Nurses' confidence and experience in using information technology

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KEY WORDS

nurses, information technology, computers, Australia

ABSTRACT

Objective
In order to support policy planning for health, nurses in
Australia were surveyed to determine their current use
of information technology and barriers to that use.

Design
A self-administered postal survey.

Setting
Nurses throughout Australia.

Subjects
The survey was distributed to 10,000 members of the
Australian Nursing Federation.

Main outcome measures
Data on nurses' experience and confidence in use of
computers and information and technology across all
sectors of nursing in Australia.

Results
Of the 4330 respondents (response rate 43.3%), 86%
used computers at work. Most frequent uses were for
managing patient records, continuing professional
education, communication, accessing policies and
procedures and accessing clinical results. Experience
in the use of information technology ranged from 90%
for a common application such as word processing
to 64% for reference tools. Confidence in use of the
technology was generally low with fewer than 25% of
nurses stating they were very confident in using any
software application. Results varied by level of nurse,
their age, and length of time in nursing. Assistants in
nursing and enrolled nurses had significantly lower
experience and confidence than registered nurses,
while younger nurses and those with the least time in
nursing were more experienced and confident.

Conclusion
For most of Australia's nurses, experience and
confidence in use of information technology is confined
to basic computer and common applications. In
order to use information technology to support health
delivery, action to increase access for nurses and
remove barriers to use is urgently required. Employers
and policy makers at all levels of government must
work with nurses to adopt strategies to increase their
access to and use of information technology.

INTRODUCTION

Information technology (IT) is playing an increasing role in the delivery of health services in Australia. IT is no longer limited to specialised clinical areas and supporting administrative services. The potential benefits of IT use in the health care sector include those anticipated within any other industry or business such as improved efficiency and communication. However an additional goal and anticipated benefit of IT within health care is to improve patient care in a cost effective manner.

Nurses will have to possess adequate IT competency to operate effectively in an IT enhanced environment. To inform policies and strategies it is paramount that the extent of the current use of IT and factors affecting the adoption of IT by nurses are known. However information on current use of IT by nurses in their workplace and the factors affecting IT use in Australia is relatively sparse. This paper reports on some results of a national study undertaken in Australia in 2005. Nurses' access to and use of IT in nursing and the experience and confidence nurses possess in using IT are detailed. Results in relation to the attitudes of nurses to IT, barriers to IT use, and education and training in IT are the subject of other publications (Eley et al 2008a; Eley et al 2008b). The full report is available from the Australian Nursing Federation website: http://www.anf.org.au/it_project/.

BACKGROUND

Computer Access and Use

Physical access by nurses to computers and their uses of IT varies enormously among countries. Contemporary data from Australia is limited but would suggest that computer use by nurses is relatively high especially in public hospitals although access is sometime problematic. For example, Darbyshire used focus groups to establish the use of computerised patient information systems by nurses and midwives across Australia and determined that access to computers was a major concern (Darbyshire 2000).

More recently, a study in two Brisbane hospitals reported high computer use among nurses (98.5%) however only 87.5% considered their access was adequate (Webster et al 2003). In another Australian study, remote area nurses enjoyed equally high access to computers but many complained of problems with internet and email access (Klotz and Reis 2005).

Expertise and Confidence.

Confidence is use of computers by nurses has been determined in several studies. For example, public health nurses in Oregon, USA "appeared comfortable" using computers (Turner and Stavri 2003) while nurses in South Dakota, USA were reported to cite "discomfort" in their use (Hegge et al 2002). Studies from the UK show that limited confidence in use of computers results in low frequency of use (Hillan et al 1998; Chan et al 2004). Additionally, an Australian study (in New South Wales) found the use of online clinical evidence tools was affected by nurses' confidence (Gosling et al 2004).

Other studies have determined competency or proficiency. In Australia, studies have shown that the majority of nurses consider their level of competence in computer use to be less than proficient (Smedley 2005; Garde et al 2006). Proficiency and subsequent computer use has been determined to be influenced by education, nursing seniority, age, sex and length of time in service (Webster et al 2003). These and other factors were examined in the present study to ascertain their effect on both nurses' confidence and their expertise.

METHOD

The study used a mixed-method approach to collect both quantitative and qualitative data.

Questionnaire Development and Design

Qualitative data were collected from key stakeholder interviews and focus groups. The results of the qualitative data and the extant literature on nurses' use of IT were then used to design a questionnaire. The resultant questionnaire was modified to ensure clarity and comprehension following review by the project steering group and two pilot studies.

Table 1: Definitions of position titles used in the study

Position titles used in study	Indicative position titles from states and territories
Assistant in nursing	Advanced assistant in nursing
	Assistant in nursing
	Nursing assistant
	Personal care assistant/personal carer
	Student nurse
	Trainee enrolled nurse
Enrolled nurse	Enrolled nurse
	Nurse 1
	Registered nurse Division 2
Registered nurse (RN1)	Nursing officer 1
	Nurse specialist
	Registered nurse 1
	Registered nurse Division 1
Registered nurse (RN2)	Clinical nurse specialist
	Nurse 3
	Nursing officer 2
	Registered nurse 2
Registered nurse (RN3)	Clinical nurse consultant (grades 1-2)
	Clinical nurse educator
	Nurse 4
	Nursing officer 3
	Nurse unit manager 1-2
	Registered nurse 3
Registered nurse (RN4)	Clinical nurse consultant (grade 3)
	Nurse 5
	Nursing officer 4
	Nurse practitioner
	Nurse unit manager 1-2
	Registered nurse 4
Registered nurse (RN5)	Assistant director of nursing
	Director of nursing
	Nurses 6-8
	Nurse manager
	Nursing officer 5-7
	Registered nurse 5

The final questionnaire consisted of 78 questions within the five broad areas of access, use, barriers, training and technical support. This paper reports on four questions that determined the frequency of use of a list of computer hardware and software applications and on the confidence of nurses in using those applications. Questions used Likert scales and yes/no responses. In addition to these questions, respondents were asked to insert any other comments they wished to make about IT in their workplace at the end of the questionnaire.

To ensure clarity of terminology, IT was defined at the beginning of the questionnaire as computer-based systems or applications that assist in the

management and processing of information to support health care and health care delivery.

Participants

Recipients of the survey as outlined in table 1 were assistants in nursing (AIN), enrolled nurses (EN) and registered nurses levels 1 to 5 (RN1-5) who were financial members of the Australian Nursing Federation. In July 2005, the questionnaire was mailed to 10,000 nurses; 2500 each within metropolitan, inner regional, outer regional and rural/remote areas of Australia as defined by the Australian Standard Geographical Classification (ASGC) (Australian Bureau of Statistics 2001). A second mail-out was sent to non-respondents three weeks after the first mail-out.

Analysis

Data were analysed by SPSS version 12 (SPSS Inc. Chicago, Illinois) using descriptive and inferential statistics as appropriate to the scale of measurement. Each question was analysed on the basis of all responses and also by age of the nurse, length of time in nursing, ASGC, level of job and area of work (public, private, or aged care).

Consent

The study was approved by the University's of Southern Queensland's Human Research and Ethics Committee. A cover letter from the ANF explaining the study and a plain-language statement were enclosed with the questionnaire. Informed consent was implied if the participant returned a questionnaire.

RESULTS

Results are presented as overall responses and by age of the nurse, length of time in nursing and level of job. Data on ASGC and health sector are not presented here.

The overall response rate was 43.3%. The demographic characteristics of respondents are presented in table 2.

### Experience in the Use of Information Technologies

Question 17 (Q17) asked respondents: *how would you describe your level of confidence in the use of the following?* Nineteen types of IT hardware and software (hereafter referred to as 'applications') were offered. In addition to confidence options of:

very confident, confident, little confident and not confident an additional option of: *have no experience*, was offered. As depicted in figure 1, over 90% of respondents had experience with the use of a mouse, computer, and keyboard. Around 90% of respondents also had experience in the use of computers for accessing the internet and word processing. Less than 70% of respondents had experience in the use of presentation software, USB drives, computer-based reference tools, statistical software or the Apple operating environment.

Table 2: Demographic characteristics of survey respondents (n=4330)

Demographic characteristic	n (%)
Geographic location [a]	
Major capital city	961 (22.8)
Inner regional	1163 (27.6)
Outer regional	1148 (27.3)
Remote/very remote	935 (22.2)
Job Level	
Assistant in nursing	162 (4.0)
Enrolled nurse	642 (15.7)
Registered nurse – level 1	1406 (34.3)
Registered nurse – level 2	869 (21.2)
Registered nurse – level 3	409 (10.0)
Registered nurse – level 4	256 (5.9)
Registered nurse – level 5	357 (8.2)
Sector	
Public hospital	2269 (54.0)
Private facilities	506 (12.0)
Other public facilities	476 (11.3)
Aged care	536 (12.8)
Community health	414 (9.9)
Age of nurse	
Average age (± sd)	45.3 (± 9.7)
Number of years worked in nursing	
Average years worked (± sd)	19.7 (± 10.3)
Other	
Sex of respondent – male	306 (7.2)
English as first language	4047 (95.4)
Used computer for work-related purposes	3603 (86.3)

[a] Classification based on Australian Standard Geographical Classification system (Australian Bureau of Statistics, 2001)

Figure 1: Confidence and experience by nurses in using information technology
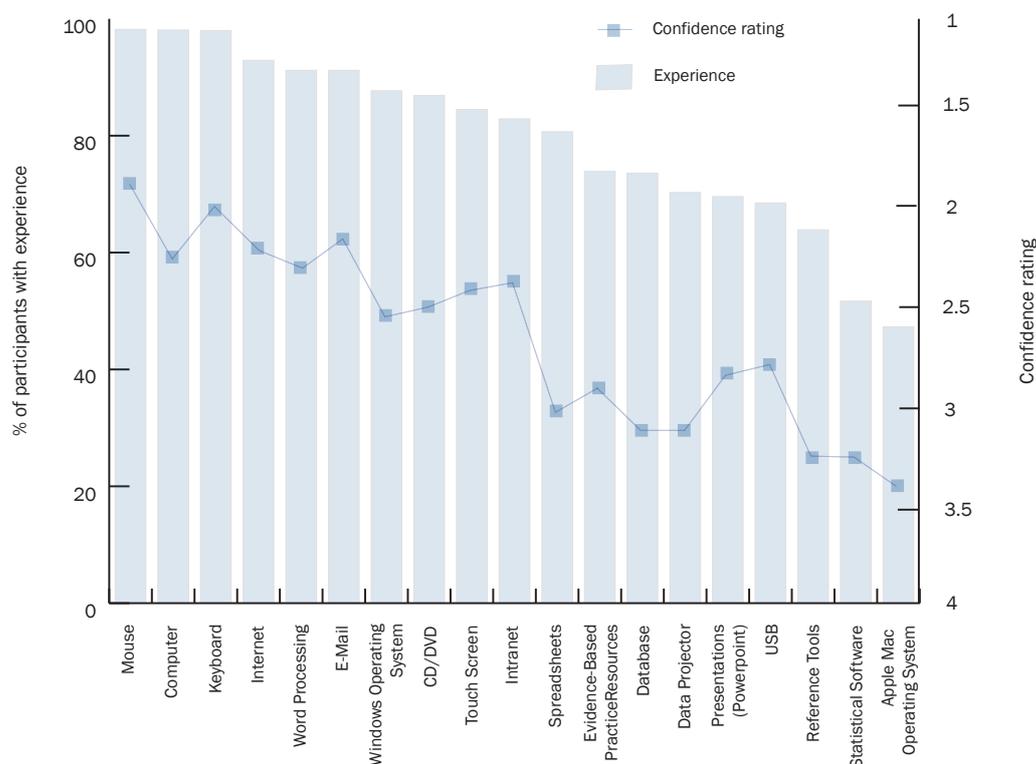
Table 3: Mean age differences between those nurses with and without experience of specific hardware and software

Application	Age			Number of years worked		
	Mean Difference	95% CI	Statistic	Mean Difference	95% CI	Statistic
Computer	7.9	6.2 - 9.6	$t(82) = 9.30$	1.3	-1.0 - 3.6	$t(4152) < 1$
Mouse	7.4	5.7 - 9.2	$t(76) = 8.59$	1.1	-1.3 - 3.5	$t(4155) < 1$
Keyboard	6.7	5.0 - 8.3	$t(88) = 8.06$	1.4	-0.9 - 3.6	$t(4141) < 1$
Touch screen	4.9	4.1 - 5.6	$t(1026) = 13.22$	3.4	2.5 - 4.2	$t(963) = 8.12$
Data Projector	3.5	2.9 - 4.1	$t(2644) = 10.75$	1.9	1.2 - 2.6	$t(2587) = 5.46$
CD/DVD	5.8	5.0 - 6.6	$t(775) = 14.40$	3.6	2.7 - 4.6	$t(775) = 14.40$
USB	4.0	3.5 - 4.7	$t(2925) = 13.00$	4.0	3.5 - 4.7	$t(740) = 8.04$
Word Processing	5.4	4.5 - 6.3	$t(467) = 11.53$	3.4	2.4 - 4.4	$t(452) = 6.42$
Spreadsheets	3.6	2.9 - 4.3	$t(1342) = 10.03$	2.4	1.7 - 3.2	$t(1315) = 6.24$
Databases	2.8	2.1 - 3.5	$t(2146) = 8.40$	2.0	1.3 - 2.7	$t(2165) = 5.70$
Referencing Tools	3.0	2.4 - 3.6	$t(3323) = 9.41$	2.1	1.4 - 2.7	$t(3321) = 6.06$
Evidence-Based Resources	4.2	3.5 - 4.8	$t(2131) = 12.71$	2.4	1.6 - 3.1	$t(2030) = 6.54$
E-mail	5.1	4.2 - 6.1	$t(456) = 10.49$	2.4	1.3 - 3.5	$t(4069) = 4.31$
Presentation Software	4.1	3.5 - 4.7	$t(2720) = 13.03$	2.3	1.6 - 3.0	$t(2620) = 6.66$
Statistical Software	1.9	1.2 - 2.5	$t(3282) = 5.72$	0.8	0.2 - 1.5	$t(3242) = 2.42$
Windows	3.8	3.0 - 4.7	$t(3890) = 8.41$	2.0	1.0 - 2.9	$t(3870) = 4.05$
Apple	2.9	2.3 - 3.6	$t(2623) = 8.79$	2.3	1.6 - 3.0	$t(2606) = 6.31$
Internet	6.1	5.1 - 7.1	$t(359) = 12.23$	3.1	1.9 - 4.3	$t(4084) = 5.03$
Intranet	4.1	3.4 - 4.8	$t(1105) = 11.03$	1.5	0.7 - 2.3	$t(3946) = 3.55$

Statistics in *italics* are significant at $p < 0.05$

For all identified applications, those who had no experience were significantly older than those with experience. Age differences ranged between 1.9 years for experience with statistical software, and 7.9 years for experience with computers. With only three exceptions those without experience had also been nursing for a greater number of years than those with experience. Significant differences ranged between 0.8 years for statistical software and 3.4 years for the use of touch screens and word processing packages (see table 3).

Experience, as a function of job level, is shown in table 4. For the most part, the more senior the job level, the more likely it was that nurses had experience with the identified information technology. For example, 40.7% of AINs and ENs had no experience in the use of evidence-based resources, compared to 27.6% of RN level 1-2 and 19.2% of RN level 3-5.

There were some exceptions with all RNs equally likely to use the computer, mouse, keyboard, touch screens and Windows. However RN level 3-5 were more likely than other levels to have experience in the use of reference tools and statistical software.

Confidence in the Use of Information Technologies

Those who responded that they had experience with information technologies stated their level of confidence in using these technologies. As noted above confidence options were: *very confident, confident, little confident and not confident*. In general level of confidence followed a similar trend to level of experience (figure 1) with high overall level of confidence in the use of the common applications. Confidence was low for many of the other offered applications.

Table 4: Proportions of nurses with no experience in selected information technologies as a function of job level

Technology	JOB LEVEL			
	AIN/EN	RN 1-2	RN 3-5	χ^2 Statistic[†]
Computer	7.0[ab]	0.7[a]	0.8[b]	130.04
Mouse	6.3[ab]	0.8[a]	0.6[b]	114.59
Keyboard	6.6[ab]	1.0[a]	0.9[b]	99.61
Touch screen	21.9[ab]	15.3[a]	14.7[b]	20.04
Data Projector	40.8[ab]	34.7[ac]	24.4[bc]	51.95
CD/DVD	23.5[ab]	12.5[ac]	8.6[bc]	86.01
USB	41.3[ab]	35.7[ac]	27.3[bc]	37.05
Word Processing	18.5[ab]	8.2[ac]	4.0[bc]	113.51
Spreadsheets	28.8[ab]	21.1[ac]	12.3[bc]	71.17
Databases	35.5[ab]	29.7[ac]	21.2[bc]	43.11
Referencing Tools	43.0[b]	42.5[c]	35.4[bc]	14.16
Evidence-Based Resources	40.7[ab]	27.6[ac]	19.2[bc]	91.82
E-mail	18.2[ab]	7.8[ac]	4.1[bc]	113.70
Presentation Software	43.5[ab]	34.0[ac]	21.7[bc]	91.45
Statistical Software	57.8[b]	58.4[c]	41.6[bc]	25.83
Windows	19.8[ab]	11.9[a]	10.0[b]	40.26
Apple	59.3	61.9	62.1	1.53 (NS)[‡]
Internet	15.5[ab]	6.2[ac]	3.3[bc]	104.31
Intranet	35.3[ab]	15.4[ac]	10.1[bc]	198.25

Same superscripts denote significant differences between groups from post-hoc comparisons.
[†] For all tests, *df* = 2
[‡] NS = not statistically significant

Table 5 shows confidence in the use of selected information technologies as a function of age, years worked, and job level. For many applications, as indicated by positive correlations, confidence in the use of IT decreased as age and number of years worked increased. The relationships between age and confidence in use were stronger than those for number of years worked and confidence in use.

Table 5: Confidence in use of selected information technologies as a function of age, number of years worked and job level

Information Technology	Age	Years Worked	AIN/EN M	RN 1-2 M	RN 3-5 M	F-Statistic
					Job Level	
Computer	0.25**	0.17**	2.51[ab]	2.38[ac]	2.16[bc]	$F(2,3976) = 37.65$**
Mouse	0.28**	0.20**	2.06[ab]	1.90[ac]	1.78[bc]	$F(2,3989) = 25.25$**
Keyboard	0.27**	0.21**	2.19[ab]	2.03[ac]	1.91[bc]	$F(2,3965) = 22.46$**
Touch screen	0.25**	0.19**	2.64[ab]	2.44[a]	2.37[b]	$F(2,3194) = 13.21$**
Data Projector	0.10**	0.05**	3.27[b]	3.21[c]	2.95[bc]	$F(2,2401) = 22.45$**
CD/DVD	0.21**	0.15**	2.65[b]	2.58[c]	2.47[bc]	$F(2,3332) = 6.05$**
USB	0.11**	0.07**	2.97[b]	2.84[c]	2.61[bc]	$F(2,2397) = 16.41$**
Word Processing	0.24**	0.17**	2.52[ab]	2.32[ac]	2.14[bc]	$F(2,3578) = 28.78$**
Spreadsheets	0.14**	0.09**	3.07[b]	3.00[c]	2.80[bc]	$F(2,3044) = 15.60$**
Databases	0.10**	0.08**	3.14	3.16	3.10	$F(2,2640) = 1.00$
Referencing Tools	0.12**	0.09**	3.25	3.27	3.20	$F(2,2079) = 1.29$
Evidence-Based Resources	0.11**	0.08**	2.99	2.91	2.85	$F(2,2654) = 2.73$
E-mail	0.16**	0.11**	2.44[ab]	2.20[ac]	1.98[bc]	$F(2,3625) = 44.03$**
Presentation Software	0.16**	0.10**	3.09[ab]	2.94[ac]	2.66[bc]	$F(2,2523) = 26.39$**
Statistical Software	0.01	-0.01	3.42	3.48	3.38	$F(2,1528) = 2.44$
Windows	0.16**	0.12**	2.67[b]	2.61[c]	2.51[bc]	$F(2,3288) = 5.69$**
Apple	0.11**	0.09**	3.40	3.41	3.41	$F(2,1306) < 1$
Internet	0.24**	0.19**	2.46[ab]	2.25[a]	2.17[b]	$F(2,3701) = 18.66$**
Intranet	0.18**	0.11**	2.76[ab]	2.43[ac]	2.21bc	$F(2,3196) = 50.52$**

Superscript letters denote significant differences between groups from post-hoc comparisons p < 0.05; ** p < 0.01

There were also significant relationships between confidence in use and job level for the use of all information technologies except databases, reference tools, evidence-based resources, statistical software and the Apple operating environment. In general, as denoted by the lower means, nurses employed at more senior levels had higher levels of confidence in the use of the other information technologies, with the most pronounced differences evident for the use of the intranet and e-mail.

The Use of Computers for Work-Related Purposes
Eighty-five percent of respondents (n=3680) used computers at work. Those who used computers for work purposes were younger (M = 47.8 years) than those who did not (M = 44.9 years), t(4107) = 6.74, p < 0.001. No such difference in use for work-related purposes existed with the number of years worked, t(4088) = 1.93. Use differed by level of job with only 64.0% of AIN/ENs using computers for work-related purposes as compared to 90.6% of RN level 1-2 and 95.4% of RN level 3-5, χ^2 (2) = 444.76, p < 0.001.

Participants who used computers for work-related purposes were asked in Q27: *How often do you use a computer for the following work-related purposes?* A total of 22 applications were offered divided in the categories of patient/client management; clinical use;

administration; and other. Responses were made on a Likert-type scale (never =0, rarely =1, occasionally =2, frequently = and always =4). Responses and relationships with age, number of years worked, and job level are summarised in table 6.

As denoted by the higher means, computers were used most frequently for managing patient records, continuing professional education, communication, accessing policies and procedures and clinical results.

Younger nurses used computers more frequently for three of the five patient/client management purposes (patient records, bed management and theatre), five clinical use purposes (poisons, results, ordering, accessing policies/procedures and accessing evidence-based practice) and continuing professional education. In contrast older nurses used computers more for consultation, the administrative purposes of reporting, developing policy/procedures and complaints and for accreditation.

Table 6: Use of computers for work-related purposes as a function of age, number of years worked and job level

Work-Related Purpose	Age	Years Worked	AIN/EN M	RN 1-2 M	RN 3-5 M	F-Statistic	Overall Mean M (95% CI)
Patient/Client Management							
Patient records	-0.06**	-0.02	1.52^{ab}	2.00^a	2.10^b	$F(2,3335) = 25.57**$	1.95 (1.90 – 2.00)
Appointments	0.02	0.07**	0.52^{ab}	0.74^{ac}	1.31^{bc}	$F(2,3179) = 71.39**$	0.87 (0.82 – 0.91)
Bed Management	-0.14**	-0.09**	0.80^{ab}	1.22^a	1.19^b	$F(2,3152) = 15.52**$	1.12 (1.07 – 1.18)
Patient Assessment	0.01	0.03	0.98^{ab}	1.24^{ac}	1.45^{bc}	$F(2,3157) = 14.59**$	1.25 (1.20 – 1.31)
Theatre	-0.04*	0.002	0.17^{ab}	0.38^a	0.35^b	$F(2,2908) = 9.02**$	0.33 (0.30 – 0.36)
Clinical Use							
Documentation	0.01	-0.01	0.43^{ab}	0.60^a	0.66^b	$F(2,3082) = 5.49**$	0.59 (0.55 – 0.63)
Medication	0.01	0.01	0.31^{ab}	0.48^{ac}	0.60^{bc}	$F(2,2067) = 10.65**$	0.50 (0.46 – 0.54)
Poisons	-0.04*	0.01	0.25^b	0.35	0.38^b	$F(2,3115) = 3.94*$	0.35 (0.31 – 0.36)
Consultations	0.04*	0.07**	0.38^{ab}	0.66^{ac}	1.11^{bc}	$F(2,3136) = 64.42**$	0.74 (0.70 – 0.78)
Results	-0.22**	-0.15**	1.21^{ab}	2.02^{ac}	1.80^{bc}	$F(2,3291) = 55.65**$	1.83 (1.77 – 1.88)
Ordering	-0.09**	-0.06**	0.39^{ab}	0.67^a	0.78^b	$F(2,3050) = 23.61**$	0.66 (0.61 – 0.70)
Access policies/ procedures	-0.04*	0.03	1.25^{ab}	1.77^{ac}	2.36^{bc}	$F(2,3411) = 130.19**$	1.84 (1.80 – 1.89)
Access EBP	-0.07**	-0.003	1.09^{ab}	1.53^{ac}	2.07^{bc}	$F(2,3384) = 104.36**$	1.61 (1.57 – 1.66)
Administration							
Reporting	0.08**	0.15**	0.55^{ab}	0.94^{ac}	2.35^{bc}	$F(2,3126) = 374.25**$	1.29 (1.23 – 1.34)
Staff management	0.03	0.12**	0.42^{ab}	0.81^{ac}	1.95^{bc}	$F(2,3091) = 246.01**$	1.06 (1.00 – 1.11)
Finance	0.02	0.09**	0.20^b	0.26^c	1.10^{bc}	$F(2,2931) = 217.66**$	0.50 (0.46 – 0.54)
Develop policy/ procedures	0.05**	0.15**	0.52^{ab}	0.99^{ac}	2.21^{bc}	$F(2,3179) = 353.48**$	1.27 (1.22 – 1.32)
Complaints	0.04*	0.12**	0.31^b	0.44^c	1.37^{bc}	$F(2,3066) = 229.19**$	0.68 (0.64 – 0.72)
Recruitment	0.01	0.09**	0.15^{ab}	0.29^{ac}	1.31^{bc}	$F(2,2981) = 314.89**$	0.56 (0.52 – 0.60)
Other							
Professional education	-0.08**	-0.02	1.47^{ab}	1.88^{ac}	2.35^{bc}	$F(2,3433) = 90.64**$	1.94 (1.90 – 1.98)
Communication	0.01	0.11**	1.00^{ab}	1.72^{ac}	2.72^{bc}	$F(2,3372) = 287.78**$	1.89 (1.84 – 1.94)
Accreditation	0.08**	0.16**	0.45^{ab}	0.63^{ac}	1.67^{bc}	$F(2,3094) = 250.34**$	0.89 (0.85 – 0.94)

NB: * $p < 0.05$; ** $p < 0.01$. Superscript letters denote significant differences between groups from post-hoc comparisons

Patterns in relation to number of years worked varied. Nurses with a greater number of years worked were more likely to use computers for appointments, consultations, all six of the identified administration tasks, communication, and accreditation. Frequency of computer use declined with greater number of years nursing for bed management, results and ordering.

There were also significant relationships between frequency of use and job level for the use of computers. In general computer use increased across the three job groups, although for patient records, bed management, theatre applications, documentation and ordering, there was no difference in frequency of use between RN level 1-2 and RN level 3-5. Furthermore for finance and complaints RN level 3-5 used computers for these purposes more frequently than either AIN/ENs or RN level 1-2, with no difference in frequency of use between the latter groups.

The Use of Specific Systems for Work-Related Purposes

Participants who used computers for work-related purposes were also asked how frequently they used an additional list of systems and applications (Q28: *How often do you use any of these systems for work-related purposes?*).

As shown in table 7, increasing age and number of year of years worked was associated with a decreasing frequency of use in most of the 15 applications. However telehealth/telemedicine and financial management were used more frequently by nurses who had been working for longer.

Table 7: Frequency of use of systems and applications for work-related purposes as a function of age, number of years worked and job level

| System/Application | Age | Years Worked | Job Level | | | F-Statistic | Overall Mean |
			AIN/EN M	RN 1-2 M	RN 3-5 M		M (95% CI)
GPS/Satellite Navgationi	0.00	0.01	0.01[b]	0.03[c]	0.08[bc]	$F_{(2,3218)} = 11.01**$	0.04 (0.03 – 0.05)
PDA/Tablet Computer	-0.01	0.00	0.05[b]	0.10[c]	0.17[bc]	$F_{(2,3206)} = 7.79**$	0.11 (0.09 – 0.13)
Patient Monitoring	-0.19**	-0.15**	1.00[a]	1.40[ac]	1.11[c]	$F_{(2,3221)} = 18.51**$	1.26 (1.20 – 1.31)
Diagnostic Result Access	-0.13**	-0.08**	0.69[ab]	1.21[a]	1.09[b]	$F_{(2,3248)} = 24.83**$	1.09 (1.04 – 1.14)
Delivery	-0.19**	-0.11**	0.90[ab]	1.56[ac]	1.19[bc]	$F_{(2,3213)} = 38.31**$	1.35 (1.29 – 1.40)
Telehealth/ Telemedicine	0.03	0.08**	0.32[ab]	0.53[ac]	0.70[bc]	$F_{(2,3227)} = 24.53**$	0.54 (0.51 – 0.57)
MIMS Online	-0.13**	-0.07**	1.18[ab]	1.63[a]	1.67[b]	$F_{(2,3325)} = 27.83**$	1.56 (1.52 – 1.61)
Joanna Briggs Institute	-0.07**	-0.03	0.69[b]	0.83[c]	1.14[bc]	$F_{(2,3276)} = 32.29**$	0.88 (0.84 – 0.92)
Cochrane Library	-0.09**	-0.03	0.54[ab]	0.85[ac]	1.09[bc]	$F_{(2,3274)} = 38.61**$	0.87 (0.83 – 0.90)
Patient Management	-0.07**	-0.02	0.39[ab]	0.78[ac]	1.12[bc]	$F_{(2,3218)} = 44.50**$	0.81 (0.76 – 0.86)
Staff Management	-0.05**	-0.01	0.20[ab]	0.42[ac]	0.69[bc]	$F_{(2,3225)} = 33.10**$	0.46 (0.42 – 0.49)
Financial Management	0.02	0.08**	0.08[b]	0.08[c]	0.53[bc]	$F_{(2,3222)} = 129.96**$	0.21 (0.18 – 0.24)
Online Professional Journals	-0.10**	-0.04*	0.83[ab]	1.13[ac]	1.40[bc]	$F_{(2,3280)} = 39.22**$	1.16 (1.12 – 1.20)
Information Access Systems	-0.04*	0.00	0.65[ab]	0.80[ac]	1.04[bc]	$F_{(2,3249)} = 19.25**$	0.83 (0.79 – 0.87)
CCHP	0.06**	0.04*	0.13[b]	0.14[c]	0.24[bc]	$F_{(2,3223)} = 8.41**$	0.17 (0.14 – 0.19)

N.B. * $p < 0.05$; ** $p < 0.01$. Superscript letters denote significant differences between groups from post-hoc comparisons

For the most part, RN level 3-5 identified using systems more frequently. However RN level 1-2 used diagnostic result access and MIMS Online[1] as frequently as RN level 3-5 and used patient monitoring and delivery systems more frequently than RN level 3-5.

Question 29 asked respondents to: *indicate your confidence in using the applications that you identified in Q28*. As age of respondents and number of years worked increased, confidence in the use of patient monitoring, diagnostic result access, delivery, MIMS online, Joanna Briggs Institute[2], Cochrane Library, online professional journals and information access systems decreased, while confidence in the use of financial management increased (table 8).

In general RN level 3-5 had the highest levels of confidence in the use of these systems. In the case of patient monitoring, diagnostic result access and delivery systems, RN level 1-2 and RN level 3-5 were equally confident but more confident than AIN/ENs.

DISCUSSION

Representation of the Nursing Workforce

Approximately 60% of the 250,000 nurses in Australia (Australian Institute of Health and Welfare

Table 8: Confidence in the use of systems and applications as a function of age, number of years worked and job level

| System/Application | Age | Years Worked | Job Level | | | F-Statistic | Overall Mean |
			AIN/EN M	RN 1-2 M	RN 3-5 M		M (95% CI)
GPS/Satellite Navigation	-0.01	0.01	3.71[b]	3.74[c]	3.40[bc]	$F(2,504) = 8.36**$	3.64 (3.57 – 3.71)
PDA/Tablet Computer	0.09*	0.07	3.60[b]	3.49	3.29[b]	$F(2,600) = 3.97*$	3.46 (3.38 – 3.48)
Patient Monitoring	0.16**	0.08**	2.73[ab]	2.27[a]	2.26[b]	$F(2,1759) = 22.26**$	2.33 (2.28 – 2.38)
Diagnostic Result Access	0.12**	0.07**	2.90[ab]	2.41[a]	2.44[b]	$F(2,1787) = 19.13**$	2.47 (2.42 – 2.52)
Delivery	0.18**	0.08**	2.83[ab]	2.06[a]	2.12[b]	$F(2,1524) = 36.59**$	2.17 (2.11 – 2.23)
Telehealth/ Telemedicine	0.01	-0.02	3.47[b]	3.36[c]	3.11[bc]	$F(2,1189) = 11.54**$	3.30 (3.24 – 3.35)
MIMS Online	0.18**	0.14**	2.67[ab]	2.42[a]	2.38[b]	$F(2,2473) = 9.17**$	2.44 (2.40 – 2.48)
Joanna Briggs Institute	0.15**	0.11**	2.87[b]	2.79	2.67[b]	$F(2,1683) = 3.78*$	2.76 (2.71 – 2.81)
Cochrane Library	0.14**	0.09**	2.96	2.85	2.80	$F(2,1676) = 1.54$	2.84 (2.79 – 2.89)
Patient Management	0.03	-0.01	3.04[ab]	2.74[ac]	2.50[bc]	$F(2,1320) = 15.19**$	2.69 (2.63 – 2.75)
Staff Management	0.02	-0.07	3.44[ab]	3.02[ac]	2.49[bc]	$F(2,3225) = 33.10**$	2.88 (2.81 – 2.95)
Financial Management	-0.08*	-0.13**	3.62[b]	3.67[c]	2.88[bc]	$F(2,958) = 40.54**$	3.34 (3.27 – 3.41)
Online Professional Journals	0.15**	0.10**	2.87[b]	2.78[c]	2.67[bc]	$F(2,676) = 60.49**$	2.76 (2.71 – 2.80)
Information Access Systems	0.09**	0.06*	2.93	2.95[c]	2.76[c]	$F(2,2082) = 4.54*$	2.88 (2.83 – 2.93)
CCHP	-0.04	-0.04	3.45	3.42[c]	3.16[c]	$F(2,654) = 5.22**$	3.36 (3.29 – 3.43)

NB: * p < 0.05; ** p < 0.01. Superscript letters denote significant differences between groups from post-hoc comparisons

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1   Mims Online is the web version of MIMS - an Australian pharmaceutical database which offers access to essential information on over 2,300 prescription and non-prescription drugs: http://www.mims.com.au

2   An internationally collaboration conducting systematic reviews of evidence based nursing: http://www.joannabriggs.edu.au

2006) are members of the ANF. Demographics of the study's EN and RN are consistent with those of the national workforce and our results are deemed to be representative. However AINs within the ANF under-represent the proportion within the national workforce (Richardson and Martin 2004) and results therefore must be viewed with caution for this cohort.

Response Rate

The high response rate for such a lengthy survey suggests that this topic is one which is important to nurses. This is substantiated by other recent Australian studies where the importance of computers and IT to the provision of health, have been acknowledged by nurses (Edirippulige 2005; Ho 2004; Darbyshire 2000).

Access to Computers

The number of nurses across all sectors using a computer was 86% and within hospitals, the figure of 95% was consistent with that for other hospital based nurses in Brisbane (Webster et al 2003). The results emphasise the high adoption of computers into nursing. Differences among levels of job in access and use of computers is however high and as noted previously, was influenced by seniority (Webster et al 2003; Gosling et al 2004).

Over half the nurses below RN level 3 do not have sole access to a computer at work. This contrasts to the 80% of RN level 3 and above who do. If access is restrictive at work then this is clearly not satisfactory and our data are in agreement with Webster who reported that over 20% of RN level 1-2 felt their access was inadequate (Webster et al 2003).

Whether there would be a positive benefit to the standard of care of patients and clients if ENs and AINs had increased access to computers is not clear. Further research should be undertaken to evaluate the impact on the standard of care and the cost-effectiveness of an increase in computer use in this level of nurse and within and across sectors (acute public and private hospitals, community, and aged care).

Experience and confidence in IT

The data could be grouped into three types of application: the common ones such as use of a mouse experienced by the majority of nurses; the intermediate applications that are familiar in some degree (eg intranet); and the more specialised applications (eg presentation software) for which between a quarter and a half of the nurses had no experience at all.

In some of the more specialised applications, such as use of spreadsheets and databases, it is not surprising that experience was low and as expected there were clear differences in response related to level of job. The most senior nurses had more experience and confidence in applications used for administration and management.

For virtually all applications (apart from those associated solely with management functions) both younger and newer nurses expressed greater experience in use and confidence in use. This is possibly because this group have recently gone through tertiary education programs where they had more exposure to IT. The difference in age for experience was 2-7 years across the applications.

These results were not unexpected, however what was surprising was that confidence rating of the most confident nurses in the most familiar of applications was only confident. Very confident was an infrequent response. Although newer nurses are more familiar and confident presumably in part because of their education in IT there is huge room for improvement if nurses are to fully utilise IT in their workplace.

Use of IT

Use of applications by nurses show similar trends as those previously presented for Australia (Webster et al 2003), Scotland (Hillan et al 1998), China (Liu et al. 2000) and the UK (Griffiths and Riddington 2001). Any differences among studies are probably due to time (increased prevalence of computers) and to the nursing sector and job levels of those surveyed.

A major use of computers at work was for professional development. In addition to work use, it was determined that two-thirds of the nurses who use a home computer did so for continuing professional

education. Respondents reported that much of this activity is undertaken at home because of factors such as insufficient time or facilities at the work place.

The results of this study indicate that employers should provide opportunities for all levels of nurses to access computers for professional development within the workplace (both within and outside of working hours).

The absolute level of use was surprising given the high reported computer use in the workplace. Even the most used applications were used by less than 40% of total respondents to the study. These data suggest that there is huge room for expansion in the use of IT in nursing practice.

Other than applications associated with administrative functions, there was a negative correlation of frequency of use of applications with age indicating that younger nurses had a tendency to use applications more often. These results were confirmed by analysis by length of time in nursing where the same applications were used most frequently by nurses with less than 10 years experience. This result supports the notion that newer nurses are either more ready to accept or more confident in the use of information technology.

Data on the use of several more innovative systems such as telehealth and personal digital assistants (PDA) were collected but found not to have been taken up in nursing in any great numbers. For example only 148 respondents had ever used a PDA. This result was surprising as a higher adoption of this technology was expected.

Use of the internet was relatively high, although its purpose was not determined. A recent study in Brisbane reported that less than a quarter of nurses with internet access used it for nursing purposes (Edirippulige 2005).

Evidence based practice is strongly advocated as the way forward for nursing in Australia. However current usage of the Cochrane Library, the Joanna Briggs Institute, on-line journals or clinical information systems was very low and consistent with previous findings from both small local studies (Webster et al 2003; Gosling et al 2004) and with previous results from the UK (Hillan et al 1998; Chan et al 2004). These results are concerning and clearly the reasons for this lack of use should be ascertained considering the Cochrane Library is freely available to any member of the Australian community and that the states and territory of Australia have invested heavily in their own information systems.

CONCLUSION

Given the prevalence of computers in society and the stated goals of government, engagement by nurses in Australia of IT is still lower than would be expected. Apart from nurses in senior administrative levels, experience and confidence in use of IT is confined to basic computer and common applications and even in these instances is lower than desirable. On a positive note increased exposure and confidence was seen with nurses having more recently entered the workforce, suggesting that university preparation is building confidence in the use of IT. Considerable ground must be covered before the full benefits of IT in delivering health care can be realised. Employers, including Australian national, state and territory governments, must work with nurses to adopt strategies to increase their access to and use of IT.

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