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Effects of emergency department Care Coordination Team referrals in older people presenting with a fall

Kristie J Harper

Nicholas P. Gibson

Edith Cowan University, n.gibson@ecu.edu.au

Annette D Barton

Antonio C Petta

Sara K Pearson

See next page for additional authors

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Authors

Kristie J Harper, Nicholas P. Gibson, Annette D Barton, Antonio C Petta, Sara K Pearson, and Antonio Celenza

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1st Author Name (Corresponding Author):	Kristie J Harper
Qualifications:	BSc (OT) PGCertHlthSci (OT)
Position:	Senior Occupational Therapist
Department:	Occupational Therapy
Institution or Affiliation:	Sir Charles Gairdner Hospital
Address:	Hospital Avenue, Nedlands 6009
Country:	Australia
Email:	kristie.harper@health.wa.gov.au
Telephone:	(08) 93462855
Facsimile:	(08) 9346 3599
2nd Author Name	Nicholas P Gibson
Qualifications:	RN BAppSci PGDipHlthAdmin PhD FRCNA
Position:	Associate Professor
Department:	Emergency Medicine
Institution or Affiliation:	Discipline of Emergency Medicine University of Western Australia

Address:	Level 2, R Block QE II Medical Centre Nedlands WA 6009
Country:	Australia
Email:	nick.gibson@uwa.edu.au
3rd Author Name	Annette D Barton
Qualifications:	BAppSci (OT) PGDipHlthSci Masters HlthSci DipManagment
Position:	Leader Care Co-ordination team, Deputy Head of Dept Occupational Therapy
Department:	Occupational Therapy
Institution or Affiliation:	Sir Charles Gairdner Hospital
Address:	Hospital Avenue, Nedlands 6009
Country:	Australia
Email:	annette.barton@health.wa.gov.au
4th Author Name	Antonio C. Petta
Qualifications:	BSc (Physiotherapy) MSc (Physiotherapy)
Position:	Falls Specialist Coordinator
Department:	Area Rehabilitation and Aged Care
Institution or Affiliation:	Sir Charles Gairdner Hospital
Address:	Ground Floor C Block, Hospital Avenue

	Nedlands WA 6009
Country:	Australia
Email:	tony.petta@health.wa.gov.au
5th Author Name	Sara K Pearson
Qualifications:	BSc (Occupational Therapy)
Position:	Senior Occupational Therapist
Department:	Occupational Therapy
Institution or Affiliation:	Sir Charles Gairdner Hospital
Address:	Hospital Avenue, Nedlands 6009
Country:	Australia
Email:	sara.pearson@health.wa.gov.au
6th Author Name	Antonio Celenza
Qualifications:	MBBS MClInEd FACEM FCEM
Position:	Winthrop Professor
Department:	Emergency Medicine
Institution or Affiliation:	Discipline of Emergency Medicine University of Western Australia
Address:	Level 2, R Block QE II Medical Centre Nedlands WA 6009
Country:	Australia

Email:	tony.celenza@uwa.edu.au
---------------	--------------------------------

Corresponding Author:

Antonio Celenza

Emergency Medicine

Level 2, R Block,

QE II Medical Centre

Nedlands, Western Australia, Australia

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KH performed the literature review and wrote the draft manuscript. NG and AC performed the data collection and analysis and assisted in writing the draft manuscript. NG, AB, TP, SP and AC were involved in the inception and original planning of the study. All authors were involved in the writing and revision of the final manuscript.

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ABSTRACT

Objectives

To describe the characteristics of patients presenting to an Emergency Department (ED) with a fall and evaluate multidisciplinary Care Coordination Team (CCT) referrals on patient outcomes.

Methods

A single-centred retrospective analysis of electronic data at an adult tertiary hospital was performed using data from 2004 to 2009 of presentations for patients aged 65 years or over with a fall. The primary outcome measure was representation to hospital within 30 days, comparing patients referred to CCT and those not referred. Secondary outcomes were: differences in demographic characteristics, mode of arrival, triage score, and readmission.

Results

The proportion of ED patients presenting with a fall and their mean age is stable over time. From 2006 to 2009, 5162 fallers were referred to CCT in a decreasing trend, but with increased urgency. Statistically significant predictors for being referred to CCT were increasing age, being female, arriving by ambulance, being transferred from a nursing home and higher socioeconomic category. Arrival by ambulance and a history of previous falls were associated with representation and readmission. A decreasing trend

from 2006 to 2009 was seen in rate ratios and odds ratios via regression modeling for both representation and readmission in patients referred to CCT.

Conclusion

Maturing of the CCT is associated with a decrease in representation and readmission rate.

Over time, the CCT attended higher urgency patients associated with stable admission rates. These associations were not significant and the clinical effectiveness of ED CCTs requires further examination.

KEY WORDS

Falls, Accidental; Emergency Medicine; Aged; Interdisciplinary Health Team

INTRODUCTION

Falls in the older person constitute a substantial health problem with approximately 30% of adults over the age of 65 falling each year, increasing to over 50% from the age of 80.¹⁻³ Patient falls are predictable and preventable and research agendas now focus on identifying and testing strategies for reducing and preventing falls.^{4,5}

Falls are a common presenting problem to the Emergency Department (ED), yet the exact cause of a fall is not readily explained in at least two thirds of cases.⁶ ED presentations due to falls have been reported to be as high as 14% and falls are the leading cause of injury related hospital admissions.⁷ The prevalence, patient characteristics and outcomes of these ED patients have not been well described.⁸

Most fall presentations to the ED are associated with one or more identifiable risk factors (e.g. weakness, unsteady gait, confusion and certain medications) and attention to these risk factors can significantly reduce rates of falling.⁹ EDs have a potential role in preventing and managing falls in older adults by identifying those at risk and implementing interventions such as coordinated allied health teams to reduce the risk of further falls.^{2,5} A systematic review of 19 studies reported non-significant benefits of active treatments by multifactorial assessment and intervention programs. None of the included studies used ED interventions.⁸ One study of an ED Care Coordination Team (CCT) acting as a risk assessment, education and referral service resulted in reduced hospital admission rates with a non-significant effect on ED representations.¹⁰

In June 2005 the ED in our hospital introduced a CCT staffed by Occupational Therapists and Physiotherapists, primarily to intervene in older patients presenting with a fall. The majority of patients seen by the CCT are referred from ED doctors, with very few patients being self-selected by the CCT staff. Interventions by the CCT vary between patients, but usually include assessments and falls' risk stratification, patient education, functional retraining, supply of equipment and referrals to falls clinics or outpatient allied health services. Discharge planning is facilitated to reduce further falls and representation to the ED. Patients not seen by CCT received usual ED medical and nursing care which did not include the above falls-specific interventions.

This study describes temporal characteristics of patients presenting to an ED with a fall, and assesses whether a multidisciplinary CCT based in the ED is effective in improving patient outcomes. It was predicted that as the CCT process matured, there would be a change of patient characteristics in those seen and discharged home.

METHODS

Setting and Design

The study was conducted at a major metropolitan adult tertiary hospital in Perth, Western Australia. The ED treats 55,000 patients annually with approximately 50% admitted.

This single-centre study used a historical cohort design of retrospectively collected data from the Emergency Department Information System (EDIS). EDIS is an administrative and clinical database that tracks ED presentations in real time. Fields extracted for this

study included: age; gender; postcode (used to estimate socioeconomic status); Australasian Triage Score (ATS) (a well-validated measure of patient urgency); ED diagnosis; presenting problem; mode of arrival; source of referral; consultations, disposition; and other available free text fields. Address fields were also examined to determine if patients originated from nursing homes and/or residential care facilities.

The primary outcome measure was representation to hospital within 30 days, comparing patients referred to CCT and those not referred. Secondary outcomes were: readmission within 30 days, and differences in demographic characteristics, mode of arrival, and triage score.

Subject Selection

One investigator electronically interrogated EDIS data from January 2004 to September 2009 for patients with falls based on the widely accepted PROFANE (**P**revention of **F**alls **N**etwork **E**urope) definition of a fall: ‘an unexpected event in which the participants come to rest on the ground, floor, or lower level’.¹¹ As the PROFANE definition of a fall is quite broad, the cohort was narrowed to include only patients 65 years and older with a presenting problem, ED diagnosis (ICD 10) or free text fields complying with the definition. All records belonging to the same patient were identified by the Unique Medical Record Number (UMRN, used across all Perth’s public hospitals), extracted and sorted chronologically. Data accuracy and equivocal cases were resolved following manual review of case information via author consensus.

To determine the patient group referred to CCT, EDIS was searched for consultation by “Care Coordination Team”. All patients with falls actually seen by CCT

in 2006 were identified from a written CCT log and deterministically linked and compared to the EDIS derived patient group. As the numbers actually seen by CCT were not available for 2007 on, this comparison was also used to assess the suitability of using the electronically recorded EDIS cohort of patients referred to CCT as a proxy for actual CCT review for the years 2006-2009. A historical control group of all falls patients in 2004 were compared to all falls patients from 2006. As the CCT began in July 2005, this transition year was excluded from comparison.

Data Management

The study cohort was described in terms of ED presentations over time, number of previous fall presentations per patient, demographic characteristics, mode of arrival, ATS, and disposition. The Socio-Economic Index for Areas (SEIFA) was derived from Australian Bureau of Statistics data as a measure of socioeconomic status.¹² The SEIFA score was categorized into quartiles, with the lowest quartile indicating the greatest socioeconomic disadvantage.

An index presentation was defined as the first ED presentation in the period of interest for a fall where the patient was subsequently discharged from the ED. This included patients admitted to the short-stay area of the ED but subsequently discharged. A representation or readmission occurred when a patient presented or was admitted within 30 days of the index presentation.

Statistical Analysis

Data were de-identified, given unique numbers and analysed in aggregate form, with all analyses performed using SPSS[®] version 20. Preliminary tests of assumptions were performed and non-parametric alternatives were used where there were violations of normality. The χ^2 test was used to compare categorical outcomes of the cohorts and the t test or Mann-Whitney U test compared continuous variables. Descriptive analysis using frequencies and proportions with 95% confidence intervals were used where appropriate. Statistical significance was at the 5% level unless otherwise specified.

The impact of either being referred to and/or seen by CCT on hospital representation and readmission over time was compared using regression modeling. To account for the correlated data, a form of the generalized linear model, the generalized estimation equation (GEE) was used to model the data with an AR(1) (**first-order autoregressive**) type working correlation matrix. Variables of interest decided a priori were placed into a model as a block of variables and multivariate analyses performed. Binary logistic regression techniques were used to determine associations between patient characteristics and outcomes. These models were adjusted for age, sex, ATS, ambulance use, nursing home status, SEIFA, previous falls, and whether cases were referred to the CCT, with results reported as odds ratios (ORs) with 95% confidence intervals (CIs). GEE modeling was also used to compare the 2006 cohort with respect to determining differences between the cases referred to CCT and actually seen by CCT.

Group sample sizes of 435 in each group were needed to achieve 80% power (significance level 0.05) to detect a difference between the group proportions of 0.05, chosen to provide a strong measure of clinical importance for the intervention. This assumed 10% of the control group represent within 30 days. Prior to CCT, at least 1500

fallers presented to ED each year, declining to around 900 fallers presenting in 2009.

Therefore, by rule of thumb, the number of patients available for the study well exceeded that required for sufficient power.¹³

Ethical Considerations

The study was approved by the hospital's Human Research Ethics Committee.

RESULTS

Patient Characteristics

Of all patients aged 65 years or older attending ED, approximately 18% presented with a fall. This proportion remained stable from 2006 to 2009, with a significantly lower proportion of fallers presenting in 2004 compared with the other years (16.7 v 18.1%, difference 1.4%, 95% C.I. 0.7-2.1, $p < 0.001$). Mean age, proportion **arriving by ambulance, and those presenting with a history of previous falls remained stable over time. There was a significant decrease in the proportion of females over time, and the proportion of fall presentations being from nursing homes from 20.4% in 2004 to 13.6% in 2009 (difference 6.8%, 95% CI 6.6-9.0%, $p < 0.001$) (Table 1).**

When compared to all fall presentations, the index presentations were slightly younger (mean age approximately 80 years), and less likely to arrive by ambulance (57.4 v 75.9%, difference 18.5%, 95% CI 16.8-20.2, $p < 0.001$) (Table 1).

When comparing falls patients referred and not referred to CCT, there were significant differences in age, sex, and SEIFA, but no difference in ambulance transport or transfer from nursing home (Table 2).

CCT Referrals Versus Seen by CCT

In 2006, the CCT attended 1324 of 1537 (86.1% (95% CI 84.3-87.8)) of fallers referred by ED medical staff, validated against the CCT log of patients actually seen by CCT. Table 3 displays the comparison of the group seen by CCT and the group referred to CCT. There are no significant differences in both raw data analysis and GEE modelling. For the 13.9% of referred fallers not seen by CCT in 2006, there were no significant differences in age, sex, mode of arrival, nursing home status, urgency or socio-economic index when compared to those seen by CCT.

For 2006, significant predictors for being seen by CCT were: age (OR: 1.07 per year increase in age), female sex (OR: 1.63), arriving by ambulance (OR: 1.97), being transferred from a nursing home (OR: 1.56), and SEIFA (OR: 0.85 for each quartile change). These results were essentially the same in the group referred to CCT in 2006 (Table 3).

Urgency Analysis

For patients 65 years and older presenting to ED, there has been a small but significant change in the proportion of patients in the more urgent triage categories over the period 2004 to 2009 but not in the overall proportion of patients being admitted (Table 4).

However, for patients presenting with a fall, there has been a significant trend towards higher urgency of these cases. The proportion of falls cases in ATS categories 1, 2 and 3, was 52.9% (95% CI 50.8-55.0) in 2004 and 65.7% (95% CI 63.7-67.7) in 2009. This trend is replicated in urgency of fall presentations referred to CCT, as well as admission rates (Figure 1). Associated with this increase in referral of more urgent patients, the overall proportion of fall presentations referred to CCT decreased over time from 55.8% in 2006, to 43.1% in 2009 (Table 4).

Representation and Readmission

For the period 2006 to 2009, there were no significant differences in representation or readmission rates for those index cases referred to CCT compared to those not referred. A decreasing trend in rate ratios for representation and is noted for patients referred to CCT from a rate ratio of 1.46 in 2006, to a ratio of 1.00 in 2009. A similar trend is apparent for readmission (Table 5). With modeling analysis, this trend is more pronounced, with CCT referral associated with lower rates of representation and readmission in 2009 (OR 0.78 for both) (Table 6).

After adjusting for variables of interest, the strongest predictors for representation were arrival by ambulance and history of previous falls (OR 1.21 and 1.10 respectively). These factors became statistically significant as predictors of readmission with odds ratios of 1.67 and 1.33 respectively (Table 6). Fitting the model with either being seen by CCT or being referred to CCT as covariates elicited similar odds ratios for all included factors.

DISCUSSION

This study describes the impact of a maturing ED CCT. The CCT is being referred a smaller proportion of fallers with higher urgency. However, the admission rate for patients referred to CCT has remained stable. This may indicate greater selectivity of the referral process as the CCT program matured to provide service to those patients most likely to receive benefit. This finding may also be a result of more effective CCT interventions in the ED, permitting safe patient discharge for higher risk patients.

In light of representation and readmission rates being less for those patients both seen by CCT in 2009 compared to earlier years (albeit not significantly), the role played by a maturing CCT continues to evolve. Since the CCT attended higher urgency patients, yet with a stable admission rate, we speculate that readmission rates **may** have been higher without the CCT intervention.

This study also demonstrates the most significant characteristics of elderly fallers presenting to an ED and being referred to a CCT: increasing age, female sex, use of the ambulance service, and patients transferred from nursing homes. The proportion of falls patients transferred from nursing homes decreased significantly over time. The reason for this is unclear and may be related to improved access to medical care in residential facilities over the study period. Socioeconomic status was also significantly associated with referral rate. This finding is consistent with other studies where lower socioeconomic status is associated with poorer access to health care. This finding may demonstrate a clinician perspective that CCT referral may not be advantageous in this group of patients, and requires further study.

Using the risk factors identified may help target existing services with more intense intervention delivery to higher risk patients. Multifactorial falls risk assessment and intervention is an attractive strategy for preventing falls in older people but may have only a modest impact.⁸ Consistent with previous studies, our findings suggest the need for close follow up of high risk fallers.¹⁴

Changing demographic characteristics and social structure have resulted in an increasing number of older people living alone, often with minimal family support.¹⁵ The data in this study allude to this with the most frequent referral to CCT being that of an older female arriving by ambulance and/or from a nursing home. Use of the ambulance service may be a marker of poor social support or of fall severity. Older patients may poorly predict their own ability to manage and their perceptions may be unreliable indicators of their need for additional help.¹⁶ Presentation to ED is a valuable opportunity to identify persons at increased risk and develop a management plan to reduce falls and prevent ED representation.⁵ CCT intervention involves targeted falls education and functional retraining to assist in self management. Patient adherence can be enhanced if patients have an awareness of the risks they face and furthermore have the knowledge and skills to perform strategies that could reduce their risk of falls in the future.¹⁷

Limitations

Using a large population based database with limited clinical fields restricts the amount of information available to determine patient characteristics and outcomes. It therefore acts as a blunt instrument to determine only gross changes and outcomes. The large

number of repeat analyses may overestimate the statistical significance of a single analysis. The before and after nature of the study has temporal biases due to changes in patient and ED factors over time. We have been unable to clearly demonstrate the clinical effectiveness of CCT intervention strategies since the comparative groups were dissimilar, and obtaining specific intervention details required resources beyond this study.

Selection bias of the patients seen by CCT may also be present, which would be avoided in a prospective randomized trial. Using the proxy of referral for patients actually seen by CCT may overestimate the assumed number seen and affect modeled outcomes as not all patients referred would be seen by the CCT. However, multiple analyses comparing the 2006 seen by or referred to CCT groups have shown no important differences between these groups, partly justifying the use of the proxy for analysis.

Although one finding was of the CCT being referred higher urgency patients, reasons for this may be changing triage practices over time, or “overtriage” (placing less urgent/unwell patients into higher triage categories). However, overtriage is less likely since admission rates per triage category (a validated measure of triage reliability) have remained stable.

Conclusion

The ED CCT role matured over time and results are promising, **with CCT attending higher urgency patients associated with stable overall admission rates. The CCT are seeing higher risk patients associated with a trend to decreased readmission and**

representation rates. These associations were not significant and the clinical effectiveness of ED CCTs requires further examination.

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Figure 1. Referral and Admission Trends for ATS Categories 1 to 3.

Table 1: Characteristics of Study Group

Year	2004	2006	2007	2008	2009 (Jan to Sept)
Patients Attending ED	40796	48107	50009	51205	40259
65 years and older, N (% of all ED attendees, 95% CI)	13205 (32.4, 31.9-32.9)	15312 (31.8, 31.4-32.2)	15923 (31.8, 31.4-32.2)	15436 (30.1, 29.7-30.5)	12082 (30.0, 29.6-30.4)
Fall Presentations, N (% of 65 years and older, 95% CI)	2206 (16.7, 16.1-17.4)	2752 (18.0, 17.4-18.6)	2850 (17.9, 17.3-18.5)	2798 (18.1, 17.5-18.7)	2264 (18.7, 18.0-19.4)
Mean Age (years, (std dev))	82.1 (8.05)	82.1 (8.41)	82.0 (8.33)	81.9 (8.46)	82.2 (8.56)
Females, N (% of Fall Presentations, 95% CI)*	1499 (68.0, 66.0-69.9)	1898 (69.0, 68.3-69.7)	1881 (66.0, 65.3-66.7)	1811 (64.7, 63.9-65.4)	1483 (65.5, 64.6-66.3)
Arrival by Ambulance, N (% of Fall Presentations, 95% CI)	1676 (76.0, 74.2-77.8)	2080 (75.6, 74.9-76.3)	2181 (76.5, 75.8-77.2)	2101 (75.1, 74.4-75.8)	1734 (76.6, 75.8-77.4)
Nursing Home Resident, N (% of Fall Presentations, 95% CI)*	449 (20.4, 18.7-22.1)	552 (20.1, 19.5-20.7)	532 (18.7, 18.1-19.3)	450 (16.1, 15.5-16.7)	307 (13.6, 13.0-14.2)
Previous Fall (% of Fall Presentations, 95% CI)		131 (15.8, 14.5-17.2)	182 (18.1, 16.7-19.6)	137 (15.5, 14.2-16.9)	115 (18.4, 16.8-20.1)
Index Presentations	643	826	1007	886	627
Mean Age of Faller (years, (std dev))	80.2 (8.51)	80.2 (9.00)	80.8 (8.62)	80.2 (8.87)	80.3 (9.01)
Female Fallers, N (% of Index Presentations, 95% CI)	438 (68.1, 64.3-71.7)	573 (69.4, 66.1-72.5)	672 (66.7, 63.7-69.6)	564 (63.7, 60.4-66.9)	422 (67.3, 63.5-71.0)
Arrival by Ambulance, N (% of Index Presentations, 95% CI)	369 (57.4, 53.5-61.3)	475 (57.5, 54.0-60.9)	602 (59.8, 56.7-62.8)	487 (55.0, 51.7-58.3)	355 (56.6, 52.6-60.5)
Nursing Home Resident, N (% of Index Presentations, 95% CI)*	122 (19.0, 16.0-22.2)	169 (20.5, 17.8-23.4)	193 (19.2, 16.8-21.8)	138 (15.6, 13.3-18.2)	90 (14.4, 11.7-17.4)
Previous Fall, N (% of Index Presentations, 95% CI)*		131/826 (15.9, 13.5-18.6)	182/1007 (18.1, 15.8-20.6)	137/886 (15.5, 13.2-18.1)	125/627 (19.9, 16.8-23.2)
Referred to CCT, N (% of Index Presentations, 95% CI)*		518 (62.7, 59.3-66.0)	542 (53.8, 50.7-56.9)	472 (53.3, 49.9-56.6)	345 (55.0, 51.0-58.9)

* p<0.05

ED=Emergency Department

CCT=Care Coordination Team

Table 2: Comparison of falls cases referred and not referred to CCT 2006-2009

		Referred to CCT (N=5155)	Not Referred to CCT (N=5509)
Mean Age (years) (SD)*		83.0 (7.98)	81.2 (8.75)
Female*		3603 (69.9, 68.6-71.2)	3470 (63.0, 61.7-64.3)
Arrival by Ambulance		3912 (75.9, 74.7-77.1)	4184 (75.9, 74.7-77.0)
Nursing Home Resident		896 (17.4, 16.4-18.5)	945 (17.2, 16.2-18.2)
Australasian Triage Score*	1 Resuscitation	5 (0.1, 0-0.2)	55 (1.0, 0.8-1.3)
	2 Emergency	232 (4.5, 4.0-5.1)	639 (11.6, 10.8-12.5)
	3 Urgent	2249 (43.6, 42.2-45.0)	2947 (53.5, 52.2-54.8)
	4 Semi-Urgent	2632 (51.1, 49.7-52.5)	1815 (39.9, 38.6-41.2)
	5 Non-Urgent	37 (0.9, 0.7-1.2)	53 (1.0, 0.8-1.3)
Socio-economic Index*	Most Advantaged	2778 (54.1, 52.7-55.5)	2805 (51.2, 49.9-52.5)
	2	1210 (23.6, 22.4-24.8)	1280 (23.4, 22.3-16.2)
	3	628 (12.2, 11.3-13.1)	628 (15.2, 14.3-16.2)
	Least Advantaged	521 (10.1, 9.3-11.0)	521 (10.1, 9.3-10.9)

* p<0.05

Proportions presented as N (% , 95% CI)

CCT=Care Coordination Team

SD=Standard Deviation

Table 3: Comparison of 2006 Cases: Raw and GEE modeling comparing Cases seen by CCT and Cases referred to CCT.

		Seen by CCT (N=1324)		Referred to CCT (N=1537)	
		Raw Data	GEE Modeling: Odds ratio (95% CI)	Raw Data	GEE Modeling: Odds Ratio (95% CI)
Mean Age (years) (SD)		83.3 (7.90)	1.07 (1.05-1.08)	83.1 (7.97)	1.07 (1.05-1.08)
Female		981 (74.1, 71.7-76.4)	1.63 (1.21-2.20)	1123 (73.1,	1.53 (1.13-2.07)
Arrival by Ambulance		1022 (77.2, 74.9-79.4)	1.97 (1.49-2.61)	1176 (76.5,	1.89 (1.42-2.51)
Nursing Home Resident		301 (22.7, 20.6-25.1)	1.56 (1.10-2.21)	340 (22.1,	1.41 (0.98-2.02)
Australasian Triage Score	1 Resuscitation	1 (0.1, 0-0.5)	0.91 (0.72-1.16)	2 (0.1, 0-0.4)	0.89 (0.69-1.15)
	2 Emergency	40 (3.0, 2.2-4.1)		51 (3.3, 2.5-4.3)	
	3 Urgent	578 (43.7, 41.0-46.3)		658 (42.8, 40.3-45.3)	
	4 Semi-Urgent	697 (52.6, 50.0-55.3)		815 (53.0, 50.5-55.5)	
	5 Non-Urgent	8 (0.6, 0.3-1.2)		11 (0.7, 0.3-1.3)	
Socio-economic Index	Most Advantaged	726 (55.1, 52.4-57.8)	0.85 (0.74-0.97)	824 (53.9, 51.4-56.4)	0.97 (0.84-1.12)
	2	301 (22.8, 20.6-25.2)		363 (23.7, 21.6-25.9)	
	3	169 (12.8, 11.0-14.7)		192 (12.5, 10.9-14.3)	
	Least Advantaged	122 (9.3, 7.8-11.0)		151 (9.9, 8.5-11.5)	

Proportions presented as N (% , 95% CI)

GEE=Generalised Estimating Equation

CCT=Care Coordination Team

SD=Standard Deviation

Table 4: Triage and admission trends over time for patients 65 years and older.

Year		2004	2006	2007	2008	2009 (Jan to Sept)
Patients 65 Years and Over Attending ED* ATS, N (% , 95% CI)	1 Resuscitation	262 (2.0, 1.8-2.3)	306 (2.0, 1.8-2.2)	362 (2.3, 2.1-2.5)	344 (2.2, 2.0-2.5)	287 (2.4, 2.1-2.7)
	2 Emergency	3198 (24.2, 23.5-25.0)	3752 (24.5, 23.8-25.2)	4112 (25.8, 25.1-26.5)	4223 (27.3, 26.6-28.1)	3436 (28.4, 27.6-29.2)
	3 Urgent	5586 (42.3, 41.4-43.1)	6282 (41.0, 40.2-41.8)	6381 (40.1, 39.3-40.8)	6345 (41.1, 40.4-41.9)	5424 (44.9, 44.0-45.8)
	4 Semi-Urgent	3902 (29.5, 28.8-30.3)	4761 (31.1, 30.4-31.9)	4828 (30.3, 29.6-31.1)	4333 (28.1, 23.4-28.8)	2820 (23.4, 22.6-24.1)
	5 Non-Urgent	257 (2.0, 1.2-2.2)	211 (1.4, 1.2-1.6)	240 (1.5, 1.3-1.7)	191 (1.2, 1.1-1.4)	115 (1.0, 0.8-1.2)
	Total	13205 (100)	15312 (100)	15923 (100)	15436 (100)	12082 (100)
Patients Admitted from ED* ATS, N (% , 95% CI)	1 Resuscitation	245 (92.8, 89.0-95.3)	271 (88.3, 84.2-91.4)	322 (89.0, 85.3-91.8)	314 (91.3, 87.8-93.8)	269 (93.1, 89.6-95.5)
	2 Emergency	2349 (73.4, 71.8-74.9)	2653 (70.6, 69.2-72.1)	2855 (69.3, 67.9-70.7)	3197(75.6, 74.3-76.9)	2609 (75.8, 74.3-77.2)
	3 Urgent	3901 (69.8, 68.6-71.0)	4256 (67.6, 66.4-68.8)	4215 (65.9, 64.8-67.1)	4375 (68.8, 67.6-69.9)	3678 (67.6, 66.3-68.8)
	4 Semi-Urgent	2054 (52.6, 51.0-54.2)	2292 (48.0, 46.6-49.4)	2232 (46.1, 44.7-47.5)	2111 (48.6, 47.1-50.1)	1330 (47.0, 45.2-48.9)
	5 Non-Urgent	82 (31.7, 26.3-37.6)	36 (17.0, 12.5-22.6)	56 (23.1, 18.3-28.9)	63 (33.0, 26.7-40.0)	20 (17.2, 11.5-25.1)
	Total	8631 (65.3, 64.5-66.1)	9508 (62.0, 61.2-62.7)	9680 (60.7, 59.9-61.4)	10060 (65.1, 64.3-65.8)	7906 (65.2, 64.6-66.1)
All Fall Presentations* ATS, N (% , 95% CI)	1 Resuscitation	5 (0.2, 0.1-0.5)	14 (0.5, 0.3-0.8)	12 (0.4, 0.2-0.7)	20 (0.7, 0.5-1.1)	14 (0.6, 0.4-1.0)
	2 Emergency	153 (6.9, 6.0-8.1)	183 (6.7, 5.8-7.7)	201 (7.0, 6.2-8.0)	234 (8.4, 7.4-9.4)	253 (11.2, 9.9-12.5)
	3 Urgent	1009 (45.7, 43.6-47.8)	1301 (47.2, 45.4-49.1)	1267 (44.4, 42.6-46.3)	1407 (50.3, 48.4-52.2)	1221 (53.9, 51.9-56.0)
	4 Semi-Urgent	1006 (45.6, 43.6-47.7)	1229 (44.6, 42.8-46.5)	1336 (46.9, 45.1-48.7)	1119 (40.0, 38.2-41.9)	763 (33.7, 31.8-35.7)
	5 Non-Urgent	33 (1.5, 1.1-2.1)	25 (0.9, 0.6-1.4)	34 (1.2, 0.8-1.7)	18 (0.4, 0.38-0.42)	13 (0.6, 0.3-1.0)
	Total	2206 (100)	2752 (100)	2850 (100)	2798 (100)	2264 (100)
Fall Presentations Referred to CCT* ATS, N (% , 95% CI)	1 Resuscitation		2 (0.1, 0-0.5)	2 (0.1, 0-0.5)	1 (0.1, 0.1-0.4)	0 (0.0, 0-0.4)
	2 Emergency		51 (3.3, 2.5-4.3)	53 (3.9, 3.0-5.1)	67 (5.2, 4.1-6.5)	61 (6.2, 4.9-7.9)
	3 Urgent		658 (42.8, 40.4-45.3)	520 (38.3, 35.8-41.0)	581 (45.2, 42.5-47.9)	490 (50.2, 47.1-53.3)
	4 Semi-Urgent		815 (53.0, 50.5-55.5)	766 (56.6, 53.9-59.2)	631 (49.0, 46.3-51.8)	420 (43.0, 40.0-46.2)
	5 Non-Urgent		11 (0.7, 0.4-1.3)	14 (1.0, 0.6-1.7)	7 (0.5, 0.3-1.1)	5 (0.5, 0.2-1.2)
	Total		1537 (55.8, 53.9-57.6)	1355 (47.5, 45.7-49.4)	1287 (46.0, 44.2-47.8)	976 (43.1, 41.1-45.2)
All Fallers Referred to CCT Admitted* ATS, N (% Referred, 95% CI)	1 Resuscitation		0 (0.0, 0-0.4)	0 (50.0, 9.5-90.5)	1 (100.0, 20.7-100.0)	0 (0.0, 0-0.8)
	2 Emergency		31 (78.4, 65.4-87.5)	29 (69.8, 56.5-80.5)	47 (83.6, 72.9-90.6)	37 (72.0, 59.8-81.8)
	3 Urgent		391 (72.5, 69.0-75.8)	281 (65.2, 61.0-69.2)	342 (66.8, 62.9-70.5)	264 (69.4, 65.7-73.8)
	4 Semi-Urgent		385 (59.6, 56.2-62.9)	326 (53.7, 50.2-57.2)	303 (57.0, 53.1-60.8)	169 (57.2, 52.5-61.9)
	5 Non-Urgent		6 (54.5, 28.0-78.7)	4 (35.7, 16.3-61.2)	1 (28.6, 8.2-64.1)	2 (40.0, 11.8-76.9)
	Total		813 (65.6, 63.2-68.0)	640 (58.6, 55.9-61.2)	694 (62.7, 60.0-65.3)	472 (64.4, 61.4-67.4)
All Fallers Not Referred to CCT Admitted*	1 Resuscitation		10 (91.7, 64.6-98.5)	8 (90.0, 50.6-98.2)	18 (100.0, 83.2-100.0)	14 (100.0, 78.5-100.0)

ATS, N (% Not Referred, 95% CI)	2 Emergency	113 (87.3, 80.6-91.9)	131 (90.5, 84.8-94.3)	142 (86.8, 80.9-91.1)	169 (92.7, 88.1-95.6)
	3 Urgent	535 (85.7, 82.8-88.2)	574 (78.6, 75.5-81.4)	655 (79.7, 76.8-82.3)	569 (82.5, 79.6-85.1)
	4 Semi-Urgent	205 (52.4, 47.2-56.8)	265 (49.0, 45.0-53.1)	250 (53.4, 48.9-57.8)	290 (58.4, 53.2-63.5)
	5 Non-Urgent	0 (6.7, 1.2-29.8)	4 (20.0, 8.1-41.6)	7 (63.6, 35.4-84.8)	2 (25.0, 7.2-59.1)
	Total	863 (73.6, 71.1-76.0)	982 (67.8, 65.4-70.1)	1072 (72.1, 69.8-74.3)	944 (77.4, 75.1-79.6)

* p<0.05

Proportions presented as N (% , 95% CI)

ATS Australasian Triage Score

ED Emergency Department

CCT Care Coordination Team

Table 5: Representations and readmissions 2004 to 2009: Raw data of index cases

Year	Representations						Readmissions					
	N (index presentations)	Total N (% , 95% CI)	Referred to CCT	Not Referred to CCT	Rate Ratio (95% CI)	P	Total	Referred to CCT	Not Referred to CCT	Rate Ratio (95% CI)	P	
2004	643	52 (8.1, 6.1-10.5)					40 (6.2, 4.5-8.4)					
2006	826	52 (6.3, 4.7-8.2)	34/468 (7.3, 5.1-10.0)	18/358 (5.0, 3.0-7.8)	1.46	0.12	39 (4.7, 3.4-6.4)	26/468 (5.6, 3.7-8.1)	13/358 (3.6, 1.9-6.1)	1.56	0.13	
2007	1007	55 (5.5, 4.2-7.1)	34/542 (6.3, 4.4-8.7)	21/465 (4.5, 2.8-6.8)	1.4	0.14	35 (3.5, 2.5-4.8)	22/542 (4.1, 2.6-6.1)	13/465 (2.8, 1.5-4.7)	1.46	0.18	
2008	886	38 (4.3, 3.1-5.9)	22/472 (4.7, 3.0-7.0)	16/414 (3.9, 2.3-6.2)	1.26	0.34	27 (3.0, 2.0-4.4)	17/472 (3.6, 2.1-5.7)	10/414 (2.4, 1.2-4.4)	1.50	0.20	
2009 (Jan-Sept)	627	29 (4.6, 3.1-6.5)	16/345 (4.6, 2.6-7.4)	13/282 (4.6, 2.5-7.7)	1.00	0.57	22 (3.5, 2.2-5.2)	12/345 (3.5, 1.8-6.0)	10/282 (3.5, 1.7-6.4)	1.00	0.56	

Proportions presented as N (% , 95% CI)
 CCT=Care Coordination Team

Table 6: Representations and readmissions 2006-2009: Regression modeling of all falls cases

Variable of Interest	Representation			Readmission			
	Odds Ratio	95% CI	P	Odds Ratio	95% CI	P	
Referred to CCT	2006	1.23	0.55-2.77	0.62	2.21	0.77-4.72	0.16
	2007	1.42	0.78-2.57	0.25	1.68	0.78-3.64	0.18
	2008	1.12	0.58-2.17	0.74	1.38	0.56-3.38	0.48
	2009	0.78	0.34-1.77	0.55	0.78	0.30-2.03	0.61
	All Years	1.18	0.85-1.64	0.32	1.47	0.96-2.24	0.80
Age	1.01	0.99-1.03	0.31	1.02	0.99-1.04	0.24	
Female	0.85	0.62-1.17	0.32	0.90	0.60-1.37	0.90	
Arrival by Ambulance	1.21	0.84-1.74	0.31	1.67	1.03-2.69	0.04	
Nursing Home Resident	1.00	0.66-1.53	0.98	1.04	0.63-1.72	0.88	
Triage Category	0.95	0.71-1.26	0.73	0.95	0.69-1.31	0.77	
Socio-economic Index	0.92	0.77-1.09	0.32	0.97	0.79-1.18	0.75	
Previous Falls	1.10	0.84-1.45	0.49	1.33	1.01-1.75	0.04	

CCT=Care Coordination Team