Aust. J. Rural Health (2002) **10**, 137–146

Original Article

PATTERNS OF COMPUTER USAGE AMONG MEDICAL PRACTITIONERS IN RURAL AND REMOTE QUEENSLAND

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ABSTRACT: *As part of a more detailed needs analysis, patterns of computer usage among medical practitioners in rural and remote Queensland were investigated. Utilising a questionnaire approach, a response rate of 23.82% (n = 131) was obtained. Results suggest that medical practitioners in rural and remote Queensland are relatively sophisticated in their use of computer and information technologies and have embraced computerisation to a substantially higher extent compared with their urban counterparts and previously published estimates. Findings also indicate that a substantial number of rural and remote practitioners are utilising computer and information technologies for clinical purposes such as pathology, patient information sheets, prescribing, education, patient records and patient recalls. Despite barriers such as bandwidth limitations, cost and the sometimes unreliable quality of Internet service providers, a majority of rural and remote respondents rated an Internet site with continuing medical education information and services as being important or very important. Suggestions that 'rural doctors are slow to adapt to new technologies' are questioned, with findings indicating that rural and remote medical practitioners in Queensland have adapted to, and utilise, information technology to a far higher extent than has been previously documented.*

KEY WORDS: *computer usage, computers, continuing medical education, information management, information technology, medical practitioners, Queensland, remote, rural, technology.*

INTRODUCTION

Hoyal has contended that 'rural doctors are slow to adapt to new technologies and the information technology revolution must develop a human face if it is to reach them'.[1] While acknowledging there are still a number of impediments to the full scale adoption of information technologies in rural and remote medical practice, this paper suggests that many medical practitioners in rural and remote Queensland are already conversant with, and are indeed utilising, these technologies for administrative, clinical, educational and research purposes to a far greater degree than has been previously reported in available literature.

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Accepted for publication March 2001.

The data to be reported in this paper were not initially intended as a comprehensive investigation of computer and information technology usage in rural and remote Queensland locations. Rather, the questions were a subset of a more comprehensive needs analysis, which aimed to determine the perceptions and priorities of rural and remote medical practitioners in relation to continuing medical education (CME) programs provided by the Queensland Rural Medical Support Agency (QRMSA).

A central tenet underlying QRMSA's recruitment and retention policies is that the provision of quality, relevant and accessible medical education is essential for attracting, supporting and retaining practitioners in rural and remote locations. To this end the QRMSA has developed and delivers a comprehensive CME program for rural and remote medical practitioners. For example in 1999 the QRMSA's CME department delivered 24 days of continuing medical education spread over seven workshops and

covering topics such as Emergency Medicine, Obstetrics and Neonatology, Anaesthetics and ENT. Additionally, each year the QRMSA also produces and delivers at least two national satellite broadcasts and two statewide broadcasts covering contemporary medical topics, with a specific focus on rural issues. Four videoconference presentations in conjunction with Sports Medicine Australia (Queensland), were also delivered to practitioners at six participating rural and remote locations in 1999.

The exploration of multiple and innovative methods of delivering quality medical education was a major impetus for including questions in relation to computer/information technologies in the needs analysis. To understand what we can reasonably deliver to rural and remote medical practitioners, we need to have an understanding of their current degree of computer and technology access and usage. The QRMSA already has a comprehensive website (CMENet) devoted to the deployment of resources used in medical education for rural and remote practitioners, which was developed as a consortia with the Mount Isa Centre for Rural and Remote Health (MICRRH) and the Royal Flying Doctor Service (RFDS). In order to improve and expand this service and to incorporate newer technologies such as streaming video and audio, it was prudent to assess current levels of computer/information technology access and usage.

Probably the most contemporary and comprehensive investigation of computerisation and/or information technology in general practice is the AC Nielsen report prepared for the General Practice Branch of the Department of Health and Family Services.[2] While this study does not purport to be as rigorous in its methodology or detail, it does provide some interesting contrasts and tends to show a higher degree of computer usage and acceptance by rural and remote medical practitioner than has been previously documented. A further useful reference is 'Telehealth in Rural and Remote Australia', a report produced by the Project for Rural Health Communications and Information Technologies team.[3]

METHOD

A questionnaire was distributed by mail to 550 medical practitioners and CME attendees in rural and remote Queensland locations during November 1999. Due to the developing nature of the QRMSA database, a substantial number of practitioners from the rural components of provincial divisions were not included in the survey. While there was a small amount of wastage (left address, incorrect address etc.; $n = 22$), the overall response rate was reasonable in that 131 of the initial 550 contacts (23.82%) completed and returned the survey. No financial or other inducements were offered for the return of the survey, and respondents returned the survey at their own expense. Completion and return of the survey was voluntary and no follow-up contact was undertaken to increase response rates.

Figure 1 details the demographic characteristics of the respondents including self-identified doctor type and gender. Figure 2 details the GP division and the Rural, Remote and Metropolitan Areas (RRMA) classification of the respondents. 'GP division' refers to Division of General Practice. Of the 123 divisions in Australia, twenty divisions are located in Queensland. Of these, there are five major rural divisions with RRMA designations of 4 or above. Additionally, there are approximately 10 provincial divisions, which have a rural component with centres designated as RRMA 4 or 5.

Rural, Remote and Metropolitan Areas is a Commonwealth index developed in 1994 by the then Department of Primary Industry and Energy and Department of Human Services and Health.[4] It is based primarily on statistical local areas (SLAs) and attempts to measure and designate locations by degrees of remoteness and accessibility to services. This index has seven levels; the designation 'other remote centre', at level 7, being the most isolated and/or lacking access to facilities. Over time, RRMA has tended to be interpreted as a measure of rurality rather than remoteness, although this was not the original intention. Also, since the classifications were based on 1991 Census data, RRMA has many anomalies, in that locations such as Caloundra, Noosa Heads and Hervey Bay were (and still are) classified as RRMA 4.

While the greater majority of respondents were from rural and remote locations designated RRMA 4 or above, a small number (7) were from locations designated as RRMA 1, 2 or 3. The reason for their inclusion is that some GPs accessing the QRMSA's CME programs are from Aboriginal Community Controlled Health Services located in provincial cities, the RFDS or are city doctors undertaking rural locums for the QRMSA. It is doctors from these services that make up the responses for RRMA 1, 2 and 3.

As detailed in Figure 1, 72.5% of the respondents were male and 27.5% female. This distribution tends to reflect current gender distributions within Australian general practice.[5]

Participants contacted for the survey were presented with a nine-page questionnaire and a covering letter seeking their co-operation to facilitate possible changes and future planning of the QRMSA's CME programs. The first six pages were concerned mainly with CME activities and

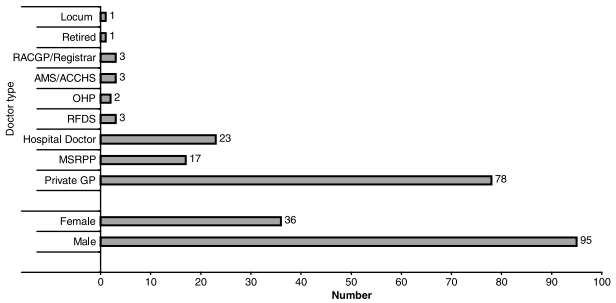

FIGURE 1: *Responses by Doctor type and Gender (N131). RACGP/Registrar = Royal Australian College of General Practice Rural Registrar; AMS/ACCHS = Aboriginal Medical Service/ Aboriginal Community Controlled Health Service; OHP = Other Health Professional; RFDS = Royal Flying Doctor Service; MSRPP = Medical Superintendent with Right of Private Practice.*

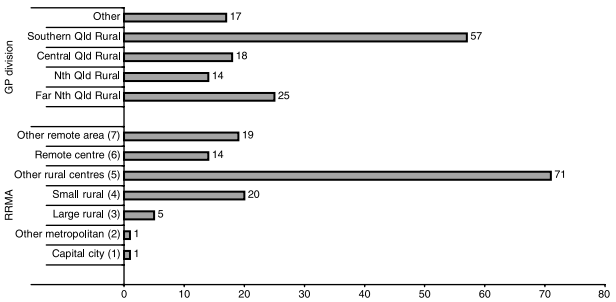

FIGURE 2: *Responses by Division and Rural, Remote and Metropolitan Areas (RRMA) (N131).*

participants' perceptions of needs, priorities and experiences. The last three pages comprised the IT section and attempted to explore participants' current level of computer/information technology exposure, experience and usage. It is the data obtained from this section which provides the thrust and content of this paper.

A common feature of mail surveys and questionnaires is that respondents often do not answer all questions and/ or provide answers that are unanticipated, confusing or complex for the researcher. While the number of unanticipated answers provided some humorous relief during data entry, the number of missing responses to particular questions was more problematic. How to deal with missing responses is always a contentious issue, with no one correct solution. However, for the purpose of this study, it was decided to concentrate chiefly on valid responses and comment only where missing responses appeared to be excessive.

RESULTS

The initial stage of the information technology section of the questionnaire attempted to determine the types of computer that practitioners were using in their home and work environments. Table 1 displays the results for this question. Results suggest that the majority of respondents have access to relatively modern computer systems which are capable of handling most common administrative and data processing tasks.

Random Access Memory (RAM) is an important aspect of modern computing, especially when dealing with programs incorporating considerable amounts of graphics or requiring complex computations. Table 2 details the amount of memory reported by practitioners in their home and work environment. Again results suggest that the majority of rural/remote practitioners tend to access relatively powerful systems capable of

TABLE 1: *Reported computer type by frequency and percentage in home and work environments*

	Home		Work	
Computer type	Frequency	Valid Percentage	Frequency	Percentage
Pentium II/III	52	44.4	57	53.3
Pentium	22	18.8	27	25.2
486	11	9.4	1	0.8
Apple/Macintosh	7	6.0	5	3.8
Other	2	1.7	1	0.8
Unknown/unspecified	8	6.8	3	2.8
QH intranet			1	0.8
None	15	12.8	12	11.2
Total	117	100.0	107	100.0
Missing	14		24	

handling most common day-to-day computational tasks.

The survey also sought to explore the type of operating systems that were being used most commonly by rural and remote practitioners. This type of information is useful in determining appropriate video/audio technologies and CD-ROM production requirements. Results for this question are displayed in Table 3. Results indicated that for the majority of valid responses, Windows operating systems are most commonly used with only a small number (less than 10%) using Macintosh or Apple systems.

TABLE 2: *Reported memory by frequency and percentage in home and work environments*

	Home		Work	
Memory	Frequency	Valid %	Frequency	%
64Mb (or more)	58	59.2	65	72.2
32Mb	28	28.6	21	23.3
16Mb	5	5.1	2	2.2
8Mb	7	1.0		
Unsure/unknown	6	6.1	2	2.2
Total	98	100.00	90	100.00
Missing	33		41	

TABLE 3: *Reported operating systems by frequency and percentage in home and work environments*

	Home		Work	
Operating system	Frequency	Valid %	Frequency	%
Win NT	11	11.2	29	32.2
Win 95/98	78	79.6	55	61.1
Win 3.x	3	3.1	1	1.1
Macintosh/Apple	6	6.1	5	5.6
Total	98	100.00	90	100.00
Missing	33		41	

TABLE 4: *Reported modem speed by frequency and percentage in home and work environments*

	Home		Work	
Modem speed	Frequency	Valid %	Frequency	%
14.4 modem	3	3.4	1	1.3
28.8 modem	15	17.2	4	5.3
33.6 modem	11	12.6	8	10.7
56.6 modem	41	47.1	39	52.0
Cable/ISDN modem	1	1.1	6	8.0
Unknown/unspecified	11	12.6	10	13.3
No modem	5	5.7	7	9.3
Total	87	100.00	75	100.00
Missing	44		56	

The survey further sought to determine the most common modem connection speeds for rural and remote practitioners, as again, connection speed has an impact on the types of technologies that can be delivered through CMENet. Table 4 displays the results for this question. Results indicate that there are still a significant number of rural and remote practitioners using slower type modems and, that modem connection speed is not known in all cases. The number of missing responses probably also reflects this uncertainty as an alternative question which asked if respondents had access to the Internet and email produced differing results. When questioned whether they had Internet and email access, 110 respondents (84%) answered Yes, 12 (9.2%) answered No and 9 responses (6.9%) were missing.

The survey also sought to determine respondents access to videoconferencing equipment and satellite broadcasts. Table 5 displays the results for these questions and the locations where they are accessed. The table indicates that 45.8% of the total sample have access to videoconferencing equipment and 74.8% access to a satellite dish. Overwhelmingly, access to videoconferencing and satellite is through the local hospital with only very small numbers accessing these technologies through other locations.

Local call access to the respondent's Internet Service Provider (ISP) was also measured. Eighty-five respondents (80.2%) indicated that they had local call access, while 21 (19.8%) indicated that they did not. Twenty-five responses were missing. The reliability of respondents Internet connection was also investigated. Sixty respondents (81.1%) agreed that their Internet connection was reliable while 13 (17.6%) indicated that it was not. One response was marked not applicable and 57 responses were missing.

Perhaps one of the more interesting questions in relation to computer/IT usage was the type of activities for which rural and remote practitioners were using their computers. A range of possible activities was provided and respondents indicated whether they used their computers to undertake these functions. These results are displayed in Figure 3. Results indicate that computers are being used for a wide variety of functions in rural and remote practices. While account keeping and practice management is the most common function reported, over 50% of respondents reported that they regularly use their computers for pathology services, patient information sheets, prescribing and education. Although activities such as patient records, patient recalls, transmission of clinical information, identification of patient groups and research have a lower reported usage, the number of practitioners using computers for these activities is quite impressive. The least reported activity was use of computer for radiology and could, in part, reflect bandwidth limitations.

Possible gender differences in reported computer usage across activities were also investigated. Chi-squared tests were conducted and it was only in one activity, use of computers for education, that a significant gender difference was found ($\chi^2 = 6.36$, df = 1, $P = 0.012$) with males being more likely to report that they used computers for educational purposes.

To determine if reported patterns of computer usage differed among group, solo and hospital practitioners and among users and non-users, an additional Chi-squared test for independence was conducted. Due to small numbers, the categories retired, other and various were excluded from this analysis. Missing responses were categorised as, and included with non-users. Results

TABLE 5: *Videoconferencing and satellite access by location and frequency*

	Location	Yes (Frequency)	No (Frequency)	%
Videoconferencing access	Surgery	3		2.3
	Hospital	57		43.5
	No access		61	46.6
	Missing		10	7.6
Satellite access	Surgery	1		0.8
	Hospital	90		68.7
	Home	4		3.1
	Other	2		1.5
	No access		24	18.3
	Missing		9	6.9

indicated that there were no significant differences in usage patterns among group, solo or hospital practitioners ($\chi^2 = 1.92$, df = 2, $P = 0.383$).

A further question attempted to assess the degree unto which practitioners made use of Internet resources for clinical purposes. Ten respondents (7.9%) indicated that they accessed the Internet for clinical purposes frequently; 74 (58.7%) Indicated that they use it occasionally and 42 (33.3%) indicated that they do not use Internet resources for clinical purposes. Five responses were missing.

An additional set of questions was addressed to practitioners who did not have a computer. These questions attempted to determine the main obstacles/barriers practitioners saw to computerising. Although addressed to non-computer users, a number of computer users also completed this section. Table 6 details the results for this question. Results for this question indicate that issues such as lack of training, access to training, lack of understanding of how to use computers, time constraints in regard to skill development and learning and cost of software and hardware are the major very important or important considerations for the respondents to this section.

A further question asked respondents who indicated that they did not have a computer if they would change their mind if training and support were provided. Twenty respondents (87%) indicated that they would while 3 (13%) indicated that they would not. Additionally, among the current non-computer users, at least four indicated that they would be instituting computer systems in their practice in the near future.

A final question asked respondents to rate a number of activities according to the degree to which they valued or did not value the activity. Table 7 displays the results for this question. As with the previous question addressed to non-users, a majority of respondents (users and non-users alike) saw assistance and advice in regard to software and hardware as being very important or important. An Internet site with CME information and other services was also seen as very important or important by the majority of respondents. Live access to CME events via the Internet was still seen as very important or important by over half of the respondents.

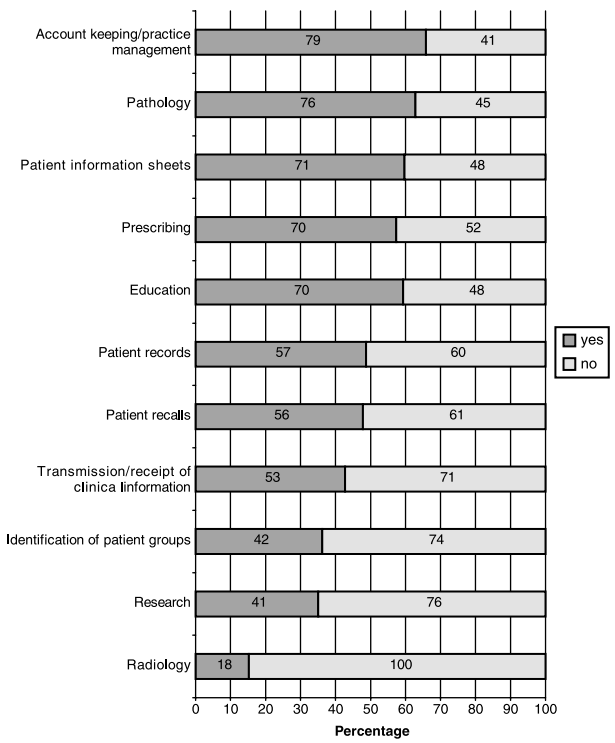

FIGURE 3: *Reported computer usage by activity.*

DISCUSSION

The data reported in this study were collected during November and December 1999. While providing interesting information in relation to patterns of computer usage and priorities among respondents, the moderate response rate and the potential for subject-selection bias suggests that the findings should be treated with some caution. For example, it is possible that a survey about computer usage is more likely to be responded to by computer users as opposed to non-users.

Although a response rate approaching 25% was reasonable for an unsolicited survey, which offered no inducements and no follow up of initial contacts, there is always the possibility that non-respondents may differ from respondents in some way. It is also recognised that the lack of follow up to increase response rates may be criticised by some. However, this was a conscious decision based on the timing of the survey (Christmas and New Year period), the recognition that other than psychology students, GPs are one of most surveyed groups in the population, and the belief that the offering of inducements or hounding of potential participants may introduce further possible confoundings.

Despite the limitations discussed above, the survey did capture nearly 25% of a reasonably finite population (total number of non specialist medical practitioners in rural and remote Queensland surveyed) and there is no substantial evidence to suggest that respondents differ from non-respondents. For example, our current database (May 2000) indicates that 33.15% of rural and remote practitioners in Queensland are associated with Queensland Health. The current sample reflects a response rate of

32.06% for Queensland Health practitioners. Similarly, the proportion of private practitioners was 67.94% compared with 66.85% for rural and remote Queensland in general. The RRMA distribution of respondents in RRMAs 5, 6 and 7 was also similar to current database percentages. The one major discrepancy was for RRMA 4 where a 15.3% response rate was obtained compared with 34.3% of practitioners in the current database. The

TABLE 6: *Barriers/obstacles to computerisation by importance*

	Very Important Freq. (%)	Important Freq. (%)	Somewhat Important Freq. (%)	Not Important Freq. (%)	Irrelevant Freq. (%)	Total Respondents
Cost of software	12 (40.0)	8 (26.7)	5 (16.7)	2 (6.7)	3 (10.0)	30
Cost of hardware	10 (33.3)	9 (30.0)	6 (20.0)	2 (6.70)	3 (10.0)	30
Lack of training	12 (41.4)	10 (34.5)	3 (10.3)	4 (13.8)	0	29
Access to training	11 (37.9)	12 (41.4)	2 (6.9)	4 (13.8)	0	29
Inability to access honest advice re buying/maintenance	7 (23.3)	6 (20.0)	8 (26.7)	5 (16.7)	4 (13.3)	30
Inaccessibility of expert advise (helpdesk)	8 (28.6)	8 (28.6)	7 (25.0)	3 (10.7)	2 (7.1)	28
Software unreliability	5 (17.9)	10 (35.7)	5 (17.9)	5 (17.9)	3 (10.7)	28
Inability to access product locally	3 (10.7)	10 (35.7)	8 (28.6)	4 (14.3)	3 (10.7)	28
Lack of understanding of how to use computers	14 (45.2)	6 (19.4)	3 (9.7)	6 (19.4)	2 (6.5)	31
Inability to train staff to use computers	7 (25.0)	4 (14.3)	9 (32.1)	3 (10.7)	5 (17.9)	28
Time constraints re skill development and learning	11 (37.9)	10 (34.5)	4 (13.8)	2 (6.9)	2 (6.9)	29

TABLE 7: *Activity by degree valued*

	Very Important Freq. (%)	Important Freq. (%)	Somewhat Important Freq. (%)	Not Important Freq. (%)	Irrelevant Freq. (%)	Total Respondents
An internet site with CME information and other services	28 (24.8)	47 (41.6)	25 (22.1)	10 (8.8)	3 (2.7)	113
Assistance/advice re software and hardware	29 (25.2)	42 (36.5)	28 (24.3)	11 (9.6)	5 (4.3)	115
Live access to CME events via internet	22 (19.5)	36 (31.9)	27 (23.9)	25 (22.1)	3 (2.7)	113

probable reason is that due to the developing nature of the database at time of survey, many RRMA 4 practitioners from provincial divisions were not included. While it is acknowledged that the relatively low response rate in this study is a possible source of bias and limits generalisability, a follow up survey undertaken in 2000 produced similar results from a larger sample thus increasing reliability.

Although not designed as an in-depth and detailed examination of computer usage by rural and remote medical practitioners, the results obtained were interesting in that they reveal a pattern computer usage which appears considerable higher compared with what has been generally reported in the available literature. For example, 77.86% of the 131 respondents reported that they used a computer at home and 72.52% used a computer at work. These percentages may well be an underestimate of actual computer usage due to missing responses. As an example, 110 or 83.97% of respondents indicated that they have access to the Internet and email. In contrast, the Telehealth in Rural and Remote Australia report details a 56% usage of desktop computer by health professionals,[3] and while not providing actual percentages, estimates usage by medical practitioners as being less than 40%. Similarly, the AC Nielsen study into level of, and attitude towards, information technology in general practice,[2] reports that computers were present in 31% of Australian practices. Even allowing for the fact that the AC Nielsen study was based on practices rather than individual GPs, their estimates of computer usage is considerably lower than levels found in this study. The Nielsen study also suggests that computers were more likely to be found in group practices, which comprised 47.3% of the current study and were more common in country practices.[2] In a similar vein, the report of the General Practice Strategy Review Group suggests, that while between 30 and 50 per cent of GP's in Australia have a computers in their practice, only a small proportion – between 3 and 15 per cent (depending on source) use computers for clinical applications.[5] The findings in this study suggest a much higher level of computer usage for clinical applications by rural and remote practitioners than has been previously documented.

The Neilsen report also notes that computer usage by medical practitioners in Australia is considerably lower compared with other countries such as Great Britain, New Zealand, Denmark and Sweden.[2] One factor cited as accelerating the adoption of computers in Great Britain was a range of administrative and financial incentives offered by the National Health Service to encourage uptake. Following from recommendations of the General Practice Strategy Review Group,[5] a Practice Incentive Program (PIP) was introduced in Australia in 1999 which targeted a number of specific areas including information management and information technology (IM/IT).[8] The IM/IT component of this program allowed for payments of up to A$3500 per full time equivalent GP for providing data to the Commonwealth. Similarly the use of prescribing software by a majority of GPs attracted a payment of A$4000 while the capacity to send and receive data through a modem or email account attracted a payment of A$2500. It is certainly probable that such incentives will increase the uptake of computers among medical practitioners and may have contributed in part, to the higher rate of computer usage among rural and remote practitioners in this study. However, it was felt that the timing of this study was too close to the program announcement for the incentives to have any significant impact on computer usage among rural and remote practitioners. Rather, it is believed that higher utilisation of computer and information technologies in rural and remote areas is related to more practical concerns such as overcoming distance, communication and isolation problems. While it is not possible to substantiate this belief, qualitative data provided in the study (not reported) suggests that the majority of respondents were experienced rather than novice users of computer and information technologies.

Findings in this study also suggests that medical practitioners in rural and remote Queensland tend to use relatively modern and powerful computing equipment capable of handling most common processing tasks. It is in the area of Internet and email access that respondents in this study differed considerably from those reported in the Neilsen study.[2] In the current study 110 or 84% of respondents indicated that they had access to Internet and email. In contrast, the Nielsen study reports that at the practice level, 44% had access to email and 47% had access to the Internet. At the personal level, access was even lower with only 27% of clinical users having email at their desk and 30% having Internet access. Although the current study did not specifically attempt to measure from where respondents accessed the Internet and email, the numbers utilising these services are considerably higher than those reported in the Neilsen study.[2]

The examination of the types of functions practitioners used their computer for, also provided some interesting information. As reported in previous studies, the most common use of computers was for account keeping and practice management functions.[7] However, not far behind in this study was the reported use of computers for pathology services with 62.8% of respondents indicating that

they used computers for this purpose. This contrasts markedly with the 23% pathology usage detailed in the Neilsen study. Similarly, respondents in this study reported a 57.4% usage of computers for prescribing compared with 40% reported in the Neilsen study. In the area of patient recalls, rural and remote practitioners reported a 48.3% computer usage compared with 22% in the Neilsen study. In relation to patient records, 48.7% of rural and remote practitioners indicated that they used computer compared with 24% reported by the Neilsen study.[2]

Other areas of relatively high computer usage reported by rural and remote practitioners in this study were in the areas of patient information sheets (59.7%), education (59.3%), and the transmission and receipt of clinical information (42.7%). No comparable data was available in these areas from the Neilsen study. The Neilsen study does, however, suggest that the proportion of clinical usage of computers was above average among solo practitioners and in rural practices.[2] Data from the present study tends to support this contention.

The present study also explored perceived barriers/obstacles to computerisation. Many of the barriers/obstacles identified as important or very important by rural and remote practitioners in this sample were also identified in the General Practice Strategy Review Group report.[5] For example, costs both financial and in terms of effort or time constraints is seen as a major obstacle. Similarly, lack of computer skills and literacy, and lack of support and technical assistance were seen as important impediments by respondents in this study, and in the General Practice Strategy Review Group report. For rural and remote practitioners, however, the major impediments were seen as lack of training and lack of access to training. These barriers were not mentioned in the Neilsen or General Practice Strategy Review Group reports and may reflect the predominately urban nature of these studies.[2,5]

Hoyal has suggested that rural doctors are slow to adapt to new technologies.[1] Data obtained in this study do not support this contention and indeed suggests that rural and remote medical practitioners in Queensland have incorporated and utilise computer and information technologies to a higher degree compared to their urban counterparts. Some support for this contention is provided in the Neilsen report, which suggests that computer usage is higher in rural practices.[2]

While not disputing the fact that hands-on training using face-to-face workshops is the preferred method of delivery by health professionals,[1,6] other methods of delivery such as an Internet site with CME information and other services and live Internet access to CME events were also seen as important or very important by a large number of rural and remote practitioners in this study.

Compared with their urban counterparts, a majority of rural and remote medical practitioners encounter additional barriers to accessing quality, timely and relevant medical education. Some of these barriers include: distance, cost, travel time and complexities, difficulty in obtaining locum relief, unreliable ISP's and bandwidth limitations. While many of these barriers are not likely to be overcome in the near future, the emerging promise of broadband technologies may facilitate wider adoption of the Internet as educational and communication mediums. Data from rural and remote respondents in this study suggests that a majority are experienced with computers and IT and are well placed to take advantage of new developments in this area.

The major strength of the study is that it provides evidence of a degree of computer usage and adaptation to IT by rural and remote and medical practitioners which has been previously undocumented or underestimated. It also suggests that CME delivered via the Internet is valued by many practitioners, and as problems with bandwidth, unreliability and online costs are overcome, it will increasingly become a realistic and practical educational alternative or supplement for rural and remote and medical practitioners. While some of the studies limitations inhibit generalisability, it does provide a foundation for more rigorous and methodological appropriate research into patterns of computer usage in rural and remote locations.

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