Fostering Research Uptake and Evidence-Use in Applied Clinical Settings

by

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We accept the thesis as conforming to the required standard

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Abstract

Radiation Therapy health care practitioners need access to actionable, evidence-based, and solution-focused research in order to make the best clinical decisions possible. This paper presents a qualitative case study which tested and explored an existing physician-orientated literature synthesis website to see in what ways it was beneficial for non-physician practitioners as a resource that could possibly also satisfy their needs. A case study and online survey questionnaire were used to gather data in order to ensure realistic workplace recommendations came from the study. The majority of surveyed practitioners were in-favour of research uptake and evidence-use to support their clinical decisions, but many barriers hinder their ability to do so including departmental structure and organization of the workplace environment, the minimal or lack of value placed on research, and limited professional development opportunities. The study finds that the implementation of a literature synthesis website has the potential to be a viable solution for practitioners to bring about evidence-based changes, support their needs to perform to higher standards, and lead departments towards best practice.

Keywords: research uptake, evidence-based practice, point-of-care tool, radiation therapy practitioners, healthcare research barriers
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Fostering Research Uptake and Evidence-Use in Applied Clinical Settings

Introduction

Improving the quality of care in applied clinical settings is a constant struggle in the Canadian healthcare system. Practitioners need evidence-based research in order to improve medical interventions and enhance productivity in resource-limited health organizations. Clinician contribution to the research community is also necessary for verification of current treatment interventions, to gain benefits from available health literature, and to get knowledge into the hands of those who need it. The implementation of actionable, evidence-based, and solution-focused research is necessary to improve the quality of care in these systems and to aid practitioners in making the best decisions possible.

Commitment to research is advantageous for health organizations as it creates opportunities for growth, forward-progression, and investment return from research initiatives in addition to improving organizational performance, effectiveness of patient service delivery, and employee satisfaction (Jones, Cifu, Backus, & Sisto, 2013). However, regardless of large investments by organizations into evidence-based medicine initiatives there is still inefficient use of evidence in Canadian healthcare (Straus et al., 2011; Grimshaw, Eccles, Lavis, Hill, & Squires, 2012). The question therefore is how do we best move evidence into practice in a dynamic health care environment? This study aimed to explore the question: what kind of resource can foster research uptake by clinical practitioners and lead to improvements in quality of care and professional development?

The main objective of this study was to test and explore an existing physician resource website used for staying current with evidence in order to determine in what ways it was beneficial for non-physician professional practitioners. Furthermore, this study also aimed to question and identify practicing Radiation Therapist’s barriers to research uptake and evidence-
use in their individual organizational contexts. Greater understanding of these elements, looking at the bigger picture and the true reality practitioners face, is necessary in order to make actionable recommendations for keeping practitioners current and using best practices from the evidence to guide their daily roles.

Using the interpretivist paradigm this study was aiming for understanding rather than discovery of causation (Lindlof & Taylor, 2011). A case study inquiry evaluating a prototype practitioner website was completed and a qualitative web survey questionnaire was created based on the case study findings then sent out to Radiation Therapy practitioners. The collected data consisted of findings from the case study, the website’s details, general approach, functionality, communication style, and ability to aid physicians in keeping up with evidence-based medicine and practitioner’s survey responses to assess for the potential website’s practicality for clinical professional groups. A grounded theory approach guided the content analysis to draw generalizable patterns and themes from the data set to establish the standards and recommendations that were made from my research.

It is common knowledge in health care contexts that practitioners need evidence-based research in order to improve medical interventions, enhance productivity, and develop professionally (Jones et al., 2013). Therefore we must develop effective resources and tools that are readily available to healthcare professionals in order to support optimal patient care.

This study was attempting to contribute findings the greater body of literature on health delivery and “mak[e] patients’ care more effective, efficient, safe, and friendly” (Grol & Grimshaw, 2003, p.1229) through quality improvement in the Canadian healthcare system. I hope this study adds to the medical communications body of knowledge and inspires
practitioners to incorporate more research use into their daily professions and make evidence-informed decisions to enhance quality of patient care.

**Literature Review**

The literature review aims to bring forward relevant, available research from other supporting studies, which help justify why it is important to have healthcare practitioners stay current with evidence-based research and move evidence into clinical practice. This review starts by addressing the significance of evidence-based medicine in health care contexts and how it’s use can lead to improved patient outcomes. Then, the review goes further to discuss the barriers to implementing the use of evidence-based medicine in health departments and the potential positive role an organizational research culture can have for enhancing practitioner development. Subsequently, there is discussion of how the knowledge translation process plays out in health contexts and the need for collaborative agendas between researchers and practitioners to become a new standard in research practices. Lastly, it explores what types of research implementation strategies currently exist and how knowledge brokering and point-of-care tools, such as websites, can be useful in improving clinical practices in the current Canadian healthcare system.

**Evidence-based Medicine**

Evidence-based medicine sets a standard of practice and a benchmark for departmental treatments and actions to be measured against. Healthcare organizations and professional bodies are asking practitioners to “ensur[e] that people receive care based on the best possible evidence” and weave research findings into their daily clinical decision making practices (Rycroft-Malone et al., 2004, p.82). Evidence-based medicine (EBM) being a commonly used phrase in healthcare environments has many definitions as to what the term is regarded as. For the purpose of this study, EBM is defined by Sackett (1997) as “a process of lifelong, self-directed learning
in which caring for one’s own patients creates the need for clinically important information about
diagnosis, prognosis, therapy, and other healthcare issues” (p. 4). In essence, the process
involves finding the best evidence for one’s purposes, critically evaluating the literature you find,
and using what evidence you find in conjunction with your own professional expertise to apply
your learning’s into clinical practice to make evidence-informed decisions (Sackett, 1997).
There is now a vast push from healthcare organizations and academic institutions towards
dissemination and translation of research knowledge into the hands of those who can put
evidence into action in healthcare in order to improve quality of care and patient outcomes
(Bowen, Erickson, Martens, & Crockett, 2009). Therefore, new resources and tools need to be
available to aid clinical professionals in pursuing this goal and to be able to adapt and expand
daily workplace practices to accommodate their use (Grimshaw et al., 2012).

Changing practice to allow practitioners to facilitate using evidence-based medicine as
much as possible in their professional roles is a challenging task. Common barriers to evidence-
use which hinder practitioners from being able to implement these processes include: defining
what constitutes evidence, gaining accessibility to available evidence, having the capacity to
understand and interpret evidence, allocating blocked time and space to review literature,
needing like-minded leaders and organizational structure to support practices, having
overwhelming workloads and constant crisis-like situations, working within overarching politics,
and vast technological concerns (Bowen et al., 2009). The complexity of healthcare contexts
requires organization’s to reflect on current cultural practices and existing barriers to evidence-
use in order to be able to promote a research-focused culture (Bowen et. al, 2009; Jones et al.,
2013). Instilling a research culture involves making changes and decisions based on evidence
and adopting new attractive and feasible systems to help practitioners, which include evaluation
and feedback metrics built-in to processes to determine success and progress of implemented changes (Grol & Grimshaw, 2003). Organizational cultures need to transform to address these barriers and be supportive of active research by nurturing practitioner involvement in the academic community, and shifting the organizational mindsets from maintaining status quo to progressive and learning-focused.

There is no clear methodology for moving evidence to action in health care contexts. In order to be able to achieve quality improvement, defined by Batalden and Davidoff (2007) as “the combined and unceasing efforts of everyone—healthcare professionals, patients and their families, researchers, payers, planners and educators—to make the changes that will lead to better patient outcomes (health), better system performance (care) and better professional development (learning)” (p. 2) creative thinking is necessary. Fundamentally, healthcare systems need to change how they view work and what outcomes they desire in order to move evidence into clinical practice (Batalden & Davidoff, 2007; Rycroft-Malone et al., 2004; Sackett, 1997; Grol & Grimshaw, 2003). Practitioners also need to move from purely being rewarded and satisfied by measurable service delivery benchmarks to focusing more on evaluating the effectiveness and results of the clinical procedures that they perform (Jones et al., 2013). Simply put by Rycroft-Malone et al. (2004) “evidence, context and facilitation” (p. 82) are they key components that need to be addressed to change health work practices and enhance quality improvement.

Knowledge Mobilization
Translating knowledge and getting research evidence into practice in health care environments from academic sources is not a straightforward task. The context of health care settings is dynamic and there are no simple cause-effect solutions to most problems (Bowen & Graham, 2012). In order to get practitioners to engage in quality improvement and become
evidence-based, rather than evidence-informed, collaborative processes and agendas need to be
designed between researchers and practitioners (Grimshaw et al., 2012; Magnier-Watanabe, &
Senoo, 2008; Baumbusch et al., 2008).

Baumbusch et al. (2008) in their work in the nursing field on collaborative knowledge
translation (KT) for clinical settings emphasize a participatory action approach to research, the
organization and the researcher working together, in order to produce more actionable and
effective solutions for practitioners. Baumbusch et al. (2008) challenge traditional research roles
in order to pursue a common agenda between practitioners and the academic world. This
approach is supported by the Canadian Institutes of Health Research’s (CIHR) collaborative
model of knowledge translation: synthesis, dissemination, and exchange principles, which
promote adapting research and knowledge to target audiences as well establishing a learning
relationship between knowledge users and researchers (CIHR, 2013). The World Health
Organization and the Canadian Coalition for Global Health Research agree with CIHR’s KT
model and define knowledge translation further as “the synthesis, exchange, and application of
knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in
strengthening health systems and improving people’s health” (p. 82) emphasizing the importance
of the role of relevant stakeholders and their necessary involvement in problem solving
throughout the research process (Pablos-Mendez & Shademani, 2006). Bowen and Graham
(2012) also support these definitions and propose a new knowledge translation paradigm, the
engagement paradigm. This new KT paradigm promotes increased research use in clinical
settings and is a move from a more traditional academic focus on content and dissemination, to a
majorly collaborative multi-disciplinary, practical approach focusing on research relevance and
change management practices (Bowen & Graham, 2012). This shift advocates for more
collaboration and reciprocal action between researchers and practitioners for real-life, relevant solutions to be addressed by scholars, rather than purely academic interests.

For collaborative processes to be successful, research uptake activities need to be embedded into professionals’ clinical work practices (Straus, Tetroe, & Graham, 2011; Magnier-Watanabe, & Senoo, 2008). A knowledge-to-action framework to mobilize evidence-use in health care has been endorsed by CIHR (2013) as one of the best ways to ensure knowledge processes are sustainable and being implemented to be practical and effective in workplace scenarios (Straus, Tetroe, & Graham, 2011). The goal is to get practical research and knowledge suited to discipline-specific needs into practitioners hands by engaging them into the research process (Graham et al., 2006). By increasing practitioner’s involvement in the research process there is more exposure to relevant evidence and hopefully more use of it in real-life practice (Pentland et al., 2011). To ensure evidence-based medicine and research is being translated into realistic practices “efforts must be made to close the knowledge-to-practice gaps by effective knowledge translation interventions” (p. 7) and development of practical and implementable practitioner tools (Straus et al., 2011).

Research Implementation
To close the knowledge-to-practice gap and make evidence-use a reality in health contexts Grimshaw et al. (2012) suggest breaking down your knowledge challenges and becoming very specific about what you want to implement in order to design a more functional process, for example, what knowledge should be transferred to practitioners, to what effect does it need to be transferred, and how can we best achieve that? Finding the answers to these questions involves receiving critical feedback from practicing professionals about their needs and their evaluation of previously implemented knowledge strategies in their specific health contexts (Best & Holmes, 2010). This will help to move more evidence into action, shifting
away from the traditional view of knowledge dissemination by researchers towards implementation of research findings into practical, workplace scenarios and changing evidence-informed practice into practice-informed evidence (Grimshaw et al., 2012).

Organizations are systems with many interdependent components and understanding the relational ties between leadership, evidence, networks, and communication strategies can help lead to creation of successful knowledge-to-action strategies (Best & Holmes, 2010). This interconnectedness means that for implementation processes to succeed, organizations must include research uptake in their strategic plans and place evidence-use at the heart of the organization (Jones et al., 2013).

There is also a need for organizations to fill in where educational programs and research training have gaps as “most clinicians-in-training do not receive formal training in research methods or mentoring in ways to incorporate research activities into clinical practice” as is necessary in the workplace (Jones et al., 2013, p. S49). Organizations can start this process by clearly informing staff of the organization’s expectations in the research process, incorporating employee opportunities into the daily workplace routine, and establishing mentoring roles which can significantly change how employees view research and use evidence in their daily practices (Jones et al., 2013; Bloomrosen & Detmer, 2010). Best and Holmes (2010) also suggest implementing evidence-use by actively sharing synthesized research findings at regular review intervals and targeting key messages to specific audiences. For example, asking practitioners to develop clinical practice guidelines involves synthesizing current evidence in order to establish recommendations for best practice in their discipline (Grimshaw et al., 2012). To implement research uptake opportunities it is necessary to introduce minor cultural changes, one step at a
time, to patiently move organizations in the right direction towards more evidence use in clinical decision-making.

**Facilitating Evidence-Use**

Organizations, clinicians, and the general public know of the need to integrate research evidence into practice and policies to deliver high-quality patient care. Prevailing health practitioners’ beliefs often lead to quick fix decisions in clinical environments because of the crisis-like conditions that exist and trump use of evidence and research findings in decision-making (Eccles, Grimshaw, Walker, Johnston, & Pitts, 2005; Grimshaw et al., 2012). Organizational structures and professional cultures, also demonstrate significant problems for knowledge mobilization (Currie & White, 2012). In order to make informed decisions and to overcome the current chronic sense of information overload plaguing healthcare professionals quick and easy access to evidence is necessary (Addison, Whitcombe, & William Glover, 2012).

Online evidence information tools are increasing in popularity for making informed patient care decisions. Point-of-care (P-O-C) electronic tools, resources for healthcare professionals to use to deliver health services to patients at the time of care, are a convenient and fast, way to access synthesized evidence-based medicine and aid practitioners in keeping up with available health literature regardless of their research capabilities (Ahmadi et al., 2011; Addison et al., 2012). P-O-C websites offer communication that can be delivered in a timely and flexible fashion, some examples include: The Cochrane Collaboration (http://www.cochrane.org) an independent international organization committed to dissemination of medical intervention reviews, Canadian Rx for Change a health professional database, and McMaster University’s Health Systems Evidence which focuses on health care system reform (Bloomrosten & Detmer, 2010). UpToDate®, a physician literature synthesis website is “considered as one of the best sources for answering clinicians’ questions at the point of care” (p. 729) and provides a good
example of a tool which practitioners embrace in their daily work (Ahmadi et al., 2011). In order for websites to be effective they need to be reflective of practitioner’s “everyday practice by being supportive of the way clinicians think and act” (p. 120) and be designed for practitioners by practitioners (Bloomrosen & Detmer, 2010).

There are many limitations and assumptions that are also associated with website use. One important one is whether the presented P-O-C information by third-party providers is accurate and trustworthy (Addison et al., 2012). If website information is not reliable or up to practitioner’s standards, the technology very quickly becomes a futile, irrelevant tool. Other concerns include how to make practitioners aware of website resources that are available to them, and ensuring that feedback loops exist between developers and practitioners in order to maintain the reliability and effectiveness of sites (Addison et al., 2012; Bloomrosen & Detmer, 2010).

Online synthesis databases provide access to evidence, but there is no guarantee of its translation into practice (Ahmadi et al., 2011). Technology can be a solution for overcoming barriers and acting as a consistent knowledge brokering tool to facilitate moving evidence into action, but unless technology is fully adopted and embraced by the target audience, it will not produce the results and benefits it was created for (Grimshaw et al., 2012; Ward, House, & Hamer, 2009). Designing relevant, easy-to-use, and accurate websites for clinical professionals in their specific contexts is essential for technology to be able to aid in fostering research uptake. More research and suitable knowledge translation strategies for health care environments need to be developed and implemented into clinical settings to see significant quality improvement (Straus et al., 2011).
Methodology

A qualitative case study research design was used to evaluate a prototype physician-focused website, *UpToDate®*, and its potential to be re-designed to become a useful tool for other clinical professional groups, in particular Radiation Therapists, for staying current with research and evidence-based medicine (Ahmadi et al., 2011). A survey was also used in order to address the complexity of healthcare contexts and the non-linear nature of problems that can arise in clinical practice (Bowen & Graham, 2012).

Definitions:

Point-of-care Resource: The *UpToDate®* website is considered a point-of-care resource which can be broadly defined as, a clinical reference tool for healthcare professionals to use to deliver health services to patients at the time of care, and can take on many different technological forms (Ahmadi et al., 2011).

Radiation Therapist: A healthcare practitioner who works in conjunction with Radiation Oncologist in applied clinical settings to design treatment plans and deliver prescribed treatments to oncology patients with the intent of destroying tumour cells, while minimizing harm to healthy tissues (CAMRT).

Research Design

The interpretivist paradigm, which is based on theories and works established by Dilthey, Weber, and Schultz was well suited to the stated research question (Lindlof & Taylor, 2011). This paradigm allowed for further understanding of others and reaches for depth of understanding rather than causation (Lindlof & Taylor, 2011). A greater sense of how clinical professionals interpret their personal reality, life experience, act on their interpretations, and make meaning in dynamic healthcare situations can be achieved and lead to a better understanding of why certain decisions are made about evidence-use and the significance of
those decisions for practitioners in daily practice (Willis, 2007). Acknowledgement of the researcher’s own subjectivity is also core to this paradigm. The inductive basis of the paradigm lends itself to reflective discussions and making generalizations from the observed behaviours in the collected data to draw out social implications for real-life, which was the aim of this study (Lindlof & Taylor, 2011).

Sources of data for this study consisted of a case examination of a third-party point-of-care physician website, UpToDate®, and results from a web survey questionnaire.

Methods and Data Gathering

A case study approach offered a holistic viewpoint and in-depth study allowing the researcher to study the details of a particular case and uncover complexities that may not be possible to see with other research methods (Yin, 2003). Case studies can provide explanations of why certain outcomes occur, and the particulars of the chosen case can be generalized to other similar instances, as will be hopefully evident in my website case analysis (Denscombe, 1998).

The UpToDate® website was, in this case study, viewed as a potential prototype for building a point-of-care tool for non-physician healthcare professionals. The website’s details, general approach, functionality, communication style, and ability to aid physicians in keeping up with evidence-based medicine will be analyzed for its practicality for other clinical professional groups. My acquired data from this case notes specifically how well UpToDate® addresses accessibility to content, structure and organization of content, styles of writing and language use, and how information is synthesized and presented. UpToDate® was selected because Ahmadi et al., (2011) found it to be the preferred tool chosen by physicians for keeping current with evidence-based medicine over other similar websites like ACP PIER, Essential Evidence Plus, and First Consult. Due to time limitations only one tool was analyzed and being used as a typical example of this type of tool. While very similar to other competitive sites, this site has
qualities that make it more convenient and preferred by more users. The findings of this case are potentially generalizable and applicable to several healthcare professional groups such as medical technologists and nurses (Denscombe, 1998). The collected data from the website formed the basis for survey questions.

A survey method was then initiated, as it offered a wide range of coverage, some measurable data, and a snapshot of the data at a specified time (Denscombe, 1998). This method minimized time and costs as many people can be contacted through an email survey and it is convenient for respondents to complete, leading to possible higher response rate. Snowball sampling was used as it allowed me to recruit from among my peers, as a practicing Radiation Therapist myself and this simplistic technique made it easier to reach my dispersed, specialized professional population, which can be difficult to get a significant sample from with other methods (Denscombe, 1998). Overall, the snowball technique optimized my odds of obtaining an increased sample size of Canadian Radiation Therapists with minimal costs and planning (Denscombe, 1998). This technique is less precise than simple random sampling, but acceptable for the qualitative purpose of this study and for my method of surveying only one professional group.

The anonymous Canadian-stored web questionnaire was designed to validate my findings from the UpToDate® website analysis with other professionals. The electronic survey was managed through a Canadian database as to avoid the implications of using an American-based database and the privacy protection concerns of the United States Patriot Act. The questionnaire was emailed out using a sampling frame of Radiation Therapy Cancer departments through my professional association the Canadian Association for Medical Radiation Technologist (CAMRT) in order to reach the majority of Radiation Therapist practitioners (approx. 500
people). The survey asked voluntary participants to answer questions related to professionals’ research needs and I had hoped to receive about a 10 percent response rate from this sample (approx. 50 completed questionnaires), but only received 7 percent response rate (35 completed surveys). Example questions included: what kind of impact a tool similar to UpToDate® can have if adopted and implemented into standard practice, what barriers currently exist which cause practitioners to resist keeping up with research needs, what is needed in practice to support practitioners with research initiatives, and generally how it is possible to move the professional forward in a productive way.

Data

Case Study.

UpToDate® is a third-party evidence-based resource for physicians which the website self-proclaims “is the premier evidence-based clinical decision support resource, trusted worldwide by healthcare practitioners to help them make the right decisions at the point of care” and can aid in medical practice changes (UpToDate® homepage, 2014). The website is a clinical decision support tool which can help physicians make evidence-based decisions in medical environments and hence potentially improve patient outcomes. The content is presented and maintained by “an advanced publishing platform with the rigor of a sophisticated editorial process managed by a faculty of accomplished physician authors and editors, [and] renowned leaders in their specialties” to ensure that the most current research and evidence is available to users (UpToDate® Product, 2014).

UpToDate®’s overarching goal is to help physicians make better patient care decisions by offering evidence-based recommendations from a trustworthy, diverse group of credible physicians who have evaluated the current available research literature and publications. The website is aiming to satisfy physicians’ workplace decision making needs and be “considered as
one of the best sources for answering clinicians’ questions at the point of care” (Ahmadi, 2011, p. 729). In order to reach this goal the website has built a strong reputation in the medical world and has been noted by Ahmadi et al. (2011) study to be “more comprehensive in content and also faster [in] compar[ison] to the others” (p. 729) such as ACP PIER, Essential Evidence Plus, and First Consult point-of-care websites.

**Data Analysis**

Content analysis was then used to categorize and code the data from the survey and then analyze for themes and patterns. Data included useful elements of web communication that were found in the case study prototype website as well as knowledge from the literature review about clinical professionals needs of a resource. This data was then incorporated with the web survey responses to help with the formation of categories and themes. Grounded theory was applied to the data to enable me to be able to draw conclusions about practice recommendations. Grounded theory introduced by Glaser and Strauss (1967) in their book The Discovery of Grounded Theory: Strategies for Qualitative Research was selected for its inductive analytical approach and the ability to facilitate themes and categories organically emerging from the study’s data set (Stern, 2007). The theoretical implications of this approach allowed me to be accountable for my interpretivist role in the research process and also for generalizable theory to develop from the data itself. As Stern (2007) states, “the beauty of the method lies in its everything-is-data characteristic” (p. 115). Grounded theory allowed for fluidity of interpretation of the data and context. The essence and flexibility of this theory allowed me, as the researcher, to have greater involvement in the study by qualitatively categorizing survey and case study data for commonalities and then using those themes to develop practical recommendations and possible solutions for practice.
The desired outcome of this study was to achieve a greater sense of what is needed by practitioners to keep up with research and evidence-use in a complicated, limited resource healthcare context and whether or not the proposed prototype tool is capable of meeting those needs. Recommendations for clinical practice were made.

**Ethics and Limitations**

This study underwent a university Research Ethics Board approval process and followed the Canadian *Tri-Council Policy Statement: Ethical Conduct for Research involving Human Subjects*. I did not have any ethical challenges.

The limitations to this design include first and foremost, the subjectivity and positionality that I brought to the process as a Radiation Therapist myself. I needed to be highly self-aware and reflexive as a researcher and let categories emerge from the research data itself, not from preconceived ideas, experience, or personal knowledge. In addition, there was also a high non-response rate due to voluntary participation, targeting only one professional group, and respondents were mostly highly research engaged Radiation Therapists.

**Results**

**Case Study**

Accessing the *UpToDate®* website is quite straightforward. The login screen is simple, resembling a basic Internet search engine, and offers to remember your user id and password for quick access. The website uses a search box to find desired topics and list potential matching articles. Clicking on an article brings up an outline and a brief overview of what to expect to find in the chosen article. Once an article is opened the user is immediately able to see who the authors and editors of the article are. A summary and recommendations link is located at the top of the article, which remains open as you read through the summaries for fast access to what the author deems the most important and relevant points physicians should take away from the...
presented content. Print, email, and different language options also remain as a header throughout each article. Article references are cited and most are hyperlinked to electronic scholarly databases with direct access to full journal articles on external websites with no extra costs.

Point-of-Care technology allows the website to be accessible through conventional methods or via downloadable mobile applications for the iPhone and iPad. The simplistic design makes navigating the website easy and no tutorial is necessary to be able to use it effectively. All articles are similarly formatted which allows users to find desired content easily.

Content is written in laymen language and medical jargon is defined and explained throughout the article as necessary. Author and editor credentials are clearly stated in each individual article and on a separate page which identifies everyone who is involved in publishing content on the website. The date of last revision is also clearly posted at the top of the article to inform users of how current the presented information is. Feedback loops are also incorporated into the site for subscribing users to be able to give comments and opinions on posted articles in order to continuously improve website content quality.

The *UpToDate®* website streamlines the communication of the latest research content to physicians and bridges the gap between academic inquiry and the workplace reality of clinical environments. Its functionality, simplistic communication style, and ability to integrate well into health systems make it a strong example of a non-physician practitioner potential tool and emulates what qualities should be considered for a website for professional practitioners.

**Survey Questionnaire**

The 35 completed survey responses were collected from March 7-25, 2014 through Fluid Surveys. Survey participation was limited because the invitation to participate was offered through the CAMRT professional association and recipients had to be active members in order to
receive it. However, the quality and geographic diversity of the survey data collected was high and allowed for significant insight into how practicing Radiation Therapy practitioners perceive research and evidence-use in their workplaces. The respondents were predominantly female, highest participation coming from those with 10-15 years, or 20 or more years of practicing experience, and education level was for the majority a Bachelor’s degree. Accordingly, responses were grouped under four main categories: (1) Research motivation, (2), research uptake barriers, (3) development of effective resources, and (4) new future professional roles and directions.

**Theme 1: Research motivation.**
Survey participants described a multitude of contributing factors to how practitioners keep up-to-date with research and evidence in their individual practice such as: Personal interest in research, organizational support, view of the importance of research to practice, and personal participation in research initiatives. Table 1 summarizes professionals’ current methods for research uptake and evidence-use in their daily practice.

Table 1: *Summary of examples of how practitioners keep current with research in their practice*

<table>
<thead>
<tr>
<th>Journal reading and literature database searches</th>
<th>Workplace study sessions</th>
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<tbody>
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<td>Departmental presentations</td>
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<td>Participating in workplace research projects</td>
<td>Learning from change management process</td>
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<td>Multidisciplinary, physics, and QA rounds</td>
<td>Interacting with communities of practice</td>
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<td>Attending conferences</td>
<td>Social media (Twitter/Facebook)</td>
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<td>Peer-to-peer networking</td>
<td>Participation in workplace committees</td>
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<tr>
<td>Continuing education courses from the CAMRT</td>
<td>Departmental education sessions</td>
</tr>
<tr>
<td>Vendor Webinars</td>
<td>Discussions with medical physicists</td>
</tr>
</tbody>
</table>
The most common resources that Radiation Therapists stated that they have access to were:
Journal databases (PubMed, CINAHL, Cochrane, JMIRS, CAMRT), facility libraries, interdisciplinary discussions, rounds, the Internet, conferences, and clinical trial information.

A majority of respondents expressed being self-motivated and doing research on their own personal time. Examples of this include: Personal networking with colleagues, volunteering to participate as members on research teams, and conducting journal articles reviews outside of work hours. Sixty-nine percent of respondents expressed that a practitioner focused research resource would change their daily clinical practices, and 80 percent stated that they would feel comfortable using a website with synthesized research articles about best practice recommendations generated from fellow Radiation Therapy professionals. Participants expressed what they foresee as anticipated benefits from a literature synthesize website such as: Saving time in searching for and reading research articles in entirety, a starting point for practice changes, being better equipped to answer patient’s concerns, avoiding re-inventing the wheel by disseminating research findings to fellow practitioners, and having the ability to quickly obtain answers to questions.

**Theme 2: Research uptake barriers.**
Departmental support and encouragement are necessary for research resources to be successful and effective in clinical environments. Respondents noted that many barriers exist which limits their ability to foster research uptake and evidence-use in their daily practice.

Seventy-nine percent of survey participants stated that they are highly interested in research uptake, but as can be seen in Table 2, there are some barriers that practitioners have in clinical environments, which hinder their ability to engage with research.

Table 2: *Summary of existing barriers that limit access to research and evidence-use*

- Lack of dedicated quiet space and protected research time
Lack of support from management to act on evidence based findings
• Workload exhaustion
• Lack of organizational funding and opportunities for frontline practitioner research initiatives
• Limitations of personal research capabilities, evaluation of research
• Limited access to databases and full text journal articles
• Limited computer access
• No additional time to use workplace technology for research initiatives
• Limited involvement in creating departmental vision, goals, and research directions
• Limited funding for educational opportunities and conferences
• Departmental research is not valued by management

Departmental structure and organization of the workplace environment, the value placed on research, and limited continuing education resources come across as the main barriers that practitioners contend with.

Theme 3: Developing effective resources.
The survey also asked practitioners what they would like to see in a resource designed for their discipline-specific research needs. Table 3 provides a summary of their responses.

Table 3: Summary of research resource ideal qualities

- Easy, quick access and navigation
- Canadian-focused
- No cost
- Inter-professional and Radiation Therapy specific articles
- Latest evidence-based research with a patient outcomes focus
- Publication of new treatments, equipment, and Radiation Therapy techniques
- Practical applications that can be translated directly to the bedside
- List of active research trials ongoing in cancer clinics
- Best practice guidelines
- Treatment planning applications (dosimetry)
- Debunking of radiotherapy ‘myths’
- Peer-reviewed summaries of high-quality research articles and evaluation of content’s clinical relevance
- Including all disciplines involved in radiotherapy, not just the radiation therapist
- Study methodologies and how data was collected to help guide others in their research
- Education on how to critically evaluate research
- Qualitative and quantitative research articles
- Open forum/discussion area for practitioners
• Rating scale and comments section for practitioners to communicate to each other
• Discussion of scope of practice and advanced roles for practitioners

The overall theme from the responses appeared to be a desire for a research resource, which could also act as a communication tool, giving practitioners the ability to form connections and network with fellow professionals in addition to translating knowledge nationally.

Theme 4: New future professional roles and directions.
Participants were also asked their opinions on how in general, they believe more research and evidence-use can be incorporated into clinical environments. Eighty-nine percent of Radiation Therapists stated the link between research and quality of care is very important in clinical settings, but only 52 percent of radiotherapy departments were noted to be somewhat supportive of implementing evidence-use into clinical decision-making. Furthermore, the data collection also shows as stated previously that 69 percent of participants believe that a practitioner-focused research resource would change their daily clinical practice. Therefore, a web-based research resource could be one component in helping to foster a research and learning focused environment which can aid practitioners in making the next steps and progressing forward with professional development and improved quality of care in addition to the following suggestions in Table 4.

Table 4: Comments on how to move Radiation Therapists profession forward

- Build the evidence that changes practice ourselves and disseminate research findings to others
- Having a dedicated departmental position for implementing standards of practice and evidence to update current practice
- Engaging department-wide Radiation Therapists in the research process to produce more evidence and be aware of the evidence that exists currently
- Managers need to recognize the need for front-line staff to keep current with practice-related research and provide support
- Website with access to research articles and resources geared to Radiation Therapists which can help guide practitioners through research processes
- Support and be open to implement informed-practice changes
• Education and departmental culture changes
• All Radiation Therapists responsible for patient care need to see the value in being research-aware
• More support for role development and advanced practice
• Information sharing forums and more collaboration between cancer centers
• Raising the profile of Radiation Therapists and their publications and mentoring skills
• Support from organizational leadership for advanced practice positions and research in order to gain research Radiation Therapist jobs
• Greater representation at management and organizational levels
• More interdisciplinary collaboration, particularly Radiation Oncologists and medical physics
• More focus on patients than effectiveness of treatment modalities, open-minded and adaptive to patient needs
• Integrate spirit of inquiry and provide resources
• Mandatory continuing education and competency assessment

Discussion

Answering what kind of resource can foster research uptake by clinical practitioners and lead to improvements in quality of care and professional development does not yield a simple solution. Finding the best way to move evidence into practice in health care environments is a complex issue with multifaceted elements to consider. The results from this study certainly indicate that Radiation Therapy practitioners have a strong interest in research and it’s important link to quality of care, but due to multiple barriers, access and use of evidence-based medicine is generally limited in their daily practice.

Access and Research Tool Requirements

One of the most expressed needs of practitioners who completed the survey was the ability to have easy access to research and evidence. Technological point-of-care tools like the website UpToDate® offer easy, flexible access to clinically relevant research articles and a practical solution which can meet practitioner’s needs. Moreover, a website research resource also acts as a knowledge brokerage tool to bridge the gap between academia and real-life practice. With 94 percent of survey respondents stating that having access to research resource
would change how much they use evidence in decision-making, a properly implemented P-O-C tool that is designed specifically for its target audience has the potential to significantly increase the amount of effective knowledge translation and improve quality of care in organizations (Straus, Tetroe, & Graham, 2011). Additionally, practitioners also stated that by having a website-based research resource that offers easy access to evidence-based medicine it may help to alleviate and overcome the chronic sense of information overload that they feel in the current healthcare system. Offering practitioners a simple way to quickly examine research findings before making clinical decisions, and making it not such an overwhelming task (Addison et al., 2012). Furthermore, it is also essential that a resource be embedded into professional’s current clinical work activities. Technology that is implemented without proper integration into a practitioner’s workload and daily routine is bound to become an inapt tool (Ahmadi et al., 2011). Therefore, involving practitioners in the design process is crucial in order for the resource to be embraced and live up to its full potential and meet practitioners expectations (Bloomrosen & Detmer, 2010).

Interestingly, to achieve significant quality improvement in clinical settings, survey results show that the majority of practitioners want a combined research and communication tool, rather than just purely a research and evidence resource. In essence, some participants were seeking to mimic an advanced traditional “journal club” in an online environment to develop a web-based community of practice where professionals can go to share their knowledge and discuss research experiences with each other. Also, preference was expressed for the incorporation of accredited professional development activities into the website to satisfy regulating professional bodies requirements and to streamline the continuing education credit submission process. Table 1 summarizes the ideal qualities to be included in a practitioner
research resource based on results from the *UpToDate®* case study, survey responses, and literature review findings.

**Table 1: Summary of research tool requirements**

<table>
<thead>
<tr>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to most current research content and synthesized literature articles</td>
</tr>
<tr>
<td>International forum</td>
</tr>
<tr>
<td>Aimed to change practice and develop ideas to improve patient outcomes</td>
</tr>
<tr>
<td>Accredited professional development tool for practitioners</td>
</tr>
<tr>
<td>Simple to use and provides quick answers</td>
</tr>
<tr>
<td>Easy to integrate into current workplace systems</td>
</tr>
<tr>
<td>Provides opportunities for continuous learning and education</td>
</tr>
<tr>
<td>Offers a feedback loop for subscribers/users</td>
</tr>
<tr>
<td>Allows for communication opportunities with fellow practitioners</td>
</tr>
<tr>
<td>Present recommendations for best practice</td>
</tr>
</tbody>
</table>

Key components of the *UpToDate®* website are best practice recommendations and synthesized literature articles. Interestingly, 80 percent of practitioners stated that would be very comfortable with these features if fellow radiation therapy professionals prepared them for the resource. Most respondents see these features as decreasing their time commitment, gaining the ability to quickly see clinical relevance and value, and overall getting through more research articles. Furthermore, by having this type of resource 69 percent of practitioners also stated in the survey that a practitioner-focused research website with these key components would change their daily work practice and give them evidence-based support to bring about changes in their departments.

**Research Culture**

In order to have a successful research website we also need to instill a stronger research culture and try to move more evidence into daily clinical practice. Health organizations and departments need to re-think how they view their work structures, employees, and internal culture because as Rycroft-Malone et al. (2004) stated, healthcare organizations want to provide the best quality of care based on the most recent evidence (Batalden & Davidoff, 2007;
Therefore, to move towards fostering research uptake and evidence-use in clinical environments there also needs to be identification of what defines a successful practitioner. Most practitioners align their workplace role and success in relation to their individual department’s expectations and culture. Interestingly the survey showed that 57 percent of respondents stated that their overall departmental culture was patient service delivery benchmarks, and 37 percent stated that effectiveness of procedures was their overall goal. If departments want a strong research culture professional performance and effectiveness of treatments needs to be regarded as equal to patient service delivery in clinical settings. This does not mean that providing service delivery is second to research needs, but rather that there are opportunities and time to given to both, service delivery and the establishment of a research culture.

Combining these elements would ideally lead to an integrative workflow process as Sackett (1997) stated as finding the best evidence for practitioner’s purposes, critically evaluate the found literature, and using the found evidence in conjunction with professional expertise to make evidence-informed decisions in clinical practice. In order to achieve this, practitioner’s roles need to shift to be evaluated on their professional performance and effectiveness of treatments, not purely attaining patient delivery benchmarks. There also needs to be a departmental cultural shift towards building an environment that fosters inquiry. In addition, cultures need to be supportive of continuous learning, practitioner satisfaction, research incentives, and assessment of practice with evaluation and feedback mechanisms to continuously improve quality of care (Jones et al., 2013). By moving workplace culture towards evidence-based practice, organizations will progress towards enhanced quality of care and increased
practitioner engagement (Grimshaw et al., 2012; Magnier-Watanabe, & Senoo, 2008; Baumbusch et al., 2008).

**Discipline-Specific Needs**

Another noteworthy finding was that most survey participants specified that the current research resources available to them were not designed for their discipline-specific needs and cannot address many of the clinical questions that they have. There is a great need for collaborative research agendas between academic researchers and practitioners and also for practitioner involvement in research initiatives themselves. Seventy-nine percent of responding practitioners stated that they are very interested in research uptake and professional development opportunities, but when asked how much involvement they currently have in research initiatives 25 percent responded with no involvement at all, and 55 percent stated that they are sometimes involved. A participatory action approach to research as advocated for by Baumbusch et al. (2008) seems to be a potential practical solution to produce more actionable and relevant clinical answers for practitioners. Bowen and Graham (2012) also presented a knowledge translation engagement paradigm that advocates for collaboration, practical focused research, and change management processes to be integrated into health care settings. This paradigm shift is what survey participant practitioners are advocating for, practitioners doing research for practitioners, in order to find action-based solutions that will help solve day-to-day questions and concerns. Survey participants made several comments indicating the importance of teaching each other, the benefit of facilitating knowledge sharing in a potential research tool, and a forum where practitioners can develop a learning relationship and discuss new ideas. Practitioners want to move away from traditional research roles and be a part of discipline-specific problem solving processes (Pablos-Mendez & Shademani, 2006).
Moreover, discipline-specific research conducted by those who need and use the knowledge leads to more actionable and solution-focused research outcomes (Bowen et al., 2009). There is also a strong desire from study practitioners to own and change their profession themselves rather than generalizing and translating from the experiences of other disciplines (Baumbusch et al., 2008; Jones et al., 2013). Survey participants however, also noted that there is still a need for multi-disciplinary involvement in discipline-specific research initiatives to gain better understanding of the bigger picture of a patient’s journey through the health care system and integrate valuable expertise from other disciplines into their research.

If the overall stated goal of practitioners is then to be increasingly involved in research initiatives, one must consider how the Radiation Therapy discipline has developed generationally throughout the current workforce. The training requirements have changed significantly and thus there are a significant number of practitioner comments from the survey results asking for more educational and mentoring opportunities in their departments. Qualification requirements over the years have moved from basic in-house diploma programs to the now standard degree-based programs with substantial research components. There is also now a drive from the field and professional bodies to progress to advanced practice and graduate school education. This has lead to a mix of practitioners in the clinical environment, with some practitioners having no research training at all whereas others have attained very high research achievements, including producing profession-specific published evidence. The challenge is nevertheless how to get practitioners to a standard level of research competence. One approach is for organizations acknowledge professionals with valuable research skills and advanced capabilities, and in turn place them in mentoring roles where they are able to pass on knowledge to others to help instill cultural changes. However, this can be a struggle without immense organization support and
ability to provide professional development opportunities and workplace mentoring time (Jones et al., 2013).

**Organizational Requirements**

Organizational support and leadership must value research and evidence in order for their employees to be motivated and want to engage with research. Health care organizations need to place research and evidence-use at the heart of all their philosophies and practices. Organizations should be evaluating their success on providing the best patient outcomes based on the best evidence use throughout all organization practices and structuring their organizational vision to reflect that (Jones et al., 2013). Incorporating research activities into daily work routines and creating opportunities for front-line workers to get involved in research at any level, can lead organizations in the right direction and aid practitioners in making the best clinical decisions possible to continuously improve quality of care. Organizations also benefit from increasing research initiatives by building a solid reputation for being an innovative and cutting-edge facility, and attracting more high-level employees.

This is also in-line with practitioner’s general goals to move the profession forward by seeking more collaboration and communication between cancer centers to develop best practice guidelines, in addition to having more resources to access evidence-based research findings. Also, highlighted throughout the survey was a desire for more collaboration and increasing communication, internally within health organizations, with Radiation Oncologists and medical physicists whose professions have a strong research background. In addition, another interesting finding was a request from practitioners to make discipline-specific research a team approach, by including and collaborating with everyone who is involved with patient care, rather than an initiative that is only reserved for those who have an advanced skill set.
Also noteworthy is that ethical considerations were not brought up in any of the participants’ responses. Practitioners were not asked directly or prompted in the survey to discuss ethics, but it was surprising with respect to practitioners’ ethical commitment to providing patients with high quality of care that it did not come up. Professionals have a duty to provide quality care and “withholding effective treatments” goes against professional codes of ethics (Jones et al., 2013, p. S49). Several of the survey comments indicate that almost 90 percent of participants stated that the link between evidence-use and quality of care is very important to them as practitioners, yet only 28 percent indicated that their departments are very supportive of research and evidence in clinical decision-making. Organizational constraints in most facilities were noted to not allow for workplace activities to reflect this need and multiple barriers such as lack of time in practice, scarce organizational support for frontline workers involvement in research initiatives, accessibility to research resources, workplace exhaustion, health organization’s perceived value of involvement with research and evidence-use all contribute to placing practitioners in this ethical predicament.

**Recommendations for the Radiation Therapy profession**

This study leads to several recommendations for Radiation Therapy practitioners and similar professional bodies that are moving forward to overcome the challenge of integrating research and supporting evidence-based practice in their organizations.

**Recommendation one.** Develop an easily accessible literature synthesis research resource, and online community of practice for practitioners.

To allow clinical practitioners to have the ability to communicate with fellow professionals and have the ability to make effective decisions and practice changes based on available evidence (Pentland, 2011). Striving to narrow the gap between the two separate worlds of academia and real-life practice. Furthermore, by implementing this recommendation it makes
accessing research easier and also can potentially increase effectiveness of communication throughout the country and internationally. Decisions regarding how practitioners can operate and maintain this resource will come down to available funding sources and if it is possible to run an effective, sufficient, quality tool without cost to individual professionals or health care organizations.

**Recommendation two.** Continue to promote an organizational research culture and acknowledge practitioners for their involvement with research and using evidence to support day-to-day decision-making. Also, offer incentives for practitioners who embrace this learning-driven culture to motivate and lead others to follow in their footsteps.

**Recommendation three.** Practitioners need to take part in generating, disseminating, and using relevant discipline-specific research that focuses on patient outcomes. Encouraging researchers and clinical practitioners to work together and become a collaborative and effective resource for each other (Pentland, 2011). Moving towards a redesigned research process with a focus on solution-based practice, which can address problems in a timelier manner (Bowen and Graham, 2013).

**Recommendation four.** Management and clinical educators need to develop educational and mentoring programs that can be integrated into daily clinical practices and increase support for professional development opportunities. Practitioners also need to be prepared for these new initiatives and see that leaders are accountable and supporting practice changes (Best and Holmes, 2010). Educational opportunities need to be embedded into established workplace routines and feedback loops introduced and maintained for continuous improvement of knowledge translation activities.
Managers and organizations also need to ensure that resources are available to support the newly established educational initiatives in order for process to be sustainable (Ward, House, & Hamer, 2009).

**Conclusion**

Research uptake opportunities and evidence-use varies considerably with each individual healthcare organization and department. A research resource website similar to *UpToDate®* would be a useful tool for practitioners, but for it to be successful many other barriers have to be overcome. Without organizational support of evidence-based practice, departmental culture changes, opportunities to participate in research initiatives, and continued professional development, practitioners cannot move towards owning their profession and applying evidence that changes practice. Furthermore, practitioners need the implementation and development of effective resources or tools that are readily available to them in order to deliver optimal patient care and meet their daily workload needs. If we can meet all of these requirements, and provide a relevant and useful product, similar to the *UpToDate®* website, that can be incorporated into current systems and address target audience desires, organizations can move towards satisfying the increasing need to facilitate knowledge transfer in clinical environments. The potential benefits for practitioners are unlimited with respect to achieving better research dissemination, improved professional competence, and enhanced overall quality of care for patients. The increased access and participation to evidence-based research can bring about changes and give practitioners the support they need to perform to higher standards, and lead health care departments towards best practice.

Limitations of this study include a very small timeframe for data collection period of this study and a small survey sample. Although the quality of responses was high, the absence of data from a larger sample of Radiation Therapy practitioners could result in overestimation of
generalizations that can be drawn from this data and that results are not reflective of the majority of practitioner’s opinions. My personal involvement throughout the research project was monitored by self-reflection and by categorizing the raw data from the survey questionnaire before any synthesis of results and discussion occurred in order to decrease my bias in the process as a clinical practitioner. A larger scale survey lead by a non-practicing professional may lead to findings similar to this study but, with increased external validity and applicability to clinical settings.

This study has presented the greater picture of where Radiation Therapy practitioners see the profession going and how to incorporate evidence use into workplace practices. Further research into methods for instilling a research culture and implementation of specific processes into applied clinical settings is needed in order to progress health care knowledge translation and evidence-use research forward.
Appendix I

Survey Questions
1. How important is research uptake to your current practice?
2. How do you currently keep up-to-date with research and evidence-based medicine in your practice?
3. What barriers exist that limit your access to research and evidence? (ie. lack of time in daily practice, allocated quiet space, personal research capabilities, access to research databases…)
4. What is your interest level in research uptake and professional development?
5. What is your department’s dominant cultural or overall goal/mission? (ie. learning-focused, patient service delivery output, effectiveness of treatments)
6. What resources do you have to access profession-related research and evidence?
7. How supportive is your department of research and evidence use in clinical decision-making?
8. What level of involvement do you have in clinical research initiatives in your department?
9. How would having easy, quick access to a research resource change how much you use evidence to guide your decision-making?
10. How comfortable do you feel reading and evaluating research content?
11. How important do you think is the link between research use and quality of care in clinical environments?
12. If a resource existed for Radiation Therapy practitioners that synthesized current research evidence (summaries of journal articles), what benefit would that have to you as a professional?
13. How open and comfortable would you be using a website with research synthesized articles and best practice recommendations maintained by fellow Radiation Therapy professionals?

14. Would having a practitioner-focused research resource change your daily work practice?

15. What would you like to see in a research resource geared towards Radiation Therapy?

16. In general, how do you think the Radiation Therapy profession can productively move forward?

17. What province do you currently practice in?

18. How many years have you practiced as a Radiation Therapist?

19. What is the highest education-level that you have obtained? (including certificates, extra training)

20. What is your gender?
Appendix II

Figures

How important is research uptake to your current practice?

<table>
<thead>
<tr>
<th>Importance Level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not very important</td>
<td>20%</td>
</tr>
<tr>
<td>Somewhat important</td>
<td>60%</td>
</tr>
<tr>
<td>Very important</td>
<td>20%</td>
</tr>
</tbody>
</table>

What is your department’s dominant cultural or overall goal/mission?

<table>
<thead>
<tr>
<th>Cultural Goal</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality/Effectiveness of Treatments</td>
<td>50%</td>
</tr>
<tr>
<td>Patient Service Delivery Benchmarks</td>
<td>60%</td>
</tr>
<tr>
<td>Learning Focused</td>
<td>10%</td>
</tr>
<tr>
<td>Other</td>
<td>10%</td>
</tr>
</tbody>
</table>
How open and comfortable would you be using a website with research synthesized articles and best practice recommendations maintained by fellow Radiation Therapy professionals?

Would having a practitioner-focused research resource change your daily work practice?
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