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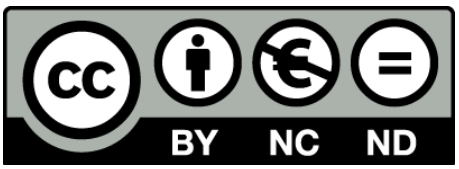

JAMES COOK UNIVERSITY AUSTRALIA

JAMES COOK UNIVERSITY
AUSTRALIA

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A/Professor Jane Mills (corresponding author)
RN, PhD, MN, MEd, BN, Grad Cert Edu, FACN
Associate Professor
Centre for Nursing and Midwifery Research
James Cook University, Cairns Campus
PO Box 6811, Cairns, QLD 4870
Australia
jane.mills@jcu.edu.au

Professor Karen Francis
RN, PhD, MEd, MHlth Sc PHC, Grad Cert Uni Teach/Learn, BHlth Sc Nsg, Dip Hlth Sc Nsg, FACN Fellow JBI
Professor of Nursing
School of Nursing, Midwifery & Indigenous Health
Charles Sturt University
Locked Bag 588
Wagga Wagga
NSW 2678
AUSTRALIA
kfrancis@csu.edu.au

A/Professor Margaret McLeod
RN, RM, PhD, MN
Associate Professor
School of Nursing, Midwifery & Indigenous Health
Charles Sturt University
Locked Bag 588
Wagga Wagga
NSW 2678
AUSTRALIA
mmcleod@csu.edu.au

Dr Mohammad Al-Motlaq
PhD, MBS, RN, BSN
Assistant Professor,
School of Nursing,
Hashemite University, Kingdom of Jordan.
MohammadA_M@hu.edu.jo

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Enhancing Computer Literacy and Information Retrieval Skills: A Rural and Remote Nursing and Midwifery Workforce Study

Abstract

Nurses and midwives collectively, represent the largest workforce category in rural and remote areas of Australia. Maintaining currency of practice and attaining annual licensure with the Australian Health Practitioners Regulatory Authority (AHPRA) present challenges for individual nurses and midwives and for their health service managers. Engagement with information and communication technologies, in order for geographically isolated clinicians to access ongoing education and training, is considered a useful strategy to address such challenges.

This paper presents a pre and post-test study design. It examines the impact of an online continuing professional development (CPD) program on Australian rural nurses and midwives. The aims of the program were to increase basic skill acquisition in the utilisation of common computer software, the use of the Internet and the enhancement of email communication.

Findings from the study demonstrate that participants who complete a relevant CPD program gain confidence in the use of information and communication technologies. Further, increased confidence leads to increased access to contemporary, reliable and important health care information on the Internet, in addition to clinicians adopting email as a regular method of communication.

Health care employers commonly assume employees are skilled users of information and communication technologies. However, findings from this study contradict such assumptions. It is argued in the recommendations that health care employees should be

given regular access to CPD programs designed to introduce them to information and communication technologies. Developing knowledge and skills in this area has the potential to improve staff productivity, raise health care standards and improve patient outcomes.

Key Words

Australian rural nurses and midwives; health care informatics; continuing professional development; currency of practice.

Introduction

The context of rural practice is characteristically human, fiscal and infrastructure resource poor, relying heavily on nurses and midwives to advance their scope of practice to meet community needs (Francis & Mills, 2011; Mills, Birks, & Hegney, 2010; Pront, Kelton, Munt, & Hutton, 2013). A challenge for health service managers in rural and remote areas of Australia is to ensure their largest workforce group (Australian Institute of Health and Welfare, 2012) maintains currency of practice. This often requires geographically isolated clinicians to engage with information and communication technologies in order to receive education and training. Further, the Australian Health Practitioners Regulatory Authority (AHPRA) demands that regulated health professionals, including nurses and midwives, annually attest to currency of practice when reapplying for licensure (Nurses and Midwives Board of Australia, 2012). Each clinician must therefore demonstrate competence in evidence-based practice. The first step in the process of applying evidence to practice (Mills, Field, & Cant, 2011) involves accessing research findings in the workplace, usually in the form of journal articles, evidence summaries or clinical practice guidelines (Nagy, Mills, Waters, & Birks, 2010). These resources are available via database searches or through dedicated websites. They are usually subscribed to by health care organisations and include the Joanna Briggs Institute (2008), the Cochrane Collaboration (Graham, Tetroe, & KT Theories Research Group, 2007), or alternatively the Australian Government's open access *Clinical Practice Guidelines Portal* (NHMRC, 2012). Rural and remote nurses may also engage in other activities to maintain currency of practice, including reading hard copy literature and attending continuing professional development (CPD) programs.

Face-to-face presentations, external study, or fully online CPD programs are the usual modes of delivery (Australian College of Nursing, 2012; Lu, Lin, & Li, 2009).

Information and communication technologies, while important to the development of knowledge and skills in the rural nursing and midwifery workforce, have broader implications. Typically, information systems are used to manage administrative, financial and human resources, and professional development processes. The utilisation of these technologies allows workplaces to advance efficiency by improving access to information and reducing the amount of time needed to complete activities (Chaudhry et al., 2006; Eley, Fallon, Soar, Buikstra, & Hegney, 2008; Fetter, 2009). Within health care environments computerised information systems underpin work activities (Haux, 2006; McBride, 2005), including the throughput of clients/patients, allocation of workloads, cost assignment and recovery, clinical care, diagnostic testing, communication between service providers, and administration and funding sources. It is essential therefore, for all health care professionals to be computer literate, having the capacity to harness the advantages that computers in the workplace provide (McNeil, Elfrink, Beyea, Pierce, & Bickford, 2006; Pruitt & Epping-Jordan, 2005).

Increasingly, health care environments are investing in computer infrastructure (Huryk, 2010). This is based on a belief that most staff will have the necessary skills to accommodate the inclusion of new technologies in their work practices. Computer literacy is often taken for granted, but there are still people in the broader community and within the health care environment, who need education and support in the use of contemporary computer technologies (Booth, 2006; Lium, Laerum, Schulz, & Faxvaag, 2006; McNeil et al., 2006). In this paper the authors present the outcomes of an online CPD program, which was offered to Australian rural nurses and midwives. The research

study was supported by an Australian Government Department of Health and Ageing RHSET Grant, secured by the Association for Australian Rural Nurses and Midwives (ARNM). Following the merger of ARNM and Royal College of Nursing Australia (RCNA) in 2009, the national online CPD program was managed and facilitated by RCNA's Rural Nursing and Midwifery Faculty. Since the original pilot of the program, as reported in this manuscript, over 600 rural nurses and midwives successfully participated in this ongoing initiative.

Aim

The aim of this study was to explore the effect of an online CPD program on Australian rural nurses and midwives' attitudes, confidence, knowledge and skills in using information and communication technologies. The hypothesis was that by developing the knowledge and skills of nurses and midwives, those with limited or no previous experience with information and communication technologies, would increase the use of these tools in their work environments.

Methods

An experimental pre and post-test design was used to evaluate the effectiveness of the online CPD program. Before and after the program participants completed self-report questionnaires that included a 12-item attitude scale and were adopted from a validated questionnaire (Norman & Skinner, 2006). Of the total number who participated in the program, 123 participants completed the pre-test questionnaire. Sixty-three participated in the post-test of which four could not be matched with the pre-test participants and were excluded (SPSS Incorporated, 2007). This paper therefore, reports on the findings from the paired 59 participants. Data were inserted

into Statistical Product and Service Solutions 17.0 (SPSS 17.0) for analyses using percentages, means and standard deviations to describe the participant sample. Correlations between variables were analysed using chi-square for independence (with Yates Continuity Correction), while the difference between participants responses before and after the intervention were analysed using paired t-tests.

Results

Demographics

Respondents included in the analysis were predominantly female, the majority of whom were aged between 41 and 60 years. Participants were highly experienced in nursing and / or midwifery, with a mean experience of 23.3 years (*SD*=8.6), ranging between three and 45 years. Participants' completion of their registered nurse (RN) training occurred between 1967 and 2003, with the majority (89.8% [n=53]) completing their education and training in Australia. Over 96% [n=55] of participants were employed on salary, wages, or contract basis, with only two participants employed on a casual basis. The large majority (93% [n=55]) worked in excess of 40 weeks in the previous year, with a mean of 40 hours (SD= 14.5) per week. Only 30% [n=18] of the participants were required to work on-call ranging between eight and 168 hours.

Access to Information Technology

Cross-tabulation of participants' responses on both surveys showed minimal changes in their reports of accessibility to computers and the Internet before and after the program. Generally, the vast majority of participants reported having a high degree of accessibility to computers and the Internet both at their work (98% [n=58]) and at home (96% [n=55]).

After the program, the number of participants who used the Internet for patient management both at work and at home increased (Table 1). A chi-square for independence (with Yates Continuity Correction) indicated a significant increase in nurses' and midwives' use of the Internet in regard to patient management at home, X^2 (1, n=55) = 9.6, P<0.001, Phi=0.46, and at work (not tested, violated chi-square assumptions).

Insert: Table 1:

Use of Information Technology

Participants reported having a higher degree of confidence using computers for all purposes after participating in the CPD program, with the majority shifting from the amateur category (74.1% [n=44] before the program) to confident and experienced categories (65.5% [n=38] after the program). Further, participants indicated that although they could now use computers for word processing and locating or retrieving information not easily available elsewhere, their main reason for accessing the Internet was to use e-mail communication. Over 98% [n=58] of the participants reported that after completing the program, they were confident or experienced in finding, opening, reading, responding, creating and sending e-mails. Similarly, 98% [n=58] of participants were confident or experienced in using a search engine (for example, Google) to find information. Fewer participants were confident or experienced in downloading files (84.5% [n=50]) or making a purchase over the Internet (82.8% [n= 49]). Only 12 participants (20.3%) indicated that they now used the Internet for discussing interests with like-minded people compared to eight (13.5%) in the pre-program reports.

Attitudes towards Computers

A 12-item attitude scale was used to measure participants' attitudes towards computers and its usage using a 4-point Likert scale (strongly agree to strongly disagree). Table 2 shows the frequency and percentage of participants who agreed or strongly agreed with each statement. Findings demonstrate a higher frequency for positive items and lower frequency for negative items after the completion of the program. The mean scores for each item were collated and contrasted. Positively worded items (8 items) were improved and negatively worded items (4 items) were rated lower after taking part in the program. Table 2 presents comparative analyses using paired-samples t-test showing that participating in the CPD program significantly improved participants' attitude towards computers and information technology practice, although participants showed less desire to learn more about the Internet after completing the program ($t(58) = 6.15$, $P<0.0001$). In line with the other items, this finding is a reflection of participants' high levels of satisfaction and confidence in what they learnt from the program. Overall, there was a statistically significant increase in participants' attitude scores increasing from 2.9 to 3.2 after the program, $t(58) = -5.2$, $P<0.0001$.

Before completing the course participants rated how useful they thought the Internet was in helping them make decisions about patient's health; 38 participants (65.6%) acknowledged its importance by rating it as useful and very useful, with only one participant (1.7%) considering it not useful. The remaining 19 participants (32.8%) were unsure. However, after completing the program all participants chose useful / very useful to help them make decisions about patient's health, except seven (11.9%) who continued to be unsure. Interestingly ratings reporting participants' perceptions of the importance of accessing health resources on the Internet remained stable before and after the CPD program. Originally, 55 participants (94.8%) chose important and

very important while the remaining three (5.2%) participants were unsure. On completion of the program 95.6% [n=57] of the participants indicated that being able to access health resources on the internet was important or very important with continuing 3.4% [n=2] to feel unsure.

Insert Table 2

Knowledge of Computers and the Internet

Eight items of the questionnaire aimed to assess participants' knowledge of computers and the Internet using a 5-point Likert scale (strongly agree to strongly disagree). Table 3 illustrates the frequency and the percentage of participants who agreed or strongly agreed with each statement. Higher agreement with each statement was evident on the completion of the program. In addition, Table 3 provides the mean score of each item for the total sample before and after the program with results of the paired-samples t-test. The analysis showed a significant increase in the knowledge of participants after taking part in the program, $t(58) = -11.3$, $P<0.0001$ (Table 3).

Insert Table 3

Participants Comments

Participants were invited to comment on the program by indicating the most enjoyable and least enjoyable parts of the online program. Learning more about computers and being able to participate in an online CPD program at their convenience were highlighted as strengths.

"Learning what a computer and its program can do, the frequent tests were a great learning tool, being able to do it at a time convenient to me."

Participants suggested that a limitation of the online CPD program was the speed at which information retrieved could be downloaded. They indicated that they did not have enough time to complete downloading information. Most indicated a preference for printing a hard copy of retrieved information to consult at a more convenient time.

"It tended to be a bit slow at times and I found that I lost concentration easily."

Discussion

The introduction of computerised health records and systems has revolutionised health care, however these technological advancements are not effective if end users are incompetent in their use (Campbell & McDowell, 2011; Cronenwett et al.; Fetter, 2009; Turner, 2010). Preparing health care staff, including nurses and midwives, to use the most current evidence in the delivery of health care is an expectation of employers and consumers and equipping staff with the skills and the resources to meet these expectations is essential (Dowding, 2013). Lium et al. (2006) argue that providing training and allowing time to adjust nurses' practice to accommodate acquired knowledge on the use of computers and computer systems improves the uptake of these technologies and ultimately improves workplace efficiencies, findings which are supported by this study.

Age, education and seniority in the workplace have been posited as additional factors that impact on computer use, confidence and competence (Campbell & McDowell, 2011; McBride, 2005; Pilcher & Bedford, 2011; Ross, 2010; Turner, 2010). This study reflects similar findings in respect to the average age of participants and their initial low levels of confidence in using information and evidence sourced from the Internet in their practice. The positive relationship between youthfulness and computer literacy in the nursing workforce is also identified in a recent study of how practice nurses source

information for their work (Hoare, Mills, & Francis, 2012). The provision of ongoing support to nurses and midwives, to facilitate skill acquisition in using and navigating computer systems and programs, is an effective method for enhancing usage and promoting access (Pilcher & Bedford, 2011; Sweeney, Saarmann, Flagg, & Seidman, 2008). This study indicates that nurses' use of the Internet to communicate with others and to source information to guide their practice will improve as a result of CPD, although accessibility remains unchanged.

Limitations

A common and unavoidable problem with this study design is the inability to evaluate the independent effect of this single intervention and properly isolate any confounding variables. This study is also limited by its evaluation of short-term change, with the possibility that results could change with the passage of time. Therefore, to assess long-term outcomes of the program, further research needs to be undertaken one-year post-training to learn about sustained impact on skills and use of the Internet as a source of information for practice. Furthermore, the study could produce better results with a larger sample size and a higher post-intervention return rate.

Conclusion

The use of computers and computer systems to improve efficiency and effectiveness should be regarded as useful tools for rural and remote nurses and midwives. The technology also provides a mechanism for geographically isolated clinicians to engage in continuing professional development activities, designed to inform practice currency and maintain annual licensure. However, the extent to which these resources are used is largely dependent on individual levels of confidence and competence in the use of contemporary computer technologies.

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Table 1: Accessing the Internet for patient management before and after the program (N=59), frequency and valid percentage

Location		Before		After		X^2	
	N	Yes	No	Yes	No		
Work	39	32 (82%)	7 (18%)	37 (94.8%)	2 (5.2%)		$
Home	55	33 (60%)	22 (40%)	41 (74.5%)	14 (25.5%)	9.6***	

$ violated assumptions of Chi-square test

***P<0.001

Table 2: Frequency and valid percentage of participants who strongly agreed/agreed with the attitudes items, and Mean (SD) of the total sample before and after the program (N=59)

Variable	Before		After		Paired-samples t-test
	N (%)	M(SD)	N (%)	M(SD)	
1. Using the internet is a great way of finding information	59 (100%)	3.47 (0.50)	58 (98.3%)	3.58 (0.53)	-1.52
2. Browsing the internet is frustrating	40 (67.8%)	2.80 (0.69)	24(40.7%)	2.32 (0.68)	5.18***
3. Using the internet is difficult	19 (33.9%)	2.35 (0.65)	3 (5.3%)	1.80 (0.53)	5.69***
4. I like using e-mail to communicate	53 (89.8%)	3.24 (0.63)	57 (96.6%)	3.44 (0.56)	-2.45*
5. The internet does not scare me at all	35 (61.4%)	2.82 (0.76)	50 (84.7%)	3.12 (0.71)	-267**
6. The internet is safe for purchasing goods	30 (53.6%)	2.56 (0.57)	43 (78.2%)	2.83 (0.51)	-3.44***
7. It is very important for me to learn how to use the internet'	55 (96.5%)	3.53 (0.63)	55 (96.5%)	3.51 (0.54)	0.18
8. I access information faster from books than from the internet	21 (36.2%)	2.36 (0.67)	12 (20.3%)	1.95 (0.66)	3.76***
9. It takes me a long time to find information on the internet	30 (51.7%)	2.59 (0.68)	14 (23.7%)	2.07 (0.64)	5.07***
10. Using the computer makes my work easier	50 (86.2%)	3.12 (0.62)	57 (96.6%)	3.26 (0.52)	-1.83
11. Using the internet is the most effective way to access information	47 (82.5%)	2.95 (0.55)	51 (86.4 %)	3.11 (0.62)	-1.76
12. I want to learn more about the Internet	59 (100%)	3.75 (0.44)	52 (88.1%)	3.20 (0.64)	6.15***
Total Attitude (Mean, *SD*)	**2.9 (0.32)**		**3.2 (0.37)**		**-5.2*** **

Paired-samples t-test, *P<0.05, **P<0.01, ***P<0.001. Total attitude calculated after controlling negatively worded items

Table 3: Frequency and valid percentage of participants who strongly agreed/agreed with the knowledge items, and Mean (SD) of the total sample before and after the program (N=59)

Variable	Before		After		Paired samples t-test
	N (%)	M (SD)	N (%)	M (SD)	
1-I know what resources are available on the internet	23 (39.6%)	3.03 (0.97)	43(72.9%)	3.74 (0.76)	-5.23***
2-I know where to find helpful health resources on the internet	21 (36.2%)	3.03 (0.87)	52 (89.9%)	4.02 (0.51)	-8.60***
3-I know how to find helpful resources on the internet	18 (31.0%)	2.95 (0.85)	51 (86.5%)	3.95 (0.63)	-8.30***
4-I know how to use the internet to answer my questions about health	13 (22.4%)	2.86 (0.83)	49 (83.1%)	3.91 (0.51)	-8.65***
5-I know how to use health information I find on the internet to help me/my clients	22 (37.3%)	3.20 (0.76)	51 (86.5%)	3.92 (0.60)	-7.35***
6-I have the skills I need to evaluate the health resources I find on the internet	14 (23.7%)	2.92 (0.79)	45 (76.3%)	3.75 (0.76)	-6.60***
7-I can tell high quality health resources from low quality health resources on the internet	12 (20.3%)	2.78 (0.87)	40 (67.8%)	3.68 (0.78)	-6.93***
8-I feel confident in using information from the internet to make health decisions	12 (20.3%)	2.90 (0.80)	40 (67.8%)	3.64 (0.78)	-6.22***
Total Knowledge (Mean, *SD*)	**2.95 (0.64)**		**3.82 (0.47)**		**-11.3*** **

Paired-samples t-test of the mean difference before and after the program ***P<0.001