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Evaluating the impact of a falls prevention community of practice in a residential aged care organisation

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Chapter

7

Chapter 7:

Evaluating the Impact of Operating a Falls Prevention Community of Practice on Falls in a Residential Aged Care Setting

Preface

This chapter describes Phase 3 (Study 4) of the research that evaluated the impact of the CoP on falls and injurious falls. This research was undertaken in tandem with the evaluation of CoP impact in translating falls prevention evidence into practice as described in Study 3 (Chapter 6).

The chapter is based on a manuscript accepted for publication and was also presented at the 7th Biennial Australian and New Zealand Falls Prevention Conference 2016 (Melbourne, Australia) titled:

Francis-Coad J., Haines T., Etherton-Beer C., Nobre D., & Hill A-M. (in press). Evaluating the impact of operating a falls prevention community of practice on falls in a residential aged care setting. *Journal of Clinical Gerontology and Geriatrics*

The author's version of the manuscript is presented with modifications to suit the style and format of this thesis.

7.1 Abstract

Background

A model with the capacity to bring organisational staff together in a manner that can facilitate changes at multiple levels is a CoP. The aim of this study was to investigate the impact of a falls prevention CoP, acting at multiple levels of a RAC organisation on falls rates and injurious falls (resulting in fracture) rates.

Methods

A prospective quasi-experimental pre/post design was undertaken. Thirteen RAC sites (779 beds) participated, with 20 multidisciplinary staff volunteering as CoP members.

Results

Falls rates pre CoP operation were 10.1/1000 occupied bed days (OBD) compared with 10.9 /1000 OBD post CoP operation [coefficient 0.7, 95% CI (-33.5, 34.9) p = .967]. This was confounded by an increased use of beds for short stay transition care services and identified differences in defining falls between sites. The rate of injurious falls resulting in fractures pre CoP was 0.2/1000 OBD compared with 0.1/1000 OBD post CoP; [coefficient -0.3, 95% CI (-1.1, 0.4) p = .423].

Conclusion

A falls prevention CoP delivering evidence-based interventions for 18 months was unable to reduce falls rates in that time frame but there was a trend to a reduction in falls resulting in fracture. Additional time for implementation and evaluation of falls prevention interventions will be required in complex settings such as RAC organisations. Valid comparisons of falls rates and injurious falls rates within the RAC population require the adoption of standardised definitions to improve reporting reliability.

7.2 Introduction

Falls are a leading adverse event in the RAC sector with reported rates ranging between 3-13 falls per 1000 occupied bed days (OBD) (Morley, Rolland, Tolson, & Vellas, 2012; Oliver et al., 2007; Rapp, Becker, Cameron, König, & Büchele, 2012). Highly prevalent disability (81.3%) and cognitive impairment (68%) (Onder et al., 2012) put this vulnerable population at high risk of falls with 50% of residents sustaining a fall within the first year of admission and 25-30% sustaining a physical injury (Burland, Martens, Brownell, Doupe, & Fuchs, 2013; Oliver et al., 2007). Australian national data demonstrate that approximately 27% of all hospital admissions for falls related injury for people aged 65 years and over were coded as being from RAC facilities (Bradley, 2013), even though older people living in RAC comprise only 6% of the total older population (Australian Institute of Health and Welfare, 2012).

The consequences of falls have a negative impact on the RAC sector at a number of levels: for the older person physical and psychological trauma can result in loss of independence and confidence that negatively impact their quality of life (Oliver et al., 2007), for RAC facilities the additional burden of care has to be accommodated (Becker & Rapp, 2010; Oliver et al., 2007) and at the health care systems level there is the financial burden with cost of a single fall in RAC conservatively estimated at $1887 AUD (Haines et al., 2013).

A limited number of studies have addressed falls prevention in the RAC population with two meta analyses presenting different key findings; the first meta-analysis of five trials found that a single intervention of supplementing residents with low vitamin D levels reduced the rate of falls by 37%, 95% CI (0.46-0.86) but not the risk of falling. Authors also suggested that multifactorial interventions could be effective but that evidence was inconclusive (Cameron et al., 2012). The second more recent meta-analysis included trials where settings consisted of nursing homes with only care-dependent residents. Meta-analysis of four trials found that multifactorial interventions significantly reduced falls by 33% as well as reducing the number of recurrent fallers by 21%, 95% CI (0.65–0.97) (Vlaeyen et al., 2015).

National guidelines (Australian Commission on Safety and Quality in Healthcare, 2009; Panel on Prevention of Falls in Older Persons, American Geriatrics

Society & British Geriatric Society, 2011) and falls researchers recommend that RAC facilities implement multifactorial interventions, which should be translated into practice by a multidisciplinary team, to improve falls outcomes (Quigley et al., 2010; Vlaeyen et al., 2015). Additionally, findings from a critical literature review by Quigley et al. (2010) propose that the testing of future research models include falls and falls injury prevention interventions delivered at resident, unit (site) and organisation levels. A sub-group analysis of three studies conducted as part of the meta-analysis in the present research (described in Chapter 2) found that delivering falls prevention interventions at two or three levels supported by added resources, reduced falls rates. One model with the capacity to bring organisational staff together in a manner that can facilitate changes at multiple levels is a CoP (Francis-Coad, Etherton-Beer, Bulsara, Nobre, & Hill, 2015; Ranmuthugala, Cunningham, et al., 2011) this could enable multifactorial interventions are able to be successfully delivered by a RAC organisation. CoPs also have the capacity to be sustainable as they allow diversification of membership and expertise, thus enabling multifactorial problems to be addressed from a range of perspectives and solutions actioned (Ranmuthugala, Plumb, et al., 2011), especially where executing multi level changes is likely to take considerable time (Quigley et al., 2010; Vlaeyen et al., 2015). To our knowledge there are no studies examining the impact of a CoP on falls prevention outcomes across a RAC organisation. Our study aimed to investigate the impact of a falls prevention CoP, acting at multiple levels of a RAC organisation on falls rates and injurious falls (resulting in fracture) rates.

7.3 Methods

7.3.1 Study Design

A prospective quasi-experimental pre–post design was undertaken. This study represented the final phase of the present research (research methods described in Chapter 3) that aimed to evaluate the impact of a falls prevention CoP at membership, site and organisation levels (as described in Chapter 6).

7.3.2 Participants and Setting

A 779 bed RAC provider organisation with 13 geographically diverse RAC sites designated as providing general aged care and respite care participated. Two of

these sites provided transition care, which is a short stay service designed to facilitate the transition of an older person from the acute care (hospital) sector to community settings (Gray et al., 2012). Four sites also provided care for residents with complex disabilities, such as those with dementia exhibiting high levels of behavioural and psychological symptoms, Huntington's chorea and older residents with acquired brain injury. The RAC organisation employed approximately 1185 full and part time care staff.

7.3.3 Intervention

A falls prevention CoP was established, piloted and then operationalised across the RAC organisation as described in Chapter 4 (Francis-Coad, Etherton-Beer, Bulsara, Nobre, & Hill, 2016a). Members of the CoP (n = 20) who were drawn from the RAC staff represented all 13 sites. The CoP met face to face three to four times annually, interacted in 11 web-based discussion forums supported by frequent email contact, to lead falls prevention audits and intervention implementation at their RAC sites. Falls prevention activities prioritised by the CoP (Francis-Coad, Etherton-Beer, Bulsara, Nobre, & Hill, 2016b), which were all directed towards translating falls prevention evidence into practice, have been described in Chapter 6.

7.3.4 Outcome Measures

The outcome measures prospectively defined were resident rate of falls per 1000 occupied bed days, resident rate of injurious falls resulting in fracture per 1000 occupied bed days and the proportion of residents who fell one or more times during the study observation period. These outcomes are recommended for use by falls researchers (Cameron et al., 2012) in consensus with falls research guidelines (Lamb, Jørstad-Stein, Hauer, & Becker, 2005). Occupied bed days (calculated using the site census) represented the denominator and number of falls the numerator multiplied by 1000.

A fall was defined by the researchers as any event recorded in the electronic clinical incident system as a fall. All falls recorded in the electronic system during the study observation period were included in the falls outcome data set. The organisation had no pre-determined fall definition in their policy, but all sites followed a pre-determined organisation procedure that instructed them to report falls into the electronic system. There

was no organisation wide injurious fall classification. An injurious fall was defined as an event recorded in the electronic clinical incident system classified as resulting in a fracture. All injurious falls resulting in fractures were also recorded in a separate section of the clinical incident reporting system, as they all resulted in the resident being transferred to hospital. This allowed them to be reliably identified in the electronic system. A person who fell was defined as a resident who was recorded in the organisation's electronic clinical incident reporting system as sustaining one or more falls during the study observation period of three years. Electronic falls data records from each RAC site were combined at organisational level.

7.3.5 Procedure

The study periods for establishing and operating the CoP are shown in Table 7.1, each period lasted six months. The control period of the trial, period one and two, provided 12 months data prior to the CoP becoming operational (2014). During period three the CoP met via web-based discussions supported by face to face meetings to plan and conduct a falls prevention audit identifying gaps in practice as previously described in Chapter 5 (Francis-Coad et al., 2016b). In periods four, five and six the CoP developed and implemented falls prevention activities, as described previously in Chapter 6, where the CoP determined the timing and type of interventions that occurred (see Table 7.1).

Table 7.1 Periods of The Trial and The Establishment of The Falls Prevention Community of Practice.

Six monthly measurement periods	CoP activity at RAC site level	CoP activity at RAC organisational level
1 (Jan 2013 - Jun 2013)	Pre CoP establishment	Pre CoP establishment
2 (Jul 2013 – Dec 2013)		Establishment of the CoP. Testing feasibility of operating a CoP using ICT
3 (Jan 2014 - Jun 2014)	CoP preparation and conduction of falls prevention clinical audit across all sites.	CoP official launch and commencement of operation
4 (Jul 2014 – Dec 2014)	Differences in falls reporting across sites identified. Interventions planned as priority implementation (post audit)	Clarifying what constitutes a fall, definition implemented. New falls policy and risk assessment discussed with stakeholder groups. CoP educational newsletter implemented
5 (Jan 2015 - Jun 2015)	Vitamin D supplementation promoted, care staff and residents surveyed re falls prevention education needs	New falls prevention policy and risk assessment (with aligned management plan) iteratively drafted.
6 (Jul 2015 – Dec 2015)	Revised risk assessment (with aligned management plan) piloted. Staff and resident falls prevention poster checklist developed.	New injurious falls classification reporting implemented Aug 2015. New falls prevention policy made available online

7.3.6 Ethical Considerations

Ethical approval for the study was obtained from the University of Notre Dame Australia Human Research Ethics Committee (Ref. no. 013145F). The board of the RAC organisation also approved the study. All CoP members and staff provided written consent to participate.

7.3.7 Statistical Analysis

The demographic characteristics of the 13 sites and of the residents present at any site during one or more of the six periods of the study were summarised using

descriptive statistics. The proportion of residents who fell during the study was calculated by finding the percentage of residents who fell one or more times, out of the total number of residents present for one or more days at any site. The falls rates and fracture rates for each period of the study were calculated by dividing the number of falls or fractures during each period of the study by the number of occupied bed days for that period. Site rates of falls were also calculated using the same approach.

Mixed-effects, multilevel, linear regression using site as a random effect and pre versus post intervention periods as a fixed effect was used to compare the rates of falls between these periods. One summative data point for each outcome was considered for each site at each period time point in these analyses. A Gaussian distribution was employed for these analyses as the summative falls data of this nature reflected a normal distribution rather than the negative binomial distribution conventionally used in patient-level analyses. The pre-intervention period was considered to include periods one and two, while the post-intervention period included periods four, five and six. Period three falls data were not included in these analyses as they were treated as an 'intervention wash-in' effect period. All analyses were adjusted for the mean age of residents present at each site during each period and the proportion of residents present at each site during each period with cognitive impairment as fixed effects. Results were presented using coefficients and 95% confidence intervals with an alpha of <.05 considered significant.

We further explored a site-by-intervention interaction effect to examine possible treatment effect heterogeneity. The effect of the intervention at each site was examined individually by including a site (random) by intervention (fixed) interaction effect in the analyses. We then extracted the best linear unbiased predictor of this effect at each site and presented these with 90% confidence intervals given the reduced statistical power of interaction effects. All statistical analyses were completed using Stata 14 (Stata SES Texas).

7.3.8 Protocol Amendments

It was planned to adjust analyses for residents' level of care as classified by the Australian Government aged care funding instrument care rating, however this adjustment was not completed. This measure did not remain stable during the periods of the study, as residents were re-classified more than once and within each resident care

rating multiple individual changes to some items meant that the overall classification changed during more than one period of the study. We did not pursue analyses investigating the impact of the intervention on the percentage of residents who had a fall during each time period. This was because of variation in the number of beds being allocated to transition or respite care over the follow-up. An increase in these beds accompanied by rapid turn-over of residents using them increases the denominator when examining the percentage of residents who fall, giving the appearance of a decrease in this outcome. So we instead focused analyses on the rate of falls per 1000 occupied beds days that was not affected by these changes in the same way.

7.4 Results

There were 3819 admissions during the research period of which 3015 were unique admissions and 804 were multiple admissions. The mean age of residents on admission across all sites was 80.8 years (*SD* 10.4). There were 1293 (42.9%) males and 1708 (56.7%) females (data were missing for 14 residents). The mean length of stay was 433.2 days (*SD* 850.5 days), while the median length of stay was 57 days (IQR 19-387). There were 2680 (70.1%) admissions where the older person was resident at a site for six months or less and 738 (19.3%) admissions where the older person was resident for longer than two years. The demographic characteristics of the residents by site and of the sites is presented in Table 7.2.

Table 7.2 Demographic Characteristics of the RAC Sites.

Site	Number of beds	Admission Type, *n*= 3819	Proportion of residents with cognitive impairment (%)	Mean Age (years)	LOS, days, median (range)
1	60	GAC 79	56.9	81.3	41 (1-5421)
		TC 548			
		RC 10			
2	33	GAC 50	50.5	85.9	14 (1-3575)
		RC 85			
3	30	GAC 50	61.2	82.4	1124 (4-4429)
		RC 1			
4	20	GAC 35	58.3	86.9	957 (25-5430)
		RC 2			

Site	Number of beds	Admission Type, *n*= 3819	Proportion of residents with cognitive impairment (%)	Mean Age (years)	LOS, days, median (range)
5	64	GAC 40	58.7	81.8	41 (1-3318)
		TC 1251			
		RC 54			
6	110	GAC 237	62.6	81.8	132 (3-4199)
		RC 165			
7	62	GAC 117	59.6	74.6	207 (1-7176)
		RC 69			
8	61	GAC 120	72.6	74.8	579 (2-5869)
		RC 10			
9	50	GAC 97	83.9	78.7	834 (14-5862)
10	30	GAC 51	67.3	77.0	1109 (1-4392)
		RC 2			
11	131	GAC 278	66.7	82.0	360 (1-3768)
		RC 92			
12	61	GAC 119	81.4	74.8	162.5 (1-5645)
		RC 71			
13	65	GAC 119	98.9	75.7	335 (1-4439)
		RC 67			

Notes. GAC = General aged care, TC = Transition care, RC = Respite care, LOS = Length of stay

There were 10763 falls and 137 fractures across all 13 sites during the three years (control and intervention periods) of the study. There were 1432 (47.5%) residents who fell during the study period. Of those, 476 (33.2%) sustained a single fall whilst 956 (66.8%) had more than one fall (range 2-193 falls). Two hundred and fourteen residents sustained two falls, 142 sustained three falls, 101 sustained four falls, 378 sustained between 5-18 falls and 121 residents sustained between 19-193 falls. Falls outcomes are presented in Table 7.3 and falls rates across all 13 sites over each period are presented in Figure 7.1.

Table 7.3 Falls Outcomes Pre and Post Operationalisation of the CoP.

Site	Periods Pre CoP - Post CoP	Falls, *n*=10763	Fractures *n*=137
1	1-3	188	2
	4-6	283	5
2	1-3	84	4
	4-6	122	4
3	1-3	120	1
	4-6	86	4
4	1-3	58	1
	4-6	63	1
5	1-3	476	12
	4-6	538	4
6	1-3	848	18
	4-6	577	5
7	1-3	184	1
	4-6	436	4
8	1-3	253	4
	4-6	287	2
9	1-3	184	5
	4-6	206	2
10	1-3	143	8
	4-6	139	1
11	1-3	1853	6
	4-6	1167	13
12	1-3	430	5
	4-6	526	5
13	1-3	734	11
	4-6	778	9

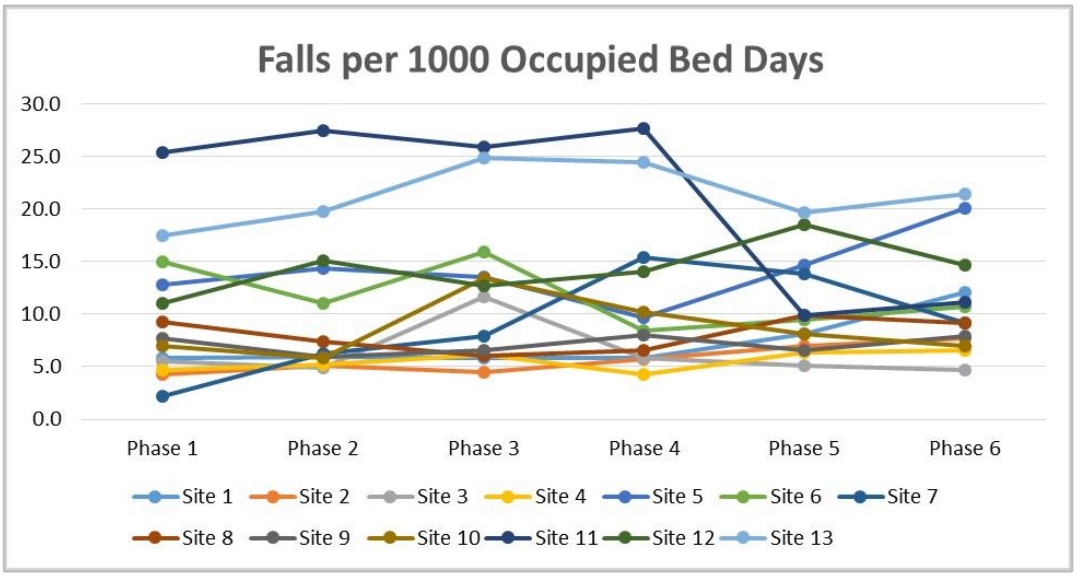

Figure 7.1 Falls Rates Measured Across Six Phases at All RAC Sites.

There was no significant difference in either rates of falls or fractures after the commencement of the CoP compared to the year prior to commencement, as shown in Table 7.4.

Table 7.4 Comparison of Falls Outcomes Pre and Post Operationalisation of the CoP.

Rate	Outcome	Coefficient, (95% CI), p value[a]
Falls rates, Pre CoP/post CoP, falls/1000 bed days[b]	10.1 / 10.9	0.7, (-33.4, 34.9), 0.967
Fracture rates, Pre CoP/ post CoP, falls/ 1000 bed days[b]	0.2 / 0.1	-0.3, (-1.1, 0.4), 0.423

[a] all analyses adjusted for age and presence of cognitive impairment, [b] comparing periods one and two with periods four, five and six

The site level effect estimates demonstrated there were no significant differences in the falls rates across the different sites. The best linear unbiased predictors for each site are presented in Figure 7.2.

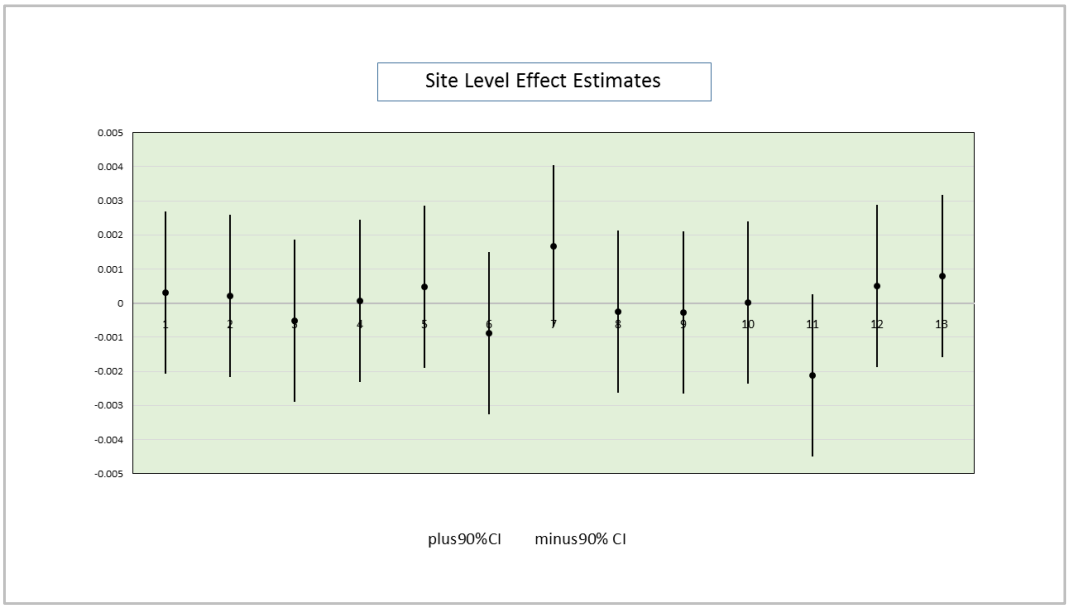

Figure 7.2 Best Linear Unbiased Predictors for Each RAC Site.

Visual inspection of these indicated the intervention may have been more effective at site 11, but this was not significant given the width of the 90% CIs.

The injurious falls data are presented in Table 7.5. For the first five periods of the study only falls that resulted in a fracture were required to be recorded as injurious, this meant 98% of falls were not classified as to whether they resulted in injury. At the commencement of study period six the organisation changed its reporting requirements so the 13 sites had to classify falls according to the level of injury sustained. During period six there were 27.98% of falls classified as causing injury.

Table 7.5 Classification of Injurious Falls Prior to and After Changes in Reporting Practice.

Classification	Periods 1-5, *n* (%)	Period 6, *n* (%)
Total falls (*10,763*)	9062	1701
Total fractures (*137*)	121(1.3%)	16 (0.9%)
Other injury	30 (0.3%)	not classified
Moderate injury	not classified	172 (10.1%)
Minor first aid	not classified	288 (16.9%)
No injury	24 (0.3%)	1206 (70.9%)
Not classified	8887 (98.1%)	19 (1.1%)

7.5 Discussion

The overall falls rate reported in our study was within the range of reported falls rates for RAC settings (Morley et al., 2012; Oliver et al., 2007; Rapp et al., 2012) however we did not demonstrate a significant difference in falls rates following the falls prevention CoP commencing operation. Like other studies delivering multifactorial interventions at multiple levels our falls rates trended upwards (Burland et al., 2013; Kerse, Butler, Robinson, & Todd, 2004). Our study showed rapid increases in the number of falls at sites one and five, this heterogeneity may be explained by the fact that these sites had converted to provide transition care services shortly after the research partnership commenced. Transition care services have a maximum stay of 12 weeks with an average stay of seven weeks (Gray et al., 2012) and hence these sites had considerably more admissions of older people not yet functionally recovered from acute care settings compared with than any other sites. Our study also showed a trend towards a reduction in injurious falls resulting in fracture as reported in a similar study by Becker et al. (2003), but as the overall number of fractures was small it is likely to have been similarly underpowered to show a significant difference. As the RAC organisation is now classifying four levels of injurious falls amalgamating them may provide larger sample sizes for future comparison.

We previously identified gaps in falls prevention policy, protocols and practice (previously reported in Chapter 5) for CoP attention (Francis-Coad et al., 2016b). However the pre-specified periods for CoP activity were found to be inadequate due to the unexpected need to extensively develop falls prevention policy and protocols prior to implementing interventions. A study reporting the potential of CoPs in nursing homes suggests allowing six months for implementation of an intervention but when development of an evidence–based protocol, such as falls prevention, is required a period of 18-36 months is necessary (Tolson et al., 2011), which we found was the case in our trial. A similar study in a RAC setting where RAC staff were participants in the process of implementing evidence-based interventions delivered the same finding that extra time was required (Nitz et al., 2012). This extensive time requirement limited the ability of the CoP to deliver more multifactorial interventions in the short term hence the true impact on falls outcomes is likely not fully evident and requires longer term follow up. Additionally, as CoP members (staff) had autonomy prioritising falls prevention

activity at their sites implementation impact was less uniform, as reported by a study similarly involving RAC staff in the research process (Nitz et al., 2012).

Falls reporting varied between RAC sites prior to the implementation of an organisation wide fall definition. Following implementation periods five and six showed the more uniform effect of standardised reporting on falls rates. A large proportion of falls were not classified as to whether they resulted in injury other than fracture until period six. Consistency in reporting falls is important (Lamb et al., 2005) particularly for RAC organisations choosing to make reliable site comparisons to learn from each other's practices.

7.5.1 Clinical Implications

As the RAC population continues to age and thus potentially acquire increased falls risk factors, a more realistic evaluation may be to focus on delivering a trend in fall reduction (Nitz et al., 2012) and injurious falls reduction, particularly fractures, as these are also more robustly measured, as suggested by other studies (Burland et al., 2013; Quigley et al., 2010).

Additional time for implementation and evaluation of falls prevention interventions will be required in complex settings such as RAC organisations. Sustainable models with flexibility are required to provide long term focus and follow up, as the constrained nature of the sector means that favourable outcomes delivered by external assistance, enabled through short term funding sources, is not able to be sustained (Capezuti, Taylor, Brown, Strothers, & Ouslander, 2007; Ray et al., 1997). We feel an operationalised CoP could offer this but more time investment is required so that falls outcomes can continue to be measured.

In the absence of a RAC industry wide adoption of a standardised fall definition and injury classification the accuracy of comparing injurious falls rates and injurious fall rates across the sector remains a challenge. Likewise the co-location of transition care services within RAC settings means that there is now another high risk sub-group of the population in this location, which could have different requirements for effective falls prevention.

7.5.2 Strengths and Limitations

This study used a quasi-experimental pre-post design to accommodate 13 RAC sites that were pre-existing populations all doing some falls prevention interventions prior to the trial commencing. It was problematic to use individual resident level data to ascertain the proportion of fallers, due to multiple admissions and discharges across the study period. Whilst this design does not have the rigour for generalisation provided by randomised controlled trials we, like Burland et al. (2013), felt this design provided a clear indication of intervention outcomes under "real world" conditions that are likely to be similar in other RAC settings.

We underestimated the requirement for longer term follow up on falls outcomes (falls rates and injurious falls rates). However it was difficult to plan for this prior to ascertaining the results of falls prevention site audits conducted following the commencement of the larger project (Francis-Coad et al., 2016b).

Changes in falls reporting during the trial is likely to have confounded fall rates as staff's clinical understanding of what constitutes a fall is likely to have influenced what events were actually recorded as falls. However the adoption of standardising falls reporting and classification (Lamb et al., 2005) is likely to rectify this in the longer term.

7.6 Conclusion

A falls prevention CoP operating across 13 RAC sites was unable to reduce falls rates or injurious falls rates after 18 months of operation, although a reduction in the number of injurious falls resulting in fracture was observed. The unexpected task of developing a falls prevention policy and protocols extended the implementation period and limited the delivery of evidence-based falls prevention interventions during this time. Measuring the effects of complex interventions in RAC settings when policy and protocols need development requires a far greater time investment. Changes to falls prevention reporting coupled with changes in bed type to provide transition care services are likely to have confounded falls rates. In addition to this, RAC sites had autonomy for prioritising the implementation of falls prevention interventions, which may explain some of the observed heterogeneity. However the falls prevention CoP was established as a sustainable way of actioning and evaluating falls prevention activity and will continue to measure falls outcomes into the future.

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