

Evaluation of the Northside Health Service District Falls Clinics Project

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Executive Summary

Issue addressed

Falls remain a major public health problem for adults aged 65 years and over in Queensland, particularly due to subsequent fall-related injury, morbidity and mortality. Falls clinics are an important component of the state-wide approach to falls prevention, providing multidisciplinary service to community-dwelling older adults who are at high-risk of experiencing falls and falls with injury. These clinics provide time-limited, falls-specific assessment and interventions to clients using evidence-based research to identify and treat modifiable falls risk factors, with the aim of reducing the risk of future falls.

The Northside Health Service District falls clinics project

The Patient Safety and Quality Improvement Service, formerly known as the Patient Safety Centre, provided funding to the Northside Health Service District (HSD) to establish one hospital-based falls clinic at The Prince Charles Hospital and two community-based falls clinics located in local community centres. All clients attending these clinics underwent a comprehensive multidisciplinary falls-risk assessment, including comprehensive falls history and a range of functional capacity measures based on the recommended Victorian Falls Clinics Minimum Data Set (MDS) (Hill & Black 2004). Following this assessment, clients were provided with advice, referrals and recommendations for further services and interventions, and reassessed at 6-monthly intervals.

Methods

Data were collected from the Northside HSD falls clinics between October 2007 and September 2009. This report examines the baseline demographics and MDS measures of attending clients, and the effectiveness of the falls clinic interventions on reducing falls and improving functional capacity. The adherence rates to the falls clinic recommendations were also examined. Furthermore, differences were examined between attendees and non-attendees of the follow-up visits.

Results

The hospital-based and community-based falls clinics were both effective in reducing the rate of falls and fall injuries among clients who returned for follow-up visits. In the hospital-based clinic, the rate of falling at the 6-month visit was reduced by 55% and

the rate of injurious falls was reduced by 38%. In the community-based clinics, the rate of falling at the 6-month visit was reduced by around 60% and the rate of injurious falls was reduced by over 70%. In addition, statistically significant improvements in functional capacity were found among clients who returned for follow-up visits. In the hospital-based clients, significant improvements were seen in dynamic balance (47%), falls self-efficacy (13%), walking speed (10%) and physical function (Frenchay Activities Index, 10%). Similarly, in the community-based clients, improvements were seen in dynamic balance (15%) and walking speed (14%), although the small sample size limited the extent to which significant improvements could be detected. Further research is required to promote greater adherence to falls clinic recommendations and reduce loss to follow-up of clients.

The project demonstrated that formal falls clinics can be successfully established in Queensland utilising existing health care services already providing services to the older population. Formalising these services into falls clinics enables the delivery of a specialised, evidenced-based falls-prevention service in a systematic and effective approach. Importantly, these clinics provide a vital service to which community healthcare providers can refer older adults at high risk of experiencing falls.

Conclusions

The Northside HSD falls clinics, established from existing services, provided an opportunity to deliver specialised, evidenced-based falls-prevention interventions to older adults at high-risk of falls, and was effective in reducing the rate of falls and improving the functional capacity of attending clients. The multi-factorial, multidisciplinary approach used in these clinics made a positive contribution to the health and well-being of older Queenslanders, by minimising their risk of falls and falls injury, and reducing the substantial burden of falls on the healthcare system.

Where to from here?

Falls clinics provide an essential falls prevention service to older Queenslanders, and should be established across Queensland, particularly areas where a high demand for these services exists. Queensland Health should continue to support the establishment of these clinics, given the evidence of their effectiveness in reducing risk of falls, by providing centralised support, education and resources. Furthermore, the services of falls clinics should be widely promoted to healthcare providers, particularly those who provide services to older adults at high risk of falls.

About this report

This report is presented to further our understanding of the effectiveness of falls clinics in reducing the rate of falls among older adults at high-risk of falling. In particular, the aim of this report is to assess the impact of the Northside Health Service District (HSD) falls clinics on the rate of falls and injury and functional capacity of attending clients. As such, the scope of this report is limited to the data obtained from the Northside HSD hospital-based and community-based falls clinics.

Report structure

This report includes a background section which summarises the problem of falls among older adults in Queensland. The sections that follow detail the establishment of the Northside HSD falls clinics, and reports on the effectiveness of these clinics in reducing falls risk and improving functional capacity of clients. The final sections summarises the key findings, lessons learnt, enablers and barriers, and recommendations arising from the project. A number of appendices are also included.

Potential users of this report

This evaluation report is intended to provide information to persons with an interest in community aged care services and falls prevention. This includes, but is not limited to, health care professionals, policy makers, managers and organisations at all levels of healthcare across Queensland. Information from this report will also provide valuable advice for the statewide planning of falls prevention in Queensland across the healthcare continuum.

SECTION 1

Background

1.1 The problem of falls among older adults

Falls remain a major public health problem for adults aged 65 years and over in Australia. Falls account for one fifth of fatal injuries – almost 2,900 Australians died due to unintentional falls in 2004-05, most of whom were older adults (Henley & Harrison 2009). Furthermore, 14,168 older Queenslanders were hospitalised due to fall-related injuries in 2008-09, which equates to a rate of 2,691 per 100,000 population. The direct costs of these fall-related hospitalisation in Queensland was estimated to be \$118.9 million, and are likely to double by 2015 unless substantial attempts are made to reduce the risk of falls among older adults (Black & Begg 2010). This is an important issue for Queensland, given the growth of our ageing population.

Falls are seldom due to a single cause, and epidemiological studies in community-dwelling older adults have identified many contributing factors. These studies are essential in guiding effective interventions to identify and target modifiable falls risk factors to prevent future falls. Examples of falls risk factors include socio-demographic factors (age, female gender, living alone); physiological or functional factors (balance impairment, muscle weakness, physical inactivity); medical risk factors (Parkinson's disease, stroke, depression, cognitive impairment and arthritis); medication factors (central nervous system agents, polypharmacy); and environmental factors (footwear, lighting, trip hazards) (Close 2001, Lord *et al.* 2007, Moylan & Binder 2007, Tinetti *et al.* 1988).

1.2 Falls clinics

Falls clinics are an important component of a community-wide approach to falls prevention. Falls risk among older adults varies along the spectrum of physical function, from those who are healthy and active, through to those with high level of frailty, multiple co-morbidities, and at high risk of falls and injury. Falls clinics can be hospital or community-based, and are designed to target the frailer end of the falls risk spectrum, particularly for those where a falls prevention management plan has

not been developed. The purpose of falls clinics is to identify and treat modifiable falls risk factors to reduce risk of falls, using current evidence-based research.

Falls clinics are multidisciplinary services that focus on the assessment and management of clients with falls, mobility and balance problems. These clinics provide time-limited, specialist intervention, as well as advice and referral to mainstream services for additional management. An important component of these clinics is the provision of training to clients, carers and health professionals. Hospital falls clinics are designed to target high risk populations, and comprise of specialist medical, nursing and allied-health disciplines which provide individualised assessment, interventions and referrals for clients. Community falls clinics tend to target more highly functioning older populations, and are designed to provide more generalised exercise, education and access to community allied-health services.

The effectiveness of falls clinics in reducing falls and injury among high-risk older adults have been recently evaluated, using the Victorian Minimum Data Set (MDS) proposed by the National Ageing Research Institute (NARI) (Hill & Black 2004). This MDS was developed from the considerable diversity of evidence-based outcome measures available for use in older and frailer populations. Measures included in the MDS include history of falls and falls injury, and measures of physical function, balance, mobility, leg strength, falls self-efficacy and medications use.

The use of MDS allows for the systematic analysis of falls and functional capacity outcomes in falls clinics, and provides evidence of substantial benefits of falls clinics as a falls prevention intervention. In an analysis of data collected by 13 Victorian outpatient falls clinics, Hill et al (2008) demonstrated that there was more than 50% reduction in falls, multiple falls and fall injuries in the 454 clients who attended these clinics. Furthermore, significant improvements were found for a number of functional capacity measures, including balance, leg strength, walking speed and falls confidence. The MDS remains widely used across Victorian falls clinics since its development. Details of the components of the MDS, which provides the basis for this present evaluation, are presented in Section 2.6.

1.3 Current status of falls clinics in Queensland

At the commencement of this project in 2007, districts throughout Queensland lacked a formalised co-ordinated falls prevention strategy for community-dwelling older adults at high-risk of falls. There was one formal falls clinics at the Princess Alexandra Hospital, which provided specialised falls prevention assessments, and there were a number of community-based programs focussed on falls prevention, including physical activity and education programs. However, no formal evaluation of the effectiveness of these services had been undertaken.

While many older adults at high-risk of falls are already in contact with hospital and community health care professionals for a range of reasons, falls clinics offer a systematic, effective and efficient approach to the diagnostic evaluation and risk minimisation of falls to prevent harm and maintain independence. While providing a specialised falls prevention services, these clinics accept referrals from hospital and community health care practitioners who lack the expertise or time to provide the required assistance. As an example, falls rates among older people following discharge from hospital after an injurious fall are high – 15% will fall at least once in the month after discharge home, and 11% will require re-admission to hospital (Mahoney *et al.* 1994).

To date, there has been limited research or evaluation into the effectiveness of the use of falls clinics in Queensland, nor any assessment of the organisational requirements in the establishment of these clinics, to guide future practice or policy directions for Queensland Health.

SECTION 2

The Northside HSD falls clinic project

2.1 Project development

This project was developed in response to concerns of Queensland Health about the rate of falls among community-dwelling older adults. These concerns were discussed, and the need to increase the capacity to deliver evidence-based falls prevention interventions to older adults to reduce their rate of falls and fall injuries, particularly high-risk groups, was identified. This chapter describes the establishment of falls clinics within the Northside Health Service District, which comprised of one hospital-based and two community-based falls clinics.

2.2 Project aims and outcomes

Aims

- To establish hospital and community-based falls clinics within the Northside HSD using existing services within the district.
- To deliver evidence-based falls assessment, advice and interventions to clients attending the clinics.

Objectives

- To reduce the rate of falls and fall injuries, and improve functional capacity, among older community-dwelling adults attending the falls clinics.
- To evaluate the impact of these falls clinics on functional capacity and the rate of falls and injury of attending clients.

2.3 Project location, funding and personnel

The first step was to identify locations in which to establish the clinics. Expressions of interest were sought from potential Health Service Districts (HSD). The Northside HSD was selected to participate in the project. It was decided that one clinic would be established at the Prince Charles hospital, and two clinics located in community centres within the Northside HSD.

The Patient Safety and Quality Improvement Service, formerly known as the Patient Safety Centre, provided approximately \$120,000 in funding to meet the labour and non-labour costs associated with the establishment of these clinics in the Northside HSD, led by a project officer whose role was to drive the development of the clinics in the selected locations.

2.4 The hospital-based falls clinic

The hospital-based falls clinic was established within the Rehabilitation Day Hospital of The Prince Charles Hospital, Brisbane. Its objectives were to:

- Provide individualised falls assessment and appropriate recommendations regarding interventions for clients;
- Provide referral to additional services, including exercise programs and to allied-health services;
- Obtain falls history and MDS outcome measures at baseline, 6- and 12-month visits.

Staffing of the clinic included a specialist geriatrician, nurse, physiotherapist and occupational therapist (OT). These positions were recruited from existing staff members working in the Day Hospital. Administrative support was provided by current staff of the Day Hospital.

The target client population for this clinic were high-risk older adults. Referrals were accepted from a range of sources, including community and hospital healthcare providers, and were reviewed by the nurse. Based on available information, clients were then listed for a falls clinic assessment and notified of the appointment time and description of clinic procedures, usually via letter. This initial information included a simple home environment survey which the patient and/or carer completed prior to the clinic visit.

The 3 hour clinic was conducted fortnightly, during which two new patients and two review patients were seen. At the appointment, the client initially saw the nurse, who collected basic background information and observations, recorded on a single assessment form completed by all disciplines. The physiotherapist and OT completed further assessments and outcome measures, followed by the geriatrician who completed the appropriate medical assessment. Each discipline spent around

30 minutes with the client. At the end of the visit, a team meeting (case conference) was held to outline the main issues and develop the management/intervention plan.

Referrals were made to existing services for any interventions. Clients requiring exercise programs were referred to the Day Hospital Physiotherapy balance classes, while those requiring home visits or other allied-health services were referred to existing community services. Clients returned to the clinic for a 6 month assessment, or sooner if needed, and again at 12 months.

2.5 The community-based falls clinics

Two community-based falls clinics were established at the Chermside and Redcliffe community centres. Their objectives were to:

- Provide education, health promotion and exercise programs to clients in a supportive group environment;
- Provide individualised community based interventions as required, such as home safety assessments and mobility aid assessments;
- Obtain falls history and MDS outcome measures at baseline, at the completion of the 6-week program, and at a 6-month follow-up.

Staffing of these clinics included a physiotherapist, occupational therapist (OT) and nurse. Staff were recruited from existing positions within the district. Staff were also engaged in continuing education and professional development activities to maintain their knowledge of evidence-based best practice for falls prevention.

The target client population for this clinic were high-risk older adults who were independently ambulant, although possibly restricted. They were likely to have experienced falls in the previous 12 months or a number of slips, trips or near misses. The selection criteria for inclusion into the program were decided by the clinic team. Compared to the hospital-based falls clinic, these clients were likely to be 'lower-risk' patients with less complex issues, due to safety issues and access to appropriate investigative and treatment options. Referrals were accepted from a range of sources, including local general practitioners, allied-health professionals and hospital outpatient clinics. Reports were provided to the referring source following the initial and final clinic assessments to communicate the falls prevention strategies and plans.

Clients underwent a two-hour initial assessment with the physiotherapist, OT and nurse, which included the baseline MDS assessment. Following this, clients returned to participate in a 6-week program, which comprised of:

- Weekly one-hour exercise sessions led by the physiotherapist, primarily in a circuit class format, comprising weight-bearing strengthening, balance and mobility exercises.
- Weekly education sessions and discussions led by the physiotherapist, OT or nurse. External health care professionals, for example pharmacists, podiatrists and dietitians, also provided education sessions, depending on availability.
- Each 6-week program comprised around 6 to 8 clients per class, based on staffing and space limitations.

Individual or domiciliary interventions were also provided to clients according to identified needs. In addition, a home medication review, funded by the Commonwealth Government, was recommended for selected clients. Follow-up visits were conducted at the completion of the 6-week program, and again at a 6-month follow-up visit.

2.6 Falls clinic measures

Baseline clinic measures

A number of measures were undertaken at the baseline assessment. These measures included:

- Source of referral
- Reasons for referral
- Current living arrangement
- Use of community services
- Risk factor assessment: medical, psychological, motor function and environment
- Cognitive assessment: using either the Mini-mental State Examination (MMSE) or RUDAS score.
- Height and weight
- Nutritional assessment: using the Malnutrition Screening Tool (MST)
- Recommendations provided following baseline assessment

Falls clinic: Minimum Data Set

The Victorian Falls Clinics Minimum Data Set (MDS) proposed by Hill and Black (2004) was used to evaluate the effectiveness of these falls clinics. The dataset comprises the following sets of measures:

Self-reported falls and fall injuries in the previous 6-months. This includes the number of falls, number of falls resulting in injury, number of falls which resulted in clients seeking medical attention or going to hospital, and nature of any injuries sustained as a result of these falls.

Physical function assessment – Modified Barthel Index (MBI) and Frenchay Activities Index (FAI). The MBI established degree of independence, by rating the ability to perform basic self-care activities, such as bathing, feeding and toileting. The MBI score ranges from 0 (totally dependent) to 100 (fully independent). The FAI rated the frequency with which clients perform domestic and community activities in the previous 6 months, such as housework, social outing and hobby activities. The FAI scores range from 0 to 45, with higher scores indicating higher activity levels.

Dynamic standing balance – step test. Clients stood in front of a step and were instructed to place their whole foot onto the step and return it to the ground. The number of steps in fifteen seconds is recorded and the result for the worst leg is used.

Mobility assessment – Timed Up and Go Test (TUGT). Clients were timed as they rose from a chair, walked three metres, turned around and returned to sit in the chair.

Leg muscle strength – chair stands. The time taken to perform three "stand up and sit down" from a chair was recorded.

Walking speed assessment. The time taken to walk the middle ten metres of a fourteen metre pathway at a self-selected comfortable speed was recorded.

Falls self-efficacy – Modified Falls Efficacy Scale (MFES). Clients rated their confidence in performing 14 functional activities (from 0 to 10). Higher scores indicate greater self-efficacy and confidence, ranging from 0 to 10.

Number of prescription medication. The total number was recorded.

Postural hypotension. Postural hypertension was defined if a drop of systolic blood pressure of 20mmHg or more occurred from lying to standing position after 3 minutes.

Additional follow-up measures

A number of additional measures were included in the follow-up assessment. This included the level of compliance with baseline recommendations, and an adherence score, calculated using the following formula (Hill *et al.* 2008):

$$\text{Adherence score} = \frac{[1 \times \text{number of recommendations fully adhered to}] + [0.5 \times \text{number of recommendations partially adhered to}] + [0 \times \text{number of recommendations not adhered to}]}{\text{Total number of recommendations}}$$

2.7 Evaluation methodology

The project evaluation examines changes in the MDS measures at follow-up visits compared to baseline. It also examines differences between the follow-up attendees and non-attendees, and differences between clients attending the hospital and community clinics. The scope of the evaluation is limited to the data collected from the hospital and community Northside HSD falls clinics up to late September 2009.

Statistical analyses

Descriptive statistical analyses using means and proportions were performed to characterize the baseline demographic, referral and risk factor characteristics of the clients attending the clinics. The evaluation of follow-up measures was based on a pre-post study design, using data collected at the baseline and follow-up visits. Data were analysed using SPSS (version 16.0) and p-values less than 0.05 were considered statistically significant.

Baseline and follow-up comparisons for the MDS outcome measures were made using paired t-tests (for normally distributed continuous measures), paired Wilcoxon Sign Rank tests (for non-normally distributed continuous measures), and McNemars test (for dichotomous measures).

Generalised estimating equations (GEE) were used to analyse the fall outcomes:

- Using a log link function and binomial distribution for dichotomous falls outcomes. Odds ratios (OR) were obtained by exponentiation of the estimated regression coefficients and 95% confidence intervals were calculated.
- Using a log link function and negative binomial distribution for count of fall outcomes. Incident rate ratios (IRR) were obtained by exponentiation of the estimated regression coefficients and 95% confidence intervals were calculated.

To examine potential reasons for non-attendance at follow-up visits, comparisons were made between clients who attended the follow-up visits and those who did not. These comparisons were made using independent t-tests (for normally distributed continuous measures), Mann-Whitney U tests (for non-normally distributed continuous measures), and chi-squared test (for dichotomous measures). Similarly, differences in characteristics of clients attending the hospital and community clinics were examined.

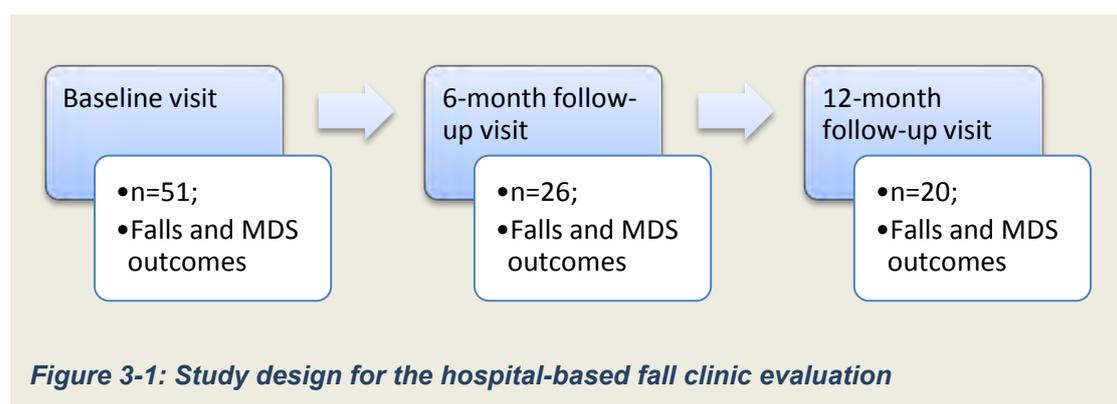
SECTION 3

The Northside HSD hospital-based falls clinic

Data were collected on clients attending the Northside HSD falls clinic located at The Prince Charles Day Hospital during the period from October 2007 and September 2009. This section reports on the baseline data collected on clients attending this clinic, and evaluates the clinic's effectiveness in reducing falls and falls injury, and improving functional capacity measures.

3.1 Evaluation methodology

The evaluation was based on a pre-post study design, using data collected at the baseline and follow-up visits (6-month and 12-month) (see Figure 3-1). The statistical methodology is outlined in Section 2.7.



3.2 Baseline demographics characteristics

The demographic characteristics of clients (n=52) attending the hospital-based falls clinic are presented in Table 3-1. The mean age of clients attending was 77.3 ± 8.6 years, and 73% were female. The majority of clients lived with others (60%) or alone (35%), had a resident carer (62%) or non-resident carer (33%), and accessed 1.2 ± 1.4 community services (range 0–5). The most frequently accessed community services were home care (40%) and personal alarms (23%).

Table 3-1: Demographics characteristics of clients attending the hospital-based falls clinic (n=52)

Baseline characteristics			
Age, years		Community Services accessed, n (%)	
mean ± sd	77.3 ± 8.6	Meals on Wheels	5 (9.6)
range	49 - 89	Home care (domestic tasks)	21 (40.4)
≥ 65, n (%)	48 (92.3)	Personal care	3 (5.8)
≥ 85, n (%)	8 (15.4)	Community Nurse	4 (7.7)
Gender, n (%)		Home maintenance	4 (7.7)
Male	14 (26.9)	Planned activity / day centre group	3 (5.8)
Female	38 (73.1)	Community health centre	2 (3.8)
Reason for Referral, n (%)		Respite	5 (9.6)
History of falls	41 (78.8)	Personal alarm	12 (23.1)
Gait disorder	21 (40.4)	Package (eg EACH, transition)	0 (0)
Syncope	2 (3.8)	Community based rehab	1 (1.9)
Dizziness	6 (11.5)	No. of community services accessed, count	
Balance disorder	2 (3.8)	Mean ± sd	1.2 ± 1.4
Referral source, n (%)		Median (range)	1 (0 - 5)
Local medical officer, e.g. GP	18 (34.6)	Living Arrangements, n (%)	
Hospital inpatient departments	12 (23.1)	Alone	18 (34.6)
Hospital outpatient departments	7 (13.5)	With others	31 (59.6)
Hospital emergency departments	3 (5.8)	Residential Aged Care Facility	0 (0)
Medical specialists	7 (13.5)	Other	2 (3.8)
Other	5 (9.6)	Not specified	1 (1.9)
Care support, n (%)			
No carer	1 (1.9)		
Resident carer	32 (61.5)		
Non-resident carer	17 (32.7)		
Not specified	2 (3.8)		

3.3 Baseline risk factors, history of falls and MDS measures

On average, clients had 7.4 ± 3.2 fall risk factors identified (range 0-15), predominantly medical and motor function risk factors (Table 3-2). The most common risk factors for falls identified were impaired balance (81%); unsteady gait (67%); polypharmacy (>4 medications; 62%); medications associated with increased falls risk (56%); muscle weakness or deconditioning (56%); reduced physical activity (50%); osteoporosis (46%); and chronic medical conditions such as stroke or Parkinson's' disease (44%).

Table 3-2: Baseline falls risk factors of clients attending the hospital-based falls clinic (n=52)

Baseline risk factors			
Medical risk factors, count		Psychological risk factors, count	
Mean ± sd	3.35 ± 1.79	Mean ± sd	0.56 ± 0.67
Median (range)	3.5 (0 - 8)	Median (range)	0 (0 - 2)
Motor function risk factors, count		Environmental risk factors, count	
Mean ± sd	2.88 ± 1.63	Mean ± sd	0.58 ± 0.72
Median (range)	2.5 (0 - 5)	Median (range)	0 (0 - 2)
Total risk factors, count			
Mean ± sd	7.37 ± 3.23		
Median (range)	7 (0 - 15)		

Seventy-five percent of clients reported at least one fall in the 6 months preceding the visit (Table 3-3). Furthermore, 49% experienced multiple falls, 61% experienced injurious falls and 57% required medical attention following a fall. In total, 120 falls (mean 2.35 ± 2.5, range 0-12), and 56 injurious falls (mean 1.08 ± 1.3, range 0-6) were reported in the 6 months preceding the visit. In addition, the baseline MDS scores are present in Table 3-3.

Table 3-3: Baseline falls and MDS measures of clients attending the hospital-based falls clinic (n=52)

Falls history		MDS baseline measures		mean ± sd
Number of clients falling, n (%)	38 (74.5)	RUDAS score (range 0-30)		25.7 ± 3.2
Number of clients falling more than once, n (%)	25 (49)	Body mass index		27.1 ± 6.6
No. of falls		Malnutrition screening tool (range 0-8)		1.29 ± 1.6
Mean ± sd	2.35 ± 2.51	Modified Barthel Index (range 0-100)		90.8 ± 8.3
Median (range)	1 (0 - 12)	Frenchay Activities Index (range 0-45)		25.8 ± 9.5
Number of clients experiencing fall injuries, n (%)	31 (60.8)	Timed Up and Go Test (sec)		14.7 ± 5.1
No. of fall injuries		Step test, worse leg (count)		7.06 ± 4.1
Mean ± sd	1.08 ± 1.28	Leg strength, stand to sit test (secs)		10.9 ± 4.5
Median (range)	1 (0 - 6)	Walking speed, 10 metres (m/min)		54.8 ± 17
No. of clients seeking medical attention due to falls, n (%)	29 (56.9)	Modified falls efficacy scale (range 0 - 10)		7.77 ± 2.1
		Prescription medications, count		7.76 ± 4.7
		Postural hypertension at 3 minutes, n (%)	15 (29.4)	

3.4 Recommendations

On average, the hospital-based falls clinic recommended 4.2 ± 2.8 new interventions (range 0-15) per client (Table 3-4). The most commonly recommended interventions were exercise interventions (balance class (62%) and home program – combo (14%)), medical interventions (investigation of health problems (31%) and osteoporosis treatment (29%)), environmental interventions (home visits (23%), and other interventions (podiatry assessment (35%) and driving assessment (31%)). A range of additional interventions were recommended, although these were less common (<10% of clients).

Table 3-4: Recommendations to clients attending the hospital-based falls clinic (n=52)

	n	(%)		n	(%)
Review outside 6 and 12 month follow-up	18	(34.6)	Community Services		
Medical			Food services	2	(3.8)
Medical specialist	7	(13.5)	Home care	3	(5.8)
Investigations/treatment of health problems	16	(30.8)	Community Nurse	2	(3.8)
Medication reduction	5	(9.6)	Home maintenance/gardening	5	(9.6)
Osteoporosis meds and/or Vit D supplement	15	(28.8)	Respite care	2	(3.8)
Inpatient admission	1	(1.9)	Personal care	0	(0)
Other - specify	2	(3.8)	Package (eg EACH/CAPS)	0	(0)
Exercise			Planned activity group / day centre	0	(0)
Balance class	32	(61.5)	CBRT / Community Health Centre	1	(1.9)
Home program - Balance	5	(9.6)	Other rehab - specify	0	(0)
Home program - Strength	5	(9.6)	Other		
Home program - Combo	7	(13.5)	Other specialist clinics	0	(0)
Vestibular rehab - repos.	1	(1.9)	Behaviour modification	5	(9.6)
Vestibular rehab - desensitising	0	(0)	Foot care/podiatry	18	(34.6)
Vestibular rehab - gaze stability	0	(0)	Social work review	5	(9.6)
Tai chi	0	(0)	Vision Ax/Mx	1	(1.9)
Hydrotherapy	0	(0)	Relaxation	3	(5.8)
Environment			Clinical psychology	0	(0)
Home visit	12	(23.1)	Neuropsychology	5	(9.6)
Home aids/mods	7	(13.5)	Dietician	1	(1.9)
Footwear change	1	(1.9)	Driving Assessment	16	(30.8)
Gait aid change/adjustment	1	(1.9)	Other - specify	0	(0)
Personal alarm	9	(17.3)			
Recommendations made, count					
mean \pm sd	4.15	\pm 2.84			
median (range)	4	(0 - 15)			

3.5 MDS and fall outcomes: 6-month follow-up visit

Clients attending the 6 month follow-up visit (n=26, Table 3-5) showed significant improvements in a number of MDS outcomes. Significant improvements were found for a number of measures, as shown in Figure 3-2: dynamic balance (47%), falls self-efficacy (13%), walking speed (10%) and physical function (Frenchay Activities Index, 10%). There were no significant changes in the other MDS outcomes.

Table 3-5: MDS outcomes at baseline and 6 month follow-up visit (n=26)

	N	Baseline visit	Six-month visit	Improvement		P-value
		Mean ± sd	Mean ± sd	Unit	%	
Physical function						
Modified Barthel Index	26	89.77 ± 7.8	91.08 ± 7.76	1.31	1.5%	0.209 ^b
Frenchay Activities Index	26	26.77 ± 10.24	29.46 ± 6.88	2.69	10.0%	0.024 ^a
Dynamic standing balance						
Step test (count)	25	5.84 ± 4.07	8.6 ± 3.79	2.76	47.3%	0.001 ^a
Mobility						
Timed up and go test (sec)	25	14.96 ± 4.69	14.61 ± 7.42	0.35	2.3%	0.763 ^a
Leg muscle strength						
Stand-sit test (sec)	25	11.33 ± 4.41	10.36 ± 4.83	-0.97	-8.6%	0.284 ^a
Walking speed						
10-m walk test (m/min)	25	50.49 ± 13.29	55.86 ± 16.41	5.37	10.6%	0.008 ^a
Falls self-efficacy						
Modified Falls Efficacy Scale	26	7.45 ± 2.36	8.45 ± 1.54	1.00	13.4%	0.003 ^b
Medication use						
Number of prescription medications	26	6.96 ± 4.2	7.38 ± 4.09	0.42	6.0%	0.541 ^b
Postural hypotension						
Present at 3 minutes, n (%)	26	8 (30.8)	4 (15.4)	4	15.4%	0.220 ^c

a. Paired t-test

b. Paired Wilcoxon Signed Ranks Test

c. McNemar test

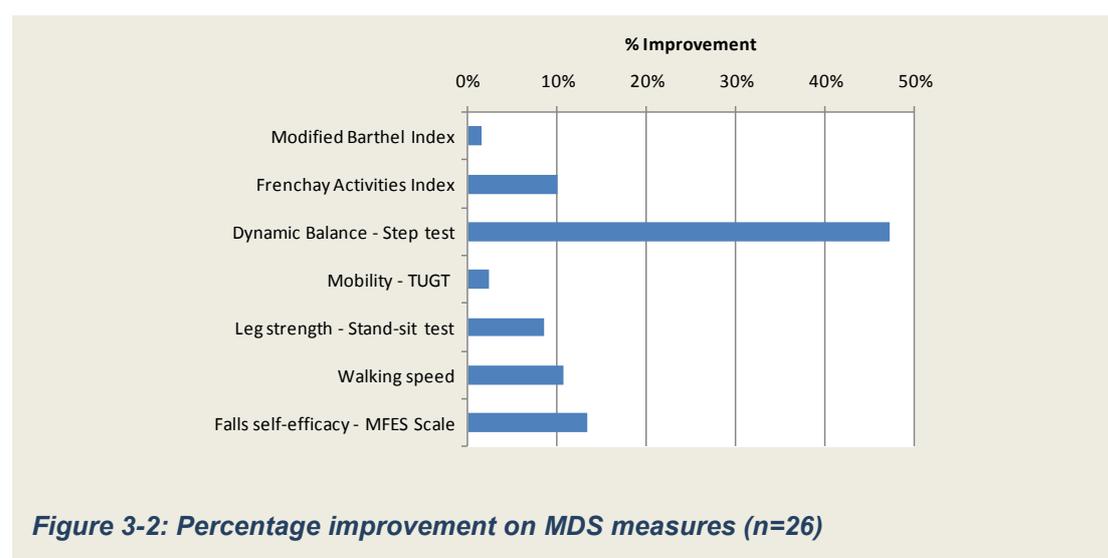


Figure 3-2: Percentage improvement on MDS measures (n=26)

Table 3-6 reports the fall outcomes for the 26 clients attending the 6 month follow-up visit. At this visit, clients were less likely to experience any fall in the previous 6 months (68% reduction; odds ratio 0.32) or any injurious fall (61% reduction; odds ratio 0.39). Although clients were less likely to experience multiple falls in the previous 6 months, this did not reach statistical significance. Importantly, the clinic visit significantly lowered the rate of reported falls and injurious falls, by 55% and 38% respectively.

Table 3-6: Fall outcomes at baseline and 6 month follow-up visit (n=26)

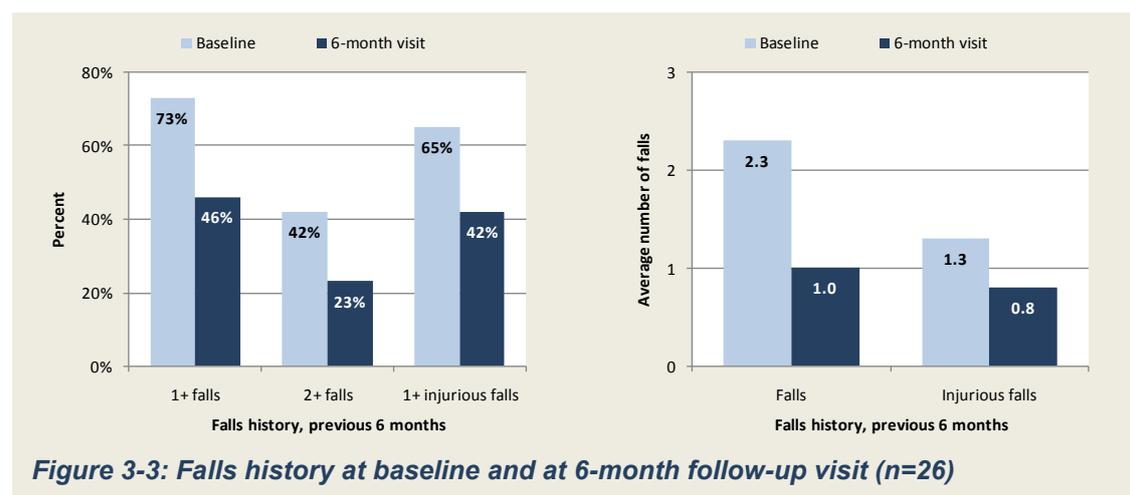
Outcome measure	Baseline	6-month follow-up	Odds Ratio (95% CI) ^a	P-value
Any fall, n (%)				
	19 (73)	12 (46)	0.32 (0.11 - 0.88)	0.028
Any multiple fall, n (%)				
	11 (42)	6 (23)	0.41 (0.15 - 1.14)	0.088
Any injurious fall, n (%)				
	17 (65)	11 (42)	0.39 (0.15 - 1.00)	0.049

Outcome measure	Baseline	6-month follow-up	Incidence Rate Ratio (95% CI) ^b	P-value
Number of falls, mean ± sd				
	2.31 ± 2.83	1.04 ± 1.68	0.45 (0.27 - 0.74)	0.002
Number of injurious falls, mean ± sd				
	1.31 ± 1.44	0.81 ± 1.36	0.62 (0.38 - 1.01)	0.056

a. Generalised Estimating Equations with logit link and binomial distribution

b. Generalised Estimating Equations with log link and negative binomial distribution

CI = confidence interval



3.6 MDS and falls outcomes: 12-month follow-up visit

Clients attending the 12-month follow-up visit (n=20, Table 3-7) showed significant improvements in several MDS outcomes. There were significant improvements in dynamic balance (37%) and walking speed (12%). While there were improvements found in the other MDS outcomes, these were not significant, and may be due to the small sample size.

Table 3-7: MDS outcomes at baseline and 12 month follow-up visit (n=20)

	N	Baseline visit	Six-month visit	Improvement		
		Mean ± sd	Mean ± sd	Unit	%	P-value
Physical function						
Modified Barthel Index	20	89 ± 8.26	89.4 ± 8.91	0.40	0.4%	0.702 ^b
Frenchay Activities Index	20	26 ± 11.46	29.45 ± 9.48	3.45	13.3%	0.077 ^a
Dynamic standing balance						
Step test (count)	20	6.6 ± 3.98	9.05 ± 4.91	2.45	37.1%	0.034 ^a
Mobility						
Timed up and go test (sec)	20	14.54 ± 4.67	13.14 ± 4.68	-1.40	-9.6%	0.102 ^a
Leg muscle strength						
Stand-sit test (sec)	20	11.08 ± 3.76	10.02 ± 3.41	-1.06	-9.6%	0.188 ^a
Walking speed						
10-m walk test (m/min)	20	52.75 ± 12.66	58.79 ± 16.03	6.04	11.5%	0.018 ^a
Falls self-efficacy						
Modified Falls Efficacy Scale	20	7.33 ± 2.42	7.98 ± 2.48	0.65	8.9%	0.073 ^b
Medication use						
Number of prescription medications	20	7.3 ± 3.76	7.55 ± 3.93	0.25	3.4%	0.541 ^b
Postural hypotension						
3-min postural hypotension present, n (%)	20	4 (20.0)	2 (10.0)	2	10.0%	0.625 ^c

a. Paired t-test

b. Paired Wilcoxon Signed Ranks Test

c. McNemar test

Table 3-8 reports the fall outcomes for the 20 clients attending the 12 month follow-up visit. Clients were less likely to experience any fall in the previous 6 months (65% reduction; odds ratio 0.35) or any injurious fall (82% reduction; odds ratio 0.18). Although clients were less likely to experience multiple falls in the previous 6 months, this did not reach statistical significance. Importantly, the clinic intervention significantly lowered the rate of reported falls and injurious falls, by 59% and 61% respectively.

Table 3-8: Fall outcomes at baseline and 12 month follow-up visit (n=20)

Outcome measure	Baseline	12-month follow-up	Odds Ratio (95% CI) ^a	P-value
Any fall, n (%)	14 (70)	9 (45)	0.35 (0.13 - 0.98)	0.046
Any multiple fall, n (%)	10 (50)	7 (35)	0.54 (0.19 - 1.54)	0.249
Any injurious fall, n (%)	14 (70)	6 (30)	0.18 (0.07 - 0.51)	0.001

Outcome measure	Baseline	12-month follow-up	Incidence Rate Ratio (95% CI) ^b	P-value
Number of falls, mean ± sd	2.2 ± 2.78	0.9 ± 1.17	0.41 (0.21 - 0.79)	0.007
Number of injurious falls, mean ± sd	1.4 ± 1.47	0.55 ± 1.05	0.39 (0.19 - 0.83)	0.014

a. Generalised Estimating Equations with logit link and binomial distribution

b. Generalised Estimating Equations with log link and negative binomial distribution

CI = confidence interval

3.7 Adherence to recommendations at 6-month follow-up

Of the 26 clients attending the 6-month follow-up, data on adherence to recommendations were available for 20 clients. There was high adherence to the recommended interventions: the mean adherence score was 84.4 ± 20.0% (median 90, range 0-100). Over 95% of clients scored 50% or higher on the adherence score.

3.8 Non-attendance at 6-month follow-up

On average, the majority of clients (65%; 26 of 40) who were eligible attended the 6-month follow-up visit. Reasons for non-attendance at the 6-month follow-up visit included withdrawal from the program (19%), poor health (12%), or other reasons (5%).

Compared to those attending the 6-month follow-up visit, non-attendees were older, although not significantly (Table 3-9). There were no significant differences between the two groups with respect to gender, number of risk factors, fall-related outcomes, number of recommendations made, cognitive status or body mass index.

Table 3-9: Baseline demographic, health, and fall-related characteristics of clients who did and did not attend 6 month follow-up visit at the hospital-based falls clinic

	Did attend (n=26)	Did not attend (n=14)	P-value
Age, mean ± sd	77.02 ± 8.3	79.05 ± 6.69	0.437 ^a
Female, n (%)	21 (80.77)	8 (57.14)	0.110 ^b
Number of risk factors, mean ± sd	7.5 ± 2.97	7.43 ± 2.79	0.941 ^a
Number of falls, mean ± sd	2.31 ± 2.83	1.86 ± 1.83	0.594 ^a
Clients falling, n (%)	19 (73.08)	10 (71.43)	0.911 ^b
Number of injurious falls, mean ± sd	1.31 ± 1.44	1.07 ± 1.14	0.599 ^a
Clients falling more than once, n (%)	17 (65.38)	9 (64.29)	0.945 ^b
Clients seeking medical attention after a fall, n (%)	17 (65.38)	7 (50)	0.343 ^b
Number of recommendations made, mean ± sd	4.65 ± 3.25	4.21 ± 2.26	0.655 ^a
Cognitive status (Rudas score), mean ± sd	26.04 ± 2.82	25.29 ± 4.23	0.841 ^c
Body Mass Index, mean ± sd	27.34 ± 6.33	24.8 ± 5.35	0.209 ^a

a. Independent Samples Test

b. Chi-Square tests

c. Mann-Whitney tests

3.9 Summary

In summary, the hospital-based falls clinic was effective in reducing the risk of falls and falls injury among community-dwelling older adults at high risk of falling. Importantly, positive effects were demonstrated on the rate of reported falls and injurious falls in this evaluation. At the 6-month visit, the rate of falling was reduced by 55% and the rate of injurious falls was reduced by 38%. These positive effects were also sustained at the 12-month visit – the rate of falling was reduced by 59% and the rate of injurious falls was reduced by 61%. The results provide positive support for the use of hospital-based falls clinics to manage clients with a high-risk of falls. Some caution is needed, however, in interpreting these findings as there may be some recall bias in the reported falls in the preceding 6 months.

In addition, clients of the hospital-based falls clinic achieved significant improvements on a number of MDS outcome measures at the 6-month visit and the 12-month visit, although the small sample size limited the extent to which significant differences could be detected. These findings suggest that the program is of sufficient duration to provide both short- and medium-term improvements in a number of functional measures among community-dwelling older adults at high risk of falling.

The level of adherence to the recommendations was reasonably high, as the majority of clients completed at least 50% of the recommendations. Further research is

needed to explore effective method to prioritise and promote adherence to these recommendations and improve the proportion of clients completing the program. The rate of return to this hospital falls clinic, however, was reasonably high – less than 35% of clients did not attend the 6-month follow-up visit.

In conclusion, hospital-based falls clinics offer an important falls prevention service for frail older adults who have experienced recent falls or are at high risk of falls. The provision of this hospital-based service significantly improved clients' functional capacity, falls-self efficacy and importantly, reduced clients' risk of further falls and falls injury.

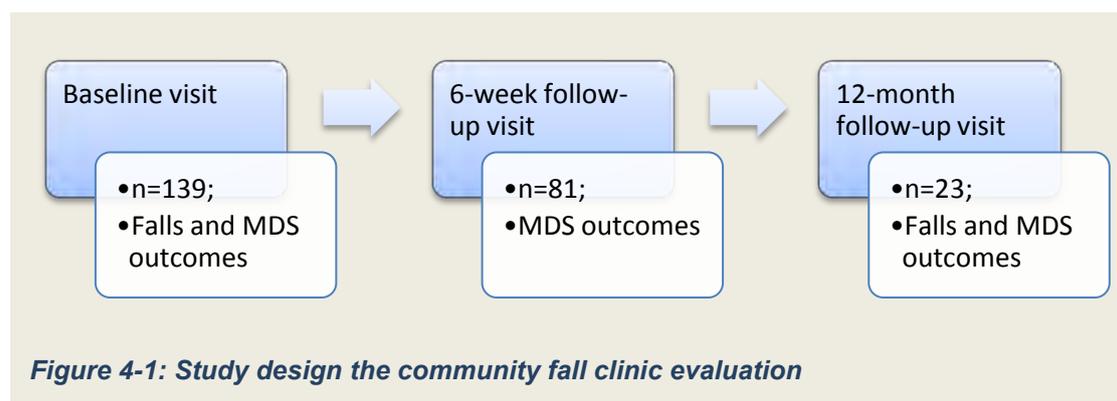
SECTION 4

The Northside HSD community-based falls clinics

Data were collected on clients attending the two Northside HSD community-based falls clinic during the period from January 2008 and September 2009. This section reports on the baseline data collected on clients attending these clinics, and evaluates the clinics' effectiveness in reducing falls and falls injury, and improving functional capacity measures.

4.1 Evaluation methodology

The evaluation was based on a pre-post study design, using data collected at the baseline and follow-up visits (6-week and 6-month) (see Figure 4-1). The statistical methodology is outlined in Section 2.7.



4.2 Demographics characteristics

The demographic characteristics of clients (n=139) attending the community-based falls clinics are presented in Table 4-1. The mean age of clients attending the clinics was 76.0 ± 8.9 years, and 66% were female. The majority of clients lived with others (59%), had no carer support (60%), and on average, accessed 0.9 ± 1.0 community services (range 0–5). The most common community services accessed were home care (37%) and community health centres (21%).

The most common reasons for referral to the clinic were history of falls (70%) and gait disorders (21%). The top 5 referrals sources include community health allied-health (50%), inpatient (19%), community health nurse (7%), outpatient department (7%) and medical specialists (4%).

Table 4-1: Demographics characteristics of clients attending the community-based falls clinics (n=139)

Baseline characteristics			
Age, years		Community Services accessed, n (%)	
mean ± sd	76.03 ± 8.9	Meals on Wheels	6 (4.3)
range	41 - 91	Home care (domestic tasks)	51 (36.7)
≥ 65, n (%)	123 (90.4)	Personal care	6 (4.3)
≥ 85, n (%)	24 (17.6)	Community Nurse	1 (0.7)
Gender, n (%)		Home maintenance	9 (6.5)
Male	47 (33.8)	Planned activity / day centre group	8 (5.8)
Female	92 (66.2)	Community health centre	29 (20.9)
Reason for Referral		Respite	3 (2.2)
History of falls	97 (69.8)	Personal alarm	6 (4.3)
Gait disorder	29 (20.9)	Package (eg CAPS, EACH)	2 (1.4)
Balance disorder	1 (0.7)	Community based rehab	2 (1.4)
Dizziness	11 (7.9)	No. of community services accessed, count	
Other	32 (23)	Mean ± sd	0.88 ± 0.98
Referral source, n (%)		Median (range)	1 (0 - 5)
Community allied health	69 (49.6)	Living Arrangements, n (%)	
Community health nurse	10 (7.2)	Lives Alone	52 (37.4)
Hospital inpatient departments	27 (19.4)	Lives with others	82 (59)
Local medical officer, eg GP	3 (2.2)	Other supported accommodation	2 (1.4)
Medical Specialist	5 (3.6)	Missing	3 (2.2)
Hospital outpatient department	10 (7.2)	Care support, n (%)	
Other	4 (2.9)	No carer	84 (60.4)
Other community service	7 (5)	Non-resident carer	4 (2.9)
Self or family	4 (2.9)	Resident carer	46 (33.1)
		Missing	5 (3.6)

4.3 Baseline risk factors, history of falls and MDS scores

On average, falls clinic clients had 5.7 ± 2.6 falls risk factors identified (range 0-12), predominantly medical and motor function risk factors (Table 4-2). The most common risk factors for falls identified were impaired balance (58%); polypharmacy (>4 medications; 56%); chronic medical conditions such as stroke or Parkinson's disease (55%); muscle weakness or deconditioning (53%); and unsteady gait (46%).

Table 4-2: Baseline risk factors of clients attending the community-based falls clinics (n=139)

Baseline risk factors			
Medical risk factors, count		Psychological risk factors, count	
Mean \pm sd	2.5 \pm 1.4	Mean \pm sd	0.6 \pm 0.8
Median (range)	2 (0 - 6)	Median (range)	0 (0 - 3)
Motor function risk factors, count		Environmental risk factors, count	
Mean \pm sd	2.1 \pm 1.5	Mean \pm sd	0.5 \pm 0.7
Median (range)	2 (0 - 5)	Median (range)	0 (0 - 3)
Total risk factors, count			
Mean \pm sd	5.7 \pm 2.6		
Median (range)	6 (0 - 12)		

Sixty-eight percent of clients reported at least one fall in the 6 months preceding the visit (Table 4-3). Furthermore, 38% experienced multiple falls, 53% experienced injurious falls and 38% required medical attention following a fall. In total, 284 falls (mean 2.1 ± 3.9 , range 0-30), and 125 injurious falls (mean 0.93 ± 1.4 , range 0-10) were reported in the 6 months preceding the visit. In addition, the MDS scores for clients at the baseline visit are present in Table 4-3.

Table 4-3: Baseline falls history and MDS measures of clients attending the community-based falls clinics (n=139)

Falls history		MDS baseline measures (mean \pm sd)	
Number of clients falling, n(%)	92 (68.1)	RUDAS score	26.9 \pm 3.2
Number of clients falling more than once, n (%)	51 (37.8)	Body mass index	27.6 \pm 6.4
No. of falls		Malnutrition Screening Tool (MST)	0.5 \pm 1.1
	Mean \pm sd	Modified Barthel Index	95.3 \pm 12.2
	Median (range)	Frenchay Activities Index	36.8 \pm 8.9
Number of clients experiencing fall injuries, n (%)	1 (0 - 30)	Timed Up and Go Test (sec)	12.7 \pm 5.6
		Step Test (count)	8.4 \pm 4
	71 (52.6)	Leg Strength (sec)	11 \pm 4.8
No. of fall injuries		Walking Speed (m/min)	50.8 \pm 22
	Mean \pm sd	Modified Falls Efficacy Scale (MFES)	7.9 \pm 1.9
	Median (range)	Prescription medications, count	6.8 \pm 4.6
No. of clients seeking medical attention due to falls, n (%)	51 (37.8)	Postural hypertension at 3 minutes, n (%)	7 (14.3)

4.4 Recommendations

On average, the clinics recommended 2.2 ± 1.5 new interventions (range 0-7) per client (Table 4-4). The most commonly recommended interventions were exercise interventions (home program – combo (89%), balance class (38%) and tai chi (14%)), as well as behaviour modification or reduction of risky behaviours (10%). A range of other interventions was also recommended, although each of these occurred in less than 10% of clients.

Table 4-4: Recommendations to clients attending the community-based clinics (n=139)

	n	(%)		n	(%)
Review outside 6-month follow-up	0	(0)	Community Services		
Medical			Food services	0	(0)
Medical specialist	4	(2.9)	Home care	3	(2.2)
Investigations of health problems	4	(2.9)	Community Nurse	0	(0)
Medication reduction	2	(1.4)	Home maintenance/gardening	0	(0)
Osteoporosis meds, Vit D supplerr	1	(0.7)	Respite care	1	(0.7)
Inpatient admission	0	(0)	Personal care	1	(0.7)
Other - specify	0	(0)	Package (eg EACH/CAPS)	1	(0.7)
Exercise			Planned activity group / day centre	2	(1.4)
Balance class	53	(38.1)	CBRT / Community Health Centre	1	(0.7)
Home program - Balance	1	(0.7)	Other rehab - specify	3	(2.2)
Home program - Strength	0	(0)	Other		
Home program - Combo	123	(88.5)	Other specialist Clinics - specify	3	(2.2)
Vestibular rehab - repos.	0	(0)	Behaviour modification	14	(10.1)
Vestibular rehab - desensitising	0	(0)	Footcare/podiatry	4	(2.9)
Vestibular rehab - gaze stability	0	(0)	Social work review	5	(3.6)
Tai chi	19	(13.7)	Vision Ax/Mx	2	(1.4)
Hydrotherapy	2	(1.4)	Relaxation	8	(5.8)
Environment			Clinical psychology	0	(0)
Home visit	9	(6.5)	Neuropsychology	0	(0)
Home aids/mods	10	(7.2)	Dietician	7	(5)
Footwear change	4	(2.9)	Driving Assessment	0	(0)
Gait aid change/adjustment	2	(1.4)	Other - specify	8	(5.8)
Personal alarm	2	(1.4)			
Total number of recommendations made					
mean \pm sd	2.2	\pm 1.5			
median (range)	2	(0 - 7)			

4.5 MDS outcomes at 6-week follow-up visit

Falls clinic clients achieved significant improvements in all of the MDS measures at the 6-week follow-up. The program demonstrated significant improvements in the following outcome measures: dynamic balance (26%), mobility (12%), leg muscle strength (17%), walking speed (17%) and falls self-efficacy (6%).

Table 4-5: MDS scores at baseline and 6-week follow-up visit (n=81)

	N	Baseline visit		Six-week visit		Improvement		
		Mean	± sd	Mean	± sd	Unit	%	P-value
Dynamic standing balance								
Step Test (count)	78	8.94	± 3.75	11.24	± 3.99	2.3	25.8%	< 0.01 ^a
Mobility								
Timed Up and Go Test (sec)	81	12.11	± 4.41	10.69	± 4.33	1.4	11.6%	< 0.01 ^a
Leg muscle strength								
Timed chair stands x 3 (sec)	81	10.39	± 3.97	8.64	± 2.77	1.8	16.8%	< 0.01 ^a
Walking speed								
10-m walk (m/min)	77	47.98	± 20.41	56.17	± 22.23	8.2	17.1%	< 0.01 ^a
Falls self-efficacy								
Modified Falls Efficacy Scale (MFES)	61	7.93	± 1.92	8.41	± 1.41	0.5	6.1%	0.01 ^b

a. Paired t-test

b. Paired Wilcoxon Signed Ranks Test

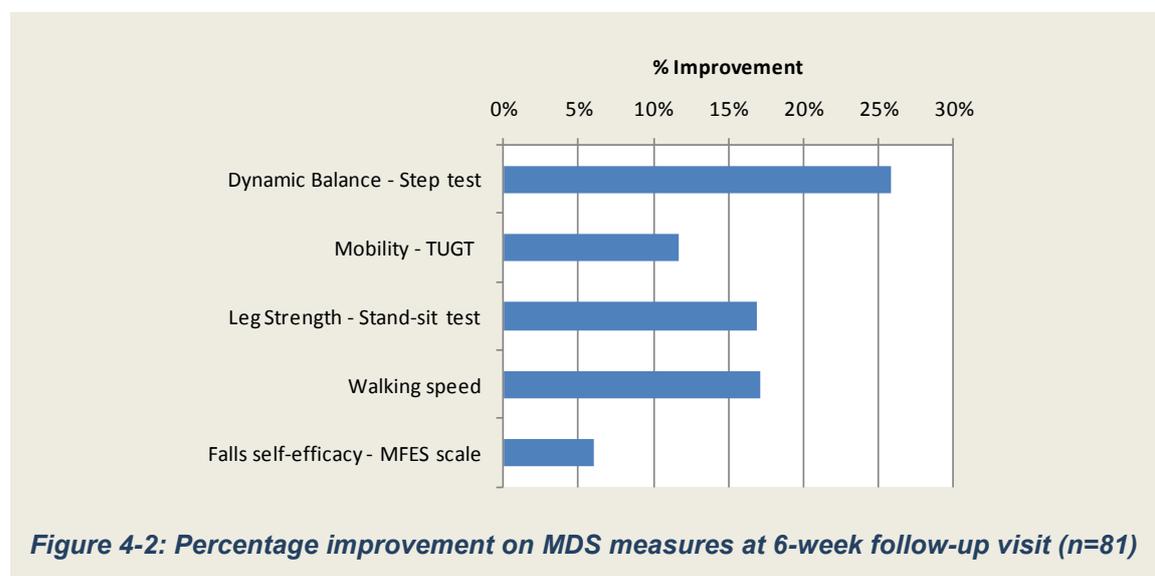


Figure 4-2: Percentage improvement on MDS measures at 6-week follow-up visit (n=81)

4.6 MDS and fall outcomes at 6-month follow-up visit

Falls clinic clients achieved significant improvements in some of the MDS measures. This includes dynamic balance (15% improvement) and walking speed (14% improvement). There were small, but non-significant, improvements in the other MDS measures.

Table 4-6: MDS scores at baseline and 6-month follow-up (n=23)

	N	Baseline visit	Six-month visit	Improvement		
		Mean ± sd	Mean ± sd	Unit	%	P-value
Physical function						
Modified Barthel Index	23	96.74 ± 10.58	98.04 ± 6.44	1.3	1.3%	0.609 ^b
Frenchay Activities Index	23	35.22 ± 7.9	36.22 ± 10.22	1	2.8%	0.665 ^a
Dynamic standing balance						
Step test (count)	21	10.24 ± 3.53	11.81 ± 4.08	1.57	15.3%	0.001 ^a
Mobility						
Timed up and go test (sec)	23	10.92 ± 4.01	10.42 ± 5.64	0.51	4.7%	0.362 ^a
Leg muscle strength						
Stand-sit test (sec)	23	10.00 ± 4.29	8.94 ± 4.49	1.06	10.6%	0.133 ^a
Walking speed						
10-m walk test (m/min)	23	54.19 ± 26.45	61.79 ± 25.57	7.6	14.0%	0.017 ^a
Falls self-efficacy						
Modified Falls Efficacy Scale	22	8.18 ± 2.06	8.82 ± 1.89	0.64	7.8%	0.104 ^b
Medication use						
Number of prescription medications	20	6.55 ± 5.33	6.60 ± 5.32	0.05	0.8%	0.739 ^b
Postural hypotension						
3-min postural hypotension present	n/a					

a. Paired t-test

b. Paired Wilcoxon Signed Ranks Test

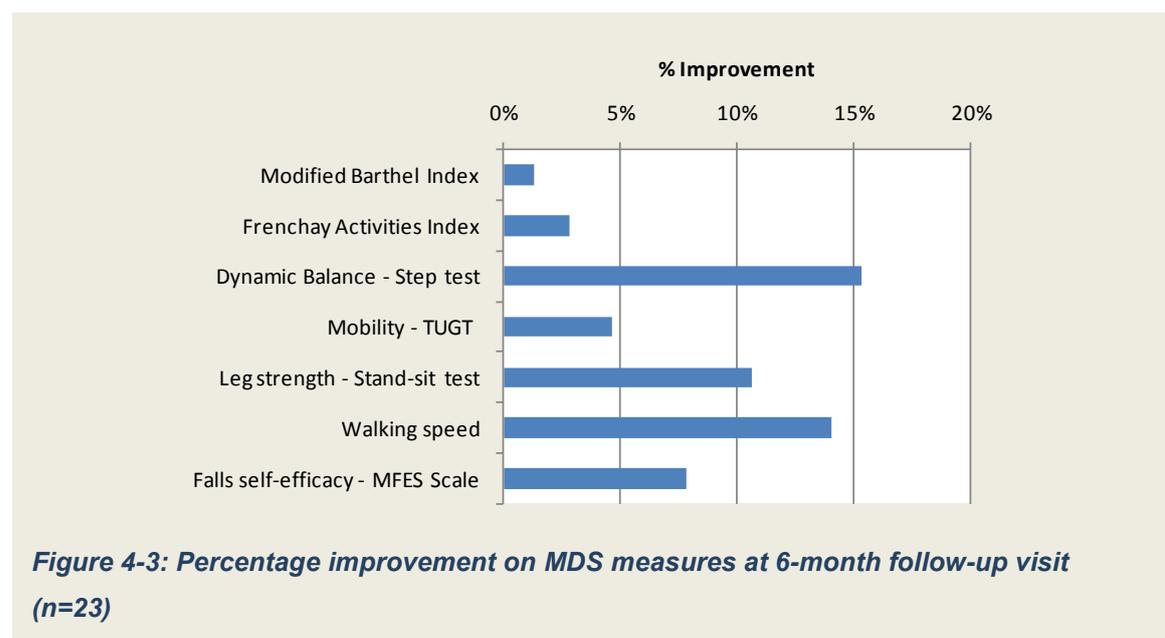


Figure 4-3: Percentage improvement on MDS measures at 6-month follow-up visit (n=23)

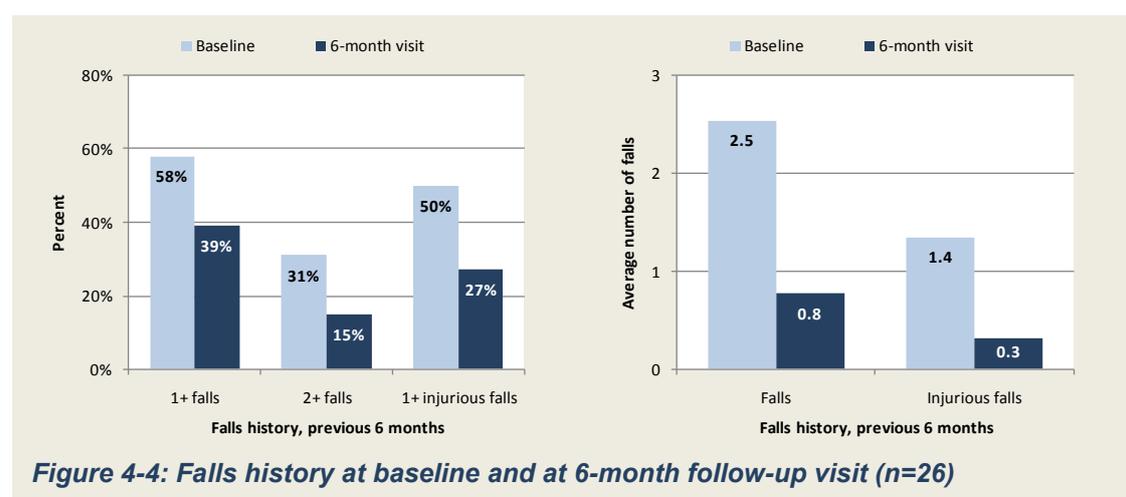
Table 4-7 reports fall-related outcomes for the 26 clients attending the 6-month follow-up. There was a significant reduction in the rate of previous falls in the 6 months preceding assessment at the 6-month follow-up (60% reduction, IRR 0.40, adjusted for location). Similarly, there was a significant reduction in the rate of previous injurious falls in the 6 months preceding assessment at the 6-month follow-up (72% reduction, IRR 0.28, adjusted for location). While there was a reduction in the proportion of clients experiencing any falls, multiple falls or injurious falls in the 6 months preceding the assessment, these did not reach statistical significance.

Table 4-7: Falls and injurious falls at baseline and 6-month follow-up (N=26)

Outcome measure	Baseline	6-month follow-up	Odds Ratio (95% CI) ^{a,c}	P-value
Any fall, n (%)	15 (58)	10 (39)	0.44 (0.14-1.38)	0.16
Any multiple fall, n (%)	8 (31)	4 (15)	0.39 (0.10-1.50)	0.17
Any injurious fall, n (%)	13 (50)	7 (27)	0.34 (0.10-1.15)	0.08

Outcome measure	Baseline	6-month follow-up	Incidence Rate Ratio (95% CI) ^{b,c}	P-value
Number of falls, mean ± sd	2.54 ± 4.80	0.77 ± 1.39	0.40 (0.19-0.88)	0.02
Number of injurious falls, mean ± sd	1.35 ± 2.51	0.31 ± 0.55	0.28 (0.12-0.65)	<0.01

- a. Generalised Estimating Equations with logit link and binomial distribution
 - b. Generalised Estimating Equations with log link and negative binomial distribution
 - c. Adjusted for site
- CI = confidence interval



4.7 Adherence to recommendations

For the group completing the 6-month assessment (n=25), there was good adherence to the recommended interventions. Using the adherence score calculation, the mean adherence score was $64.5 \pm 28.3\%$ (median 63, range 0- 100). Around 84% of clients scored 50% or higher on the adherence score.

4.8 Non-attendance at 6-month follow-up

On average, 23% of clients (28 of 124) who were eligible to return for follow-up attended the 6-month follow-up. Reasons for non-attendance included inability to attend (relocated, difficulty in accessing the venue; 23%), poor health (14%), withdrew from the program (14%) or passed away (2%). Reasons for non-attendance were not known for around 17% of clients. A key factor in this considerable loss to follow-up was the relocation of one of the community clinics to another suburb, where there were limited transport options. This meant that clients who attended the initial venue were less able to attend follow-up visits at the relocated venue.

Compared to those attending the 6-month follow-up, non-attendees were significantly older (Table 4-8). There were no significant differences between the two groups with respect to gender, history of falls, number of risk factors, number of recommendations, cognitive status or body mass index.

Table 4-8: Comparison between community-based falls clinic clients who did and did not attend the 6-month follow-up assessment

	Did attend (n=28)	Did NOT attend (n=96)	P-value
Age, mean \pm sd	72.2 \pm 11.2	76.8 \pm 7.6	0.015 ^a
Female, n (%)	17 (60.7)	63 (65.6)	0.630 ^b
Number of risk factors, mean \pm sd	5.5 \pm 2.8	5.6 \pm 2.6	0.813 ^a
Number of falls, mean \pm sd	2.5 \pm 4.8	1.8 \pm 3.4	0.403 ^a
Clients falling, n (%)	15 (57.7)	64 (68.1)	0.320 ^b
Number of injurious falls, mean \pm sd	1.4 \pm 2.5	0.8 \pm 1.0	0.094 ^a
Clients falling more than once, n (%)	13 (50.0)	49 (52.1)	0.850 ^b
Clients seeking medical attention after a fall, n (%)	9 (34.6)	37 (39.4)	0.660 ^b
Number of recommendations made, mean \pm sd	2.3 \pm 1.2	2.2 \pm 1.5	0.883 ^a
Cognitive status (RUDAS score), mean \pm sd	27.9 \pm 2.5	26.8 \pm 3.2	0.109 ^c
Body Mass Index, mean \pm sd	29.2 \pm 6.4	26.6 \pm 7.1	0.102 ^a

a. Independent t-test

b. Chi-squared test

c. Mann-Whitney test

4.9 Summary

In summary, community-based falls clinics are effective in reducing the risk of falls and falls injury among community-dwelling older adults at high risk of falling. Importantly, positive effects were demonstrated on the rate of reported falls and injurious falls in this evaluation. At the 6-month visit, the rate of falling was reduced by around 60% and the rate of injurious falls was reduced by over 70%. The results provide positive support for the effectiveness of community falls clinic approach in managing clients with a high-risk of falls, although some caution is needed in interpreting these findings as there may be some recall bias in the reported falls in the preceding 6 months.

Furthermore, the community-based falls clinic clients achieved improvements on a number of MDS outcome measures at the 6-month visit, although the small sample size limited the extent to which significant differences could be detected. These findings indicate that the community program is of sufficient duration to provide both short- and medium-term improvements in a number of functional measures among community-dwelling older adults at high risk of falling.

While the level of adherence to the recommendations varied, the majority of clients completed at least 50% of the recommendations. Further research is needed to examine the most effective method to prioritise adherence to these recommendations.

Further research is needed to explore effective methods to prioritise and promote adherence to these recommendations and improve the proportion of clients completing the program, particularly as around 77% of clients did not attend the 6-month follow-up visit. A key factor in this considerable loss to follow-up was the relocation of one of the community clinics to another suburb, where there were limited transport options.

In conclusion, community-based falls clinics offer an important falls prevention service for older adults who have fallen or are at high risk of falls. This service significantly improved clients' functional capacity and importantly, reduced their risk of future falls and falls injury.

SECTION 5

Falls clinics comparisons

5.1 Comparisons of characteristics between hospital and community clinics clients

There were no significant differences between the clients attending the community and hospital based falls clinics on the main demographic variables (age, gender). The groups also did not differ significantly in terms of community services used, number of falls and falls injury, and proportion falling. A higher proportion of hospital clients, however, required medical attention from a previous fall (hospital 55%; community 38%; $p < 0.01$).

In addition, the hospital clients had significantly worse performance on some balance and mobility measures, had more baseline risk factors, and more recommendations were made ($p < 0.05$) than those attending the community clinics. These findings suggest that the hospital clients were a higher fall-risk group compared to the community clinics.

5.2 Summary

In summary, all falls clinics clients are at high-risk of experiencing falls, hospital clients are a group more at risk compared to community clients, and are likely to need to more specialised interventions provided at the hospital falls clinics. Furthermore, no adverse events were reported during the Northside HSD falls project, which indicates that the provision of these services are safe and effective in reducing the rate of falls and improving functional capacity.

Table 5-1: Comparisons between baseline characteristics of community and hospital-based falls clinic clients

Variable	Community Falls Clinic (n=138)	Hospital Falls Clinic (n=51)	P-value
Age at baseline, mean ± SD	76 ± 8.9	77.3 ± 8.7	0.37 ^a
Female gender, n (%)	92 (66.67)	37 (72.55)	0.44 ^b
Number of community services accessed, mean ± SD	0.9 ± 1	1.2 ± 1.4	0.48 ^c
Number of falls [†] , mean ± SD	2.1 ± 3.9	2.4 ± 2.5	0.67 ^a
Number of injurious falls [†] , mean ± SD	0.9 ± 1.4	1.1 ± 1.3	0.45 ^a
Number of fallers [†] , n (%)	92 (68.15)	38 (74.51)	0.4 ^b
Number of multiple fallers [†] , n (%)	51 (37.78)	14 (27.45)	0.19 ^b
Number of injurious fallers [†] , n (%)	71 (52.59)	31 (60.78)	0.32 ^b
Number of fallers requiring medical attention, n (%)	51 (37.78)	28 (54.9)	0.04 ^b
Number of risk factors, mean ± SD	5.7 ± 2.5	7.5 ± 3.1	< 0.01 ^a
Rudas score, mean ± SD	26.9 ± 3.2	25.7 ± 3.2	< 0.01 ^c
Body mass index, mean ± SD	27.6 ± 6.4	27.1 ± 6.6	0.64 ^a
Malnutrition screening score, mean ± SD	0.5 ± 1.1	1.3 ± 1.6	< 0.01 ^c
Modified Barthel Index, mean ± SD	95.3 ± 12.2	90.7 ± 8.3	< 0.01 ^c
Frenchay Activities Index, mean ± SD	36.8 ± 8.9	25.8 ± 9.5	< 0.01 ^a
Step test, mean ± SD	8.4 ± 4	7.1 ± 4.1	0.05 ^a
Timed Up and Go test, , mean ± SD	12.7 ± 5.6	14.7 ± 5.1	0.03 ^a
Leg strength, mean ± SD	11 ± 4.8	10.9 ± 4.5	0.9 ^a
Walking speed (m/min), mean ± SD	50.8 ± 22	54.8 ± 17.5	0.25 ^a
Modified Falls Efficacy Scale, mean ± SD	7.9 ± 1.9	7.8 ± 2.1	0.76 ^c
Number of prescription medications, mean ± SD	6.8 ± 4.6	7.8 ± 4.6	0.24 ^a
Number of recommendations made, mean ± SD	2.2 ± 1.5	4.2 ± 2.8	< 0.01 ^a

a. Independent t-test

b. Chi-squared test

c. Mann-Whitney U test

† Falls in the previous 6 months

SECTION 6

Summary

This report adds to the growing body of evidence supporting the benefits gained from falls clinics in providing valuable services and interventions to older adults at high risk of falls and fall injuries. This project evaluation showed that hospital and community-based falls clinics are effective in improving functional capacity of clients, and reducing their risk of falls and injury.

6.1 Key achievements

Key achievements of the project were as follows:

- Both the hospital and community-based falls clinics were effective in reducing the falls and fall injury rates. In the hospital-based clinic, the rate of falling at the 6-month visit was reduced by 55% and the rate of injurious falls was reduced by 38%. In the community-based clinics, the rate of falling at the 6-month visit was reduced by around 60% and the rate of injurious falls was reduced by over 70%.
- Statistically significant increases in functional capacity were found for clients attending the falls clinics. In the hospital-based clients, significant improvements were seen in dynamic balance (47%), falls self-efficacy (13%), walking speed (10%) and physical function (Frenchay Activities Index, 10%). Similarly, in the community-based clients, improvement were seen in dynamic balance (15%) and walking speed (14%), although the small sample size limited the extent to which significant improvements could be detected.
- Importantly, it is possible to establish formal falls clinics in Queensland using existing health care services already being provided to the older population. Formalising these services into falls clinics allows for a standardised approach to delivering evidenced-based interventions to prevent falls and improve function and provides an important referral point for high risk clients seen by hospital and community healthcare providers. Furthermore, all of these clinics continue to provide services beyond the life of the project.

6.2 Lessons learnt

The lessons learned from this project can be used to inform future falls prevention promotion activities based on the establishment of falls clinics. These include:

Standardising the falls assessments, equipment and training resources:

- This was facilitated by using the Victorian MDS, and the development of standardised falls clinic assessment forms, training manuals and data spreadsheets.
- Data collection and collation remains an issue for the falls clinics, particularly due to limited administrative support.

Overcoming organisational issues:

- Success was dependent on the ongoing support and “buy in” of the clinicians running the programs, as well as the required support of management. As such, these clinics are now part of “usual” business for the Northside district.

Streamlining access for clients:

- There were some early difficulties in determining appropriate triage protocols for potential clients, as well as managing the waiting list and times. This meant that there was limited advertising of the falls clinics services to community allied-health professionals, to ensure that demand did not surpass supply.

Staffing issues:

- Administrative demands remain considerable, particularly for the community-based clinics.
- Difficulties were also encountered when recruiting for part-time allied-health staff in the community-based clinics.
- Access to medical staffing was limited for the hospital-based clinic. As such, the frequency of falls clinics was guided by medical staff availability.
- It was also not feasible to have ongoing medical input into the community-based clinics; therefore, any medical input was provided through liaison with the clients’ general practitioner.

Clinic location issues:

- Challenges remain for the community-based clinics, particularly in improving access to the services for clients who no longer drive, and ensuring an adequate amount of physical space in which to run the programs.

6.3 Project recommendations

Queensland Health should consider the following recommendations based on the findings of this evaluation, for future health service planning towards the prevention of falls among older Queenslanders.

Local district recommendations:

- Falls clinics should be established across the state, particularly in areas where there is a high demographic of older adults.

Queensland Health recommendations:

- Queensland Health should continue to support and invest in the statewide development of falls clinics to reduce the risk of falls in this high-risk falls and falls injury population.
- Queensland Health should provide a centralised support service for districts establishing falls clinics. Queensland Health should also provide a centralised database into which falls clinics data can be reported. This would enable local, district and statewide data to be available for analysis, reporting and evaluation.
- Queensland Health should promote the use of these services to primary care health professionals and hospital health professionals.

6.4 Current Queensland Health falls prevention initiatives

Currently, the PSQ Falls Injury Prevention Program has a number of initiatives underway to address some of the recommendations outlined in this report. These initiatives include:

- Development of a Health Service Plan for falls prevention across the healthcare continuum, including in the community setting.
- Compilation of a database of existing falls clinics across the state, so these services can be promoted within the Falls Injury Prevention Collaborative.
- Dissemination of the 2009 Falls Prevention Best Practice Guidelines for Australian Community Care (Australian Commission on Safety and Quality in Health Care 2009).
- Building Queensland Health staff capacity to integrate falls prevention into their core duties through education via on-line programs.

- Ongoing support and communication to Chairs of District Falls Prevention Working Groups.

6.5 Conclusion

This report adds to the evidence supporting the need and benefits gained from establishing falls clinics in Queensland. The Northside HSD falls clinics demonstrated significant improvements in the functional capacity of community-dwelling older adults attending these services, and importantly, reduced the client's risk of falls and falls injury. This is particularly important, as falls contribute to a significant proportion of the burden of disease and injury among older Queenslanders (Bright *et al.* 2009), and \$118.9 million was spent in 2008-09 on hospital costs alone in treating older Queenslanders admitted due to falls (Black & Begg 2010).

In conclusion, the findings of this report indicate that the establishment of falls clinics across Queensland will ensure that:

- Older Queenslanders at high risk of falls are provided with evidence-based best practice interventions to improve functional capacity and reduce their risk of falls, in a variety of healthcare settings;
- Health professionals in Queensland have appropriate services to which clients can be referred for falls clinic services;
- The gaps in the provision of health services for falls prevention across Queensland are minimised;
- Queensland Health makes a positive contribution to maintaining the health and well-being of older Queenslanders.

SECTION 7

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SECTION 8

Appendix 1: Falls clinics assessment form

 <p>Queensland Government Queensland Health</p> <p style="text-align: center;">Falls Clinic DRAFT</p> <p style="text-align: center;">Facility: TPCH</p>	<p style="text-align: right;">(Affix patient identification label here)</p> <p>URN:</p> <p>Family Name:</p> <p>Given Names:</p> <p>Address:</p> <p>Date of Birth: Sex: <input type="checkbox"/> M <input type="checkbox"/> F</p>																																																																												
<p>Referral Source: Please select Diagnosis:</p> <p>Reason for Referral: <input type="checkbox"/> Falls <input type="checkbox"/> Gait Disorder <input type="checkbox"/> Loss of consciousness / syncope <input type="checkbox"/> Dizziness</p> <p><input type="checkbox"/> Other – specify</p> <p>Date of Initial Ax: Date of 6 month F/U: Date of 12 month F/U:</p> <p>Living Arrangements : Please Select Informal carer availability: Please Select</p> <p>Community Services: <input type="checkbox"/> 1.MoW <input type="checkbox"/> 2.Home care <input type="checkbox"/> 3.Personal care <input type="checkbox"/> 4.Com nurse <input type="checkbox"/> 5.Home maintenance <input type="checkbox"/> 6.Planned activity / day centre group <input type="checkbox"/> 7.Com health centre <input type="checkbox"/> 8.Respite <input type="checkbox"/> 9.Personal alarm <input type="checkbox"/> 10.Packages (e.g. CAPS, EACH, Transition) <input type="checkbox"/> 11.CBR / ARCH</p> <p>Falls History</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"></th> <th style="width: 15%;">Initial</th> <th style="width: 15%;">6 month F/U</th> <th style="width: 15%;">12 month F/U</th> </tr> </thead> <tbody> <tr> <td>No. of Falls (last 6 months)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Number of Injurious Falls</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Medical Attention sought</td> <td>Please select</td> <td>Please select</td> <td>Please select</td> </tr> <tr> <td>Nature of Injuries</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Risk Factors (mark all relevant)</p> <p>Medical</p> <p><input type="checkbox"/> 1. Acute health problem – specify</p> <p><input type="checkbox"/> 2. Vision impairment with best correction available</p> <p><input type="checkbox"/> 3. Vestib. Dysfunction <input type="checkbox"/> 4. Peripheral neuropathy / LL sensory loss <input type="checkbox"/> 5. Postural Hypotension</p> <p><input type="checkbox"/> 6. > 4 meds <input type="checkbox"/> 7. Meds assoc with ↑ risk <input type="checkbox"/> 8. Chronic conditions that ↑ risk e.g. PD, CVA</p> <p><input type="checkbox"/> 9. Osteoporosis <input type="checkbox"/> 10. Osteomalacia <input type="checkbox"/> 11. Under nutrition <input type="checkbox"/> 12. Syncope <input type="checkbox"/> 13. Incontinence</p> <p>Psychological</p> <p><input type="checkbox"/> 1. Cog impairment <input type="checkbox"/> 2. Depression <input type="checkbox"/> 3. Fear of falling / anxiety</p> <p>Motor / Function</p> <p><input type="checkbox"/> 1. Impaired balance <input type="checkbox"/> 2. Weakness / deconditioning <input type="checkbox"/> 3. Unsteady gait <input type="checkbox"/> 4. ↓ physical activity</p> <p><input type="checkbox"/> 5. ↓ Functional independence</p> <p>Environment</p> <p><input type="checkbox"/> 1. Environmental hazards - @ home <input type="checkbox"/> 2. Environmental hazards – away from home</p> <p><input type="checkbox"/> 3. Poor footwear <input type="checkbox"/> 4. Foot problems</p> <p><input type="checkbox"/> 5. Hazardous behaviours / actions that ↑ risk</p> <p>3 most significant contributing factors 1. 2. 3.</p> <p>Cognition Assessment Test Please select Result / Score</p> <p>Measures</p> <p>Weight (kg) Height (m) BSL</p> <p>Malnutrition Screen Score <input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;"></th> <th style="width: 30%;"></th> <th style="width: 15%;">Initial Assessment</th> <th style="width: 15%;">6 Month Review</th> <th style="width: 15%;">12 month Review</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Function</td> <td>MBI (Verbal report)</td> <td>/100</td> <td>/100</td> <td>/100</td> </tr> <tr> <td>Frenchay Activity Index</td> <td>/45</td> <td>/45</td> <td>/45</td> </tr> <tr> <td rowspan="2">Balance</td> <td>TUG</td> <td>sec</td> <td>sec</td> <td>sec</td> </tr> <tr> <td>Step test – worse leg</td> <td>/15 sec</td> <td>/15 sec</td> <td>/15 sec</td> </tr> <tr> <td>Leg Muscle Strength</td> <td>Sit to Stand to Sit x3 from chair</td> <td>sec</td> <td>sec</td> <td>sec</td> </tr> <tr> <td>Gait velocity</td> <td>Time to walk 10 m</td> <td>sec</td> <td>sec</td> <td>sec</td> </tr> <tr> <td>Fear of Falling</td> <td>MFES</td> <td>/10</td> <td>/10</td> <td>/10</td> </tr> <tr> <td>Number of meds</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td rowspan="3">Postural BP</td> <td>Lying BP</td> <td>/</td> <td>/</td> <td>/</td> </tr> <tr> <td>Standing BP 1 min</td> <td>/</td> <td>/</td> <td>/</td> </tr> <tr> <td>Standing BP 3 mins</td> <td>/</td> <td>/</td> <td>/</td> </tr> </tbody> </table>			Initial	6 month F/U	12 month F/U	No. of Falls (last 6 months)				Number of Injurious Falls				Medical Attention sought	Please select	Please select	Please select	Nature of Injuries						Initial Assessment	6 Month Review	12 month Review	Function	MBI (Verbal report)	/100	/100	/100	Frenchay Activity Index	/45	/45	/45	Balance	TUG	sec	sec	sec	Step test – worse leg	/15 sec	/15 sec	/15 sec	Leg Muscle Strength	Sit to Stand to Sit x3 from chair	sec	sec	sec	Gait velocity	Time to walk 10 m	sec	sec	sec	Fear of Falling	MFES	/10	/10	/10	Number of meds					Postural BP	Lying BP	/	/	/	Standing BP 1 min	/	/	/	Standing BP 3 mins	/	/	/
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Version 1.3 October 2007

FALLS CLINIC MINIMUM DATA SET

Recommendations, Interventions and Compliance (mark all relevant)

	Recommended	Non compliance		Partial Compliance		Full Compliance	
		6/12 F/U	12/12 F/U	6/12 F/U	12/12 F/U	6/12 F/U	12/12 F/U
1. Review outside 6 and 12 month f/u	<input type="checkbox"/>						
Medical							
2. Medical Specialist - Specify	<input type="checkbox"/>						
3. Investigations / treatment of health problems	<input type="checkbox"/>						
4. Medication reduction	<input type="checkbox"/>						
5. Osteoporosis medication and/or Vit D supplements	<input type="checkbox"/>						
6. Inpatient admission	<input type="checkbox"/>						
7. Other- Specify	<input type="checkbox"/>						
Exercise							
8. Balance Class	<input type="checkbox"/>						
9. Home Prog – Balance	<input type="checkbox"/>						
10. Home Prog – Strength	<input type="checkbox"/>						
11. Home Prog – Combo	<input type="checkbox"/>						
12. Vestib Rehab – Repos.	<input type="checkbox"/>						
13. Vestib Rehab – Desensitising	<input type="checkbox"/>						
14. Vestib rehab – Gaze stability	<input type="checkbox"/>						
15. Tai Chi	<input type="checkbox"/>						
16. Hydrotherapy	<input type="checkbox"/>						
Environment							
17. Home Visit	<input type="checkbox"/>						
18. Home aids/mods	<input type="checkbox"/>						
19. Footwear change	<input type="checkbox"/>						
20. Gait aid change/adjustment	<input type="checkbox"/>						
21. Personal alarm	<input type="checkbox"/>						
Community Services							
22. Food Services	<input type="checkbox"/>						
23. Home care	<input type="checkbox"/>						
24. Community Nurse	<input type="checkbox"/>						
25. Home maintenance/gardening services	<input type="checkbox"/>						
26. Respite Care	<input type="checkbox"/>						
27. Personal care	<input type="checkbox"/>						
28. Package (e.g. EACH/CAPS)	<input type="checkbox"/>						
29. Planned activity Group / day centre	<input type="checkbox"/>						
30. CBRT / Community Health Centre	<input type="checkbox"/>						
31. Other Rehab Specify	<input type="checkbox"/>						
Other							
32. Other Specialist Clinics – specify	<input type="checkbox"/>						
33. Behaviour modification	<input type="checkbox"/>						
34. Foot care/podiatry	<input type="checkbox"/>						
35. Social Work review	<input type="checkbox"/>						
36. Vision Ax / Mx	<input type="checkbox"/>						
37. Relaxation	<input type="checkbox"/>						
38. Clinical psychology	<input type="checkbox"/>						
39. Neuropsychology	<input type="checkbox"/>						
40. Dietician	<input type="checkbox"/>						
41. Driving Assessment	<input type="checkbox"/>						
42. Other – specify	<input type="checkbox"/>						

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Additional Reports / Assessments

Medical Nursing Physiotherapy Occupational Therapy Other – Specify

Comments