic illness or disability. The medical conditions require inpatient admission for review and management by a geriatrician and interdisciplinary team for a specific episode of care. GEM@home is designed to support patients in an appropriate community setting and aims to reduce time spent in hospital and replace inpatient hospital bed with home based care. The objectives of GEM@home are to develop patient-centred care in partnership with families and care givers, maximise independent function, ensure early identification of appropriate discharge plans, promote patient recovery, reduce functional decline, reduce avoidable hospital admissions and increase use of sub-acute services to improve access.

To translate this into an NHS setting the following recommendations could be implemented:

- Clear patient expectation and understanding of the rehabilitation process to be implemented on admission to a rehabilitation ward.

- The use of a Key Communication Person to improve communication between patients, families and carers to enhance the discharge processes.
- It may be beneficial for ward staff, involved in discharge planning of the patient into the community, to shadow community based staff. Better patient transition from ward to home may be achieved if the ward staff are aware of the challenges the community based staff and patient face in their home setting.

## In patient stroke rehabilitation

UK Stroke NICE guidelines advocate that patients, who are able, should have a minimum of 45 minutes of Physiotherapy and occupational therapy a day. NICE also states that patients who are physically able should have more than the minimum recommended 45 minutes of therapy a day (NICE, 2013). There is evidence that inpatient circuit classes appear to be beneficial in improving walking independence (English et al 2007, Wevers et al 2009).

Bankstown-Lidcombe Hospital in Sydney has developed semi-supervised stations where patients can improve function by practicing repetitive functional tasks. Patients are supervised by Physiotherapists and allied health assistants. The aim of carrying out highly repetitive functional tasks is to promote motor control, re-learning and recovery. The use of semi-supervised exercise stations which are set up in a safe controlled environment allows independent problem solving by the patient. Movement is learnt by trial and error, allowing the opportunity for individuals to strategise and actively search for appropriate movement patterns. A Cochrane review identified Repetitive task training in a range of lower limb outcome measures resulted in modest improvement (French et al 2010). Patient progress is achieved by changing functional tasks according to ability, variation in similar tasks is added to increase challenges. Exercise diaries are implemented which act as a visual reminder of progression made. Family and carers are encouraged to participate in patient activity thus carers and family members become facilitators in the rehabilitation process.

Therapy is carried out in an open gym environment which engenders peer support. Competition is also introduced and encouraged using a champion's board to act as a motivator for patients. Peer group support, competition, family and carer involvement and visual reminders of patient progress appear to encourage and facilitate patients to engage in the rehabilitation process thus promoting self-efficacy.

Stroke survivors often have reduced exercise tolerance hence increased energy demand when walking. A study investigating energy consumption in young stroke survivors showed a high metabolic cost of walking, suggesting that aerobic exercises should be incorporated in rehabilitation (Platts et al 2006). There is strong evidence that aerobic exercise conducted 20 to 40 minutes per day over 3 to 5 days per week is beneficial for enhancing aerobic fitness, walking speed and walking endurance, in people who have had mild to moderate stroke (Pang et al 2013).

It is suggested that to gain aerobic benefit in this population initial work should be at 40 to 50% heart rate reserve (HRR) then progressing to 60 to 80% HRR (Pang et al 2013). The NHS England Commissioning Guidelines for Rehabilitation identify that exercise post stroke reduces the risk of a further vascular event (NHS England Commissioning Guidelines for Rehabilitation March 2016). Epworth Healthcare in Melbourne is a private hospital specialising in rehabilitation for patients with brain injuries. Their day unit has implemented aerobic training in rehabilitation practices. Physiotherapists and Exercises Physiologists implement appropriate aerobic exercises which are individually tailored allowing client specific goal orientated aerobic programs. Leanne Hassett from the University of Sydney carried out a randomised trial and implemented a circuit class to assess if this format could have a cardiovascular effect in individuals with traumatic brain injuries. The trial showed that a circuit class implementing low intensity cardiovascular exercises over a long duration was sufficient exercise dosage for a fitness improvement effect for 62% of people with traumatic brain injury (Hassett et al 2012). The circuit based class was set up as a continuous circuit with no rest. Participants were encouraged to work at 50% of their HRR, with experimental participants receiving feedback from heart rate monitors and the control receiving no feedback. There was no difference in feedback and non-feedback groups, suggesting that feedback from heart rate monitors did not influence outcomes in physical intensity levels (Hassett et al 2012). Therefore, the use of heart rate monitors while useful to monitor individual's effort may not act as a motivator.

## Continuing rehabilitation in the community

In the UK stroke survivors undergo a process of inpatient and community therapy. A study looking at stroke survivors 6 months' post stroke identified that a circuit based rehabilitation class improved gait and endurance these gains were not maintained 3 months later (Jeon et al 2015) The results suggest, to maintain benefits from rehabilitation, stroke survivors need to access exercise services or continue achievable exercise post rehabilitation to maintain function and cardiovascular health. Peninsula Health in Frankston has implemented service changes to enable and promote stroke survivors to continue exercising in the community once discharged from the community therapy services. An early supported discharge programme called Stroke Detours which is a 5-day service for individuals with mild to moderate strokes has been implemented by Peninsula Health. The community therapy service provides stroke circuit classes in the day unit and links have been developed with community service providers to develop a stroke circuit class within the community for discharged stroke patients, no longer receiving formal rehabilitation.

The hospital run community based stroke circuit classes are run by a Physiotherapist in a community rehabilitation day hospital assisted by an allied health assistant. It is a 3 times weekly circuit class lasting an hour with strength, balance and cardiovascular exercises incorporated with 4 levels of progression for each station.

A rolling exercise programme is employed enabling a continuous class hence patients meet individuals further down the rehabilitation process thus building peer support. New members to the class are partnered with patients who have been attending the class, this buddy system allows individuals further along the rehabilitation timeframe to act as mentors. The classes have an educational component and stroke nurse input when required. Alongside the stroke circuit class is an occupational therapy (OT) and physiotherapy run upper limb exercise group which meets twice weekly for eight weeks and is run as additional input with patients remaining under the care of the referring therapist.

Patients who have achieved their rehabilitation potential in physiotherapy are encouraged to attend community stroke based circuit classes. There is increasing evidence that task orientated circuit training for stroke patients in the community can improve function (Jeon et al 2015, van de Port 2012). The classes were set up with guidance from therapists at Peninsula Health at various sites across the Frankston and Mornington area as a long term programme for stroke survivors no longer receiving formal physiotherapy input. The stroke circuit is run at 4 sites across the Frankston and Mornington area at Monash University includes two council run centres and one volunteer run centre, there is a charge to access the service. Cost may be a barrier to patients accessing further exercise intervention. However, individuals in the UK could potentially gain financial support to access stroke circuit classes through the personal health budget scheme. The Personal health budgets enable people with long term health conditions and disabilities to use money for health and wellbeing needs (NHS England Personal Health Budgets accessed 2017).

Stroke survivors access the service via GP or Physiotherapist referral. The site at Monash university gym currently has 50 individuals attending the circuits throughout the week. The Exercise Physiologists running The Stroke Circuit at Monash university gym are trained in providing exercise to stroke survivors and have participated in courses specific to stroke and continue to learn and develop the service by updating their education credits.

The service caters for a wide range of mobility needs and accepts stroke survivors who are independently mobile and none mobile and tailors exercises appropriately. The stroke circuit allows stroke survivors to access a supervised exercise class with staff trained and skilled in exercise in stroke in a non-medical environment.

The Service also considered including carers and family members who are able to access the facility. There is limited evidence to suggest that physical activity can reduce subjective care giver burden for carers of people with dementia (Orgeta et al 2014). Physical activity has been shown to have physiological benefits. A Finnish study in a healthy population identified that individuals who exercised at least twice a week reported a stronger feeling of social integration than individuals who exercise less (Hassman et al 2000). Engaging both stroke survivors and care givers in physical activity programmes may have the potential to reduce the subjective care burden in care givers and possibly aid social integration of both care giver and stroke survivor.

## Community programs encouraging an active lifestyle in an elderly, mobility and balance compromised population

The Agestrong project implemented and run by Peninsula Health is a program designed to maintain mobility and balance in an elderly population. The project was initially developed from an audit of falls conducted by Peninsula Health Accident and Emergency service which identified that there was no follow up, no community programmes and no after care for falls patients. The Agestrong program was implemented in 2002 in seventeen sites across the Frankston and Mornington Peninsula area with a combination of healthcare and council providers. Initial start-up equipment was provided by Peninsula Health which included cuff weights and resistance band. Agestrong trainers are predominantly from Frankston city council. Initial training was provided and Age strong trainers shadowed physiotherapists and observed existing inpatient exercise groups to gain experience in an elderly population with multiple co-morbidities and mobility issues. Refresher training is carried out 3 times a year by Peninsula Health. The scheme consists of 26 health trainers across the Frankston and Mornington area and is coordinated by Peninsula Health recreational therapists who accept referrals from health care professionals and self-referrals. Peninsula Health recreational therapists coordinate waiting lists and contact patients directly to identify appropriate groups and locations. Participants all undergo an initial assessment by a Physiotherapist/Exercise Physiologist. The Agestrong program runs twice weekly, the charge for community sessions ranges from \$5-7.5, which is approximately £3-4.50. Participants engage in rolling programs with a total of ten to fifteen places, the venue is also a limiting factor on participant numbers.

Recreational Therapists from Peninsula Health regularly visit sites to check programmes and respond to any health issues. Agestrong trainers are supported by the Peninsula Health recreational therapy team and are able to refer participants back to a physiotherapist.

One of the challenges faced in implementing the service was to break down barriers, make community links and sell the service. Education and increased awareness of the service among service providers and particularly among General Practitioners was key to implementing the service.

Key factors in the success for the Agestrong service at Peninsula Health are as follows:

- GP and therapist awareness of the service.
- Involvement of Key Stake holders, GP, local council and health care provider.
- Easily accessible (close to good transport links), affordable, with an interactive enjoyable programme including social activities.
- A financially viable scheme that is self-funding.
- Central and easy referral process.

- Training program and support for Agestrong trainers provided by Peninsula Health Therapy service
- Easy to implement evidence based exercise program.

One of the barriers for patients accessing exercise and leisure services is lack of awareness by therapists of community initiatives. Peninsula Health has responded to this and developed a scheme to improve patient access to community services. Recreational therapists are community based physiotherapists with a remit to coordinate community services and facilitate access and involvement in community exercise services. To aid awareness and involvement an up to date publicly accessible physical directory is available on the Peninsula Website which is regularly updated by Peninsula Health.

The recreational service is offered to community based clients in the Peninsula Health area. Referrals are predominantly from therapists and patients must have rehabilitation goals. Recreational therapists provide support and enable individuals to access exercises and activity services. Initial contact with the client is by phone. The phone call is used to identify client goals, likes and interests engaging the client in the discussion to identify appropriate programs or classes. The Recreational therapist will then meet and attend one of the community based exercise classes with the client to enable the client to feel supported. The recreational therapist is involved with the patient journey in accessing community exercises until the client has achieved their goal and feels confident to continue. A follow up phone review is then carried out to ascertain if the client is managing to access the service, and whether the client requires further input or discharge.

A study investigating transition experiences in stroke survivors following discharge home identified that community integration presented a major challenge (Rittman et al 2014). Promoting and encouraging stroke survivors to access existing services may help in their social integration. The use of the Stroke Exercise Preference Intervention (SEPI) tool may be a means to identify early exercise preference for individual stroke survivors enabling identification of physical activity that stroke survivors are more likely to engage with.

The Never2old programme is a programme that is constantly looking at ways to engage individuals in physical activity. It is an over sixty-five years old community exercise programme based at Auckland University of Technology (AUT) Sports and Fitness Centre New Zealand. It is run by a team of two with experience in nursing and sports and recreation. Clients access the gym alongside University students intergenerational exercise thus addressing the ageist view modern society appears to suffer from. The European Social Survey Report identified that ageism is experienced in the over seventies and in the under twenty fives in the United Kingdom (European Social Survey, 2013).

Referrals are by GP, local physiotherapist or word of mouth. Clients undergo an initial assessment by the Never2old staff using the Physical Activity Readiness Questionnaire (PARQ) and functional assessment tool. For appropriate individuals a tailored gym program is developed focusing on

functional goals the exercise classes are run to incorporate strength, balance, flexibility and aerobic activity.

Adapted volleyball matches are also available which appeal to individuals who prefer competitive sports. There is an emphasis on improving health through health education and social interaction, members are encouraged to be members of the groups social committee. There is also an added financial incentive to encourage members to take an active role in the social committee as committee members have class fees waived for three months.

The program encourages clients to challenge themselves and has links to the university outdoor leader course, this encourages clients to take part in activities outside their normal comfort zone allowing them to experience activities supported by qualified instructors the aim being that the client will experience a sense of achievement.

- One of the barriers to physical activity is service accessibility and easy access to an up to date data base of relevant and available services for clients and health care providers.
- A therapist who has good links to community services and first-hand knowledge of services such as the role carried out by the recreational therapists in Peninsula Health may be beneficial in acting as a facilitator giving stroke patients confidence to access services.
- Engaging in services provided within the community could reduce social isolation for stroke survivors.
- Encouragement of physical activity in a supported environment with trained professionals may help to overcome preconceptions of physical activity and improve engagement long term.
- Evidence suggests that individuals within the older population should carry out one hour of exercise twice a week over a period of 50 hours to reduce falls (Sherrington et al 2011). It would be difficult to provide the level of input in an NHS environment. Existing community exercise providers should be utilised and educated to include appropriate exercises for balance and strength training.

## Bernie Brae centre Healthy Connections, Brisbane case study.

Bernie Brae Centre in Brisbane is a community based not for profit member only organisation. It offers a wide range of social and educational activities for the over fifties. Members pay a \$5 joining fee and further fees of \$5 and \$20 per year. The site has an onsite cafe and runs a range of government funded community services for seniors, frail and aged individuals. The multi-disciplinary hub provides access to social facilities, podiatrist, hairdresser, library, computers, hearing testing, advice regarding welfare services, personal care, domestic assistance and Healthy connections an exercise service.

This multi-disciplinary and care service approach has enabled Healthy Connections to implement a home based exercise programme implemented by health care assistants (HCA). The programme called Active at Home is for individuals who are not able to access the exercise facilities or are not appropriate to have exercise input in a gym environment to maintain their mobility levels. HCA were trained in simple lower limb and balance exercises to carry out thirty minutes of exercise twice a week with clients as a thirty min extension of care input. The HCA's were trained by the Health Connections team to carry out exercises with clients at home and were provided with an Active at Home booklet which includes education and exercises.

- The main barriers to this intervention was resistance from Health care providers as they felt that they did not have the time to allocate an additional thirty minutes of care for the exercise intervention. It may be beneficial for health care packages to include a simple exercise component to maintain mobility and function as appropriate to the client.

The Healthy Connections initiative is an exercise service led by Exercise Physiologist with Occupational therapy input and was launched in November 2011 with a second site opening at Taringa in 2014. It provides exercise intervention and classes for clients with a wide range of co-morbidities including individuals who have experienced a stroke. Clients self-referred or are referred from health and social care providers. Individualised assessment and exercise programmes based on client goals are designed by the team at Healthy Connections and support exercise in a supervised and safe gym space. Among the services and classes set up are functional strength and falls prevention using a tailored approach. The Healthy Connections service emphasises patient education and increased awareness of health is achieved by running frequent seminars on issues appropriate to client population with the onsite cafe providing a social hub. To enable clients to access the service the Burnie Brae centre has a centre bus and volunteer transport thus enabling clients with mobility deficits to attend who would be unable to access the service. The volunteer bus was also used to enable clients to access the Muscling up against disability (MAUD) program. MAUD is a project to improve mobility by using progressive strength training and balance training in frail, community dwelling adults over sixty five requiring home assistance. The project was implemented by Healthy Connections staff and designed by researchers at the University of Queensland (Keogh et al 2017). The MAUD project has now been implemented long term by the Healthy Connection team. Participants undergo circuit based

progressive resistance training using Hur machines (resistance equipment designed to accommodate individuals of various mobility levels) and balance challenges using the four step square test.

The following themes were identified

- Clients felt supported to exercise and had confidence in Healthy Connections staff.
- Clients observed improved function during their everyday activities which encouraged them to keep attending.
- Clients found the exercises challenging and enjoyable.
- The centre provided emotional and social support.
- Some clients felt less isolated and the support from the staff and other clients enabled them to cope with their health issues.

## Falls prevention services in Australia

The main way individuals access falls prevention service in the community is via their GP as the first contact. Individuals who have had one or more unidentified falls in the past twelve months are referred to falls clinics or appropriate falls services. Falls clinics are provided in various formats across Hospital sites in Australia. A 2012 Cochrane Systematic Review reported multifactorial assessment and intervention programmes reduced falls but not the risk of falling (Gillespie et al 2012). Therefore, there is evidence to support the use of falls clinics, multifactorial assessments for falls are recommended in the 2013 NICE guidelines. Stroke survivors have been identified as being four and a half times more likely to Fall within twelve months after returning home (Ng et al 2017). Falls clinics in the most part are multidisciplinary with a physiotherapist, occupational therapist and geriatrician input. Where there is no geriatrician available as in the case of Werribee Hospital the patient's GP reviews medications that could be potentially contributing to falls.

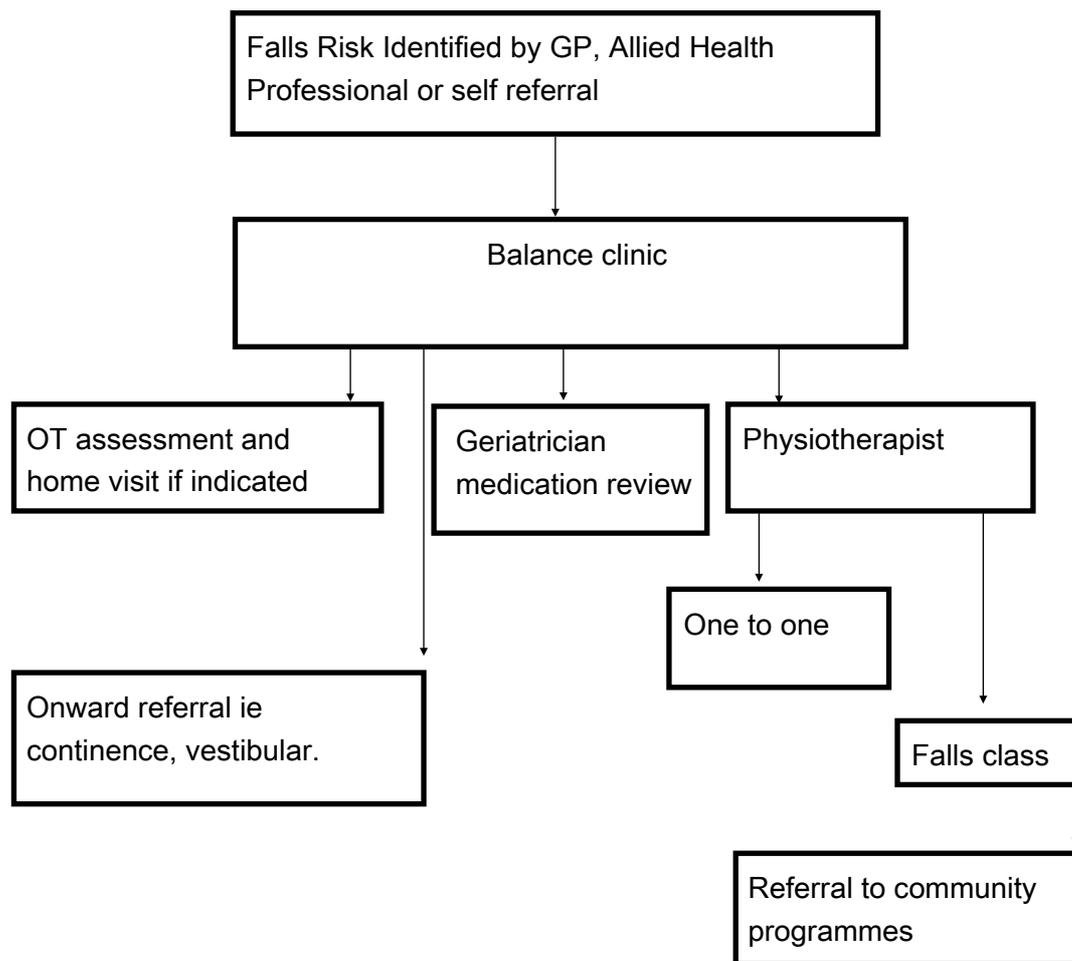


FIGURE 5) FLOW DIAGRAM TO SHOW GENERALISED FALLS PATHWAY IN AUSTRALIAN HOSPITAL RUN BALANCE CLINICS FOR UNIDENTIFIABLE FALLS.

Once an individual is assessed in the balance clinic and is appropriate for a falls class depending on the State and Hospital there are a variety of falls classes which appear to depend on therapist preference, staffing levels and client population. Falls classes which are run in the state of Victoria are specific to each hospital. The Stepping On Program (SOP), a community falls programme, has been implemented throughout New South Wales 2009 (<http://www.georgeinstitute.org/projects/is-an-impact-of-the-stepping-on-program-on-falls-and-health-service-use-in-older-adults>, accessed on 16/09/2017), Queensland Health have adopted the Otago Exercise program (OEP) for over eighty year olds.

## Evidence based Falls community prevention programs

Falls programmes have been successfully used in Australia in community dwelling adults and rolled out across community settings and home based programs. Predictive factors in falls in stroke individuals are similar to the general elderly population (Kerse et al 2008).

The evidence suggests for a falls programme to be effective strength and balance exercises should be carried out for two or more hours per week for a total of fifty hours or more (Sherrington et al 2016). Exercises should include challenging balance training and progressive strength training.

The falls prevention programmes that were identified and investigated are not specifically designed for stroke patients. Some of the practices and principles could be adapted to develop rehabilitation programmes to meet the needs of stroke survivors. It is with this rationale that evidence-based community falls programs in New South Wales and Queensland were visited.

Sunshine Coast Hospital and Healthcare Community service in Queensland run the OEP. The program is led by a senior physiotherapist with assistance from two advanced allied health assistants (AAHA).

The program accepts individuals over 80 years old who have been identified as having had falls or are a falls risk and are inappropriate for a group and would benefit from a home based exercise program. If individuals require a higher level of therapy input, then the client will be referred to the community hospital balance class

The OEP is delivered in an individual's home and consists of progressive leg strengthening, balance-retraining exercises and walking practice. The programme is structured with four home visits over the first two months, a home visit at 6 months and a telephone call every month between visits, and a final home visit at twelve months. The OEP has been shown to significantly reduce the risk of death and falling in older community-dwelling adults over the age of eighty when delivered in its original format in the individual's home (Thomas et al 2010) It is also suggested that the OEP may reduce falls by improving cognitive performance (Ambrose et al 2008). It could also be argued that programs that increase social input and learning skills would have a similar cognitive impact.

The OEP has been implemented for seven years in the Queensland Sunshine area to target falls in the frail, elderly, population and was developed from a MDT balance clinic intervention implemented by a team consisting of a geriatrician, physiotherapist and advanced allied health assistant.

Individuals accepted on to OEP are triaged and assessed during a home visit initially by a physiotherapist. The patients must be free of uncontrolled pain, have no issues which could be exacerbated by the exercise programme, be over 80 years old and living in the community.

The initial physiotherapy home visit identifies issues such as social problems and if occupational therapy input is required and appropriate referrals are made. If an individual is appropriate for OEP an advanced allied health assistant, then takes over the programme and implements the exercise component and walking plan.

Initial outcome measures, (sit to stand, timed up and go tug and balance challenges) the OEP providers found that carrying out second outcome measures at two months after the start of OEP enabled participants to see benefits and encouraged them to persevere.

The AAHA are equivalent to band 4 therapy assistant and have been up-skilled in core physiotherapy competencies they have their own case load which they manage and triage based on urgency once assessed by a physiotherapist.

OEP is a prescriptive home exercise programme for frailer adults working on major muscle groups which influence functional mobility using a combination of specific strength and balance exercises. The original OEP and the way it is implemented in Queensland is specific to individuals over 80 years old and is delivered in a home environment over a twelve-month period. The OEP has been tested in a statistically small study of stroke patients and indicates that it reduced falls (Park and Chang 2016). However, this study had very limited participant size and was highly selective. Participants selected had no cognitive issues, were able to walk unaided with or without assistance and were over 65 years old. The evidence base is insufficient to inform practice, further investigation would need to be carried out in a larger population of stroke patients to identify if the OEP is effective.

The OEP may be suitable for mild strokes with minimal loss of mobility and minor cognition deficit but even if adapted may not be suitable for moderate stroke patients as self-management and ability to follow an exercise progression programme is a requirement of OEP.

SOP Is funded by New South Wales Health and was implemented following a randomised controlled trial which showed that it was effective in reducing falls in the community (Clemson L et al 2004). The SOP is for people over sixty-five years old and is used by health care professionals to reduce falls risk and improve self-confidence in the selected population. The exercise and balance component is based on the OEP with the addition of health education to encourage behaviour changes thus tailoring the intervention to the individual's needs. SOP helps individuals to determine their risk of falling and encourages knowledge of safe practices. The program is a facilitative process to enable decision making, self-efficacy and behaviour change using adult learning principles. The SOP has also been shown to have a net cost benefit of \$134.37 per participant return on investment in its target population (Carande-Kulis et al 2015) as of 2015 which is roughly equivalent to £81.97 not accounting for 2-year inflation changes. The SOP excludes individuals with cognitive issues, dementia or Parkinson's disease. The exclusions are deemed necessary due to its basis in adult learning and behavioural change approach.

One of the sites using SOP is the Prince of Wales (POW) Hospital the program being delivered by Megan Swann, an occupational therapist, one of the co-developers of the program. The class is delivered twice weekly for seven weeks with class sizes limited to twelve to fourteen individuals. The exercise component was delivered by a physiotherapist, exercises were based on the OEP exercises using a combination of chair and standing strength exercises with use of leg weights as a progression and tandem standing balance exercises. Participants all had exercise diaries and exercise sheets which they filled in and followed. The exercise regime was carried out on a twice weekly basis with exercises progressed at the session attended by the individual. Clients are then contacted by telephone for a review and then receive two booster sessions. At the session, I observed, the participants reflected on safe mobility with Megan Swann leading the discussion. The education component was facilitated by a guest speaker who discussed road safety and awareness. The speaker delivered her talk within a social setting over tea and coffee. The informal setting encouraged participants to discuss their own experiences and to join in a group discussion where means of managing road safety issues were discussed. The POW Hospital runs a physiotherapy follow on class from the SOP called Moving On which is a twelve-week program designed to capitalise on functional gains achieved during the initial seven-week program.

The SOP and OEP are not specifically designed for stroke patients but aspects of the programmes could be used in stroke rehabilitation.

Progressive strength and balance exercises could be safely delivered by trained therapy assistants. A peer supported group setting discussing behaviour change, falls risk knowledge and safe practice may help to increase awareness of falls risk and appropriate behaviours and influence actions individuals can implement to reduce falls. However, both the OEP and the SOP are relatively short-term interventions. To enable interventions to have long term benefit individuals need to make changes in everyday life. The Life style integrated functional exercise (LiFE) program developed by Lindy Clemson and colleagues at the University of Sydney is designed to help individuals to make this change. The LiFE program incorporates balance and strength training into everyday activities and embeds it within the daily routine. A randomised parallel trial showed a reduction in falls by thirty-one per cent (Clemson et al 2012). The programme requires the participant to re-conceptualise physical activity and incorporate functional tasks into everyday life. It was developed for community dwelling adults, over the age of 70 years, who had experienced a fall or were at risk of falling.

## Identification of Falls risk patients in the primary care system.

Falls risk factors are known therefore it would be more logical to address these factors before an individual falls. According to the NICE guidelines 2013 people aged over sixty-five years should be routinely asked by Health care professionals if they have fallen in the last year and multifactorial interventions should be implemented (NICE, 2013). The Isolve project is a partnership between the University of Sydney, New South Wales (NSW) Clinical Excellence commission and Sydney North Victoria Butler, Winston Churchill Fellowship Report, 2017

Primary Health Network (SNPHN). The aim is to provide a clinical decision tool and resources for General Practitioners and practice nurses to identify older people at risk of falling and provide tailored management. This approach is an integrated primary care approach which raises awareness of falls services and provisions in primary care and allows patients at risk of falls to be identified earlier and managed using a strategic preventative method.

## Falls prevention in a residential and nursing home environment The Mercy Parklands, Auckland Approach Case study

A report by Derbyshire NHS in 2011 identified that in care homes the rate of falls is almost three times higher than that of an older person living in the community. Injury rates being considerably higher for people living in care homes. 10-20% of institutional falls resulted in a hip fracture and 25% of individuals with hip fractures admitted to acute Hospitals were admitted directly from a care home (O'Higgins and Greensmith 2011). Care homes and residential facilities support frail, mobility impaired, older people, among these may be stroke survivors who are at a greater risk of falling. It is suggested that frailty levels should also be taken into account when assessing individuals over the age of 70 years old in order to identify appropriate interventions (Morley et al 2013).

Mercy Parklands Hospital is a not for profit health care provider in Auckland for long term residential and nursing care. Comprehensive falls prevention measures have been implemented and embedded in all practice and all staff are responsible for falls prevention. Mercy Parklands uses the Spark for life Approach which is a systematic practical approach, a philosophy for dementia care to provide better care and communication and to address emotional needs. The Spark of Life Approach is a practical way to help improve care and wellbeing of individuals with dementia. The key to Spark of Life lies in making connections that enable the person with dementia to reconnect with their spirit and their inner driving force thus restoring their interest in life.

The Spark for life approach aims to improve dementia care, aspects of this approach can be applied to clinical and community settings as a holistic approach to patient care to enable carers and healthcare providers to change from being caregivers to becoming supportive partners in the rehabilitation process.

Interestingly since the Spark of Life Approach has been used by the organisation there has been a reduction in behavioural related falls. It therefore may indicate that emotional needs of individuals need to be addressed when looking at falls prevention. Mercy Parklands has an in house multidisciplinary team with a physiotherapist, occupational therapist and mobility therapist. On admission all residents have mobility and falls risk assessment and physiotherapy assessment for functional movement and strength. Residents identified as a high falls risk are monitored for their activity. Observation by staff identifies the periods of the day or activities which cause the resident

to be more at risk of falling and allows effective measures such as bed/ alarms or extra staff to be used in a targeted and intelligent way.

Residents all have a manual handling poster in their room which identifies correct manual handling procedures and mobility aids or assistance required as well as falls risk. The mobility and goals for the resident are constantly monitored and reviewed enabling mobility and falls risk measures to be put in place where appropriate. Staff are encouraged to aid and facilitate safe mobility of patients. Twice weekly physiotherapy run exercise classes, which focus on strength and balance, keep residents as independently mobile as possible. Residents suffering from cognitive issues are given assistance badges and staff and visitors are made aware that some residents may need assistance to orientate themselves.

Staff training, awareness and communication is paramount, all staff are required to achieve manual handling competencies and are trained in the use of manual handling equipment. Mercy Parkland sees empowerment and valuing of staff as essential in providing a safe and enriched environment which allows residents to live with dignity and respect.

By embedding the Spark of Life approach and embedding falls prevention practice it enables residents to live as independently as possible in an enriched environment.

- Residential and nursing homes in the UK should have robust falls prevention practices and embed falls prevention in every day practice with an understanding that falls prevention is the responsibility of all involved. Individuals should be screened for frailty using a validated and appropriate meaningful FRAIL screening tool to enable appropriate interventions to be implemented.
- Access to an MDT composed of physiotherapist and occupational therapist with support from key manual handling trainers provide manual handling recommendations and training for all staff involved in patient care would be beneficial. Clear verbal and visual communication and adherence to manual handling recommendations should be followed. Monitoring and reviewing patient's mobility should be carried out to deliver an individualised and responsive approach.
- Residents should also be encouraged to mobilise safely with appropriate walking aids or assistance and be given support to improve lower limb strength and balance. There is evidence to suggest that exercise intervention is beneficial in a frail elderly population (Labra et al 2015) Exercise interventions to improve mobility and muscle strength could potentially reduce falls (Bucking et al 2017). Exercise in this population, using a combination of resistance, aerobic, balance and functional exercise, decreased depression and fear of falling. Group based and home based exercise programs have been shown to reduce falls (Gillespie et al 2012).
- Emotional needs of patients should be taken into account as it has been shown that fear of falling has a negative effect on mobility (Painter et al 2012).

## University run student supervised exercise programmes

One of the themes identified in Australia was a potential issue of decreased staff awareness of falls and reduced analysis of reasons for falls in the community and admission to hospital. It appears that newly qualified therapy staff are not always able to relate clinical findings to the reason for falls. This suggested that there is an educational gap in falls awareness undergraduate courses should consider implementing falls awareness education to enable this gap to be closed. One of the ways this could be addressed is the development of exercises and falls programmes run by Universities to enable students to gain clinical skills and experience, allowing individuals to access specialised services in a non-clinical environment.

The University of Queensland runs a Neurological, Ageing and Balance clinic which specialises in rehabilitation of chronic and progressive neurological conditions. The clinic is staffed by qualified therapists and is a fully supervised, student led, service. Students gain clinical experience working in an outpatient environment and gain experience delivering therapy in a one to one and group environment with supervision. Individuals access therapy for a cost that is paid via their insurance, therapy is delivered in both a social and peer group setting.

The Never2old programme at Auckland University of Technology (AUT) runs a similar 6-week placement scheme for physiotherapy students from AUT. The students run low-level exercise groups, participants have to be independently mobile. The group sessions take place at AUT in the sports and fitness centre allowing students to work with exercise physiologists and sports and exercise trainers. Students gain experience of working in a multi-disciplinary environment. Health connections at the Burnie Brae Centre also have 6 weeks' placements for University of Queensland exercise physiology students.

## Health coaching, behaviour changes and education

Stroke survivors experience barriers to achieving the recommended guidelines for physical activity, this has been identified in a systematic review by Fini et al 2017. Efforts should be made to look at the barriers and perceptions, beliefs and attitudes that contribute to this. A study identified that patients receiving community rehabilitation for mobility one year after stroke show significant, but clinically small, improvements in mobility and gait speed but this was not sustained after treatment ended (Green et al 2013). There is a need to identify methods to maintain this improvement in the long term.

Health coaching is a facilitative process to empower individuals to achieve goals. When considering how to promote and improve physical activity levels in stroke patients' safety and achievable goals need to be considered. The health coaching approach is being used in falls prevention research intervention by Professor Cathie Sherrington, Dr Anne Tideman and Catherine Kirkham at the University of Sydney. The health coaching approach places the onus on the patient to self-manage. The health coach acts as a facilitator to enable the client to identify processes in order to achieve goals.

During discussions with therapists it was identified that therapists appear to be changing their approach moving away from a directed approach to allowing the patient to make errors. Some therapists appear to be taking on the role of coach to help patients to help themselves, this suggests that therapists are facilitating patients to become active learners. Active learning has been used in teaching and there is evidence that implementing active learning methods improves learning (Micheal J 2006). Therefore, applying active learning paradigms to stroke rehabilitation may be a way of encouraging stroke patients to move from passive learning to an active learning role. There is evidence that coaching by a professional can improve engagement in the learning process hence resulting in better goal commitment and progression compared to peer coaching (Spence and Grant 2007). Health care coaching to improve health life style management has been trialled in chronic disease and diabetes (Olsen and Nesbitt 2010 and Wolever et al 2010) and has shown promising results.

The LiFE programme uses prompts and cues to encourage behavioural changes to encourage activities which challenge strength and balance through practice and repetition of everyday tasks in a home environment. Behavioural changes must be maintained after an intervention has stopped, it has been identified that once an intervention has stopped the benefits are not continued (Brawley et al 2003). Using methods to embed sustained behavioural changes in response to cues in a context specific environment suggest that forming habits can embed behavioural gains (Gardner et al 2012). Incorporating habit formation into a falls programme may effect long term benefits after an intervention has been withdrawn. A systematic review concluded that intervention to improve physical activity levels in stroke survivors should incorporate physical activity and tailored counselling based on sound behavioural theory to encourage long-term participation in physical activity (Morris et al 2014).

## Collaborative approaches

The use of trained exercise prescribers such as exercise physiologists, sports therapists or sports scientist with experience of working with patients who have had strokes and other co-morbidities appears to be a logical step to progress community based individuals able to work at higher level and enable progression of patients post rehabilitation. Exercise physiologists appear to be used in the private sector but not as widely used in the public sector in Australia. This may be due to differences in funding or due to protection of a physiotherapy role. In both Epworth Health Care in Melbourne and St Andrews War Memorial Hospital in Brisbane (both private hospitals), exercise physiologists are used to complement physiotherapy and enable increased therapy input developing and progressing exercise programs with physiotherapy input when required.

## Innovative ways of accessing specialist services, Case study

### Echuca Regional Health Neuropsychology Telemedicine

Echuca Regional Health care is a public Hospital providing acute, emergency, primary care, aged care and community health. The hospital carries out thrombolysis, stroke patients are rehabilitated on a general rehabilitation ward. The care of stroke patients is co-ordinated by a passionate Stroke Care coordinator, Lauren Arthurson, a speech pathologist. Ms Arthurson has developed a tele-neuropsychology service in collaboration with Monash University to enable stroke patients to have neuropsychology input. Echuca Regional Hospital is not a specialist stroke unit and an onsite neuropsychologist is not available. A tele-medicine approach using a computer based communication system which allows the patient and the neuropsychologist to see and speak to each other has been developed. This innovation allows joint therapy and neuropsychology intervention to address any rehabilitation issues that may be affected by mood. The rehabilitation allied health professionals, assistants and all ward staff receive remote training in neuropsychology to promote understanding of the effect of the patient's mood and mental wellbeing and to identify and respond to this appropriately.

A Canadian study looking at ninety-six stroke patients two to three years post stroke to assess cognitive impairment, depressive symptoms and social restrictions identified that more than half of the stroke patients with excellent functional recovery continued to have cognitive impairment and reduced participation and one third of patients suffered from depression two to three years post stroke (Kapoor et al 2017). Access to neuropsychology within a community based programme may be beneficial in longer term stroke survivors to address falls issues and understand and enable them to overcome barriers to physical activity.

The use of tele-medicine allows patients to access specialist services in locations that might otherwise not be able to recruit or have the capacity for specialist input. This enables the patients' needs to be met in an innovative and time effective way.

### On line support services and technology

The Stroke Line Service is a phone line staffed by Allied Health Professionals and run by the Stroke Foundation in Australia. It is open to any caller and provides a confidential and anonymous service. The service provides support to stroke survivors, carers, relatives and the public and provides information and signposts to services. The service is supplemented by final year University students studying Social work have a three-month placement responding to queries from The Stroke Line. This enables the service to respond to demand and introduces and provides training in stroke tele-service.

The Stroke Line service runs alongside Enable Me, a free online resource dedicated to stroke recovery and support. The emphasis when developing the online resource was an interactive, accessible and easy to use online resource for stroke survivors, carers, family and supporters. The

service provides peer support through interactive chats and group chats and promotes education through a variety of podcasts, and fact sheets. The UK Stroke Association has a Talk Stroke online resource however they do not respond to postings or answer questions through the site whereas the site run by the Stroke Foundation will interact with the online postings if a response to a query is requested. The site has a simple format with the added feature of site-specific arrangements for people with aphasia and visual deficits.

Social media, the internet and apps such as my therapy (<https://www.my-therapy.co.uk>) a resource developed by Northern Devon Health care NHS may be able to provide on line support and interventions that are accessible by stroke survivors and allow access to self-directed therapy.

The use of online resources could also be used by health care professionals to access information and support. The Inform Me is a relatively new free online resource through The Stroke Foundation and is a resource for Healthcare professionals working within stroke services providing a platform for communication between healthcare workers and exchange of ideas.

The active and healthy (<http://www.activeandhealthy.nsw.gov.au>, accessed 16/9/17) website for New South Wales (NSW) is a site designed to provide information for older adults to access physical activity programs and falls prevention information to aid in reducing their risk of falling. It provides information for health care professionals on falls information, events and training. The Get Healthy Information and Coaching (<http://www.gethealthynsw.com.au>, accessed on 16/9/17) by NSW Health provides Health coaching services and information. Inspirational client stories enable clients to access services to help them to make health lifestyle changes. The Make Health Normal website <https://www.makehealthynormal.nsw.gov.au>, accessed on 16/9/17) run by NSW Health promotes family health and changes in lifestyle.

Lack of awareness of tele and online service among healthcare care professionals and potential service users' needs to be considered. To tackle this problem direct communication with healthcare providers and provision of in-service training may increase awareness of media services available and information communicated to stroke survivors, families and carers.

Many GP surgeries, Hospital waiting rooms, wards, council services, leisure and community services in the UK have television monitors. Publicity relating to online services promoting healthy life styles, falls prevention programmes and exercise programmes could potentially increase awareness in the UK.

## Conclusions

While visiting various hospital sites there was a strong culture of service improvement and intervention evaluation in a clinical setting. Therapists were also supported and encouraged to carry out research into physiotherapy interventions. This enables development of therapy interventions that are evidence based and aids the transition of research into practice. Never2old (exercise provider in Auckland) and Healthy Connections (an exercise provider in Brisbane) both focus on promoting and enabling people to meet their physical activity goals in a safe and fun environment. The tailored exercise programmes enable individuals to achieve goals. Healthy connections at Burnie Brae and Never2old have University links and provide University placements for exercise physiologists and physiotherapy students respectively. The Never2old service has access to qualified exercise physiologists, physiotherapists and University facilities and has a collaborative working ethos. Healthy Connections has close links to the University of Queensland in Brisbane and is actively involved in research projects, with an Exercise Physiologist Researcher who works on community research projects to identify and evaluate interventions to promote physical health. This collaborative approach with the University of Queensland enables the centre to translate research into practice and encourages staff to develop the service in response to evidence based practice.

In both Mercy Parkland Hospital and Echuca Regional Health the clear themes of an Institution wide awareness of falls prevention was prevalent. The use of regular audits and feed back to staff and praise at reducing falls was also evident. The identification of falls themes and quick responses to address this, identification of training needs and multidisciplinary team input, were all key components in reducing falls in an inpatient environment.

The development of University run clinics and classes and placements in community settings may be a way for physiotherapy, exercise physiology and sports science students to gain clinical experience and a greater understanding of the challenges faced by stroke survivors in the community and improve falls awareness. Experience gained could equip exercise physiology and sports science students with the ability to understand the needs of a stroke population long term and develop exercises programmes accordingly in community run exercise programmes.

Circuit based classes in rehabilitation in addition to conventional rehabilitation appear to be a safe way of increasing therapy input in an inpatient and community environment in conjunction with one to one physiotherapy. There is a low quality of evidence that no adverse events are associated with circuit class therapy. Moderate quality evidence suggests that circuit class therapy provides a clinically important benefit in mobility for people after stroke (English et al 2017). Circuit based exercise classes appear to be successfully used in an inpatient environment and community setting in Australia. Aerobic training should be considered in in-patient and community rehabilitation in mild to moderate stroke survivors who have a low cardiovascular risk. To enable stroke survivors to increase physical activity levels, services need to employ intelligent practices

and promote patient therapist collaboration. Patients need be encouraged to work outside of therapy and develop ways of embedding safe long term behavioural changes into the life of patients.

The rehabilitation process is a lifelong continual process. There is a need to identify appropriate services already available to enable a joined up service and collaboration between stroke services and existing community projects and initiatives to provide long term access for stroke survivors to maintain clinical gains from rehabilitation.

Currently there is no single approach that is shown to reduce the risk of falls in stroke survivors. There is a need to evaluate interventions for falls prevention. Falls awareness and education should be implemented in an inpatient environment and continued in the community. The LiFE program may be an appropriate frame work and falls programme for integration into community stroke rehabilitation. This approach needs to be validated in a community stroke rehabilitation setting. Training HCA's, family members or care givers to deliver appropriate exercises in stroke survivors who are not appropriate for community falls programmes or exercise classes could be implemented as a long term approach to maintain safe mobility/transfers and physical activity. Physiotherapists are ideally qualified to engage with community and sports and exercise providers to provide exercise options for stroke survivors in the community and should be key workers in preventative health initiatives. A collaborative approach between health care providers and community exercise providers may enable stroke individuals to remain mobile within the community and participate in social and community activities. The medical system, social care and community providers need to be actively working together with a long term vision of a healthy and active population regardless of disability.

Implementing falls programmes such as The Stepping on Programme in the community could provide a structured falls programme. Falls programmes need to engage individuals to make long term changes to daily life and incorporate safe activities that maintain lower limb strength and balance and see a positive functional difference in everyday life. A multidimensional approach to falls which includes health coaching and behavioural changes should be considered to enable long term activity changes. In Australia there appears to be a widespread promotion of physical activity with Brisbane city promoting a healthy and active city, to encourage an active lifestyle.

Preventative strategies should be put in place to educate and increase awareness to promote physical activity and access to exercises in order to maintain strength and balance in a younger population in everyday life.

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- XXXVIII. Thomas S, Mackintosh S and Halbert J (2010) Dose the 'Otago exercise programme' reduce mortality and falls in older adults?: A systematic review and meta analysis. *Age and Ageing.* 39 (6) 681-7.
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- XLI. Wevers L, van de Port I, Vermue M, Mead G, Kwakkel G (2009) Effects of task-oriented circuit class training on walking competency after stroke: a systematic review. *Stroke.* 40 (7). 2450-9
- XLII. Weerdesteyn V, de Niet. M, van Duijnhoven HJ. R., Geurts A.C. H., Falls in individuals with stroke (2008) *Journal of rehabilitation research and development.* 45 (8). 1195-1214.

## Appendices

### WCMT itinerary

<b>Key contact</b>	<b>Organisation visited</b>
<b>Katherine David</b>	Stroke Foundation
<b>Lauren Arthurson</b>	Echuca Regional Health
<b>Alison Hocking</b>	Peninsula Health
<b>Dr Karen Borshmann</b>	Florey Institute for Neuroscience and Mental Health
<b>Associate Professor Gavin Williams</b>	Epworth Health
<b>Praveen Multini</b>	Warrabee Hospital Mercy Health
<b>Professor Roberta Shepherd</b>	Sydney University
<b>Professor Lindy Clemson</b>	Sydney University
<b>Professor Cathie Sherrington</b>	Sydney University
<b>Amy Tan</b>	Sydney University
<b>Daniel Tracey Prince of Wales Physiotherapy lead</b>	Prince of Wales Hospital, Sydney
<b>Megan Swann, Co-developer of Stepping On</b>	Prince of Wales Hospital, Stepping on Project Sydney
<b>Simone Dorsch Senior Physiotherapist</b>	Burnwood Hospital, Sydney
<b>Professor Cath Dean</b>	Deputy Dean Health Professions Macquarie University
<b>Phillipa Batts and Dave Hoskins</b>	Never2old Programme at Auckland University of Technology
<b>Helen Delmonte Operations Manager</b>	Mercy Parklands Hospital, Auckland
<b>Matt Breakspear, Rehabilitation Lead</b>	St Andrews War Memorial Hospital, Brisbane
<b>Ellen Gibson Lead Physio of the OTAGO program and Thomas Mackel Advanced Allied Health Assistant.</b>	Nambour Community Health Centre, Sunshine Coast Wide Bay Health Service (southern cluster)
<b>Karen Stewart Smith</b>	Health Connections, Bernie Brae centre, Brisbane
<b>Dr Martin Sale</b>	Physiotherapy School of Health and Rehabilitation Sciences, University of Queensland, Brisbane.

<b>Balance</b>	<b>Mobility</b>	<b>Falls</b>	<b>Assessment of Exercise preference</b>	<b>Frailty measures</b>
Balance outcome Measure for Elder rehabilitation (BOOMER)	Functional Instrument Motor Score (FIM)	Falls risk for older people in the community (FROP-COM)	Stroke Exercise Preference Inventory-13	Gereontopole Frailty Screening tool
4 Square step test	10 meter walk test (tests gait speed only)	Modified Falls efficiency Scale (functional outcome measure)		Cardiovascular Health Study Frailty Screening Scale
	De Morton Mobility Scale (DEMMI)			FRAIL Questionnaire Screening tool
	Timed up and go			

Table 1) Outcome measures and assessment tools

Program name and Provider	Criteria	Duration	Exercise component	Educational services	Centres where it is delivered	Referral on to community excise	cost
Make a Move Echuca Regional Health, Victoria	over 65's who have had a fall	12 weeks, one hour once weekly	Combination of balance strength, stretches and visual exercises	OT, Continence nurse, Physiotherapist	Hospital based Physio led	Yes various community and council providers	Yes nominal cost
Bright and Active, Austin Health, Victoria	over 65 who have had a fall	11 weeks once weekly with 3-4 month review	Exercises based on the OTAGO programme strength and balance. Teach how to get on and off the floor, Outdoor mobility	Social worker continence, exercise and safe footwear, pelvic floor exercise, diet, Medication, energy conservation , group discussions	Hospital based Physio led	Yes Living longer living stronger- Exercise for the over 50's	\$5.40-2.70
Age Strong Mornington Peninsula Shire and Frankston City Council Victoria	Designed for an elderly population Referral from GP for Physiotherapist/ Exercise physiologist	long term program, twice weekly sessions	Strength and balance exercises	No	Community based over 17 sites combination of leisure centres and community centres	Long term exercise programs	\$5-6.50
Stepping on Program, New South Wales	Over 65 who have had a fall or fear of falling. Must be independently mobile with or without a walking stick. Exclusion dementia or neuromuscular conditions	7 weeks 2 hours per week with a 2 month booster session	Based on Otago exercise program. Combination and strength and balance exercises in sitting and standing	home hazard awareness, moving safely in the community, safe footwear, nutrition and bone health, vision, medication management, leg strength and balance exercises and getting up after a fall. given exercises booklet and exercise diary, Peer support and group discussions	Community and Hospital based	Prince of Wales (POW) hospital referral to 12 week exercise programme at POW	Free Funded by New South Wales Health

Program name and Provider	Criteria	Duration	Exercise component	Educational services	Centres where it is delivered	Referral on to community exercise	cost
Stay on your Feet Otago exercise program Sunshine Health	For individuals 80 years and over who have had a fall on the community with limited mobility	Initial assessment carried out by Physiotherapist and exercise component carried out by advanced allied health assistant initial visit carried out to implement exercises then 2 fortnightly weekly visits followed by a 6 week visit and a phone r/v at 6 months	Chair based exercises using the Otago exercise program of lower limb strength and balance exercises	No formal education talks, Referrals are made to appropriate services ie social, continue, OT	Delivered as home visits and telephone reviews	No	Funded by Queensland Health and implemented by Sunshine Health Service

Table 2) Exercise programs and falls prevention programs delivered in the states of Victoria, New South Wales and Queensland.

Web addresses

Dementia Foundation Australia

<https://www.dementiafoundation.org.au/introducing-spark-of-life/description>

Stroke Foundation Australia

<https://strokefoundation.org.au>

Website for Health care Professionals

<https://informme.org.au>

Website to support stroke survivors

<https://enableme.org.au>

Stroke Association UK

<https://www.stroke.org.uk>

Stepping on Project

<http://www.steppingon.com>

New South Wales Falls network

<http://fallsnetwork.neura.edu.au/blog/uncategorized/life-program-resources/>

Get Healthy Service New South Wales

<http://www.gethealthynsw.com.au>

Otago programme Stay On Your Feet Queensland

<https://www.health.qld.gov.au/stayonyourfeet/for-professionals/otago>

Never 2 Old Auckland

<http://www.aut.ac.nz/study-at-aut/study-areas/sport-and-recreation/aut-sport-and-fitness-centres/never2old>

Healthy Connections Burnie Brae Centre

<http://www.burniebrae.org.au/venues/healthy-connections/>

<http://m.youtube.com/watch?v=1ABz0FpCvO0>

<http://m.yputube.com/watch?v=26vwLnpvT28>

Age Strong Peninsula Health

<https://www.peninsulahealth.org.au/services/services-a-e/aged-care/agestrong/>

<http://www.armchairmedical.com/exercise-to-prevent-falls-case-study-2/>

iSOLVE project for Australian General Practitioners.<http://www.sydneynorthhealthnetwork.org.au/partnership/isolve-project>

<http://physiotherapyexercises.com>

[www.huruk.co.uk](http://www.huruk.co.uk)

<https://www.england.nhs.uk/personal-health-budgets/what-are-personal-health-budgets-phbs/>

