

## Original Article

# Radiation therapists and the Internet: a perspective from Australia

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## Abstract

The Internet is an important information source for health practitioners; yet little is known of how radiation therapists (RTs) are currently using this vast information resource for their professional learning. In 2007, a four-page postal survey was sent to a random sample of 1,142 Medical Radiation Science practitioners with a response rate of 32.8%, which included 76 RTs. This paper reports and analyses the questionnaire responses from RTs on the use of the Internet to update their professional knowledge and issues affecting accessibility to the Internet in the workplace. This research provides an initial data set on the professional use of Internet-based tools and resources by Australian RTs. It has been shown that the Internet is an important information source widely used by RTs as they search the Internet (89%), access specific web pages (85%), use e-mail (84%) and listservs (49%) to update their professional knowledge. Although all RTs reported Internet access within their workplace, a number of factors have been identified which at present limit accessibility of current quality health and medical information through the Internet to RTs. A large number of RTs were unaware of Internet-based resources, such as Cochrane Library (48%) and GoogleScholar (42%), which support evidence-based practice (EBP) and research. RTs in teaching environments had greater access to computers with Internet access than their colleagues in non-teaching environments ( $p = 0.044$ ). More RTs in the private sector (22%) reported they had 'no' access to the Internet in their workplace than their public sector colleagues (4%,  $p = 0.037$ ). In addition, RTs in metropolitan workplaces had greater access to protected time during work hours for professional reading or study than their non-metropolitan colleagues ( $p = 0.000$ ). These issues of non-uniformity of resources across workplaces and knowledge gaps within the profession must be addressed so that all RTs can avail themselves of high quality resources available through the Internet that support them in implementing EBP and meeting the mandatory requirement of updating their professional knowledge.

## Keywords

Access; Internet; Lifelong learning; Professional learning; Radiation Therapist

## INTRODUCTION

The Internet is an important information source for health practitioners offering immediate access to the most current health and medical

information.<sup>1–7</sup> Websites of professional, government, education and commercial organisations provide access to online journals,<sup>1,2,7–11</sup> health and medical databases,<sup>4,5,9–12</sup> practice guidelines<sup>4,12</sup> as well as information on professional development activities.<sup>1,7,10,12</sup> Internet-based communication tools of e-mail,<sup>1,2,10–12</sup> listservs<sup>10,12</sup> and discussion forums<sup>10,12</sup> are used

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by health practitioners to consult with colleagues nationally and internationally.

Although the Internet offers many resources that support professional practice, factors limiting health practitioners' access to the Internet have been identified. Recent studies demonstrate that access to the Internet in the workplace is not universal among health practitioners with access to the Internet affected by size and type of workplace,<sup>5,10</sup> geographic location,<sup>5,10,13,14</sup> health sector<sup>5,10</sup> and profession.<sup>3,12,14</sup> Lack of time during work hours to search and read information<sup>9,10,12</sup> and the vast amount and variable quality of information on the Internet<sup>3,6,15</sup> have also been identified as factors limiting Internet use by health practitioners.

The literature related to use of the Internet as an information resource within Radiation Therapy and Oncology has been primarily limited in scope to patients' use.<sup>16–18</sup> Little is known about how Radiation Therapy practitioners are using the Internet to meet their own professional learning needs. Shanahan *et al.*<sup>10</sup> investigated Australian Medical Radiation Science (MRS) practitioners' use of the Internet to update their professional knowledge. MRS includes four areas of specialisation, namely Diagnostic Radiography, Nuclear Medicine, Radiation Therapy and Sonography. This study showed that the Internet is an information resource widely used by MRS practitioners to update their professional knowledge. It was evident from this study that access restrictions to the Internet in workplaces were widespread across the MRS profession. As Radiation Therapy is one of the areas of specialisation within the MRS profession, this paper reports and analyses the questionnaire responses from radiation therapists (RTs) from the larger study<sup>10</sup> to gain a better understanding of how RTs are currently using Internet-based resources and tools for updating their professional knowledge and identifying factors influencing access and use of the Internet in their workplace.

## METHODS

### Sample

The sample population for the larger study<sup>10</sup> was 1,142 Australian MRS practitioners. This

sample included 1,067 practitioners holding registration with the Medical Radiation Technologists Board (MRTB) of Victoria and Queensland and to all (75) academics listed on their University web page. The sampling method was a 20% random sample—every fifth name on the register of the Victorian MRTB Register (537 practitioners) and 50% random sample of registrants (every second name on the register) with addresses publicly available on the Queensland MRTB Register (530 practitioners). The number of practitioners for each area of specialisation in the sample group could not be determined from the register extracts used in the study and so the proportion and gender distribution of respondents across the four areas of specialisation were compared to the latest available workforce data. It was confirmed that these were in proportion to the size of the individual groups<sup>10</sup> and this acted as a check of the representativeness of the total sample. A comparison of the characteristics of respondent RTs to available Australian workforce data is provided in the Results section.

### Instrument

A questionnaire was developed following a critical review of the literature and interviews with 28 academic and clinical MRS practitioners. Seven of the 28 interview participants were RTs, three academic and four senior or manager clinical practitioners with specialist knowledge in their professional area. The interview participants acted as 'information rich cases' for this research<sup>19,20</sup> as collectively they would have a broad range of knowledge and experience of the issues relevant to the MRS profession in general and also more specifically their areas of specialisation within the profession. The interview data were used to develop the four-page questionnaire. The questionnaire contained 37 questions including open and closed questions. The first part of the questionnaire contained 14 demographic questions. The questionnaire obtained data on the frequency of use of a range of information sources and tools by MRS practitioners to update their professional knowledge. The questions of relevance to this paper were focussed on workplace access

to the Internet, awareness of and frequency of use of Internet-based resources (e.g., free access health and medical databases) and tools (e.g., e-mail, listservs) for updating professional knowledge, skill level of practitioners in searching for and evaluating information retrieved from the Internet, and the provision of time during work hours for professional reading (defined in the questionnaire as including reading and information searching) or study. The questionnaire was trialled with seven MRS practitioners not involved in the interviews to refine questions<sup>20–22</sup> before it was used for this study.

In 2007 the developed four-page questionnaire, a letter describing the purpose of the study and a reply paid envelope, was sent to 1,142 MRS practitioners. Due to funding constraints only one mail out was undertaken. Prior to data collection the research gained ethics approval from the University of Wollongong.

### Analysis

Questionnaire data were input into SPSS 15.0<sup>®</sup> and descriptive and inferential statistics were used to analyse these data. Percentages were used to describe survey findings. The collected demographic organisational data allowed cross tabulations to be performed on organisational factors including health sector, geographic location and work environment to determine whether associations existed. Differences between groups were examined using  $\chi^2$  analysis and when there was an SPSS warning for small cell size, Fisher's exact test was performed. A *p*-value <0.05 was the level for statistical significance used throughout the analysis. A number was assigned to each questionnaire as the data was entered into SPSS and this number has been used in this paper when reporting comments written by RTs on their questionnaire (Qnumber). These written comments proffered in response to open questions were utilised to offer insight and greater understanding of the experience of respondent RTs in terms of facilitators and impediments they experience when updating their professional knowledge.

## RESULTS

### Respondents' characteristics

Of 362 surveys returned,<sup>10</sup> 76 were returned from RTs. Table 1 displays the demographic characteristics of responding RTs. All age ranges were represented with 60% of responding RTs under the age of 40 years. This figure is consistent with Australian workforce statistics where 55.5% of RTs were under 35 years of

**Table 1.** Demographic characteristics of respondent radiation therapists (*n* = 76)

Characteristic	No. (%) <sup>a</sup>
Employer	
Public	51 (69)
Private	23 (31)
Work environment <sup>b</sup>	
Teaching hospital	48 (72)
Non-teaching hospital	2 (3)
Clinic	17 (25)
Geographic location	
Metropolitan	46 (61)
Regional	20 (27)
Rural and remote	9 (12)
Primary role	
Practitioner	29 (39)
Senior Practitioner	18 (24)
Manager	11 (15)
Clinical Educator	7 (9)
Academic	8 (11)
Research	2 (3)
Years of professional experience	
<5 years	14 (18)
5–10 years	13 (17)
11–15 years	20 (26)
>15 years	29 (38)
Level of education	
Doctorate	1 (1)
Master	17 (23)
Graduate Diploma/Cert	17 (23)
Bachelor	31 (41)
Diploma	7 (9)
Associate Diploma/Cert	2 (3)
Gender	
Female	55 (72)
Male	21 (28)
Age (years)	
20–29	20 (26)
30–39	26 (34)
40–49	15 (20)
50–60	14 (18)
>60	1 (1)

<sup>a</sup>Percentages are based on number of respondents answering each question.

<sup>b</sup>The responses to this organisation factor exclude practitioners who indicated they worked in more than one type of these environment and those who selected 'other'.

**Table 2.** Frequency of use of Internet resources and tools by RTs to update their professional knowledge

	Internet searches (n = 75) No. (%)	Access web pages (n = 75) No. (%)	E-mail (n = 76) No. (%)
Daily	28 (37)	5 (7)	48 (63)
Several times a week	14 (19)	10 (13)	10 (13)
Several times a month	16 (21)	24 (32)	2 (3)
Several times a year	9 (12)	25 (33)	4 (5)
Never	8 (11)	11 (15)	12 (16)

age.<sup>23</sup> The majority of RTs were female (72%), a finding also consistent with Australian workforce statistics gender data for RTs (76.1%).<sup>23</sup> The highest qualification for the majority of responding RTs was at the postgraduate level (46%) with 24% of respondents currently undertaking further study. The majority of RTs had employment in metropolitan locations (61%), in teaching hospitals (72%) and in the Public Sector (69%).

### Use of the Internet by RTs

RTs frequently search the Internet and access specific websites to obtain information to update their professional knowledge (Table 2). Eighty-nine percent of RTs undertake Internet searches with 56% of practitioners searching the Internet at least weekly. Eighty-five percent of RTs access specific websites to update their professional knowledge with one-fifth accessing websites at least weekly. The most commonly used communication tool by RTs was e-mail. Eighty-four percent of practitioners use e-mail with 63% using e-mail on a daily basis. Approximately half (49%) of responding RTs use Listservs to update their professional knowledge. A minority of RTs currently use e-mail alerts for journals and topic areas in databases, 12% and 2%, respectively.

The Internet provides access to a range of free access databases such as PubMed<sup>®</sup>,<sup>24</sup> Cochrane Library<sup>1</sup> (ref. 25) and Google Scholar.<sup>26</sup> Seventy-five percent of RTs had used PubMed, 43% had used the Cochrane Library

**Table 3.** Respondents awareness and use of Internet resources

Resource	n (%)
Cochrane Library	
Unaware	32 (48)
Aware but not used	6 (9)
Used	29 (43)
GoogleScholar	
Unaware	30 (42)
Aware but not used	15 (21)
Used	26 (37)
PubMed	
Unaware	7 (10)
Aware but not used	11 (16)
Used	53 (75)

and 37% had used GoogleScholar. Although few RTs were unaware of PubMed (10%), a larger number of RTs were unaware of other free access resources such as Cochrane Library (48%) and GoogleScholar (42%, Table 3).

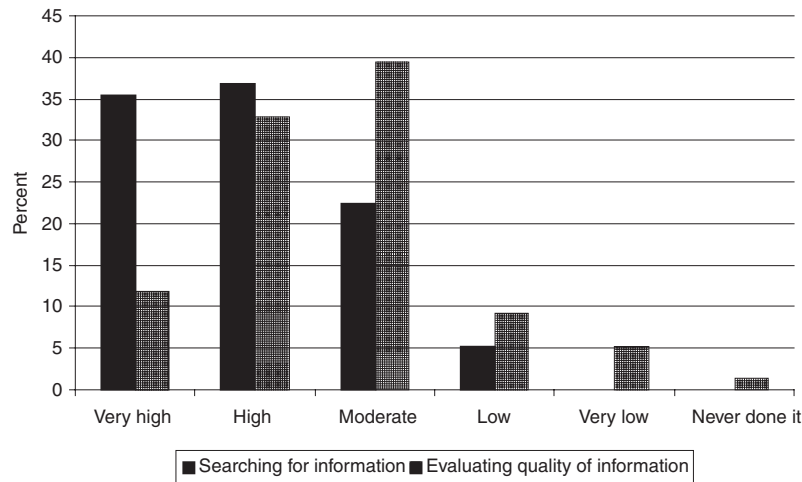
### Internet access in the workplace

All RTs reported their workplace had Internet access with over half (51%) having Internet access on all work computers (Table 4). The difference in computers with Internet access was significant for work environment (Fisher's exact test = 7.800,  $p = 0.044$ ) with over half of RTs in teaching environments having Internet access on all computers compared to 21% of their colleagues in non-teaching work environments. Internet access while available in all Radiation Therapy workplaces did not necessarily mean that practitioners could access it. Four percent of RTs employed in the Public Sector reported they had 'no' access to the Internet in their workplace and this rose to

1 The Cochrane Library is available free to residents in some countries, one of which is Australia see <http://www3.interscience.wiley.com/cgi-bin/mrwhome/106568753/AccessCochraneLibrary.html>

**Table 4.** Access to the Internet within Radiation Therapy workplaces

	Overall	Geographic Location ( $p = 0.345$ )		Work environment ( $p = 0.044$ )*		Sector ( $p = 0.08$ )	
	$n = 75$ No. (%)	Metropolitan $n = 45$ No. (%)	Non-metropolitan $n = 29$ No. (%)	Teaching $n = 47$ No. (%)	Non-teaching $n = 19$ No. (%)	Public $n = 50$ No. (%)	Private $n = 23$ No. (%)
All computers	39 (52)	26 (58)	12 (41)	26 (55)	4 (21)	30 (60)	7 (30)
Most computers	17 (23)	8 (18)	9 (31)	11 (23)	6 (32)	10 (20)	7 (30)
Some computers	7 (9)	3 (7)	4 (14)	3 (6)	4 (21)	3 (6)	4 (17)
Only in offices	12 (16)	8 (18)	4 (14)	7 (15)	5 (26)	7 (14)	5 (22)

**Figure 1.** Skill level of RTs in searching for and evaluating information retrieved from the Internet ( $n = 76$ ).

22% of RTs in the Private Sector (Fisher's exact test = 10.342,  $p = 0.037$ ).

### Skill level of practitioners

The self-reported skill level of RTs for Internet searching and evaluating the quality of information retrieved from the Internet is shown in Figure 1. RTs are more confident in their ability to search for information on the Internet than they are with their ability to evaluate the quality of the information they retrieve. The percentage of practitioners who rated their skill level as 'very high' or 'high' for Internet searching was 72% compared to 45% for evaluating the quality of information. Across all age levels, skill level in evaluating information retrieved from the Internet was lower than skill level for searching for information on the Internet.

There was a significant difference between RTs age groups' in Internet search skills (Fisher's exact test = 25.108,  $p = 0.004$ ) with the vast majority of RTs in the 20–29 and 40–49 year age groups rating their skills levels as 'high' or 'very high'. In contrast, 29% of RTs in the 50+ age group rated their skill level of searching the Internet as 'low'. Interestingly, difference in skill level in evaluating the quality of information retrieved from the Internet was not significant for age group ( $p = 0.769$ ).

### Protected time

Approximately half (52%) of RTs were provided with dedicated time during work hours for professional reading or study (Figure 2). There was a significant difference between geographic location of the workplace and hours allocated

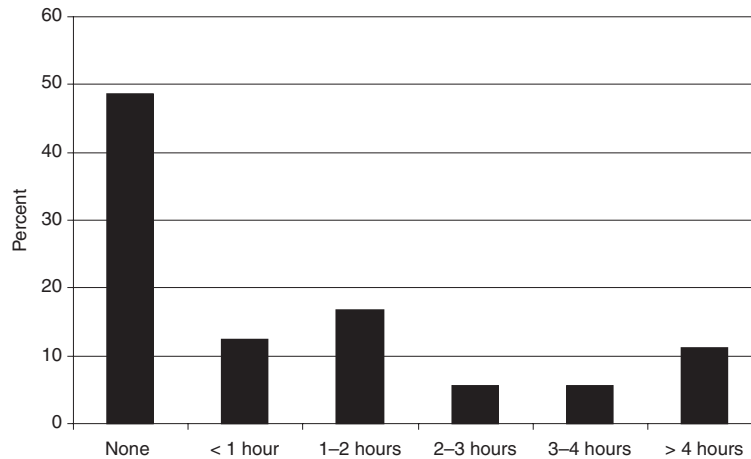


Figure 2. Time allocated to RTs during work hours for professional reading and study ( $n = 72$ ).

for reading (Fisher's exact test = 19.673,  $p = 0.000$ ) with 68% of RTs in non-metropolitan areas having no time allocated compared to 36% of their metropolitan colleagues.

## DISCUSSION

### Use of the Internet by RTs

This research provides an initial data set on use of the Internet by RTs to update professional knowledge. It has been demonstrated that the Internet is an information resource being widely used by RTs. The majority of practitioners use general Internet searches, access specific websites, and use e-mail to update their professional knowledge. The frequency of use of Internet searches and accessing websites was very similar to those reported for the MRS profession<sup>10</sup> and other health professions in Australia.<sup>12</sup> A higher proportion of RTs use e-mail, listservs, and free access databases than is typical for the MRS profession.<sup>10</sup> Just over half (51%) of RTs indicated that all computers in their workplace had Internet connectivity and this level is higher than was typical for the MRS profession (39.7%).<sup>10</sup> Greater access to the Internet within the workplace may contribute to more frequent use of Internet tools and resources by RTs.

The Internet provides access to databases such as PubMed<sup>®</sup>, the Internet free version of Medline<sup>®</sup> which provides health practitioners with access to citations and links to full-text

articles,<sup>24</sup> Cochrane Library which provides access to article abstracts, full-text articles, systematic reviews and clinical trials<sup>25</sup> and GoogleScholar which provides access to peer-reviewed resources from scholarly organisations such as academic publishers, universities, and professional societies and includes theses, books, abstracts and articles.<sup>26</sup> The higher use of these free access databases by RTs than is typical for the MRS profession may also be due to evidence-based practice (EBP) and support for involvement in research being at the implementation phase within workplaces in Radiation Therapy<sup>27-31</sup> whereas this does not yet appear to be the case in Diagnostic Radiography.<sup>32-37</sup> The level of use of Cochrane Library by RTs (43%) was similar to the level of use by Australasian Radiation Oncology Registrars in 2003 (49%)<sup>38</sup> and higher than use reported by Radiation Oncologists (17%) and Radiation Oncology Registrars (26%) in 2000. Again, this finding suggests evidence-based practice is being implemented within Radiation Therapy and Oncology in Australia.

It was also evident a high number of RTs were unaware of Cochrane Library (48%) and GoogleScholar (42%). This shows an immediate need for professional development activities aimed at expanding the knowledge base of RTs so they can more fully engage with the health information world being made available through the Internet. Comments on questionnaires by RTs indicate they want this increased support to expand their knowledge base of

professionally relevant resources available through the Internet. Their comments included:

*We have no training on which sites to access* Q180,

*Don't know what's available or how to access it* Q63, and

*Greater awareness of 'online' resources [is needed]* Q143.

### Internet access in the workplace

Although all RTs reported Internet access within their workplace, not all RTs could access it. For example, 22% of RTs employed in the Private Sector reported they had 'no' access to the Internet in their workplace. Written comments on questionnaires by RTs elucidate some access restrictions experienced by RTs in their workplace. Their comments included:

*Not allowed to use the internet* Q06,

*Only if recognised site — do not have access to web only govt site* Q57, and

*Personally no issues but rest of RTs need someone to sign in for them to access net* Q224.

Access restrictions experienced by RTs such as lack of permission to use the Internet; passwords used to deny or restrict access to the Internet, and limiting access to an intranet with no access to external websites within workplaces are forms of Internet access restriction that exist across Australian health professions.<sup>10,12,39</sup> Restrictions on access to the Internet in the workplace create a digital divide preventing some RTs from accessing current quality health and medical information available through the Internet that supports them in updating their professional knowledge and implementing evidence-based practice.

### Skill level of practitioners

Another factor identified as limiting Internet use by health practitioners is the vast amount and variable quality of information on the Internet.<sup>3,6,15</sup> It is evident from this study that RTs

are more confident in their ability to search for information on the Internet than to evaluate retrieved information for quality. This finding of Internet evaluation skills being lower than Internet search skills is in accord with other health practitioners.<sup>10,40</sup> Good skill levels in searching for and evaluating the quality of information retrieved from the Internet are required to successfully navigate to high quality current health and medical information available through the Internet.<sup>8,41–43</sup> Comments from RTs indicate they want to be supported in developing their skills and knowledge in navigating the information super highway to quality information sources. Purposefully designed learning activities which have produced long-term positive changes in the information search and evaluation knowledge and skills of MRS students<sup>44,45</sup> may provide a useful framework for professional development activities.

### Protected time

Time is recognised as a major barrier in updating professional knowledge by health practitioners.<sup>7,9–11,46–48</sup> 'Protected time', that is time during work hours when health practitioners are not engaged in clinical or teaching duties, is one example of how organisations are supporting health practitioners to meet their professional learning needs.<sup>49</sup> In a recent study of Australian and New Zealand Radiation Oncologists,<sup>49</sup> 58.1% reported they had access to 'protected time' for professional reading, a figure similar to RTs (52%). It is also apparent from this research that the level of organisational support in terms of the provision of 'protected time' is not uniform for RTs with more metropolitan RTs (64%) having access to 'protected time' than their non-metropolitan colleagues (32%,  $p = 0.000$ ). RTs wrote comments on their questionnaire indicating they need time to search and read professionally relevant information in their workplace. Their comments included:

*[We need] computer and time availability* Q25,

*Dedicated time to review information* Q148, and

*Time to browse databases* Q180.

As all RTs are expected to stay up-to-date with the changing knowledge base of their profession, greater support for RTs in non-metropolitan workplaces should be investigated.

The majority of RTs (74%) were not able to remotely access electronic information resources available in the workplace such as journals and databases from home. RTs identified that professionally relevant information resources could be made more available through the facility of remote access to workplace resources.

*e-access through work is excellent but time to sit and read only comes when at home* Q121

*Would be good to access [journals] from home* Q315.

As the vast majority of RTs had Internet access at home (95%), remote access to workplace resources would be a useful feature providing RTs with greater flexibility in terms of when and where they can access information resources.

### Study limitations

This study has limitations associated with postal survey methodology such as the unknown characteristics of non-respondents. Of particular interest in this study is that the number of RTs in the initial sample is unknown. The demographic analysis of the larger study ( $n=362$ ),<sup>10</sup> indicated that the proportion of respondent RTs ( $n=76$ ) was representative of the Australian population of MRS practitioners for area of specialisation. This paper shows that both gender and age groups of the respondent RTs were consistent with latest available workforce data. These findings provide multiple indicators that suggest the sample is representative of the Australian population of RTs. However, it should also be noted that there is several years' difference between the survey data and the available workforce data and changes in workforce data may have occurred across the MRS profession since that time. Although the small size of this study is another limitation, this study presents valuable information by

providing an initial data set of workplace access to and use of the Internet by RTs for updating professional knowledge. The author encourages other researchers to build upon this work so that the body of knowledge on contemporary professional use of the Internet by RTs is developed.

### Conclusion

The Internet offers immediate access to the most current health and medical information and has been identified as an important information source for health practitioners generally. This research shows that RTs actively use Internet-based tools and resources to update their professional knowledge. Although all RTs reported Internet access within their workplace, a number of factors have been identified which at present limit the accessibility of current quality health and medical information through the Internet to RTs. A large number of RTs were unaware of resources, which support evidence-based practice and research such as Cochrane Library (48%) and Google Scholar (42%). RTs reported low skill levels in their ability to evaluate information retrieved from the Internet for quality. These findings show an immediate need for professional development activities aimed at expanding the knowledge base and skills of RTs to support them successfully navigate the information superhighway. Access to resources was also shown to vary across workplaces with RTs in teaching environments having access to more computers with Internet access than their colleagues in non-teaching environments ( $p=0.044$ ); more RTs in the private sector (22%) reported they had 'no' access to the Internet in their workplace than their public sector colleagues (4%,  $p=0.037$ ); and RTs in metropolitan workplaces had greater access to protected time during work hours for professional reading or study than their non-metropolitan colleagues ( $p=0.000$ ). These issues must be addressed so that all RTs can avail themselves of resources available through the Internet that support them in implementing EBP and meeting the mandatory requirement of updating their professional knowledge.<sup>50-53</sup>



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