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Title

Can a web-based community of practice be established and operated to lead falls prevention activity in residential care?

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Abstract

The aims of this study were to evaluate establishing and operating a web-based community of practice (CoP) to lead falls prevention in a residential aged care (RAC) setting. A mixed methods evaluation was conducted in two phases using a survey and transcripts from interactive electronic sources. Nurses and allied health staff (n=20) with an interest in falls prevention representing 13 sites of a RAC organization participated. In Phase 1 the CoP was developed, and the establishment of its structure and composition was evaluated using determinants of success reported in the literature. In Phase 2 all participants interacted using the web, but frequency of engagement by any participant was low. Participatory barriers, including competing demands from other tasks and low levels of knowledge about information communication technology (ICT) applications, were identified by CoP members. A web-based CoP can be established and operated across multiple RAC sites if RAC management support dedicated time for web-based participation and staff are given web-based training.

Introduction

Falls are a major problem in residential aged care (RAC) with falls rates between 3-13 per 1000 bed days^{1,2} and 25-30% resulting in serious injuries, such as femoral fractures.^{3,4} Preventing resident falls in RAC organizations is complex as the population is old and frail and heavily reliant on clinical staff to provide personal assistance to maintain resident safety.^{4,5} Staff members therefore need to have the knowledge and skills to deliver evidence based falls prevention interventions to assist with resident safety.⁶ However it is uncertain if staff in RAC organizations possess these abilities as levels of training, skills and experience are varied.⁷ In addition there are fewer professional staff on duty simultaneously meaning they often work in isolation, so peer support and professional development opportunities through tacit learning are limited,^{6,8,9} particularly when individual RAC facilities making up an organization are geographically diverse. Thus finding pragmatic ways of getting staff together to share knowledge and ideas to lead falls prevention in RAC organizations requires an innovative solution.^{10,11}

One model with the potential characteristics to address such a problem is a community of practice (CoP); these have been emerging in the health sector as a resource for bringing together expertise, problem solving and actioning new policy and practice.^{10,12,13} A CoP is described as a group of people who share a concern regarding a common topic and interact on a frequent basis to deepen their knowledge and skills in the area of concern.^{14,15} As RAC facilities are often geographically diverse, staff time poor and funding limited, a CoP might be prohibited from meeting frequently enough face to face to have any impact on falls prevention practice.¹⁶ However CoPs are also able to operate virtually, therefore a web-based CoP may

enable staff to meet frequently, share ideas and lead falls prevention practice change without the costly need to leave their workplace. As many RAC organizations have invested in information and communication technologies (ICT) to enhance their operation a web-based CoP is potentially feasible. A CoP also requires leadership, in the form of its facilitator role, to promote and steer interaction and activity among its members.¹⁷ Multidisciplinary staff undertaking managerial duties within RAC settings have the potential to fulfill such a role. Providing the infrastructure to support web-based CoP activity, having the capacity to interact frequently and identifying a committed facilitator are all reported determinants of success for CoPs.^{10,13} However there is limited research that has explored the feasibility of establishing and operating a web-based falls prevention CoP across a RAC organization.

People are the fundamental component of a CoP, with the CoP model providing the opportunity to learn about falls prevention through web-based social interaction.^{15,16} However this would require members of a web-based CoP to engage with ICT to interact and learn from each other. Staff who work in Australian RAC settings have a median age of 48 years⁷ and consequently may not have had the same exposure to ICT compared with their younger peers.^{18,19} Therefore they may feel challenged in engaging with ICT, or be less familiar with a digital environment^{19,20} and may be required to adopt new behaviors to engage with ICT. Changing the behavior of an individual or group involves changing their capability, opportunity and/or motivation (COM) to engage in the new behavior (B); this has been conceptualized as the COM-B model.^{21,22} For example, capabilities to operate a web-based CoP would require staff to have a knowledge and understanding of ICT and be versed in its use. Opportunity may depend on access to computer hardware or software and time to engage with ICT, whilst motivation may depend on the individual's passion for

problem solving, learning and collaborating on the topic of falls prevention. It is not known if staff in a RAC setting have the capability, opportunity or motivation to establish and operate a web-based falls prevention CoP.

Therefore, the aims of the study were: firstly to describe the development and evaluate the establishment of a web-based CoP to lead falls prevention activity in a RAC organization; secondly, to explore CoP members' capability, confidence, opportunity and motivation to participate in web-based activity using the organization's intranet; thirdly, to identify barriers and facilitators for sustainable web-based CoP member participation.

Methods & Procedure

Study Design

A descriptive-explanatory mixed methods study was conducted in two phases.²³ During phase 1 the CoP was developed using RAC organizational and researcher input. In phase 2 the CoP was operationalized and members identified barriers and facilitators to sustainable participation. The study used a survey-based approach supported by prospective researcher observation journaling, stakeholder meeting minutes, emails and CoP electronic document transcripts. An overview of the study design is shown in Figure 1.

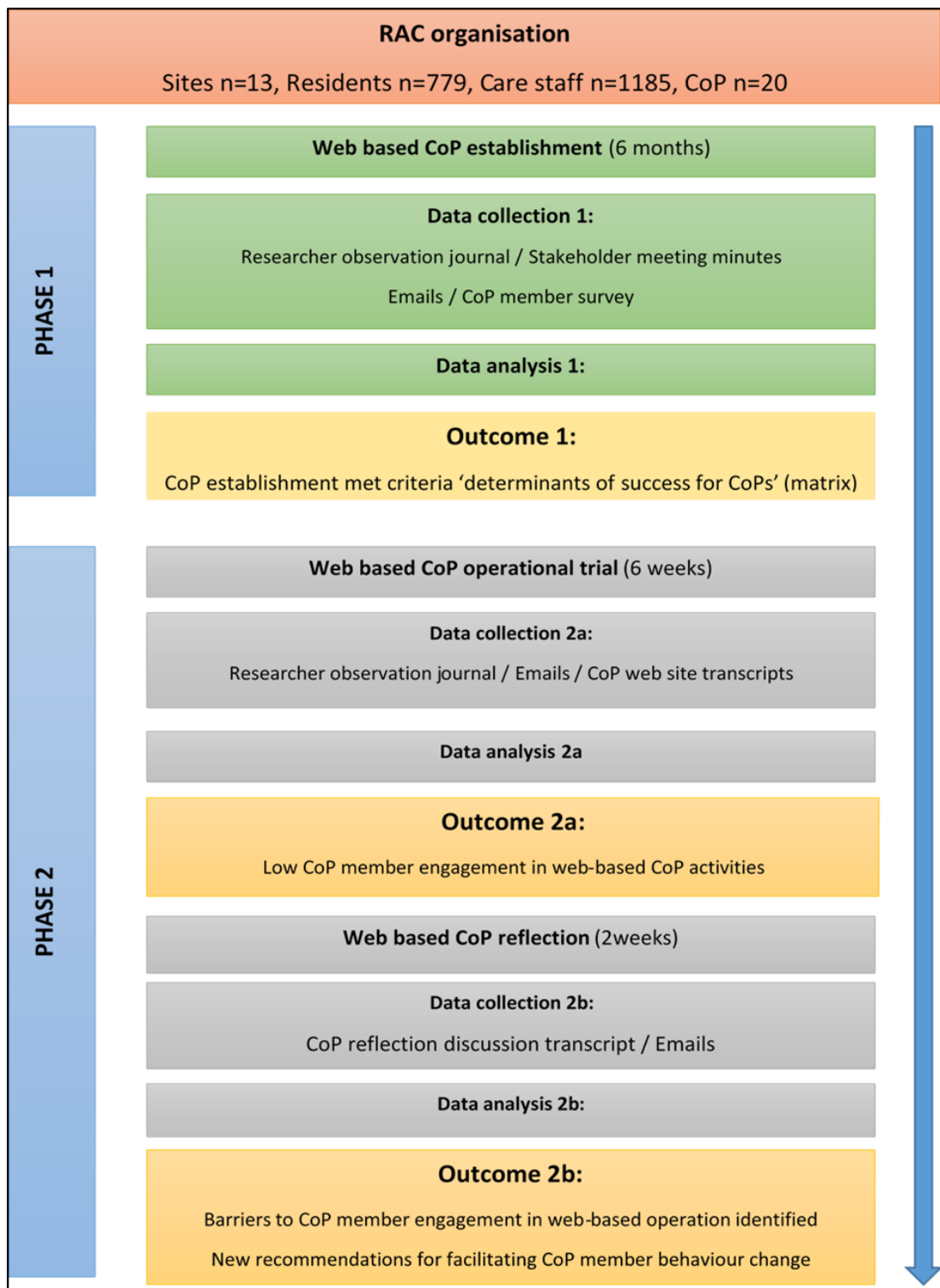


Figure 1. Study design overview

The study formed part of a larger project, which aimed to evaluate the impact of operating a web-based falls prevention CoP on falls outcomes in a RAC setting.²⁴ The larger project used a realist approach to evaluation,²⁵ which enables a comprehensive

understanding of complex interventions. As part of this approach, it was planned that actions of the CoP, as well as falls and injurious falls rates data, would be measured and analyzed.

Recruitment, Participants and Setting

The CoP partnered university researchers with 20 multidisciplinary staff, volunteering as members, representing each of the 13 geographically diverse sites belonging to a single RAC organization. The RAC organization provided care in a home-like environment for 779 older people with a mean age of 84 years. There were approximately 1185 full and part time care staff across the 13 RAC sites. Care assistants supervised by enrolled nurses, registered nurses, clinical nurse specialists and nurse practitioners provided most of the direct resident care. A care manager led each site and all sites had some allied health professional input.

Data Collection and Procedure

Phase 1

At the commencement of Phase 1 commitment to establish a web-based CoP was endorsed by the organization's CEO and general managers. Operation of the CoP was planned to be predominantly web-based to enable frequent web-based interaction, supplemented by three to four face to face meetings annually. A stakeholder steering committee was formed to commence the logistical development of the CoP. The steering committee, which comprised research and service provider representatives from nursing and allied health, based the development of the CoP on Wenger's three stages of CoP development¹⁵

- i. Potential: those with a common goal and passion to learn volunteered to be CoP members.

- ii. Coalescing: CoP members met and CoP purpose was negotiated.
- iii. Active: CoP members committed to sharing and collaborating on common goals and championing best practice at their sites.

It was envisaged that each site would be represented in the CoP membership. The organization elected their allied health consultant to the role of CoP facilitator because the scope of this liaison managerial position was perceived to be conducive to the CoP model. The researchers provided training for the CoP facilitator, following established CoP facilitator guidelines.¹⁷ All CoP members were invited to an initial face to face training session prior to the trial of the web-based CoP.

Data from three sources were collected during Phase 1 of the study:

- i) researcher journal observations
- ii) stakeholder steering committee meeting minutes
- iii) email communications between stakeholders.

Phase 2

In Phase 2 an invitation and a hyperlink to participate in a baseline survey was emailed to CoP members. The questionnaire, containing both open and closed (Likert scale) responses, was constructed with reference to the COM-B model of behavior change.²¹ Three independent clinical educators reviewed the questionnaire prior to piloting by four RAC staff members to determine content and face validity. The internal consistency of the questionnaire was determined using Cronbach's alpha where an alpha value >0.7 is deemed acceptable.²⁶ The CoP members' demographics, capability, confidence, opportunity and motivation in using ICT for interacting with other members were reported.

The web-based CoP was then operationalized and the ability of the CoP to function sustainably using the intranet was evaluated. The CoP members' interacted using the RAC organization's intranet over a six week trial period. Intranet was selected over Internet as all staff groups had authorized access. Operation was enabled using Microsoft Windows SharePoint Services (Version 3.0. Redmond, WA: Microsoft Corporation). A secure intranet webpage was designed for the falls prevention CoP as a repository for sharing information and asynchronous discussion. The trial activities were based around Wenger's 'active' stage of CoP development,¹⁵ commencing with an introductory activity of posting a brief social profile followed by an asynchronous discussion on a falls prevention related topic. Asynchronous posting allows a virtual discussion to take place at different points in time by reading and responding to prior participant posts. A goal of posting an asynchronous weekly comment during CoP members' usual working hours was planned by the researchers. Links to quality falls prevention evidence were placed on the webpage for review and discussion. The primary researcher was available to answer any queries along with access to the organization's ICT staff. Following the close of the operational trial CoP members were asked to reflect and comment on their participation and identify barriers or facilitators for engaging in sustainable web-based CoP activity. This final evaluation was completed over two weeks. Data from four sources were collected during Phase 2 of the study:

- i) survey of CoP members
- ii) researcher journal observations
- iii) intranet discussion transcripts
- iv) email communications.

Ethical considerations

Ethical approvals were obtained from the human research ethics committee of the University and the RAC organization. The CoP members were provided with both a verbal explanation and information sheet and all provided written consent to participate.

Data Analysis

Phase 1

Qualitative data from stakeholder meeting minutes, researcher journal observations and stakeholder emails were collected and transcribed. Two independent researchers read through all transcripts several times to become familiar with and make sense of the data.²⁷ Transcripts were analyzed using deductive content analysis, which uses previous knowledge around the research topic, when a theory is being tested.²⁸ The process of the CoP establishment was mapped against determinants of success for establishing CoP's in healthcare¹³ using a category matrix²⁸ to address the first study aim.

Phase 2

In Phase 2 quantitative questionnaire responses addressing CoP members' capability, confidence, and opportunity to interact using the organization's intranet platform were extracted into SPSS version 22 software package (IBM SPSS Inc., Chicago IL, USA) and summarized using descriptive statistics. Qualitative data from the questionnaire were analyzed using an inductive content analysis approach, as little was known regarding CoP member motivation to interact in a web-based environment.²⁸ Responses were organized using open coding, category creation and abstraction. Multiple categories were generated from the headings copied on to coding sheets, further grouping and collapsing followed to reduce the number of categories. The

abstraction process involved applying content-specific words to each category.

Subcategories with similarities were then described using a generic category and finally a main category²⁸ to address the second study aim.

Data from researcher journal observations, intranet discussion board transcripts and CoP member emails were collected and transcribed. After two researchers had read all transcripts thoroughly, data were subjected to deductive content analysis. In phase 2a frequency counts of individual CoP member postings were extracted from the intranet discussion board transcripts. In phase 2b a category matrix was designed²⁸ to address the third study aim of identifying barriers and facilitators for CoP members to engage in sustainable web-based participation.

Results

Phase 1

A total of 20 staff self-nominated for CoP membership representing all 13 RAC sites. The baseline profile of the CoP was 17 (85%) females 3 (15%) aged between 40-59 years of age. Eleven (55%) had completed a bachelor degree and 10 (50%) had more than six years' experience in their current job role. The membership included nurses, managers, physiotherapists and occupational therapists with 8 (40%) having a clinical background in nursing.

The CoP was established over a period of six months. The evaluation of the establishment of the web-based CoP demonstrated that it met with determinants of success for CoPs in healthcare identified from the literature, as shown in Table 1.

Table 1. Evaluation of the establishment of a web-based falls prevention CoP

Determinants of success for CoP's in healthcare	Identifying a committed facilitator	Having a shared purpose	Commitment and enthusiasm	Endorsement of the CoP from organisational management	Capacity for regular CoP member communication	Developing relationships with an initial face to face meeting	Infrastructure to support CoP activity
Evaluation evidence	Steering committee identified facilitator. 72 email exchanges between CoP facilitator and researcher drove logistics for establishment,	Reducing falls rates a priority for staff and organisation, <i>"Falls are our highest recorded clinical incident, we should improve</i>	Seven face to face stakeholder meetings and four presentations enabled CoP set up, <i>"I think we are moving closer to getting started which is exciting! Drafting an action</i>	Consent for study obtained from organisation's CEO and General Managers, <i>"have set a date for the official (CoP) launch as</i>	CoP members have computer access to intranet site, <i>"some of us share a computer as we work on different days but there's also a hot desk available"</i>	CoP members met at initial face to face training session and social lunch. Two additional face to face meetings scheduled in addition to web-	RAC organisation invested in intranet with plans for future upgrades. ICT support available, <i>"Test web page should be up</i>

<p><i>“It’s great to be involved in such a worthwhile project”</i></p>	<p><i>on that”. CoP members identified initial goal of auditing falls prevention activity at each site to identify gaps in practice for targeting.</i></p>	<p><i>plan and timeline will allow us to plan how to get all (RAC) sites on board,” CoP membership (n=20) self-nominated across 13 RAC sites</i></p>	<p><i>CEO is available and it’s during the care managers meeting”</i></p>	<p><i>based interactions, “It’s feasible to link face to face CoP meetings alongside current organisation meetings to save on cost”</i></p>	<p><i>and running by launch”</i></p>
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These included: organizational staff with an interest in falls prevention volunteered as members, they met face to face initially to negotiate their goals and committed to leading falls prevention best practice at their sites.

Phase 2

All 20 (100%) CoP members responded to the survey. The internal consistency for the questionnaire used to survey CoP members was acceptable ($\alpha = 0.83$). Twenty (100%) CoP members reported the most frequent electronic media they used for communication was email and only six (30%) had previously used a blog format. Self-rating of CoP members' capability, confidence and opportunity to participate in web-based activity using the intranet is shown in Table 2.

Table 2. CoP member capability and opportunity to participate in web-based activity

Item	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
Capability					
I use the intranet as part of my every day work practice	12 (60%)	4 (20%)	0	3 (15%)	1 (5%)
I am confident to use the intranet to communicate with other staff members	10 (50%)	9 (45%)	1 (5%)	0	0
I feel confident to use a blog for communicating with other CoP members	2 (10%)	8 (40%)	6 (30%)	3 (15%)	1 (5%)
Opportunity					
I have easy access to the	15 (75%)	5 (25%)	0	0	0

intranet at my work site.

I have time to use the intranet at 9 (45%) 7 (35%) 4 (20%) 0 0

my work site for CoP

participation.

The motivations of CoP members to participate in web-based CoP activity during operation were determined as personal, peer and resident driven and centered on the anticipated benefit of improving falls prevention management at their workplace, as shown in Figure 2.

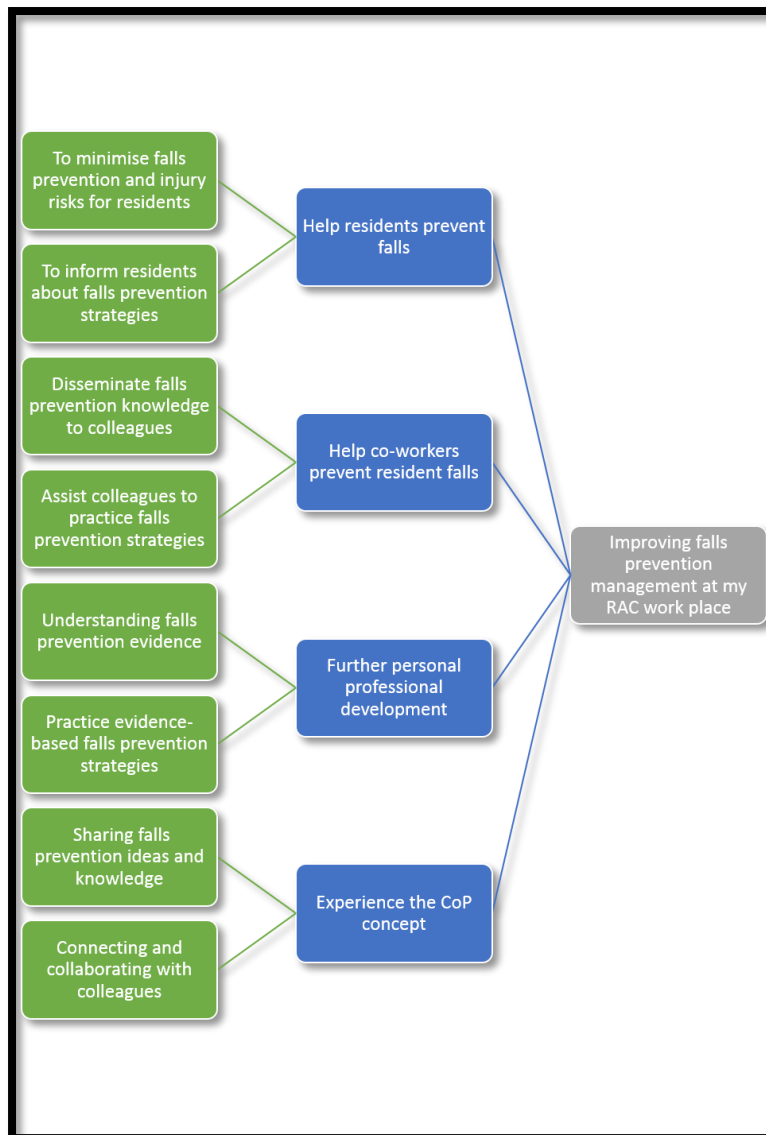


Figure 2. CoP members' motivation for web-based participation

Personal expressions of member's motivation to participate in a web-based CoP are shown in Table 3.

Table 3. Expressions of members' motivation to participate in a web-based CoP

Generic categories identified	Supporting quotations
To help residents prevent falls	P12 <i>"to manage falls prevention more effectively on site and reduce resident falls and injuries"</i>
To help co-workers in preventing resident falls	P8 <i>"to help our staff implement and embed improvements"</i>
To further personal professional development	P7 <i>"improve falls prevention knowledge and practice in ourselves"</i>
To experience the CoP concept	P7 <i>"to link with like-minded colleagues on common goals"</i>

Note. P = participating CoP member

Two (10%) CoP members who had not posted during the operational trial were followed up and offered assistance. It was identified they had been unable to attend the initial training session and were uncertain of how to participate in a web-based discussion. An interactive training session was provided on site for both CoP members to enable future participation. A training document describing the web-based participation process was also produced to assist members. This was made freely available on the RAC intranet.

Seven (35%) CoP members participated in the introductory web activity and posted a social profile. Eighteen (90%) CoP members communicated by posting asynchronously during the trial but none met the goal of posting a weekly comment. The highest frequency of virtual engagement (two posts, two article downloads) by any one CoP member was low.

CoP Facilitator: “some members are slow to respond to posts on discussion board, then it’s frustrating for others who have posted... you can’t move on”, “RAC culture involves more face to face communication so this web-based discussion could be out of their comfort zone”

Following the operational trial eight (40%) CoP members provided their reflections regarding barriers and facilitators for engaging in sustainable web-based participation. These are presented in Table 4. Barriers included challenges to building web-based rapport due to unfamiliarity with other members and competing priorities resulting in members forgetting to participate. Facilitators proposed to induce member behavior change included attaching member photos linked to web-based activity to build familiarity and rapport, with email alerts to prompt participation being the most frequent suggestion [n=3 (15%)]. The theoretical concepts for facilitating each new behavior change are also explained in Table 4¹⁷ with plans for adoption in ongoing CoP operation.

Table 4. CoP member identified barriers and facilitators to web-based participation with proposed behaviour change techniques

Barriers	Facilitators	Behaviour Change Technique	Explanation of BCT
Getting to know and recognise other CoP members by text was challenging and slowed building rapport, “ <i>you don’t know them and what site they are from</i> ”	Add member photographs to posts on discussion board, “ <i>Identification photo's for each member so they know who they are communicating with</i> ”	Adding objects to the environment	Add objects to the environment to facilitate performance of the behaviour
Not all CoP members able to attend face to face training ,-“ <i>I have no idea how to blog or what it is. I never use social media</i> ”	Easy to follow electronic training document (Welcome Pack) produced, “ <i>use screen shot steps on how to access the intranet, navigate our webpage and post on discussion board</i> ”	Instruction on how to perform the behaviour / Demonstration of the behaviour	Advise or agree on how to perform the behaviour Provide observable sample of performance of the behaviour, directly or indirectly eg. via pictures
CoP members asked to take on	Members receive a certificate of	Incentive outcome	Inform that a reward will be

added responsibilities without recognition, *“there’s no extra time for this but it has to fit in, it’s an important topic”*

participation or **CPD points** for incidences of web based CoP activity, *“It might be good to have something in recognition we were part of it (the CoP)”*

delivered if there’s been effort and progress in achieving the behavioural outcome

CoP members have **multiple demands** on their **time**, requiring attention away from computer. Resulted in **forgetting** to go to **intranet** webpage, *“You come in, quickly check emails then you have to get on with your work (clinical) so you put it off”*

Members receive **email reminder alert** when new activity on intranet webpage, drawing attention to **access webpage,** *“It’s there (email inbox) right in front of you on the screen when you log on”*

Prompts / Cues /Habit formation

Introduce environmental or social stimulus with the purpose of prompting or cueing the behaviour / Prompt rehearsal and repetition of alternative behaviour

Note. BCT = Behaviour change technique

Discussion

Establishment and operation of a CoP in a RAC setting

Establishing and operating a web-based falls prevention CoP across multiple RAC sites was achievable if sufficient staff time, training and support is allocated, although some barriers to sustainable operation were identified.

Attention to detail was undertaken when establishing the CoP by tailoring guidelines from the literature.^{12,15,17,29} Previous CoP studies have shown that lack of attention to detail can deliver poor outcomes¹⁴ and in the case of web-based health related CoPs there has been very little use of measurement.³⁰ The study measured the establishment of a web-based CoP by designing an evaluation matrix²⁸ using the broader determinants of success for healthcare CoPs identified from the literature.¹³ This is an important first step as several problems may arise, such as the creation of factions or silos that hamper knowledge sharing,³¹ if the structure and composition of a CoP does not enable its theoretical underpinnings. Previous systematic reviews have also identified that diversity in CoP structure makes them challenging to replicate and evaluate^{14,32} therefore using an evaluation matrix may assist in highlighting structural gaps, standardizing this process for future comparisons to be made.

CoP members' capability, confidence, opportunity and motivation

Taking on any new role, such as being a member of a web-based CoP, involves behavior change that requires capability, confidence, opportunity and motivation to engage in the new ICT behaviors.²¹ The CoP member survey findings showed members felt motivated to participate in the web-based CoP for their professional development and to help their co-workers and residents in preventing falls. All

(100%) were in agreement they had easy access to the intranet with 80% of CoP members reporting they already used it daily and perceived they had time to use it to participate. There was also high agreement (95%) in perceived member confidence to communicate with other members via the intranet. These findings suggested that the required levels of CoP member capability, confidence, opportunity and motivation were present to enable the new behavior of web-based participation as reported in studies describing behavior change.^{22,33} However member engagement with the ICT applications of asynchronous discussion and accessing evidence were low. Similarly Eley et al¹⁹ identified lower than expected levels of engagement with ICT amongst the nursing profession despite the prevalence of computer access. Access to web-based health care staff education in a community setting has been reported as positive due to the flexible, asynchronous format but engaging with the content was influenced by management support, access accountability and whether the web-based education program was integrated as on the job learning.³⁴ These findings indicate that further investigation is required to enable engagement in ICT applications with the potential to benefit healthcare outcomes.

Lessons learned - barriers and facilitators to web-based CoP operation

The final phase of this study identified barriers and facilitators to CoP member web-based participation. Although members initially reported they had time to participate in web-based activity (80%), CoP reflection identified a key barrier was competing demands from other clinical tasks away from the computer. This culminated in them forgetting to engage in CoP web-based activity, as experienced by other online CoPs in healthcare.^{18,30} Having an onscreen prompt of activity on the webpage via email alerts was suggested as a facilitator to improve participation.

Using unfamiliar ICT applications, such as navigating the route to the discussion board web page and posting was challenging for some CoP members, particularly those who were older. Having technology that was easy to use in a supportive environment³⁴ was paramount to the successful operation of a web-based CoP as reported by Barnett et al.³⁰ Over 60% of the CoP was aged between 40-59 years of age and reported less experience of ICT applications such as asynchronous learning pedagogy. This suggests a technology usability gap exists and more training and time may be required to enable ICT participation, as suggested by Eley et al¹⁹ to enable nurses to engage with ICT. A plan to facilitate CoP member participation by providing a procedural pictorial training document that can be accessed by all, as recommended by Kimball and Ladd,¹⁷ to assist members in using these ICT applications was undertaken.

Web-based interaction between CoP members requires them to build rapport and trust, which was challenging, as they didn't know many participants from other sites they were engaged with in discussion. Previous CoP studies have shown that building trust is an important pre-requisite for sharing ideas and information.^{13,17} Members suggested having photo identification attached to posts to enable them to recognize each other and feel safe to express their opinions, as this was a new way of building rapport and trust. Providing a familiar and safe web-based environment was identified by other studies for encouraging sharing amongst its CoP members.^{18,30}

Conclusion

A web-based falls prevention CoP was established across multiple sites of a RAC organization and was evaluated structurally as meeting determinants of success for CoPs in healthcare. Evaluation of web-based CoP operation identified members had

lower capabilities using ICT applications than expected and limited opportunity for web-based participation. The operation of a CoP could be facilitated if members are given web-based training and RAC management support dedicated time for web-based participation. This could enable CoP members to interact frequently to deliver beneficial healthcare outcomes.

Limitations

This study was conducted within a single organization and was of short duration. There was some reliance on member self-report in accessing items on the webpage however future RAC software upgrades will enable tracking of member web-based activity. The position of the researcher as a part of the CoP may have resulted in some bias, however this also enabled the necessary in depth understanding of CoP operation required for analysis.²⁷

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