Simulations in the Workplace: Integrating Technology into Health Care Aides' Workflow

Sharla King, Lili Liu, Eleni Stroulia and Ioanis Nikolaidis

University of Alberta/Faculty of Education, Edmonton, Canada

Abstract—**Health care aides (HCAs) are critical to home care, providing a range of services to people with chronic conditions, aging or are unable to care for themselves independently. The current HCA supply will not keep up with this increasing demand without fundamental changes in their work environment. One possible solution to some of the workflow challenges and workplace stress of HCAs is hand-held tablet technology. Workplace simulations were identified as a strategy in order to introduce the use of tablets with HCAs. A progressive approach was used to ensure comfort with the tablet was achieved before introducing a simulated client. The HCA interacted with the simulated client and used the tablet applications to assist with providing care. A mixed methods approach was used to determine the HCAs' perception and acceptance of the tablet. Workplace simulations were an effective approach to providing further training for HCAs to build their skills and buy-in to integrate ICT solutions into their workflow. Future deployment and implementation of technologies in home care should be further evaluated for outcomes.**

Index Terms—**information communication technologies, mobile devices.**

I. INTRODUCTION

Health care aides (HCAs) are critical for the delivery of home care and provide a range of services to people with age-related chronic conditions, or individuals unable to care for themselves independently. About 1.2 million Canadians, 65 years and older, use home-care services annually [1]. In both the US and Canada, the demand for HCA services is increasing dramatically due to the aging population [2]. However, the current HCA supply will not keep pace with this increasing demand without fundamental changes in their work environment. One possible solution to alleviate some of the workflow challenges and workplace stress of HCAs is information communication technology (ICT), or more specifically, hand-held mobile devices.

Amplifying this challenge is the fact that HCA training programs are brief (average 16 weeks) and continuing education opportunities are limited, as funding is often unavailable to allow the HCAs to participate.

Two fundamental hypothesis underlying this work were that: 1) HCAs would be more effective in their tasks and more satisfied with their careers if they had ICT support for their care-delivery activities, including their daily schedule, their clients' care plans, relevant knowledge at the point of care, and the ability to communicate with each other and the home office whenever they deemed it useful; 2) workplace simulations would be an effective training approach to build skill and confidence in HCAs to integrate technology into workflow.

II. PROJECT PHASES

The purpose of this project was to determine whether ICTs can address some of the workflow challenges HCAs face in Alberta, Canada. The study was conducted in three phases. Phase 1 involved an ethnographic study analyzing HCAs' workflows and team interactions. Based on the ethnographic study conducted in Phase 1, key workflow challenges were identified. Phase 2 involved consultations with service providers and expert groups to help identify potential uses of technology to resolve the issues identified in Phase 1. In addition, an ICT suite was designed that integrated 'off-the-shelf' and newly developed technologies to address the issues. Due to current health service policies, we could not measure the actual impact of these technologies in the actual practice, since the current scope of practice for HCAs prevents their deployment. Therefore, Phase 3 involved the development of simulations to determine the HCAs' receptivity to using a tablet and to gather HCAs' and additional health team members' feedback on the utilization of tablets to aide with care provision. This paper reports on Phase 3 of the project, the pilot testing of the simulation protocol and technology simulations with HCAs.

A. The Information Communication Technology Solutions

Participant input from a key stakeholder symposium led to the choice of a tablet based on the Android platform to deploy ICTs to address the prioritized workflow issues. The tablet was loaded with a combination of off-the-shelf, and project developed applications.

The initial application HCAs were introduced to was "Fruit Ninja" (to develop comfort with touching the screen and swiping), We used Skype to enable video-conferencing between the HCAs and their clients with the home-care office. We selected TiKL for the communications between the home-care team; TiKL is a 'push to talk' walkie-talkie application for chatting and voice communication. We chose Google maps as our geospatial information service to enable path finding to the clients' locations, which can be a challenge for HCAs visiting clients for the first time in sparely marked, rural areas. We also deployed a mobile client for a secure authoritative virtual learning community, established and maintained by home-care experts, the Continuing Care Desktop.

We also developed the *HCAMobile App*, to enable the HCAs to access their daily schedule, and to access and

update the care plan for the clients they visit on a given day. This application ensures that HCAs have up-to-date information on their clients when they visit them and that the client's record is always up to date for the staff at the main office (as no transcription delays are introduced in the process).

Finally, we provided HCAs with a separate device, called SafeTracks, a GPS-enabled pendant that regularly reports the owner's location and uses the cellular phone service to communicate this location to a service provider in case of an emergency.

B. Workplace Simulations

Simulations are used in health professional education, both pre-licensure and post-graduate to enhance and develop competencies and clinical skills [3]. There is no published literature on the use of simulation to train HCAs to integrate technology into their workflow to positively impact practice.

As the proposed ICT solutions were not covered by provincial health services policies, we could not roll out ICT solutions across the province in current health care environments using real clients. Therefore, it was premature to collect data on ICT uptake by users, efficiency of the health care team and quality of care. Instead, we developed a simulation protocol using three client educators and two occupational therapy students. A client educator is a real client who role-plays in a scenario for educational or research purposes. Minor modifications were made to the training and simulation protocol before it was introduced to HCAs in their workplace.

It was hypothesized that workplace simulations would provide the best environment to safely test the ICT solutions and determine the perspectives of HCAs and managers to the proposed ICT solutions.

III. METHODS

HCAs completed a survey before and after the tablet training and simulation to determine their perception and acceptance of the tablet. We conducted interviews and focus groups to gather data on the perspectives of HCAs and managers on the simulations and the ICT solutions we introduced. These interviews and focus groups were audio-recorded and transcribed verbatim by a professional transcription service. Finally, we analyzed the transcribed data following a focused-ethnography analysis methodology, according to the same protocols used in Phase 1.

A. Workplace ICT Training and Simulations

Initial training with the HCAs using the tablet involved basic operating instructions, and then progressed to more complex features, such as taking a picture, using Skype, searching for health-related information using the browser and the HCA app, an application created by our project to support the efficient scheduling of HCA visits to clients and to provide HCAs with relevant, secure and timely client information at the point of care. Once an HCA was comfortable with the tablet, a simulated client was introduced. The HCA interacted with the simulated client and used the tablet applications to assist with providing care.

The training and simulation sessions took place at the HCAs' workplace and occurred over a period of 4 to 6 hours and covered the following topics: informed consent, pre-training questionnaire (30 min), introduction to the tablet and applications and a short video (30 min), training (1 to 2 hours), simulation with a "tech buddy", commuting to and interacting with two client educators, interacting with a simulated remote case coordinator (1 hour), post-training (or post- simulation) questionnaire and focus group (1 hour). In terms of applications, we introduced participants to apps that would be useful in their work, as described below.

The order of the training content facilitated the acceptance of ICT. Training was planned to first build on what HCAs might be familiar with, and then introduce applications in the order in which they might be used in their workflow: receiving a client file, navigating to a client's home, accessing a client's information and care plan, communicating with health care professionals and EMS, documenting and receiving/accessing just-in-time information and support. During the simulations, HCAs and their tech buddies followed the cues of their client educators and the scenario. A tech buddy was a member of the research team who worked individually with the HCAs to guide their training. The tech buddies worked closely with the HCAs in a non-threatening manner to ensure an increasing comfort level with the HCA when using the tablet.

After the simulations, the HCAs participated in a focus group. Since these technologies were designed to mitigate the challenges identified during Phase 1 of our project, a positive HCA attitude towards them would validate our hypothesis that the technologies could address the workflow challenges facing HCAs.

IV. RESULTS

Fifty-three participants completed the simulations, 32 of whom were HCAs. The individuals who participated in this third phase of the project were from rural/urban, community/facility, public/private locations. Table 1 summarizes the pre-training questionnaire results, which indicate that the HCAs' attitude after the simulations was strongly positive towards the technology; 68% wanted to learn more about the technology. Some participants who initially indicated that they strongly disagreed with the statement "I would use a tablet in my personal life," changed their minds after and stated that they would like to use one in their personal and work lives. These HCAs indicated that going back to the current paper-based system would be frustrating.

A. Focus group interviews

Six key themes were identified from the focus groups: 1) attitudes towards the tablets; 2) positive use of the technology; 3) negative use of the technology; 4) communication with the health team; 5) ICT impact on clients; 6) Recruitment, retention, recognition.

1) Attitudes towards the tablets

Generally, the HCAs and nurse managers who participated in the focus groups had positive attitudes towards the tablets and how they can benefit their lives on a professional and personal level. For many of the HCAs, their initial attitude was skeptical and almost negative towards the tablet. However, by the end of the training and simulations, the attitudes often changed to be more positive and receptive towards the tablet.

TABLE I.
PRE- AND POST-TRAINING QUESTIONNAIRE RESPONSES

Question (n)	Strongly Agree n (%)	Agree n (%)	Disagree n (%)	Strongly Disagree n (%)
Pre-training questions (1-5)				
1. I think this tablet will be easy to use (36)	8 (22)	22 (61)	3 (8)	3 (8)
2. I believe a tablet will be useful in my work (36)	12 (33)	15 (42)	7 (19)	2 (6)
3. I feel positive about using a tablet in my work (36)	10 (28)	19 (53)	6 (18)	1 (3)
4. I would use a tablet in my work (36)	11 (30)	21 (58)	2 (6)	2 (6)
5. I would use a tablet in my personal life (36)	15 (42)	14 (39)	5 (14)	2 (5)
Post-training question				
6. I want to learn more about tablets (32)	22 (68)	9 (29)	0 (0)	1 (3)

'It's got some good things on there and it's inspired me to get busy on my computer too so that I can...be more savvy when they do come out. We're not going to say "if". We hope these come out.'

'I had no idea about this until today, and as my first question I had, would I use it in my personal life? Disagree. Are you kidding? The first thing I said as soon as it was over, "I want one."'

2) Positive use of the technology

Due to the trainings and simulations, the HCAs experienced first hand the benefits of the tablet and explored many different possibilities to enhance the provision of care.

'If you take the quality of care, and the true old-fashioned standards of giving that personal care, and hearing a person, and understanding, and you combine it with the technology and the tools, you could still bring the two and find that perfect medium.'

'...documentation is so huge in this day and age that this kind of device totally brings that just right to the forefront. There's no getting out of it, you know. It's right there, it's in your hand, document, document, document.'

3) Negative use of the technology

Despite all the positive attitudes expressed after the training and simulations, the HCAs also expressed several concerns about some challenges with the tablet. For example, there was hesitation related to a reliance on technology, especially if it failed and that was the only source of client information.

'The last thing you want to do is be out there, you've got your list, and you're starting to depend on this now, and all of a sudden this thing goes down and you don't know where you're going next, so all your clients have disappeared and you didn't write them down.'

4) Communication with the team

One challenge identified in Phase 1 was the difficulties related to communication among the health care team, especially HCAs and other health professionals. Due to the nature of the HCAs job, they often feel disconnected with the other team members, which ultimately can impact patient care.

'Yeah, I think that whole notion of teamwork is really important because they really feel a lot of times very disconnected from the rest of the team. They don't always provide feedback, they don't always know whether we get it or we don't or whatever, no one gets back to them. I think it would go a long way actually to having them get timely information in a more timely way and to help them communicate with the rest of the team in a way that's more meaningful for them. Actually see a body, know that the feedback was received and what somebody did with it because then there can be a feedback loop back. Thanks for that information, this is what happened to the client. Care plan changed, whatever that is, right?'

5) ICT Impact on Clients

The HCAs universally expressed their dedication to their clients. Regardless of the benefits of the tablet to the HCAs personally in alleviating some of the workflow challenges and safety issues, the tablet would be abandoned if it had a negative impact on the personal connection to clients and the care provided.

'We go in, we're almost… their eyes, ears, everything. If there's something wrong, they're talking to us. If we're working on this [the tablet], it's like well we're distracted. It's not like eye to eye contact which a lot of them count on. We're the people they see every day.'

6) Recruitment, Retention, Recognition

The HCAs were asked if they thought the use of technology and specifically tablets would improve recruitment, retention and recognition of their work in homecare. There was a mixed response, with some HCAs stating that they would stay in their jobs regardless of the tablet and others who felt that some of the features of the tablet would enhance the feeling of safety, thereby retaining staff for longer.

'It would impact my satisfaction, but it wouldn't impact whether or not I'd stay 'cause I like my job regardless of the tablet.'

'So whether the retention – this will help retention, it may make certain workers feel safer and therefore stay longer because they don't feel threatened in their job. But that certainly won't be the only reason why retention is.'

There was also the feeling of importance or recognition for their work, if technology was integrated into the typical workflow.

'I feel appreciated or … yeah, "You're doing an important job here. We need you to have some good equipment on board," kind of thing.'

V. CONCLUSION

Two key outcomes arose from this research. First, through our simulation protocol for ICT deployment, HCAs and their team members perceived that technology would improve their workflow, allow them access to information that would enhance the quality and efficiency of care they provide to their clients. An indirect benefit of these improvements would also be recruitment and better retention of workers to the profession, which would have a positive impact on the envisioned shortage of front-line health-care workers. Second, workplace simulations were an effective approach to provide training for HCAs and to

build their skill and confidence with using technology and buy-in for integration into their workflow.

Future deployment and implementation of technologies in home care should be further evaluated for outcomes. Policies and other barriers would need to be addressed before technologies are implemented. In addition, future technology design should involve end users, and implementation should incorporate carefully planned training approaches, including simulation, that meet the needs of the users.

REFERENCES

[1] G. Carriere, "Seniors' use of home care," Health Reports, 17(4), pp 3-47, (Statistics Canada Catalogue no. 82-003). Retrieved April 20, 2009, from http://www.statcan.gc.ca/studies-etudes/82-003/archive/2006/9498-eng.pdf

[2] Home Care Sector Study Corporation. (2003, October). *Canadian home care human resources study* (synthesis report). Retrieved April 20, 2009, from http://www.saintelizabeth.com/pdf/CanadianHomeCareHumanResourcesStudy_Synthesis.pdf

[3] W. McGaghie, S.B. Issenberg, E.R. Petrusa, and R.J. Scalese, "A critical review of simulation-based medical education research: 2003–2009," Medical Education, 2009, 44 pp 50–63. http://dx.doi.org/10.1111/j.1365-2923.2009.03547.x

AUTHORS

Sharla King is with the Health Sciences Education and Research Commons and Faculty of Education, University of Alberta, Edmonton, AB T6G 1K2 Canada (email sharla.king@ualberta.ca).

Lili Liu is with the Department of Occupational Therapy, University of Alberta, Edmonton, AB T6G 2G4 Canada (e-mail: lili.liu@ualberta.ca).

Eleni Stroulia is with the Department of Computing Science, University of Alberta, Edmonton, AB T6G 1K2 Canada (e-mail: eleni.stroulia@ualberta.ca).

Ioanis Nikolaidis is with the Department of Computing Science, University of Alberta, Edmonton, AB T6G 1K2 Canada (e-mail: nikolaidis@ualberta.ca).