

**A SURVEY OF BRITISH COLUMBIA FAMILY
PHYSICIANS' AND NURSES' EXPERIENCES
WITH CONTINUING PROFESSIONAL DEVELOPMENT
AND TECHNOLOGY**

by

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ABSTRACT

The purpose of this study was to understand the educational experiences, needs, and technological profile family physicians and nurses in British Columbia. A survey was completed by family physicians (n=168) and nurses (n=533) and the data were analyzed using SPSS for Windows. Live conferences, workshops, seminars and print resources were the most frequently used and preferred educational formats. Access to computers and the Internet was almost universal for both groups with e-mail reported as the most frequent online activity for both groups. Both groups accessed online information sources (e.g., journals, practice guidelines, and library services) while use of other online resources was lower. Perceived benefits to technology are increasing while barriers are declining. Differences exist between both groups that may necessitate different models for continued learning. Additional research and training are required to facilitate a shift from traditional to alternative forms of continuing professional development.

Keywords: family physicians, nurses, continuing professional development, continuing medical education, continuing nursing education, online continuing education, computer, technology, Internet, web-based, access, barriers, information-seeking

To my beloved and most deserving Allan.

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1 INTRODUCTION

The Canadian health care system is undergoing massive changes and major initiatives are underway to ensure its sustainability (Romanow, 2002). A committed and energized workforce of health care professionals prepared to meet the changing demands of the health care system is key to the continuing survival of a dynamic, patient responsive system (Mazankowski, 2001). These professionals are facing many changes in their practice of medicine. They are expected to use technology in their daily practice, to access and use 'best-evidence' guidelines consistently, and to work in interprofessional settings, for example. These changes require a commitment to continuing professional development matched with educational strategies that are responsive to their needs, workloads, and time constraints. Research is required to assess health care professionals' experiences and perceptions of continuing professional development and to determine their readiness to explore new options that support their learning endeavours.

The purpose of this study is to understand the educational experiences, needs, and technological profile of accredited family physicians and nurses in British Columbia. The research will provide information that will assist educators, employers, family physicians, and nurses to facilitate the use of online continuing professional development.

1.1 Research Objectives

In order to understand the educational needs and technological profile of family physicians and nurses in BC, two main objectives guided this research. The two objectives are:

- To identify family physicians' and nurses' readiness and capability to participate in online continuing professional development by examining their current practices and preferences, specifically their experiences with Internet technology

- To identify lessons for practice that inform the design of online continuing professional development opportunities that respond to the needs and experiences of family physicians and nurses in British Columbia

1.2 Research Questions

These questions will help accomplish the research objectives. The research questions are:

- What are the family physicians' and nurses' patterns and preferences for continuing professional development and how do they compare?
- What are the family physicians' and nurses' experiences using computer technologies for continuing professional development and how do they compare?
- What are the family physicians' and nurses' perceptions about the benefits and barriers to using computer technologies for continuing professional development and how do they compare?
- What are the family physicians' and nurses' needs for training and technical support for technology-enabled continuing professional development and how do they compare?

1.3 Overview of the Chapters

Chapter 1 outlines the background, the research objectives, and the research questions designed to achieve these objectives. Chapter 2 reviews the literature to provide the context for the study and to assess current knowledge in the field. It looks at the challenges within health care and the needs of health care professionals to change to meet the new and diverse requirements. It looks at both the traditional and new approaches to continuing professional development and the potential of the new technologies to deliver continuing professional development in ways that meet the new demands. It also examines whether health care professionals are using new technologies for continuing professional development and whether there are perceived benefits and barriers either facilitating or restricting the use of these technologies.

Chapter 3 provides the methodology for the study including the research design, the sample, the research questions, the survey instrument, and the data analysis procedures. Chapter 5 describes and discusses the findings. Finally, Chapter 6 concludes with a discussion of the research questions, the limitations of the study, and opportunities for the future.

2 LITERATURE REVIEW

2.1 New Times, New Challenges

In recent years, there has been an extensive debate about the future of the health care system in Canada. This debate centres on concerns that the existing health care system is not sustainable in its present form. This has led to several commissions and reports from different levels of government. The Commission on the Future of Health Care in Canada (Romanow, 2002), the Alberta Framework for Reform - Report of the Premier's Advisory Council on Health (Mazankowski, 2001), the Health of Canadians Final Report (Kirby, 2002), the Picture of Health (BCHealthPlanning, 2002) and others have diagnosed the strengths and weaknesses of the current system. Many of the identified challenges are associated with escalating costs due to factors such as the increased scope of services, labour costs, operating and capital costs, as well as the costs of pharmaceuticals, and new technologies (BCHealthPlanning, 2002).

In addition, there are other pressures threatening the sustainability of the publicly funded health care system. These include a growing and aging population, emerging public health threats, expectations for improved and equivalent services across the country, access to new treatments and technologies, and 'silos of care' that are unable to provide patients and providers with access to required information thereby resulting in delays and duplication (BC eHealth Steering Committee, 2005). Finally, there is a critical shortage of health care professionals to work in the system, particularly in rural and isolated communities.

These reports have emphasized the importance of technology in creating a revitalized, effective, and viable system (Mazankowski, 2001; BCHealthPlanning, 2002; Kirby, 2002; Romanow, 2002). A recent report by the British Columbia eHealth Steering Committee noted "There is broad consensus...[among Canadian policymakers]... that increased funding, a fundamental transformation of the health care system and the use of enabling technologies and innovative service delivery models are all required to meet the needs of the future and create a sustainable citizen-centric health care system" (p.6).

In the Report on the Future of Health Care in Canada, Romanow argues that “leading-edge information, technology assessment and research “(p. 76) is an essential foundation for all of the reforms needed in the system. Technology will allow health care professionals access to information that will lead to cures for many illnesses and identify the genetic basis of chronic illnesses. It will also provide the best information about new treatments or drugs to improve the quality and safety of care and to empower patients to manage and maintain their own health. Essentially, Romanow proposes that an information management and technology infrastructure will guide the future of the health care system, improving its efficiency, quality of care, and ultimately the health of Canadians.

In the same vein, the BC eHealth Strategic Framework Report states that eHealth is key to transforming the health care system into a streamlined continuum of care with an information infrastructure that supports practitioners in applying best practices and high standards for the quality and safety of health services for British Columbians. Electronic health care or ehealth is defined as “an integrated set of information and communication technologies, together with related health delivery process enhancements, that:

- enables the efficient delivery of health care services over the full continuum of care through the provision of integrated, interoperable health information systems, tools and processes;
- transforms the health sector decision-making culture into one that is firmly supported by accurate, timely and relevant information in a manner that protects individual privacy,
- respects clinical practice requirements and sustains the long-term viability of the health system; and
- encompasses the interoperable Electronic Health Record and Telehealth” (BC eHealth Steering Committee, p. 89).

The vision articulated for British Columbia is multifaceted and ambitious. Along with the introduction of improved data collection and capabilities for sharing information, the eHealth Steering Committee supports the use of telehealth to enable broader, more equitable access to information and services. Telehealth “is the use of communications and information technology to remotely deliver health and health care services,

information and education, where the participants are geographically separated...[It]...facilitates clinical consultation, continuing professional education, health promotion, and health care management" (BC eHealth Steering Committee, p. 37). The information and communication technologies are expected to transform clinical and business practices, lead to new and innovative ways of delivering health care, provide integrated and timely access to health information, and help break down silos among professionals. The eHealth Steering Committee recognizes the success of these projects is dependent on extensive collaboration and participation among the various stakeholders.

2.2 Changing Professional Roles

The state of the health care profession is a consistent theme in the government reports. Romanow contends the current situation is serious and requires national solutions to address challenges posed by recruiting, training, and retaining nurses and doctors, especially for remote, rural, and northern communities (Romanow, 2002). Health care providers' roles, responsibilities, and patterns of delivering health care are changing in response to this dynamic and evolving industry. Increasingly, physicians and nurses are required to work in integrated teams, use evidence-based protocols, and provide patient-centred care. In Romanow and other's view, these changes must be accompanied by new approaches to their education and training - approaches that emphasize interprofessional and collaborative education and the ability to incorporate evidence-based research into their daily practice.

Other national and provincial reports on the health care system echo this view. An Alberta report states that the ability to incorporate 'evidence-based' research into regular practice requires that health care practitioners have access to better information and expanded opportunities for continuing education, including flexibility for employees to participate in educational activities (Mazankowski, 2001). The First Ministers' Accord on Health Care Renewal (2003) views the changing requirements for educating health care professionals as a key component in system renewal. As a result, Health Canada has developed several initiatives in response to these changing educational needs. One major initiative focuses on knowledge translation (Ho et al. 2004; Canadian Institutes for Health Research, 2006). Knowledge translation involves incorporating research evidence and new knowledge into regular medical practice. Another major initiative

supports an integrated and collaborative approach to primary care by implementing interprofessional education that encourages patient-centred practice. Interprofessional education refers to “learning together to promote collaboration. It involves health care providers learning to work together, sharing in problem solving and decision making, to the benefit of patients” (Health Canada, 2006). In the case of both of these initiatives, the challenge is to discover the most effective means for implementing ‘best practices’ or ‘evidence-based practice’ and interprofessional education into mainstream medicine.

Rapid technological change, information overload, and increasing public expectations are forcing health care professionals to rethink the importance placed on continuing professional development. The demands on health practitioners to manage the wealth of available information and to avoid making errors are influencing changes in the practice of medicine. Increasingly health professionals must accommodate to a variety of new demands: new technologies, new practice settings, new roles, new health problems, evidence-based medicine, and increased accountability (Bennett et al., 2000; Towle, 2000; Hegge, Powers, Hendrickx, & Vinson; Griscti & Jacono, 2006). The challenge of keeping up to date given the range of locations, types of work, workloads, shortages, and other commitments is substantial. The choices and complexities of the improved new treatments combined with increasingly educated consumers and media advertising have placed new demands on physicians. This situation is complicated further by the rising expectations, guidelines, regulations, and recommendations from professional associations, governments, health plans, and advocacy groups. Physicians are expected to be knowledgeable about an increasing array of topics ranging from new specialized diagnosis and treatments to preventive care, leading many physicians to feel they are on a ‘treadmill’ (Mechanic, 2003). Moreover, the medical profession uses continuing medical education “as evidence of competence for medical practice when granting medical re-licensure, hospital privileges, specialty recertification, professional society membership, and recognition for selected other professional activities” (Bennett et al., 2000, p. 1168).

2.3 Traditional Continuing Professional Development

Continuing professional development is considered essential to supporting changes in the system. However, the ability of existing continuing professional development methods to change medical practice has been the subject of controversy.

Physicians and nurses generally accept the need for continued learning for personal and professional reasons (Peterson, Galvin, Dayton, & D'Alessandro, 1999). In addition, many physicians are required to attend continuing education programs to retain their professional status. In British Columbia, as in many jurisdictions, family physicians who are members of the College of Family Physicians of Canada (CFPC) are required to obtain professional development credits for ongoing accreditation. Although there is recognition of the importance of continued learning, the effectiveness of continuing medical education has been the subject of considerable debate over the years. One of the issues is the lack of responsiveness of traditional continuing medical education to the needs of practitioners. Problems may arise due to several factors such as the way information is presented, the inflexibility of the options, the limited choice of topics, the pace of the programs, the place of learning, and the difficulty of delivering the information when and where physicians and nurses' need it (Neame, Murphy, Stitt, & Rake, 1999; Peterson et al., 1999).

Ebell and Shaughnessy (2003) argue that traditional continuing medical education has not met the needs of physicians. Clinical questions arising in a family physician's practice are central to physician learning, but often continuing medical education is disconnected from their clinical demands. It occurs at times and places that are separate from the delivery of care and frequently it fails to deliver the most important and meaningful information to clinicians. Family physicians require different information at different times depending on the circumstances. These authors propose that physicians will learn best when information is in "the context of patient care, answers their questions, does not take too much time, and is directly applicable to their work " (p.553). Similarly, it appears that nurses' continuing education offerings have not been responsive to their needs, thereby requiring new approaches to their continuing professional development (Furze & Pearcey 1999; Griscti & Jacono 2006).

The effectiveness of different continuing medical education interventions has been reviewed extensively in the literature. With the exception of a recent study (Grimshaw, Eccles, & Tetroe, 2004), the majority of reviewers found that passive information sessions did not result in changes in professional practice, whereas interactive methods were often successful in changing behaviours and clinical practice (Bero et al., 1998; Davis et al. 1999; Thompson O'Brien et al., 2001). For example, a review of continuing medical education studies from 1966 to 1996 found modest

improvements in professional performance after the interventions (Bero et al., 1998). These authors found the use of computerized systems appeared to improve physicians' decision-making about drug dosages, the provision of preventive care, and the general clinical management of patients, but not in making a diagnosis. Moreover, combining two or more interventions seemed to be more effective than single interventions. However, in most cases, passive dissemination of information was generally ineffective, regardless of the importance of the issue or the validity of the assessment methods.

The importance of interactive techniques and mixed educational sessions in continuing professional development was substantiated in an often cited review involving 14 randomized controlled trials about the effect of didactic and/or interactive continuing medical education interventions on physician performance and health care outcomes from 1993 - 1999 (Davis et al., 1999). The authors concluded that interactive techniques, mixed educational sessions, and sequenced sessions were associated with changing professional practice and occasionally health care outcomes. While didactic lectures by themselves did not play a significant role in immediately changing physician performance or improving patient care, the authors did not rule out the possibility that these interventions may change knowledge, skills, and attitudes or predispose the participant to making changes.

Similar findings were reported in two other major studies (Thompson O'Brien et al. 2001; Mazmanian & Davis, 2002). A review of 36 studies investigating the effect of continuing education meetings on health professionals' clinical practice and their health care outcomes from 1966 - 1999 found that didactic presentations showed no statistically significant effects with the exception of one study (Thompson O'Brien et al., 2001). This was an important finding given that educational meetings and printed educational materials are the most common types of continuing education formats used by health professionals. There were small to moderately large effects in the interactive workshops, and interventions that combined workshops and didactic presentations showed small to moderately large effects. These researchers supported the conclusions discussed above that interactive workshops can result in changes in professional behaviour, whereas lectures and presentations (didactic sessions) alone are unlikely to change professional practice. Finally, another major literature review on the effect of continuing medical education from 1992 - 2002 found interventions to change physicians' behaviours had inconsistent effects across practitioners, settings, and

behaviours (Mazmanian & Davis, 2002). The results indicated that interactive learning and opportunities to practice skills can result in changes, and sequenced, multifaceted activities can affect practice and patient outcomes. This finding is consistent with earlier work that found sequenced sessions appear to have more impact (Davis et al., 1999). The authors recommended that physicians reconsider their current emphasis on lectures, grand rounds, and medical meetings in light of these findings.

Until recently there was a consensus among researchers that interactive and multifaceted interventions are effective compared to passive information delivery formats; however, these findings have been challenged. Researchers reinterpreted the earlier data using different a methodology and found 86% of the studies reported positive changes in practitioner behaviour (Grimshaw et al., 2004). The authors concluded that “interventions previously that were thought to be ineffective (e.g., dissemination of educational materials) may have modest, but worthwhile benefits” (p. S31). Moreover, multifaceted interventions appear to be no more effective than single interventions. This study contradicts earlier findings and suggests that while there is extensive research about the effectiveness of continuing medical education for physicians, it remains inconclusive.

In the case of nurses, there is less research to draw upon and the results appear inconclusive. A review of North American and United Kingdom literature on the effects of continuing professional education on nurses’ clinical practice found it was difficult to prove conclusively that these programs influence the quality of patient care (Wood, 1998). Similarly a recent literature review found a lack of research demonstrating the effectiveness of continuing nursing education programs on improving patient outcomes (Griscti & Jacono, 2006). These authors also found limited research about the reasons nurses participate in continuing education or incentives that might encourage greater levels of participation.

Another literature review identified fundamental problems with continuing nursing education programs noting the offerings were fragmented, inequitable, and poorly funded in the United Kingdom (Furze & Pearcey, 1999). Similar to other studies, these authors found a lack of research demonstrating a positive impact of continuing professional education on patient care. They also found that a significant number of nurses did not participate in continuing education programs due to barriers such as motivational factors and staff shortages as well as the lack of offerings, limited

information about available programs and courses, few available places, minimal management encouragement, and limited funding.

It is not surprising that the mixed and unspectacular results garnered from the traditional forms of continuing education for both physicians and nurses has led researchers and planners to re-examine their approaches to continuing professional development. The next section explores some of these new proposed approaches along with some of the results reported from these endeavours.

2.4 New Approaches to Continuing Professional Development

Although there have been many attempts to improve practice in the past, the gulf remains between what is known and what is practiced (Davis et al., 2003; Davis, 2006). In light of this situation, experts have developed new approaches to educating and supporting health care professionals. Some of these approaches include knowledge translation and the use of Internet-based technologies.

2.4.1 Knowledge Translation

The concept of 'knowledge translation' is gaining prominence as a framework for designing education and training in the health care field. Knowledge translation is defined as "the exchange, synthesis and ethically-sound application of knowledge - within a complex system of interactions among researchers and users - to accelerate the capture of the benefits of research for Canadians through improved health, more effective services and products, and a strengthened health care system" (Canadian Institutes for Health Research, 2006). This holistic, multidisciplinary approach focuses on strategies for incorporating research evidence and new knowledge into routine clinical practice. Advocates claim many benefits, such as motivating and shaping behaviour change, providing better teamwork and continuity of care, accessing more accurate and timely information, and improving provider knowledge and skills to ultimately improve patient outcomes (Ho et al., 2004).

Knowledge translation is facilitated by the use of computer technologies such as telehealth. These communication technologies are expected to provide the infrastructure that allows health care professionals to obtain the information when they need it and to use their best clinical judgment to manage their patients. In addition, computer technologies are viewed as a way to educate physicians, facilitate consultations between

clinicians, and allow them to obtain just-in-time advice from their colleagues (Ho, 2004). In this context, telehealth can act as a vehicle to support both the dissemination of best practice guidelines and the implementation of interprofessional collaborations. This requires a workforce that is ready and willing to use technology. Moreover, this state of readiness depends on their experiences and perceptions about the benefits and barriers associated with this approach. This study examines and compares family physicians' and nurses' continuing professional development patterns and preferences, and specifically their experiences with Internet technology, to identify some of the possible factors hindering or supporting the use of technology for improving their knowledge and practices.

2.4.2 Continuing Professional Development Courses and the Internet

Physicians' and nurses' use of the Internet for continuing medical education and professional development courses is steadily rising (Cobb, 2003). Recent studies suggest that online courses may effectively deliver continuing medical education to physicians. Studies about online, interactive, evidence and case-based programs focusing on cancer prevention, domestic violence, pulmonary problems, chlamydia-screening rates, bioterrorism, and other medical conditions have shown promising results (Harris, Salasche, & Harris, 1999; Harris, Salasche, and Harris, 2001; Casebeer, Allison, & Spettell, 2002; Harris, Kotub, Surprenant, Maiuro & Delate, 2002; Casebeer et al. 2003; Allison et al., 2005; Casebeer et al., 2006). For example, two studies reported high levels of user satisfaction as well as improvements in physician confidence and ability to answer knowledge and skill tests about the management of skin lesions (Harris, Salasche, & Harris, 1999; Harris, Salasche, & Harris, 2001). In a study of an online domestic violence education program involving physicians, researchers reported increased confidence, knowledge, and expected performance, as well as improvements in managing domestic violence patients that were similar or greater in magnitude to the positive outcomes from an intensive, multi-hour classroom-based course (Harris et al., 2002). Two studies of online courses designed to improve physicians' chlamydia screening rates reported positive results. One study showed a significant increase in physicians' chlamydia knowledge, attitudes, and skills (Casebeer, Allison, & Spettell, 2002) and the other study found physicians reduced the declining chlamydia screening rates in their offices after taking an online continuing medical education program (Allison et al., 2005). Finally, researchers reported that physicians in an online bioterrorism

course were more knowledgeable about diagnosing certain threatening conditions, more confident in finding information to diagnose patients with different exposures, and more knowledgeable about the emergency contacts than physicians enrolled in an unrelated online course (Casebeer et al., 2006).

Several studies about nurses' experiences with online courses also showed positive results. Nurses rated the theory, critical thinking, discussion questions, clinical experience, and examinations positively in an online refresher course (Roberts, Brannan, & White, 2005). Advanced practice nurses enrolled in online learning modules on acute low back pain and common dermatological problems responded positively to the online learning experience, and the knowledge tests showed significant differences between the pre-test and post-test knowledge scores (Huckstadt & Hayes, 2005). Another study found the majority of nurses that completed a web-based course were satisfied with the experience once they adjusted to the online environment (Atack & Rankin, 2002). Finally, a qualitative study of registered nurses experiences with online courses found that once nurses were familiar with the technology, they had a positive experience with the course (Atack, 2003).

Although these studies reported successes with online continuing medical education, several reviews on the effectiveness of web-based programs have taken a more cautious approach, noting that web-based learning may produce similar, but not necessarily better results than conventional formats (Chumley-Jones, Dobbie, & Alford, 2002; Wutoh, 2004; Curran & Fleet, 2005; Ruiz, Mintzer, & Leipzig, 2006). An extensive review of medical, dental, and nursing web-based learning literature from 1966 - January 2002 found that web-based learning improved post-test scores, but did not out-perform other educational measures (Chumley-Jones, et al., 2002). For example, well-designed web-based learning increased user confidence and many studies reported positive user satisfaction scores similar to the results with other formats. A review of Internet-based continuing medical education interventions from 1966 - January 2004 found that while Internet-based continuing medical education programs were as effective as other types of continuing medical education in transferring knowledge, there was little evidence that online programs changed behaviour (Wutoh, 2004). A review of 86 web-based continuing medical education studies up to December 2003 indicated that the majority of evaluative research on web-based continuing medical education was based on participant satisfaction data (Curran & Fleet, 2005). There was limited research

demonstrating that web-based continuing medical education changed clinical practices and there were no studies demonstrating changes in patient or health outcomes. Finally, Ruiz et al's (2006) literature review on the impact of e-learning on medical education found students were satisfied with e-learning as a component within a blended learning strategy and knowledge gains in web-based learning were equivalent to traditional methods.

Overall, the research results from the studies about online learning appear promising, but inconclusive. There are increasing numbers of health care practitioners participating in online courses. While there is limited research about the effects on patient outcomes, performance measures suggest online courses may perform as effectively as well-designed traditional courses. Moreover, physicians and nurses have reported high levels of satisfaction with their online experiences.

Internet-based interventions offer the promise of increasing the level of access and participation in continuing professional development. These interventions can potentially support the implementation of interprofessional education and knowledge translation focused on best practices. However, even well designed interventions may have limited impact if there is low participation. If Internet-based interventions are to be effective, they must reach their target audience. Therefore, "understanding participation patterns and barriers to participation will help advance this important delivery mode of continuing education" (Wall et al., 2005, p. 2) and potentially improve the quality of health care. Once again, this study explores the patterns and preferences of family physicians and nurses to identify their needs and to develop approaches that respond to their desires and requirements.

2.5 Physicians' and Nurses' Patterns and Preferences

Health care professionals use a variety of information sources for continuing professional development. Several studies have examined health care practitioners' information-seeking behaviours. There is substantial evidence that the most popular delivery format for both physicians and nurses is in-person meetings, conferences, and consultations and the second most popular is print-based materials. These are their preferred choices in spite of research suggesting these methods may be less effective than interactive approaches and possibly formats based in Internet technologies. The desire for social contact and the ease of access may underlie these preferences and

perpetuate the continuing dominance of these formats. If this is the case, educational planners may have to accommodate to these preferences by finding solutions that use interactive and collaborative technologies as well as technologies that address the issues of convenience and ease, for example.

2.5.1 Motivations for Participating

There are a variety of professional reasons nurses and physicians participate in continuing professional development. The most often cited reason is to find information related to direct patient care. Physicians and nurses also seek information about the latest medical research, information about new products and therapies, and information about drugs and diseases (Rasch & Cogdill, 1999; Bryant, 2004; Bennett, Casebeer, Zheng, & Kristofco, 2006).

2.5.2 Patterns of Use

Physicians and nurses use a variety of delivery formats for continuing professional development. The most frequently used format is person-to-person interactions through live meetings, events, and consultations with colleagues (Rasch & Cogdill, 1999; Mamary & Charles, 2000; Charles & Mamary, 2002; Cobb, 2003; Bryant, 2004; Andrews, Pearce, Ireson, & Love, 2005). The second most common format is print-based resources such as textbooks and journals (Rasch & Cogdill, 1999; Mamary & Charles, 2000; Charles & Mamary, 2002). In addition to live and print resources, health care professionals seek technology-enabled information through e-mail, audio and video conferences, web-based courses and resources, audio and video cassettes, and personal digital assistants. However, there is limited information about the extent of their use.

2.5.3 Preferences

Studies have shown consistently that physicians prefer in-person conferences and courses and print-based sources for continuing professional development (Goodyear-Smith, Whitehorn, & McCormick, 2003a; Mamary & Charles, 2003; Stancic, Mullen, Prokhorov, Frankowski, & McAlister, 2003). This appears related to their desire for either social interaction and easily accessible content (Goodyear-Smith et al. 2003a; Goodyear-Smith et al. 2003b).

Conferences, Events and Consultations

There is an almost universal preference among both physicians and nurses for face-to-face opportunities involving social interactions, such as consultations with colleagues, conferences, live meetings, and events (Dorsch, 2000; Mamary & Charles, 2000; Charles & Mamary, 2002; Cobb, 2003; Estabrooks et al., 2003; Mamary & Charles, 2003; Bryant, 2004; Cobb, 2004; Andrews et al., 2005; Dee & Stanley 2005; Bennett et al., 2006). This is especially true when physicians are seeking information requiring immediate attention to clinical issues. One study suggested this preference did not vary based on age, gender, race/ethnicity, and location (Stancic et al. 2003). Another study (Cobb, 2004) suggested the reliance on meetings has declined somewhat recently due to the rise in the use of the Internet, but this has not been corroborated in other studies.

Print Sources

The majority of studies report that both physicians' and nurses' second preference for receiving information is through print resources such as journals, newsletters, and textbooks (Dorsch, 2000; Mamary & Charles, 2000; Charles & Mamary, 2002; Cobb, 2003; Estabrooks et al., 2003; Mamary & Charles, 2003; Bryant, 2004; Chew, Grant, & Tote, 2004; Cobb, 2004; Andrews et al., 2005; Bennett et al., 2006). These sources are usually easily accessible at work, home, or in the library.

Other Sources

Physicians and nurses use other sources of information less frequently than face-to-face and print resources. These sources include e-mail, audio and video conferences, CD-ROMs, audio and video tapes, and online sources such as forums and discussion groups, chat groups, Instant messaging, journals, library services, practice guidelines, textbooks, medical databases, and professional news. There was no consistent ordering of preferences in the literature and there may be differences between physicians and nurses. For example, in a study comparing nurses and physicians, both groups' first preference was live lectures but physicians ranked the Internet third and nurses ranked it fourth (Cobb, 2003).

2.6 Health Care Professionals and Computer Technologies

Several policy makers have envisioned that technology will play an essential role in educating health care professionals for a reinvigorated health care system. This

premise is predicated on the assumption that family physicians and nurses access and use computers and Internet technology for their ongoing continuing professional development.

2.6.1 Computer and Internet Access

Physicians' and nurses' use of computers and the Internet has been rising steadily over the last few years. Physicians' computer use has increased every year from 10% in 1997 to 70% in 2000 (American Medical Association, 2002) and this growth has continued as indicated in several studies (Casebeer et al., 2002; Chew et al., 2004; Martin, 2004a; Miller, Hillman, & Given, 2004). For example, a U.S. study found nearly all the physicians surveyed had access to the Internet and used it for medical information (Casebeer, Bennett, Kristofco, Carillo, & Centor, 2002). The next year, a survey of U.S. physicians reported that more than 80% of physicians had home computers, two-thirds had computer access at work, and three-quarters had Internet access (Mamary & Charles, 2003). By 2004, a survey of U.S. physicians found 88% used the Internet for work in the previous year, and two-thirds used the Internet daily for work or non-work purposes (Miller et al., 2004). Similarly, another survey of U.S. physicians found that over 90% had computers both at work and at home and almost three-quarters had Internet access (Chew et al., 2004).

A study of Canadian physicians found that almost 90% had Internet access but less than two-thirds had Internet access at work (Martin, 2004a; Martin, 2004b). Two-thirds used the Internet to support treatment or direct patient care with almost three-quarters accessing the Internet mainly from home and one-fifth accessing it mostly from work. In another study of general practitioners and family physicians, three quarters reported having computers in their office and a fifth used it for clinical purposes (Canadian Medical Association & Canadian Health Infoway, 2006). Their use for continuing professional development was not reported.

Despite this plethora of research about physicians, there is limited research on nurses' use of computer technologies. Two surveys of nurses in 1996 and 1998 found that although nurses' Internet and e-mail use at home increased over a two-year period and was comparable to the use by physicians, Internet use at work was low in spite of adequate workplace access (Estabrooks et al., 2003). Compared with the general

Canadian population, nurses were more likely to use the Internet at home and significantly less likely to access the Internet at work.

There are few studies comparing different health care practitioners' use of computers and the Internet. An integrative literature review of health care professionals' use of the Internet for continuing education from January 1990 - June 2004 found the majority had access to computers at home, work, or both and that the Internet was increasing in popularity (Cobb, 2004). This finding is consistent with other studies (Mamary & Charles, 2000; Jadad et al., 2001; Cobb, 2003). A survey of physicians, nurse practitioners, and physician assistants' continuing education practices found almost 90% had access to home computers and almost three-quarters had access to CD-ROMs, the Internet, office computers and electronic mail (Mamary & Charles, 2000). A Canadian study of physicians and nurses affiliated with a regional cancer centre found all of the physicians and almost three quarters of the nurses had access to the Internet (Jadad et al., 2001). Surveys comparing oncology nurses and physicians in 2001 and 2002 found almost all the nurses used the Internet and approximately two-thirds used it daily, mostly accessing it from home rather than work. Similarly, almost all the physicians used the Internet for up to five hours per week; however, almost half accessed it from work (Cobb, 2003).

The research about computer and Internet access and use indicates increasing reliance on technology for work. However, the extent of use may differ between the two professional groups. It appears that computer access for both professions is almost universal either at home or in the workplace, but more physicians than nurses use computers for work. Similarly, there is widespread access to the Internet by both physicians and nurses, with nurses tending to access it more frequently from home. This study will examine these issues in more detail.

2.6.2 Internet Use

Although there has been a preference for live conferences and print mediums, the reliance on the Internet is increasing (Cullen, 2002; Bennett, 2004; Martin, 2004b; Bennett et al., 2005). Key factors influencing physicians and nurses' decisions about accessing Internet-based continuing professional education sources is that the content is relevant, immediately available, credible, and easy to find and use (Casebeer et al., 2002). In most cases, the primary purposes for using the internet is information retrieval,

supporting direct patient care (Casebeer et al., 2002; Bryant, 2004), and e-mail (Miller et al., 2004). Professionals tend to use online continuing professional development for professional communication, information-seeking, and courses.

Professional Communication

There are many forms of interactive communication available to professionals through the Internet. E-mail, audio and video conferences, forums and discussion groups, chat groups, and Instant messaging are some examples. The most commonly used professional communication format cited in the research was e-mail with colleagues (Cobb, 2003; Miller et al., 2004; Bennett et al.2006).

Information Seeking

Health care professionals used the Internet to search for the latest research about a variety of topics as well as to obtain information about diseases, specific patient problems, drugs, new therapies, and different products (Cullen, 2002; Bennett, 2004; Bennett et al., 2006). A U.S. survey found family physicians considered the Internet an important source of information (Bennett et al., 2005).

Their online information sources include journals, library services, practice guidelines, textbooks, medical databases, and professional news. A Canadian study found that physicians used the Internet for searching online medical and drug databases, accessing clinical practice guidelines, and reading online medical journals and texts (Martin 2004a; Martin 2004b). A U.S. study found physicians most frequently searched for information through online journals, professional association websites, point-of-care databases, continuing medical education programs, and colleagues on e-mail (Bennett et al., 2006). Comparing these findings to earlier studies, Bennett et al. (2006) suggest that physicians are getting increasingly skilful in using the Internet to find clinical information about patient problems and there are fewer barriers to seeking information. This appears consistent with other research findings.

One study comparing physicians and nurses found differences in their Internet use. For example, physicians used the Internet most frequently to conduct literature searches, whereas nurses used it most frequently for health information. For both groups, the second most frequent use was e-mailing other professionals (Cobb, 2003).

Online Continuing Professional Development Courses

Physicians and nurses' use of the Internet for continuing medical education and professional development courses is steadily rising (Cobb, 2003). The growth of continuing medical education for U.S. physicians/MDs and non-physicians including nurses, physician assistants, and other health professionals was traced from 1998 to 2004 (American Accreditation Council for Continuing Medical Education Reports, 2005). In 1998, there were 245 live Internet courses involving 14,667 physicians and 21,583 non-physicians, compared to 696 live courses in 2004 involving 30,716 physicians and 22,157 non-physicians. Access to Internet-based materials that can be used over time (e.g., printed) went from 790 in 1998 involving 23,212 MDs and 3,150 non-MDs to 14,836 in 2004 involving 868,674 physicians and 555,402 non-physicians.

Although there has been a strong growth in the number of courses offered to physicians and nurses, it is unclear whether the number of family physicians and nurses taking the courses has passed the 10% mark. A couple of studies found that about 10% of physicians reported taking continuing education courses (Charles & Mamary, 2002; Miller et al., 2004) and another study reported that over 40% of the nurses and physicians expressed an interest in participating in online continuing education (Cobb, 2003).

2.7 Benefits and Barriers

New technologies have the potential to augment and possibly replace traditional professional development methods (e.g., lectures, journals, and workshops). Physicians must be able to analyze clinical data, use relevant evidence based information, and communicate with their colleagues. This requires access to self-directed and interactive learning opportunities that are compatible with their daily routines and work settings (Shaughnessy & Slawson, 1999; Manning & DeBakey, 2001; Casebeer et al., 2002). While many potential benefits to using computer-based technologies have been identified in the literature, researchers also caution about potential obstacles for physicians and nurses such as time, computer capability, limited training and skills, relevance to their practice, and Internet experience (Casebeer et al., 2002; Hegge et al., 2002; Harris et al., 2003). Moreover, the preference for face-to-face communication and the reliance on print-based sources may also act as a barrier (Mamary & Charles, 2000; Mamary & Charles, 2003; Stancic et al., 2003).

Although physicians used the Internet to find medical information and for professional development, Internet use for continuing medical education courses was much lower (Casebeer et al., 2002). Mamary' and Charles' (2003) study of physicians found the top reasons for not using computer-based continuing education were the physicians' preference for in-person instruction and not knowing how to use computer-based technologies.

Several studies of nurses' experiences with online learning identified key barriers to using computer technologies for continuing professional development (Charles & Mamary, 2002; Hegge et al., 2002; Schmitt et al., 2004; Dee & Stanley, 2005). Some of the barriers included the lack of time and access to computers and databases at work, whereas colleagues and books were accessible, easy to use, and trusted sources.

Cobb's (2003) comparison of physicians' and nurses' use of the Internet for continuing professional development found differences in their computer practices, noting that more physicians than nurses used computers at work. It appeared that nurses had less access and time in the workplace to use the Internet for professional development. The study also found that both physicians and nurses reported their use of the Internet would likely increase if the activities were low cost or free, and if nurses had increased personal skills and knowledge and physicians had easier access. In a follow-up literature review, Cobb (2004) found that while Internet-based continuing education was perceived as effective and participants appeared satisfied with the experience, there were still barriers related to the lack of computer competence and technical difficulties with programs.

2.7.1 Benefits

Several benefits were identified to using computers and Internet technology for continuing professional education. These benefits fall into two categories - practical benefits and learning enhancements:

- Practical benefits include time flexibility and time saved travelling to courses (Curran et al., 2003; Janes et al., 2005), convenience (Curran et al., 2003; Curran et al., 2004), cost savings from not having to travel to courses (Janes et al., 2005), accessibility and availability (Curran et al., 2003; Janes et al., 2005), and ease of use (Curran et al., 2003).

- Learning enhancements include learning at your own pace (Curran et al., 2004) and quality of content and delivery (Janes et al., 2005).

2.7.2 Barriers

The barriers to using computers and the Internet can be grouped into four categories - access to a computer and the Internet, learning preferences, professional concerns, and knowledge and skills:

- Access to a computer and the Internet includes computer access, convenience and capacity (Curran et al., 2003; Harris et al., 2003; Dee & Stanley, 2005; Janes et al., 2005), Internet access at home or at work (Cobb, 2003; Schmitt et al., 2004; Janes et al., 2005), connection speed or lack of high speed Internet (Janes et al., 2005), technical difficulties or issues (Hegge et al., 2002; Cobb, 2004; Schmitt et al., 2004; Bennett et al., 2005; Bennett et al., 2006), and software requirements (Bennett et al., 2005; Bennett et al., 2006).
- Learning preferences includes preferences for social interaction through in-person interaction or instruction and information from professional colleagues (Mamary & Charles, 2000; Charles & Mamary, 2002; Andrews et al., 2005; Janes et al., 2005) and preferences for print sources and personal libraries (Hegge et al., 2002; Andrews et al., 2005)
- Professional concerns includes lack of time at home or work (Mamary & Charles, 2000; Casebeer et al., 2002; Charles & Mamary, 2002; Schmitt et al., 2004; Andrews et al., 2005; Dee & Stanley, 2005; Janes et al., 2005), Internet content, format of information sources, too much information to scan, the lack of specific information, problems finding quality information (Casebeer et al., 2002; Bennett, 2004; Bennett et al., 2005; Janes et al., 2005; Bennett et al., 2006), and cost (Hegge et al., 2002; Cobb, 2003; Curran & Fleet, 2005; Janes et al., 2005).
- Knowledge and skills includes lack of computer and Internet searching knowledge and skills, inexperience with Internet learning systems, difficulty finding information (Mamary & Charles, 2000; Charles & Mamary, 2002; Cobb, 2003; Harris et al., 2003; Curran et al., 2004; Andrews et al., 2005;

Dee & Stanley, 2005; Janes et al., 2005), and lack of knowledge about computer-based continuing education programs (Charles & Mamary, 2002).

2.8 Summary

The use of technology and the Internet by physicians is increasing annually. Although there is a growing body of research about computer and technology use, specific research about family physicians' use of technology and the Internet for continuing professional development remains limited. Physicians are using technology in a variety of ways, ranging from e-mail and searching for information on the Internet, to having fully integrated computer-based systems in their offices. Some physicians are taking online programs and courses. In many cases, physicians agree there are many potential benefits to using technology, but there are many barriers to overcome such the preference for in-person experiences, time, lack of skills and limited training opportunities, and online courses that may not meet their needs.

Similar to physicians, nurses' use of technology and the Internet is increasing annually. Although research about nurses' use of technology for continuing professional development is limited, it appears they are using technology for a variety of purposes. However, their use is less extensive than the use by physicians. There may be several barriers in their way: time, workplace demands, lack of confidence and skills with the computer and the Internet, lack of social interaction, and problems with the technology.

The Internet can provide continuing medical education and professional development to physicians and nurses in many forms and in a variety of locations. The research suggests that physicians and nurses can benefit from online continuing education and professional development, particularly if it is interactive, self-directed, supports collaboration with other professionals, and is easy to use. The content must be of a high calibre and based on 'evidence-based practice' guidelines. It must be flexible and responsive to the needs of the practitioners facing a myriad of challenges on a daily basis. The Internet has these capabilities so it is especially important to understand the physicians' and nurses' experiences and requirements so programs can be designed to meet their needs.

3 METHODS

3.1 Research Design

This study examined British Columbia family physicians' and nurses' continuing professional development practices and preferences and their experiences with using Internet technology. It used a quantitative approach employing a descriptive research design to determine the characteristics and requirements of two groups of health care professionals at one point in time. The study involved a secondary analysis of results from a survey of health care professionals in 2003. The methodology used for the survey allowed the researchers to obtain comprehensive information efficiently. This feature was important to health care professions faced with time challenges. Moreover, the survey questionnaire analysed for this study was distributed to a large population in multiple and diverse locations and within a relatively short time. Based on the purpose of this study, a standard statistical technique was used for the analysis.

3.2 Sample

The study examined the continuing professional development experiences and requirements of family physicians and nurses in British Columbia. Family physicians and nurses were identified for the study because of their key role in health care system reform (Romanow, 2002). A sample of the population was selected to approximate the number of registered family physicians and registered nurses in the province. For both the family physicians and the nurses, the sample size was determined by the available budget that included the cost of mailing the questionnaire as well as the cost of a follow-up mailing.

Family physicians and nurses reside in both urban and rural settings in different regions of the province. These regions have been divided into Health Authorities. British Columbia has five regional Health Authorities that, in conjunction with the Ministry of Health Services, manage and deliver most of the publicly funded health services. These five geographically defined Health Authorities are responsible for providing a full range of local health services. In 2003, the Northern Health Authority provided services to

approximately 302,000 residents in northern British Columbia (BC Health Services, 2004). The Vancouver Coastal Health Authority provided services to approximately 1,040,000 residents in the Lower Mainland. The Interior Health Authority provided services to approximately 691,000 residents in the interior of British Columbia. The Fraser Health Authority provided services to approximately 1,440,000 residents, predominantly within the Lower Mainland. Finally, the Vancouver Island Health Authority provided health services to approximately 698,000 residents of Vancouver Island and the BC coast. The sample population was drawn from across these regions.

In a study about B.C. family physicians, over three quarters reported working primarily in private offices or clinics or free-standing walk-in clinics and the remainder worked academic health science centres, community clinics or hospitals, emergency departments, nursing homes or homes for the aged and other venues (College of Family Physicians in Canada, Canadian Medical Association, & Royal College of Physicians and Surgeons of Canada, 2004). In a study of trends for nurses in 2003, the vast majority of B.C. nurses reported working in hospitals, community health agencies, and nursing homes or long term care facilities and just over a tenth worked in other venues (Canadian Institute for Health Information 2004). This data assists in guiding the interpretation of the findings.

3.2.1 Family Physicians

In 2003, there were 4,500 registered family physicians in BC. The questionnaire for this study was distributed to a random sample of 1,440 family physicians representing 32% of the population and 168 (11.7%) responded to the survey. While additional data for 2003 were not available, survey data collected in a 2004 National Physician Survey reported there were 4,633 family physicians in British Columbia (College of Family Physicians in Canada, Canadian Medical Association, & Royal College of Physicians and Surgeons of Canada, 2004). The sample responding to the study was compared with the profile from the national survey (Table 1). Based on a comparison between the sex and age profile of the sample and the family physicians in the 2004 B.C. population, a higher percentage of females in the study responded to the study. A higher percentage of family physicians under 35 years responded to the survey; however, the other age groups were consistent with the population statistics. Based on the 2003/2004 regional populations, the family physicians had more representation from

the Northern Health Authority, the Vancouver Island Health Authority and the Interior Health Authority and less representation from the Vancouver Coastal Health Authority and the Fraser Health Authority (Table 2).

3.2.2 Nurses

In 2003, there were 27,711 registered nurses employed in British Columbia (Canadian Institute for Health Information, 2004). The questionnaire was distributed to a random sample of 3,002 nurses representing 10.8 % of the population and 533 (17.8%) responded to the survey. The characteristics of the sample were compared with the population data from the report on the Workplace Trends of Registered Nurses in Canada, 2003 (Table 1). More females in the sample responded to the survey than the percentage represented in the population data. There was some variation in the responses based on age. The under 35 age group was equivalent to the population statistics; however, more 45-54 year old nurses and less 35-44 years and 55 years and older nurses responded to the survey. The percentage of nurses from each Health Authority varied. Compared to the population in each region, there were more nurses represented from the Northern Health Authority and the Interior Health Authority, less from the Vancouver Island Health Authority and the Fraser Valley Health Authority, and about the same representation from the Vancouver Coastal Health Authority (Table 2).

Table 1: Comparison of Family Physicians' and Nurses' Sample Characteristics with Population Data

Characteristics	Family Physicians Response to Survey* (N=168)	BC Family Physicians 2004 National Survey** (N=4,633)	Nurses Response to Survey* (N=533)	BC Nurses 2003 Workplace Trends Survey*** (N=27,711)
Sex				
Female	38.6% (64)	32.7% (1,515)	96.6% (514)	95% (26,427)
Male	61.4% (102)	67.3% (3,118)	3.4% (18)	5% (1,284)
Age				
Under 35	12.5% (21)	8.7% (401)	17.6% (94)	17% (4,596)
35-44 years	29.2% (49)	30.7% (1,420)	23.2% (124)	26% (7,232)
45-54 years	32.8% (55)	32.4% (1501)	40.1% (214)	36% (10,024)
55 years and over	25.6% (43)	26.2% (1211)	18.9% (101)	21% 5,859

*All percentages are based on the number of respondents to each question.

**Data from the 2004 National Physician Survey

***Data from the Workplace Trends of Registered Nurses in Canada, 2003 is used by permission of the Canadian Institute for Health Information.

Table 2: Comparison of Family Physicians' and Nurses' Sample Characteristics with Regional Data

Regions	Family Physicians*	Nurses*	Population in Region % (N)**
Health Authority			
Northern Health Authority	10.7% (18)	13.9% (74)	7% (302,000)
Vancouver Island Health Authority	19.0% (32)	14.8% (79)	17% (698,000)
Interior Health Authority	20.2% (34)	18.0% (96)	17% 691,000
Fraser Health Authority	20.2% (34)	20.6% (110)	35% (1,44,000)
Vancouver Coastal Health Authority	22.6% (38)	25.1% (134)	25% (1,041,000)

*All percentages are based on the number of respondents to each question.

**Data from the Report on the 2003/2004 Health Authority Performance Agreement Report, Government of British Columbia

3.2.3 Comparison of Family Physicians' and Nurses' Characteristics

Not surprisingly, there were more male family physicians and more female nurses involved in the study (Table 3). These differences are consistent with the overall population of family physicians and nurses. There were variations in the ages as well. More family physicians under 35 years and in the 45-54 age group and more nurses in the 35-44 and 55 years and older age groups responded to the survey. There is no apparent reason for these differences. There were no significant differences in their years of practice or their location within a Health Authority.

Table 3: Comparison of Family Physicians' and Nurses' Sample Characteristics

Characteristics	Family Physicians (N=168)*	Nurses (N=533)*	χ^2	<i>p</i>
Sex			299.6	0.00
Female	38.6% (64)	96.6% (514)		
Male	61.4% (102)	3.4% (18)		
Age			25.8	0.00
Under 35	12.5% (21)	17.6% (94)		
35-44 years	29.2% (49)	23.2% (124)		
45-54 years	32.8% (55)	40.1% (214)		
55 years and over	25.6% (43)	18.9% (101)		
Years of Practice			52.2	0.22
0-10 years	23% (37)	22% (115)		
11-20 years	32% (51)	34% (178)		
21-30 years	28% (45)	32% (168)		
31 years and over	16% (26)	18% (96)		
Health Authority			9.06	0.11
Northern Health Authority	10.7% (18)	13.9% (74)		
Vancouver Island Health Authority	19.0% (32)	14.8% (79)		
Interior Health Authority	20.2% (34)	18.0% (96)		
Fraser Health Authority	20.2% (34)	20.6% (110)		
Vancouver Coastal Health Authority	22.6% (38)	25.1% (134)		

*All percentages are based on the number of respondents to each question.

3.3 Research Questions

The research questions guiding the study are:

- What are the family physicians' and nurses' patterns and preferences for continuing professional development and how do they compare?

- What are the family physicians' and nurses' experiences using computer technologies for continuing professional development and how do they compare?
- What are the family physicians' and nurses' perceptions about the benefits and barriers to using computer technologies for continuing professional development and how do they compare?
- What are the family physicians' and nurses' needs for training and technical support for technology-enabled continuing professional development and how do they compare?

3.4 Survey Instrument

In 2003, the B.C. Universities Vice Presidents' Academic Committee (VPAC) Telelearning Sub-Committee Project conducted a study to understand the educational needs and technological profile of accredited health professionals in B.C. (BC Universities Vice Presidents' Academic Committee Telelearning Sub-Committee Project, 2003). The research team developed research protocols and a series of survey questions to administer to a variety of health care professionals groups in B.C. In the first week of May 2003, a survey questionnaire entitled "Continuing Professional Development for Practicing Health Professionals: Needs Assessment" (Appendix 1) and a Consent Form were mailed to a randomly selected cross section of health professionals across British Columbia. These health professionals included Family Physicians (n=1440), Nurses (N=3002), Pharmacists (N=501), Physical Therapists (N=355), Occupational Therapists (N=340), and Dentists (N=803) across British Columbia. In the third week of July 2003, a second mailing went to those that did not respond to the first mailing. This study uses a sub-set of this data, specifically it analyzes data related to family physicians and nurses.

The survey questions solicited information about the demographic profile of the family physicians and nurses, their learning patterns and preferences, their educational needs, and their technological profile including their experience with online communities. The survey consisted of thirty-one questions (See Appendix 1: Continuing Professional Development for Practicing Health Professionals: Needs Assessment"). The Questions 1

- 7 provided demographic data about the participants. The questions addressing the specific research questions are outlined below (Table 4).

Table 4: The Relationship between the Research Questions and the Survey Questions

Research Questions	Question Number
1. What are the family physicians' and nurses' patterns and preferences with continuing professional development and how do they compare?	Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16
2. What are the family physicians' and nurses' experiences using computer technologies for continuing professional development and how do they compare?	Q19, Q20, Q21, Q22, Q23, Q24, Q30, Q31
3. What are the family physicians' and nurses' perceptions about the benefits and barriers to using computer technologies for continuing professional development and how do they compare?	Q25, Q26, Q27
4. What are the family physicians' and nurses' needs for training and technical support for technology-enabled continuing professional development and how do they compare?	Q28, Q29

3.5 Human Research Ethics Approval

The Research Ethics Boards of both Simon Fraser University and the University of British Columbia granted approval for the survey to the B.C. Universities Vice Presidents' Academic Committee (VPAC) Telelearning Sub-Committee Project. This writer received retroactive approval for a secondary analysis of the survey data for the purposes of this thesis.

3.6 Data Analysis

The Statistical Package for Social Sciences (SPSS 14.0 Windows Version) was used for data analysis. The study used descriptive and inferential statistics to analyze

the data. Frequency data about family physicians and nurses were calculated on each group independently to describe their characteristics and the frequency of their ratings on a range of items. The data about each group were also compared to determine statistical significance on a number of variables. Chi-Square tests or t-tests were calculated depending on the nature of the questions and the responses. A Chi-Square test is a nonparametric statistical test used to determine whether the data in items with simple frequency counts are distributed differently for different samples. The t-tests tested the differences between two independent responses to questions resulting in continuous scores distributed in interval or ratio scales of measurement. An alpha level of .05 was set for all statistical comparisons.

3.7 Findings and Discussion

3.7.1 Findings

Patterns and Preferences

The family physicians' and nurses' patterns and preferences were explored through several survey questions. These health care professionals responded to questions about their motivations for accessing continuing professional development. They provided information about their actual use of structured and self-directed formats over the previous twelve months and they rated these formats based on their preferences. They also provided information about their views on the importance of continuing professional development.

Motivations for Accessing Continuing Professional Development

Health care professionals accessed continuing professional development opportunities for professional and personal reasons. These professionals wanted to meet professional requirements, to increase awareness of current developments, to contribute to the profession, to enhance employment opportunities, and to interact with colleagues. They also pursued continuing professional development activities to increase self-confidence and for personal interest and enjoyment. Family physicians and nurses ranked the importance of these motivations on three point Likert scale with 1 = low importance, 2 = medium importance, and 3 = high importance. The mean was calculated for each item (Table 5).

Family physicians gave the highest rating to increasing awareness of current developments (2.7); however, personal interest (2.5), personal enjoyment (2.3) and self-confidence (2.2) were among the top five motivations, with meeting professional requirements (2.0), contributing to the profession (2.0) and having social interaction with colleagues (2.0) sharing fifth place. All were rated of medium importance. The nurses' top five motivations included personal interest (2.6) and increasing awareness of current developments (2.6) in first place. The other top motivations included self-confidence (2.4), personal enjoyment (2.3), contributing to the profession (2.3), opportunities for social interaction (2.2), and meeting professional requirements (2.2) that were rated of medium importance as well as improving employment opportunities (1.9) rated low importance. While both groups rated most of the same professional and personal motivations among their top five choices, there were differences among their ratings. Family physicians attributed more importance to increasing awareness of current development than nurses, while nurses placed more importance on personal reasons such as personal interest and self-confidence, and on professional motivations related to contributing to the profession, fulfilling professional requirements, and increasing employment opportunities. There were no statistically significant differences in family physicians' and nurses' quest for personal enjoyment or social interaction with colleagues.

Table 5: Family Physicians' and Nurses' Motivations for Accessing Continuing Professional Development Opportunities

Motivation*	Family Physicians		Nurses		t	p
	No. Responses	M (SD)	No. Responses	M (SD)		
Professional						
Professional Requirement	161	2.0 (0.89)	531	2.2 (0.83)	2.17	0.03
Aware of Current Developments	164	2.7 (0.50)	531	2.6 (0.59)	2.45	0.01
Contribute to Profession	165	2.0 (0.80)	525	2.3 (0.74)	3.67	0.00
Employment Opportunities	163	1.2 (0.76)	527	1.9 (0.88)	9.9	0.00
Social Interaction with Colleagues	162	2.0 (0.70)	524	2.2 (0.75)	1.81	0.07
Personal						
Self-Confidence	164	2.2 (0.8)	533	2.4 (0.75)	3.01	0.00
Personal Interest	164	2.5 (0.62)	533	2.6 (0.6)	2.90	0.00
Personal Enjoyment	164	2.3 (0.67)	527	2.3 (0.75)	0.86	0.39

(*Based on a 3 point Likert scale when 1 = low importance, 2 = medium importance, and 3 = high importance).

Structured and Self-Directed Continuing Professional Development Formats.

Family physicians and nurses used both structured and self-directed continuing professional development formats. Structured formats included conferences, workshops or seminars, classroom and work-based courses, web-based courses, audio and video conferences, and tele-tutoring. Self-directed formats included print resources, work resources, computer resources, personal digital assistants, web resources, and audio/video taped sessions. Family physicians and nurses were asked about their use of these formats over the previous twelve months. In addition, they ranked their preferences for each of these formats on a three point Likert scale with 1 = low importance, 2 = medium importance, and 3 = high importance. The mean was calculated for each item (Table 6).

Almost all the family physicians (98.2%) attended conferences, workshops, and seminars and over 80% used print resources. Over 40% used web resources and about

a third used personal digital assistants (32.5%) and computer resources (31.9%), the other formats in their top five choices. A quarter of the family physicians attended classroom-based courses (26.5%) and less than a fifth used audio conferences (16.3%), video conferences (16.3%), web-based courses (15.1%) and work-based courses (10.8%). Use of tele-tutoring (3.0%) was minimal. With one exception, their top five preferred formats were consistent with their actual use. Conferences, workshops, and seminars (2.7) were in the lead followed by print resources (2.3) in second position and web resources (2.0) in third place. Classroom-based courses (1.8) and computer resources (1.6) were also in the top five group. However, other than their leading three formats, all the other formats received low importance ratings.

Similar to family physicians, the nurses' top two choices were first, conferences, workshops, and seminars and second, print resources. Over 90% of the nurses attended conferences, workshops, and seminars and three quarters (75.6%) used print resources. Work-based courses (48.8%) and resources (48.4%), web resources (39.4%) and classroom-based courses (38.3%) were also in the top five. Less than a quarter of the nurses used computer resources (21.0%), web-based courses (12.0%), audio conferences (13.3%), video conferences (10.9%), tele-tutoring (5.1%) or personal digital assistants (4.1%). The top rated formats used by nurses were consistent with their preferences, but work-based resources along with the other formats received low importance ratings.

Table 6: Family Physicians' and Nurses' Use of Continuing Professional Development Formats

Educational Formats	Family Physicians		Nurses		χ^2	<i>p</i>
	No. Responses	Yes % (N)	No. Responses	Yes % (N)		
Structured						
Conferences/ Workshops/ Seminars	166	98.2% (163)	533	90.1% (480)	11.37	0.00
Classroom-Based Courses	166	26.5% (44)	533	38.3% (204)	7.66	0.00
Work-Based Courses	166	10.8% (18)	533	48.8% (260)	76.05	0.00
Web-Based Courses	166	15.1% (25)	533	12.0% (64)	1.06	0.30
Audio Conferences	166	16.3% (27)	533	13.3% (71)	0.91	0.34
Video Conferences	166	16.3% (27)	533	10.9% (58)	3.43	0.06
Tele-Tutoring	166	3.0% (5)	531	5.1% (27)	1.24	0.27
Self-Directed						
Print Resources	166	83.7% (139)	533	75.6% (403)	4.80	0.03
Work Resources	165	17.6% (29)	533	48.4% (258)	49.46	0.00
Computer Resources	166	31.9% (53)	533	21.0% (112)	8.36	0.00
Personal Digital Assistants	166	32.5% (54)	533	4.1% (22)	102.37	0.00
Web Resources	166	44.0% (73)	533	39.4% (210)	1.10	0.29
Audio/Video Taped Sessions	166	11.4% (19)	533	19.9% (106)	6.14	0.01

More family physicians engaged in conferences, workshops, and seminars, while more nurses participated in classroom and work-based courses. More family physicians used print resources, computer resources, and personal digital assistants, while more nurses used work resources and audio/video taped sessions. There were no differences in family physicians' and nurses' preferences for conferences, workshops, and seminars; however, nurses had greater preferences for classroom and work-based courses and for tele-tutoring (Table 7). Nurses also had a higher preference for print resources, web

resources, work resources, and audio/video taped sessions, while family physicians had a greater preference for personal digital assistants. Overall, nurses tended to rate their preferred formats higher than family physicians. There were no significant differences in either their uses or preferences for the other formats.

Table 7: Family Physicians' and Nurses' Preferences for Continuing Professional Development Formats

Educational Format Preference*	Family Physicians		Nurses		<i>t</i>	<i>p</i>
	No. Responses	<i>M</i> (SD)	No. Responses	<i>M</i> (SD)		
Structured						
Conferences/ Workshops/ Seminars	162	2.7 (0.53)	525	2.7 (0.53)	1.28	0.20
Classroom-based Courses	150	1.8 (0.88)	517	2.2 (0.80)	5.59	0.00
Work-Based Courses	144	1.6 (1.02)	513	2.4 (0.80)	9.70	0.00
Web-based Courses	144	1.4 (0.83)	486	1.5 (0.97)	1.69	0.09
Audio Conferences	144	1.1 (0.67)	501	1.3 (0.76)	1.61	0.11
Video Conferences	142	1.3 (0.82)	493	1.4 (0.88)	1.85	0.07
Tele-Tutoring	137	1.0 (0.84)	484	1.2 (0.88)	2.01	0.04
Self-Directed						
Print Resources	156	2.3 (0.67)	521	2.5 (0.66)	2.65	0.01
Work Resources	145	1.3 (0.83)	502	1.9 (0.83)	7.97	0.00
Computer Resources	149	1.6 (0.88)	489	1.7 (0.99)	0.40	0.69
Personal Digital Assistants	149	1.4 (1.60)	478	0.7 (0.84)	8.40	0.00
Web Resources	152	2.0 (0.92)	497	2.0 (0.93)	0.67	0.95
Audio/Video Taped Sessions	142	1.2 (0.73)	492	1.6 (0.85)	5.17	0.00

(*Based on a 3 point Likert scale when 1 = low importance, 2 = medium importance, and 3 = high importance).

Importance of Continuing Professional Development

Family physicians and nurses engage in both structured and self-directed continuing professional development. They rated the importance of structured and self-directed continuing professional development activities on a four point Likert scale with 1 = not important, 2 = low importance, 3 = medium importance, and 4 = high importance. The mean was calculated for each item. In both cases, family physicians and nurses rated both structured (3.5 and 3.6) and self-directed continuing professional development (3.5 and 3.5) as medium importance. There were no significant differences in their ratings.

Table 8: Importance of Continuing Professional Development to Family Physicians and Nurses

Importance of CPD	Family Physicians		Nurses		t	p
	No. Responses	<i>M</i> (SD)	No. Responses	<i>M</i> (SD)		
Structured CPD	166	3.5 (0.59)	531	3.6 (0.59)	0.99	0.33
Self-Directed CPD	166	3.5 (0.60)	528	3.5 (0.62)	0.65	0.52

(Based on a four point Likert Scale when 1 = not important, 2 = low importance, 3 = medium importance and 4 = high importance.)

These professionals reported on the number of structured continuing professional development courses attended either in the community, outside the community, or via distance education (Table 8). Overall, family physicians attended an average of almost eight sessions over the previous six months. The majority of these sessions were attended in their community (5.6), secondly outside their community (1.9), and to a much lesser extent, via distance education (0.5). Nurses attended fewer sessions (4.3) than family physicians and the majority of these sessions were attended in their community (2.7), with a smaller number attended outside the community (1.1) and via distance education (0.5). Family physicians attended more sessions than nurses, both in and outside their community. Both family physicians and nurses reported low attendance in distance education sessions and there was no significant difference between these two groups.

The average number of hours family physicians spent on self-directed continuing professional development per day was roughly an hour (0.9). This amount of time was

similar to nurses who spent slightly more time per day (1.0) on self-directed continuing professional development. A fifth of the family physicians (19.9%) and over 80% of the nurses believed more time should be spent on continuing professional development.

Table 9: Family Physicians' and Nurses' Attendance and Time Spent on Continuing Professional Development

Continuing Professional Development	Family Physicians		Nurses		<i>t</i>	<i>p</i>
	No. Responses	<i>M</i> (<i>SD</i>)	No. Responses	<i>M</i> (<i>SD</i>)		
No. of Structured Sessions Attended over 6 months	157	8.0 (9.34)	524	4.3 (4.73)	6.60	0.00
In Your Community	159	5.6 (8.34)	519	2.7 (3.26)	6.46	0.00
Outside Your Community	158	1.9 (3.46)	515	1.1 (2.95)	2.76	0.01
Via Distance Education	156	0.5 (1.64)	512	0.5 (1.88)	0.02	0.99
No. of Hours Spent on Self-directed Activities Per Day	159	0.9 (1.69)	504	1.0 (1.14)	0.59	0.55

Computer Technologies and Continuing Professional Development

The survey examined family physicians and nurses' experiences using computer technologies for continuing professional development. They provided information about the nature and type of computer and Internet access as well as information about their use of the computer. They rated themselves on a scale to indicate their perceived level of expertise with technology. Moreover, they provided information about their involvement with online professional communities and the nature of their online professional activities over the previous twelve months.

Computer Access

Family physicians and nurses had access to desktop computers, laptop computers, and/or to personal digital assistants (Table 10). Both family physicians (97.0%) and nurses (97.3%) had almost universal access to computers. More family physicians than nurses had access to home computers (90.4% versus 84.9%), but this

finding was not statistically significant. However, nurses had more access to desktop computers at work than family physicians (79.2% versus 64.5%). Conversely, family physicians had greater access than nurses to personal digital assistants (52.4% versus 9.5%) and laptop computers (40.4% versus 21.7%).

Access to computer resources included the Internet, e-mail, CD-ROMs, DVDs, and audio and/or video conferencing. Over 90% of the family physicians and nurses had access to the Internet and e-mail. Access to CD-ROMs was reasonably high for both groups and access to DVDs was somewhat lower for nurses. When compared, family physicians had greater access to the Internet, e-mail, CD-ROMs, DVDs, and video conferencing than nurses. There was no difference in their access to audio conferencing.

Family physicians had greater access to high speed or broadband than nurses (79.9% versus 69.4%). There were no differences in their dial up access for a third of the family physicians and nurses (31.1% and 30.2%) and a small percentage (1.8% and 6.1%) were not sure.

The average amount of time family physicians spent on computers was over ten hours (10.1) per week and the nurses used computers over eleven hours (11.0) on average per week. Essentially, there were no significant differences in the time spent on computers.

Table 10: Family Physicians' and Nurses' Computer Access

Computer Access	Family Physicians		Nurses		χ^2	<i>p</i>
	No. Responses	Yes % (N)	No. Responses	Yes % (N)		
Type of Computer						
Computer Access	166	97.0% (161)	528	97.3% (514)	0.06	0.80
Desktop at Home	166	90.4% (150)	529	84.9% (449)	3.53	0.17
Desktop at Work	166	64.5% (107)	530	79.2% (420)	16.1	0.00
Laptop Computer	166	40.4% (67)	530	21.7% (115)	22.9	0.00
Personal Digital Assistant	166	52.4% (87)	528	9.5% (50)	147.6	0.00
Type of Access						
Internet	164	94.5% (155)	528	91.3% (482)	5.72	0.05
E-mail	164	97.6% (160)	528	95.3% (503)	5.90	0.05
CD-ROM	164	86.6% (142)	528	73.9% (390)	15.53	0.00
DVD	164	65.2% (107)	528	44.1% (233)	26.22	0.00
Audio Conferencing	164	28.7% (47)	528	27.3% (144)	3.38	0.19
Video Conferencing	164	24.4% (40)	528	16.7% (88)	8.32	0.02
Means of Access						
Dial Up	164	31.1% (51)	527	30.2% (159)	3.29	0.19
High Speed/ Broadband	164	79.9% (131)	527	69.4% (366)	10.56	0.01
Not Sure	164	1.8% (3)	527	6.1% (32)	7.83	0.02

Types of Computer Use

Computers were used for a variety of purposes. Family physicians and nurses surfed the Internet for non-course-related information and used computers for professional communication, information, courses, professional tools, and personal entertainment (Table 11). Professional communication included e-mail, discussion groups, and messenger services. Family physicians and nurses used online Information sources such as journals, library services, practice guidelines, textbooks, and

professional news. They attended web-based courses and used course-related reports and presentations. They used professional tools such as calendars and patient records. Finally, computers were used for personal entertainment such as games and music.

Family physicians' top five uses for computers included e-mail (93.9%), surfing for non-course related information (68.5%), journals (60.4%), practice guidelines (55.2%), and professional news (53.9%), with library services (49.1%) and textbooks (47.3%) close behind. Nurses' top five uses were for e-mail (92.8%), surfing for non-course related information (62.5%), journals (55.4%), course-related reports and presentations (52.0%), and professional news (51.6%). A substantial percentage of nurses also used library services (45.0%) and practice guidelines (40.5%). Although almost all the family physicians and nurses used e-mail, only a fifth of these professionals used either discussion groups (21.2% and 15.1%) and/or messenger services (19.4% and 22.9%). Around half of the family physicians used online journals (60.4%), library services (49.1%), practice guidelines (55.2%), professional news (53.9%), and textbooks (47.3%). This use was similar with nurses with the exception online textbooks. A third of the family physicians used computers for course-related reports and presentations (36.4%), while half of the nurses used course-related reports and presentations (50.0%). Around a quarter of both groups enrolled in web-based courses (29.7% and 23.7%).

There were no differences in these two professional groups' top three uses (i.e., e-mail, surfing for non-course related information, and journals); however, a greater percentage of family physicians used practice guidelines, textbooks, and discussion groups, whereas a greater percentage of nurses used course-related reports and presentations and messenger services.

Family physicians accessed the calendar more often (29.7% versus 18.3%) and nurses used the computer for patient records (35.0% versus 13.3%) more frequently. Around a quarter of both the family physicians and nurses used the computer for personal entertainment such as games (25.5% and 29.6%) and music (22.4% and 21.1%) and their use did not differ significantly.

Table 11: Types of Computer Use by Family Physicians and Nurses

Uses of Computers	Family Physicians		Nurses		χ^2	<i>p</i>
	No. Responses	Yes % (N)	No. Responses	Yes % (N)		
Surfing for Non-Course Related Information	165	68.5% (113)	531	62.5% (332)	5.43	0.07
Professional Communication						
E-mail	165	93.9% (155)	531	92.8% (493)	3.77	0.15
Discussion Groups	165	21.2% (35)	531	15.1% (80)	6.79	0.03
Messenger Services (e.g., MSN, Yahoo, ICQ)	165	19.4% (32)	531	22.9% (150)	10.04	0.01
Information Sources						
Journals	164	60.4% (99)	531	55.4% (294)	4.70	0.96
Library Services	165	49.1% (81)	531	45.0% (239)	4.19	0.12
Practice Guidelines	165	55.2% (91)	531	40.5% (215)	14.62	0.00
Textbooks	165	47.3% (78)	531	16.8% (89)	68.13	0.00
Professional News	165	53.9% (89)	531	51.6% (274)	3.58	0.17
Courses						
Web-based Courses	165	29.7% (49)	531	23.7% (126)	5.73	0.06
Course-Related Reports & Presentations	165	36.4% (60)	531	52.0% (276)	15.07	0.00
Professional Tools						
Calendar	165	29.7% (49)	531	18.3% (97)	13.37	0.00
Patient Records	165	13.3% (22)	531	35.0% (186)	31.05	0.00
Personal Entertainment						
Games	165	25.5% (42)	531	29.6% (157)	4.18	0.12
Music	165	22.4% (37)	532	21.1% (112)	3.38	0.18

Perception of Level of Technology Use

Family physicians and nurses rated themselves as non-users, occasional users, frequent users, or proponents/champions of technology (Table 12). In both cases, the largest percentage of family physicians and nurses rated themselves as occasional users (43.6% and 53.3%), followed by frequent users (38.2% and 28.7%), and non-users (12.7% and 13.6%). A relatively small percentage of both groups chose the proponent or champion designation (5.5% and 5.5%).

Table 12: Perception of Level of Technology Use by Family Physicians and Nurses

Level of Technology Use	Family Physicians (N=165)	Nurses (N=529)
	Yes % (N)	Yes % (N)
Non-User	12.7% (21)	13.6% (72)
Occasional User	43.6% (72)	53.3% (282)
Frequent User	38.2% (63)	28.7% (152)
Proponent/Champion	5.5% (9)	5.5% (23)
	$\chi^2 = 6.33$	$P = 0.10$

Online Professional Community Members

Approximately a quarter of both the family physicians and nurses (26.1% and 24.5%) considered themselves members of an online community of professionals in their field (Table 13). There were no significant differences in this regard.

Table 13: Family Physicians and Nurses as Members of an Online Professional Community

Online Professional Community Member	Family Physicians (N=161)	Nurses (N=522)	χ^2	p
	Yes % (N)	Yes % (N)		
Community Member	26.1% (42)	24.5% (128)	0.16	0.69

Professional Online Activities

Family physicians and nurses participate in a variety of online activities with their colleagues. These activities may involve online discussions using e-mail, chat rooms, discussion groups, and instant messaging. There are opportunities to learn from or help colleagues learn about technology. They can participate in or moderate and/or develop online courses or workshops. Finally, they can attend or present at video conference meetings, rounds, and educational activities (Table 14). Family physicians and nurses assessed their frequency of participation in professional online activities over the previous twelve months. They either occasionally or regularly (i.e., monthly, weekly and daily) participated or they did not participate in online activities. The top five activities were ranked according to the amount of their participation.

Both the family physicians and nurses' top five activities were e-mailing colleagues (67.1% and 75.5%), learning about (52.5% and 60.3%) and teaching technology to colleagues (43.8% and 60.1%), participating in courses and workshops (42.2% and 32.1%), and attending video conference rounds and educational activities (32.9% and 32.9%). Other than attending video conference meetings (23.8%), a relatively small percentage of family physicians engaged in any of the other professional online activities over the previous last twelve months. Ten percent or less of the family physicians engaged in any online activities on a regular basis, with the exception of e-mailing colleagues (31.5%). Less than a fifth of the nurses engaged in any of the other online activities.

E-mail was the most frequently used online activity for both family physicians and nurses (67.1% and 75.5%). However, nurses used e-mail more often and almost half (49.7%) used it on a regular basis compared to a third (32.1%) of the family physicians. Other than e-mail, a relatively small percentage of either profession participated or moderated online discussion activities such as forums (4.3% and 5.7%), chat rooms (16% and 19.2%), and instant messenger services (9.3% and 13%).

Around half of the family physicians and nurses either learned from (67.1% and 75.5%) or taught colleagues (43.8% and 60.1%) to use technology. Around 40% of the family physicians (42.3%) and a third of the nurses (32.1%) participated in online courses and workshops and few family physicians or nurses (6.2% and 7.5%) facilitated or developed online courses or workshops.

Both family physicians and nurses were involved with video conferences. Almost a third of the family physicians attended video conference rounds and/or educational activities or meetings (32.8% and 27.5%). Fewer nurses attended these rounds and/or educational activities or meetings (27% and 19.6%). Again, a small percentage of family physicians and nurses presented at these venues (9.2% and 9.6%).

Overall, nurses used e-mail and learned from or taught colleagues to use technology more frequently than family physicians, whereas more family physicians participated in online courses and workshops. There were no significant differences in their participation in other online activities.

Table 14: Family Physicians' and Nurses' Professional Online Activities in the Past Twelve Months

Professional Online Activities	Family Physicians			Nurses				x ²	p	
	No.	Never % (N)	Occasionally % (N)	Regularly % (N)	No.	Never % (N)	Occasionally % (N)			Regularly % (N)
Online Discussions										
E-mail Colleagues	162	32.1% (52)	35.8% (58)	32.1% (52)	527	24.5% (129)	25.8% (136)	49.7% (262)	21.67	0.00
Participate in Chat Room Discussions	162	84.0% (136)	11.1% (18)	4.9% (8)	522	80.8% (422)	14.4% (75)	4.8% (25)	2.93	0.57
Moderate/Develop Online Discussion Groups	162	95.7% (155)	3.1% (5)	1.2% (2)	532	94.3% (494)	4.4% (23)	1.3% (7)	2.70	0.61
Use Instant Messaging for Remote Meetings/ Discussions	161	90.7% (146)	3.7% (6)	5.6% (9)	523	87.0% (455)	8.8% (46)	4.2% (22)	7.50	0.11
Technology Training										
Learn from Colleagues	162	47.5% (77)	41.4% (67)	11.1% (18)	523	30.6% (160)	51.4% (269)	18.1% (94)	17.54	0.00
Teach to Colleagues	160	56.2% (90)	33.7% (54)	10.0% (16)	524	39.7% (208)	39.9% (209)	20.4% (107)	20.45	0.00
Online Courses/ Workshops										
Participate in Courses/ Workshops	161	57.8% (93)	31.7% (51)	10.6% (17)	523	67.9% (355)	21.8% (114)	10.3% (54)	14.23	0.01
Facilitate/Develop Courses/ Workshops	162	93.8% (152)	4.3% (7)	1.9% (3)	523	92.5% (484)	6.1% (32)	1.4% (7)	4.27	0.37
Video conferences										
Attend Meetings	160	72.5% (116)	23.8% (38)	3.7% (6)	522	80.4% (420)	16.7% (87)	2.9% (15)	4.68	0.20
Attend Rounds/ Educational Activities	161	67.1% (108)	27.3% (44)	5.5% (9)	523	73.0% (382)	21.6% (113)	5.4% (28)	2.41	0.49
Present Rounds/ Educational Activities	162	90.7% (147)	7.4% (12)	1.8% (3)	521	90.4% (471)	8.3% (43)	1.3% (7)	0.36	0.95

(Based on a 5 point Likert Scale when 1 = never, 2 = occasionally, 3, monthly, 4 = weekly and 5 = daily)

Benefits and Barriers to Using Computer Technologies

The survey explored family physicians and nurses' perceptions about the benefits and barriers to using technology for continuing professional development. They rated their comfort with technology-enabled continuing development formats. They also

provided information about the factors that either facilitated or restricted their use of this approach to their continuing learning.

Comfort with Technology-Enabled Continuing Professional Development Formats

Health care professionals used both structured and self-directed technology-enabled continuing professional development formats to a greater or lesser extent. Structured formats included web-based courses, audio and video conferences, and tele-tutoring. Self-directed formats included computer resources, personal digital assistants, web resources, and audio and/or video taped sessions. Information about their comfort with these formats was solicited to determine whether it might shed some light on their actual practices. Family physicians and nurses ranked their comfort with each of the structured and self-directed delivery formats on a four point Likert scale with 1 = do not use, 2 = low comfort, 3 = medium comfort, and 4 = high comfort. The mean was calculated for each item (Table 15).

Family physicians rated their level with all the technology-enabled formats as either low comfort or do not use. However, they experienced more comfort with self-directed than structured technology-enabled delivery formats. Four of their five top rated formats included web (2.9) and computer resources (2.7), personal digital assistants (2.4), and audio and/or videotaped sessions (2.2). The sole structured format in the leading group was web-based courses (2.1). Nurses' comfort level with self-directed and structured formats was mixed. Again, their highest rating was in the low comfort zone. While the top three formats were self-directed web (2.9) and computer resources (2.6) and audio and/or videotaped sessions (2.4), structured formats including web-based courses (2.1) and audio conferences (2.0) were among their top five choices. Other than family physicians' ratings for personal digital assistants, there were no significant differences in the comfort ratings for both groups.

Table 15: Family Physicians' and Nurses' Comfort with Technology-Enabled Continuing Professional Development Formats

Comfort with Delivery Formats*	Family Physicians		Nurses		<i>t</i>	<i>p</i>
	No.	<i>M</i> (<i>SD</i>)	No.	<i>M</i> (<i>SD</i>)		
Structured						
Web-Based Courses	161	2.1 (1.15)	526	2.1 (1.13)	0.28	0.78
Audio Conferences	157	2.0 (1.05)	518	2.0 (1.01)	0.92	0.36
Video Conferences	159	2.9 (1.00)	515	1.8 (0.97)	1.86	0.07
Tele-Tutoring	157	1.7 (0.90)	509	1.8 (0.99)	0.37	0.72
Self-Directed						
Computer Resources	160	2.7 (1.18)	514	2.6 (1.14)	0.89	0.38
Personal Digital Assistants	162	2.4 (1.17)	504	1.4 (0.80)	11.48	0.00
Web Resources	161	2.9 (1.09)	518	2.9 (1.03)	0.32	0.75
Audio/Video Taped Sessions	154	2.2 (1.15)	510	2.4 (1.16)	1.88	0.06

(*Based on a 4 point Likert Scale when 1 = do not use, 2 = low comfort, 3 = medium comfort, and 4 = high comfort)

Influencing Factors

Family physicians' and nurses' decisions to access technology-enabled continuing professional development are influenced by their perceptions of either the benefits or barriers to using these technologies. These benefits are either practical and/or related to their learning. The barriers to using technology-enabled continuing professional development tend to fall into three groups: computer and Internet access, knowledge and skills, and professional concerns. Family physicians and nurses rated each of these factors on a four point Likert scale where 1 = not important, 2 = low importance, 3 = medium importance, and 4 = high importance. The mean was calculated for each item (Tables 16 and 17).

Several of the family physicians' top benefits to using technology-enabled continuing professional education were practical: choosing your place of learning (3.5), learning at your own pace (3.4), programs offered at convenient times (3.2), no need to travel (3.0) and cost savings (3.0). Having a wider scope of learning resources (3.2),

effective way to learn (3.1), and access to learning resources were also in the top choices. Overall, all the benefits, with the exception of comfort with the technology, received medium importance ratings.

Nurses rated all of the benefits as medium importance. Many of their five top benefits were practical: choosing your place of learning (3.6), learning at your own pace (3.6), programs at convenient times (3.5), cost savings (3.4) and no need to travel (3.4). However, having a wider scope of learning resources (3.4), access to learning resources (3.4), an effective way to learn (3.3) and comfort with technology (3.2) were also ranked in the top five. There was no difference in the family physicians' and nurses' top choice of choosing your place of learning; however, nurses consistently rated all the other benefits more highly than the family physicians.

Table 16: Factors Facilitating Family Physicians' and Nurses' Decisions to Access Technology-Enabled Continuing Professional Development

Factors Facilitating Decisions	Family Physicians		Nurses		<i>t</i>	<i>p</i>
	No. Responses	<i>M</i> (<i>SD</i>)	No. Responses	<i>M</i> (<i>SD</i>)		
Practical Benefits						
No Need to Travel	139	3.0 (1.00)	463	3.4 (0.86)	3.60	0.00
Learn at Your Own Pace	140	3.4 (0.74)	462	3.6 (0.67)	2.89	0.00
Cost Savings	139	3.0 (0.87)	451	3.4 (0.79)	4.63	0.00
Choose Your Place of Learning	141	3.5 (0.75)	463	3.6 (0.69)	1.69	0.09
Programs at Convenient Times	138	3.2 (0.81)	449	3.5 (0.73)	3.75	0.00
Comfort with Technology	131	2.9 (0.87)	442	3.2 (0.75)	3.03	0.00
Learning Enhancements						
Wider Scope of Learning Resources	135	3.2 (0.78)	453	3.4 (0.73)	2.85	0.01
Effective Way to Learn about Certain Topics	136	3.1 (0.78)	457	3.3 (0.68)	3.35	0.00
Access to Learning Resources	132	3.1 (0.82)	453	3.4 (0.71)	4.17	0.00

(*Based on a 4 point Likert Scale when 1 = not important, 2 = low importance, 3 = medium importance, and 4 = high importance).

The top barrier restricting family physicians from participating in technology-enabled continuing professional development was time (3.0). The next most important factors in the top five included access to continuing professional development in their area of interest (2.5), level of technological skills (2.5), availability of technological support (2.3), cost (2.0), and access to technology resources. Similar to family physicians, nurses' top barrier factor was time (3.2). The other top rated barriers were access to continuing professional development in their area of interest (2.8), level of technological skills (2.8), availability of technological support (2.7), cost (2.4), and access to technology resources (2.0). Nurses rated all of the restricting factors higher than the family physicians. With the exception of time that was rated of medium importance, both groups rated all the other factors either of low or no importance.

Table 17: Factors Restricting Family Physicians' and Nurses' Decisions to Access Technology-Enabled Continuing Professional Development

Restricting Factors	Family Physicians		Nurses		<i>t</i>	<i>p</i>
	No. Responses	<i>M</i> (SD)	No. Responses	<i>M</i> (SD)		
Computer and Internet Access						
Access to Technology Resources	158	1.7 (0.86)	517	2.0 (1.01)	3.01	0.03
Knowledge and Skills						
Level of Technological Skills	158	2.5 (1.12)	511	2.8 (0.95)	2.92	0.00
Availability of Technological Support	160	2.3 (0.99)	514	2.7 (1.01)	4.10	0.00
Professional Concerns						
Cost	156	2.0 (0.80)	515	2.4 (0.95)	4.96	0.00
Time	156	3.0 (0.90)	516	3.2 (0.85)	2.32	0.02
Access to CPD in Areas of Interest	151	2.5 (0.92)	506	2.8 (0.92)	3.67	0.00

(*Based on a 4 point Likert Scale when 1 = not important, 2 = low importance, 3 = medium importance, and 4 = high importance).

Training and Technical Support

Family physicians and nurses' provided information about their sources of technical support. They also identified any additional computer or Internet training needs.

Sources of Technical Support

Family physicians and nurses received technical support in the workplace, through personal resources and contacts, or through their professional organizations. For some of these professionals, there was no need for support (self-sufficient) or no outside support was available (Table 18). Over 70% of the family physicians received technical support from personal resources and contacts and almost half (48.5%) received support in the workplace. Less than twenty percent received support from their professional organization (16.6%), did not need outside support (12.3%) or reported that no support was available (6.7%).

This situation differed with nurses with over 80% receiving support from personal resources and contacts and three-quarters (75.7%) getting support from their workplace. Less than twenty percent of the nurses received support from their professional organization (15.7%) or reported that either no outside support was available (4.2%) or needed (3.2%).

More nurses had support from their workplace and personal resources and contacts, whereas more family physicians reported that no support was required (self-sufficient). There were no differences in the support received from their professional organizations or their lack of outside support.

Table 18: Family Physicians' and Nurses' Sources of Technical Support

Sources of Technical Support	Family Physicians		Nurses		x ²	p
	No. Responses	Yes % (N)	No. Responses	Yes % (N)		
Workplace	163	48.5% (79)	530	75.7% (401)	43.30	0.00
Personal Resources and Contacts	163	71.8% (117)	530	80.6% (427)	5.70	0.02
Professional Organization (s)	163	16.6% (27)	530	15.7% (83)	0.08	0.78
Do Not Need Outside Support (Self-Sufficient)	163	12.3% (20)	530	3.2% (17)	20.26	0.00
No Outside Support Available	163	6.7% (11)	530	4.2% (22)	1.86	0.17

Training Required in Computer Technology

Family physicians and nurses rated their need for training in basic computer skills, Internet searching techniques, using online news groups, using e-mail, participating in online discussion groups, participating in online modules and courses, and using information on the Internet. These training requirements were rated on a four point Likert scale with 1 = none, 2 = low need, 3 = medium need, and 4 = high need. The mean was calculated for each item (Table 19).

Family physicians' five top training priorities were to learn about using information on the Internet (2.6), participating in online modules and courses (2.6) and discussion groups (2.5), improving Internet searching techniques (2.3), using online news groups (2.3), and learning about basic computer skills (2.1). Using e-mail (1.8) was a lower priority.

The nurses' top five priorities included the learning about participating in online discussion groups (3.0), modules, and courses (2.9), using online news groups (2.8), using information on the Internet (2.8), Internet searching techniques (2.5), and basic computer skills (2.2). Similar to family physicians, there was less need for training about using e-mail (1.9).

Both groups identified the same top five training needs and there were some similarities. For example, the mean rating for both professional groups was either low

need or in the 'none required' range. However, nurses reported a greater need for training than family physicians in all of their top five choices.

Table 19: Training Required in Computer Technology by Family Physicians and Nurses

Required Training*	Family Physicians		Nurses		<i>t</i>	<i>p</i>
	No. Responses	<i>M</i> (SD)	No. Responses	<i>M</i> (SD)		
Basic Computer Skills	162	2.1 (1.00)	526	2.2 (0.97)	1.49	0.14
Internet Searching Techniques	163	2.3 (1.07)	528	2.5 (0.96)	2.10	0.04
Using Online News Groups	160	2.3 (1.01)	523	2.8 (0.97)	5.25	0.00
Using E-mail	160	1.8 (0.89)	525	1.9 (0.92)	0.81	0.42
Participating in Online Discussion Groups	159	2.5 (1.02)	522	3.0 (0.97)	5.34	0.00
Participating in Online Modules/Courses	158	2.6 (1.03)	524	2.9 (0.97)	4.27	0.00
Using Information on the Internet	158	2.6 (1.01)	518	2.8 (0.96)	2.30	0.02

(*Based on a 4 point Likert Scale when 1 = none, 2 = low need, 3 = medium need, and 4 = high need.)

3.7.2 Discussion

Patterns and Preferences for Continuing Professional Development

Not surprisingly, both family physicians and nurses are motivated to pursue continuing professional development opportunities for professional reasons, especially as it pertains to keeping aware of current developments, contributing to the profession, interacting with colleagues, and for meeting professional requirements. The surprising finding was the relatively high ratings of medium importance both family physicians and nurses allocated to personal motivations for continuing learning. The importance of personal motivations such as personal interest and enjoyment, for example, may help explain the popularity of live conferences, workshops, and seminars. Clearly, this issue warrants further investigation.

Similar to findings in the literature, almost all the family physicians and nurses attended conferences, workshops, and seminars and used print resources. Predictably, these two formats were also their top preferred choices. The finding that more family physicians participate in conferences, workshops, and seminars, while more nurses

participated in classroom and work-based courses may reflect the workplace context for these professional groups. Often family physicians work in small private practices and they may appreciate the opportunity to mingle with other colleagues. On the other hand, the majority of nurses work in hospitals, clinics, and other larger workplace environments and may prefer the convenience and collegiality offered through classroom and work-based courses and resources.

While each group gave a medium importance rating for both structured and self-directed continuing professional development, there was a major divergence between these two groups' perceptions of the amount of time needed for these endeavours. Less than a fifth of the family physicians (19.9%) compared to over 80% of the nurses believed more time should be spent on continuing professional development. Although family physicians attend more structured continuing professional development sessions than nurses, both groups spend almost the same time per day on self-directed continuing professional development. On the surface, it appears that nurses may perceive the need to attend more structured sessions. This question requires further exploration given the implications for employers and time allocated for nurses' structured continuing professional development.

Using Computer Technologies for Continuing Professional Development

Computer access is almost universal for both family physicians and nurses and they are using computers over ten hours on average per week. There are differences in the type of computers available to them. Most nurses have access to computers at work and this finding differs from many studies reported in the literature. Family physicians have more access to portable devices (i.e., laptops and personal digital assistants) than nurses. These findings have implications for educational planners. Using portable devices may be a factor to consider when designing educational opportunities for physicians, whereas this may be less of an issue for nurses that infrequently use portable devices and that have extensive access to computers at work. Both groups have almost universal access to the Internet and to e-mail. There is somewhat less access to other technologies such as CD-ROMs and DVDs and considerably less access to audio and video conferencing. Overall access to high speed Internet is high and increasing across the province and it should not continue to impede access to Internet programs and resources.

Family physicians and nurses make extensive use of e-mail and both of these professional groups use the Internet to surf for non-course related information. This finding suggests a predisposition to use the computers and the Internet when there is a motivation or reason to use it. Although there is widespread use of e-mail, only a fifth of these professionals use discussion groups (21.1% and 15.1%) and/or instant messenger services (19.4% and 22.9%). Opening these new channels of communication could facilitate collaborative learning and possibly meet some of the social needs identified by these professionals.

A greater percentage of family physician and nurses (29.7% and 23.7%) have participated in web-based courses than is usually reported in the literature. In addition, around a quarter of both family physicians and nurses have used technology, such as games (25.5% and 29.6%) and music (22.4% and 21.1%) for personal entertainment. This suggests the potential for using alternative approaches to continuing professional development. Since these professionals are engaging in professional development to meet personal interests and enjoyment, a more entertaining approach to their learning may entice them to participate in online activities that benefit their practice. This is a question currently under investigation by initiatives such as the Social Sciences and Research Council funded project entitled 'Simulation and Advanced Gaming Environments (SAGE) for Learning' (Ireland, Kaufman, & Sauve. 2006; Kaufman, Sauve, & Ireland, 2005).

Use of online resources appears to be growing. A higher percentage of these professionals used online journals (60.4% and 55.4%), library services (49.1% and 45.0%), practice guidelines (55.2% and 40.5%), textbooks (47.3% and 16.8%), and professional news (53.9% and 51.6%) than is reported in the literature. These are promising findings given the emphasis placed on the need to provide up to date and easily accessible evidence-based guidelines.

Another finding reinforced the extent of computer and Internet use by these two groups. Many family physicians and nurses identified themselves as either occasional (43.6% and 53.3%) or frequent (38.2% and 28.7%) users. However, few regard themselves as proponents or champions (5.5% and 5.5%).

On a similar note, about a quarter of both family physicians and nurses (26.1% and 24.5%) viewed themselves as members of an online community, while many more engaged in online community activities. The use of the e-mail was widespread among

both groups. Around half of the family physicians (52.5% and 43.7%) and approximately two-thirds of the nurses (69.5% and 60.3%) either learned from or taught colleagues to use technology. While not necessarily a regular activity, it suggests that support for and from colleagues is an important online professional activity. It also raises a question about the influence of colleagues in facilitating the use of technology for continuing professional development and the importance of fostering technology proponents or champions. The 'diffusion of innovation' literature has identified this issue and it would be worthwhile to explore it further in subsequent studies.

Around 40% of the family physicians and a third of the nurses (32.1%) participated in online courses and workshops for professional purposes. This figure is higher than previously suggested but consistent with a recent study (Cobb, 2003). Not surprisingly, few family physicians or nurses facilitated or developed online courses or workshops.

Perceptions about the Benefits and Barriers of Computer Technologies

Overall, both family physicians and nurses reported a low comfort with both structured and self-directed technology-enabled continuing professional development. This is an important consideration given the emphasis placed on using these technologies for information, education, and training. More comfort was experienced for self-directed formats suggesting additional work is required to increase comfort levels with formats such as web-based courses, audio and video conferences, and tele-tutoring if the use of these formats is expected to grow.

The practical benefits of technology-enabled formats may play an important role in influencing whether or not family physicians and nurses will participate in technology-enabled continuing professional development. Family physicians and nurses recognized the conveniences of having the information 'when, where, and how they want it' as an aspect of the Internet that appealed to them. They also valued the benefits associated with lowering their costs, especially for people that had to travel to other locations for their learning opportunities. Learning benefits were also important, particularly having access to a wider range of learning resources. These benefits are consistent with the attitudes of today's consumers that value the elements of choice, convenience, and variety.

The top barrier for both family physicians and nurses was time. It is important to develop and promote information sources and courses that are convenient and fit their schedules and timelines (e.g., guidelines must be accessible, succinct, and easily understandable). This research supports the view that the content must match their needs and interests. It also emphasizes the importance of building appropriate technical support and resources since their technological skills level and the availability of technological support can impede access technology-enabled continuing professional development. Finally, these findings highlight the importance of upfront planning and assessment to encouraging participation.

Training and Technical Support Requirements

Family physicians and nurses received most of their technical support through the workplace and personal resources and contacts. Based on this study, it also appears that a considerable amount of support happens informally when colleagues teach or learn from each other. Their professional organizations have not played an important role and this may be an area for future mutual benefit. Although these professionals have stated that additional technical support is of low importance, their acknowledgement of their low level of comfort with several of the technology resources suggest otherwise. Moreover, the lack of technological support and skills has been identified as a barrier to using technology-enabled continuing professional development. Further investigation into this topic might provide valuable information for planning successful initiatives.

4 CONCLUSIONS

Over the last decade, there has been enormous pressure on the Canadian health care system to change and adapt to the needs of the twenty-first century. A well-educated and responsive workforce of health care professionals is considered key to the transformation and sustainability of this publicly funded system. Policymakers and educators have focused on technology as an essential strategic component in any educational initiatives designed to facilitate these changes and to prepare the workforce for the new millennium. Therefore, it is important to understand the educational experiences, needs, and technological profile of accredited family physicians and nurses in British Columbia and to examine their readiness to explore new options that support their learning endeavours. This study examined four key research questions to obtain some understanding of family physicians' and nurses' motivations, patterns of use, preferences, and experiences with continuing professional development, specifically related to the use of technology.

4.1 Research Questions

The first research question asked about the family physicians' and nurses' patterns and preferences for continuing professional development and how the two groups compared. An important finding supported other research in the field: live conferences, workshops, events, and courses remain the first and preferred choice of educational format for the majority of family practitioners and nurses. Family physicians tend to attend and prefer conferences, while nurses tend to attend and prefer structured work based venues. Another finding not so commonly reported was that both family physicians and nurses allocated relatively high ratings to personal motivations in addition to their professional reasons for participating in continuing learning. It was somewhat higher with nurses. Based on their motivations for engaging in continuing professional development, it is likely that live venues will continue to attract family physicians and nurses as long as they are compatible with their personal interests and responsive to their professional requirements and needs. Similarly, it is likely that print resources will

continue to be popular in the foreseeable future because of their immediate accessibility and ease of use. However, web resources may continue to gain ground with advances in technology and educational design. While these conclusions seem self evident, they pose a serious challenge to policymakers, administrators, and educators when considering technological change initiatives in a climate of cost containment and limited human resources. It will be important to determine whether to continue to offer live venues and print publications, and/or to develop equally compelling online alternatives that replace these formats, and/or to explore hybrid options that combine live, print, and online initiatives. This issue will require ongoing monitoring and research.

Another issue the study explored was the family physicians' and nurses' perception of the importance of continuing professional development. Both groups agreed that continuing professional development is important and both spent considerable time engaging in some form of continuing learning. However, a high proportion of nurses believe more time needs to be spent on continuing professional development. This raises important questions about why the nurses harbour this belief and what responses would be appropriate to meet this need. Again, this opens an important area for further research.

The second research question asked about family physicians' and nurses' experiences using computer technologies for continuing professional development and how the two groups compared. Almost all the family physicians and nurses have access to both computers and the Internet and they use computers around ten hours on average per week. The two professional groups tend to use computers differently with family physicians accessing computers from home or on laptops and personal digital assistants and nurses accessing them from work. This may have implications for educational design that are yet unexplored. For example, designing for portability may require different computer skills and programs than designing for desktop computers.

The use of the Internet and e-mail is high with both groups, although higher among nurses. Other technologies such as audio and video conferencing are used less frequently. It is difficult to predict whether these technologies will actually increase over time and supplant live venues or whether other web-based solutions, such as online video conferencing will have greater appeal.

As many as half of the physicians and less of the nurses use online information sources and this area has the potential for significant advances in areas such as

knowledge translation, especially if planners can design tools that are credible, accessible relevant, easy to use, and convenient.

The third research question asked about family physicians' and nurses' perceptions about the benefits and barriers to using computer technologies for continuing professional development and how the two groups compared. Neither group reported a high level of comfort with technology, suggesting a potential barrier to more extensive use. These professionals identified many potential benefits to using technology-enabled continuing professional development, particularly the benefits associated with convenience. They also gave positive ratings to the potential learning enhancements. Conversely, they rated all the potential barriers as either low or not important. It appears on the surface that both family physicians and nurses are receptive to online learning with the right conditions and incentives. Again, this needs further exploration to determine how to optimize this receptivity.

Finally, the fourth question asked about family physicians' and nurses' needs for training and technical support for technology-enabled continuing professional development and how the two groups compared. One of the key activities of both family physicians and nurses was either teaching or learning from colleagues to use technology and this is consistent with their response to questions about where they received technical support. This suggests a direction for future research to explore ways to extend this support and to increase training opportunities. Furthermore, additional research is required to determine where best to allocate scarce education and training resources.

Throughout the study, the results from family physicians and nurses were compared to determine similarities and differences in the patterns, preferences, and experiences with continuing professional development and technology. With an increasing emphasis in the literature on the benefits of interprofessional education, there is limited research comparing the use of technology by physicians and nurses. This study took a small step in this direction. It appears there are numerous and substantial barriers to overcome if collaborative education and practice are to occur between family physicians and nurses. For example, differences in their working conditions may explain the differences in their continuing professional development patterns and preferences (e.g., desktop computers versus laptops computers). There are online educational opportunities that may help bridge these differences, but not without a great deal of planning and forethought.

4.2 Limitations of the Study

The data reported in this study were collected during May - August 2003. While providing interesting information about participation, patterns, and perceptions about continuing professional development, the moderate response rate and the potential for subject-selection bias suggests the findings should be treated with some caution. For example, it is possible that professionals that participate in continuing professional development and use the computer and the Internet for these activities are more likely to respond to a survey about this subject than non-users.

Although a response rate approaching 12% of the family physicians and 18% of the nurses was reasonable for a mail survey that offered no incentives and only followed-up with a mail out, it is possible that non-respondents may differ from respondents in some way. It is also possible that the higher rate of participation by nurses influenced the results. Despite these limitations, there is no substantial evidence to suggest that respondents differ from non-respondents and the respondent sample compares favourably with the provincial population from which it is drawn. However, it is acknowledged that the relatively low response rate in this study is a possible source of bias and limits generalisability.

Finally, although it can capture a broad range of responses about a topic, quantitative data may leave unanswered questions and it is not possible to elaborate or clarify responses to a mail out survey.

4.3 The Future

The use of technology in the health care field is rapidly changing. It is difficult for individual family physicians and nurses to anticipate these changes and to know the most appropriate means for adapting to these changes. It is the responsibility of their professional organizations, their employers, and the health care planners and educators to help them prepare for the future. This study contributes to understanding the current perceptions and experiences of family physicians and nurses and it opens avenues for further exploration.

Family physicians and nurses are using technology, particularly the Internet, increasingly. Since this survey was completed, the use of continuing professional development opportunities delivered online has increased as more programs and

services have become available. Concurrently, the technology and ease of use has improved, the health care system has continued to change the way it delivers health care, and more health care professionals have increased their competency in using technology-enabled programs and services. Health care professionals have already identified many benefits and a decreasing number of barriers to using technology. This trend may increase and possibly accelerate in the future. In the meantime, ongoing support and skills training is needed to assist family physicians and nurses to use these innovative technologies in their pursuit of learning and professional development. This support and training is becoming a reality as both private companies and publicly funded institutions (e.g., Health Authorities, hospitals and universities) ramp up their capacity. It is imperative to continue to examine the evolving conditions faced by these health care professionals and to respond with the best available information.

5 APPENDIX: NEEDS ASSESSMENT



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Continuing Professional Development for Practicing Health Professionals: Needs Assessment

The B.C. Universities Vice Presidents' Academic Committee (VPAC)

Telelearning Subcommittee Project

Please indicate your multiple choice answers by placing an "X" in the appropriate box; for your short answers, please write in the space provided. This questionnaire will take approximately 15-20 minutes to complete. Thank you for your participation.

PART 1 - Demographics

1. Sex: Female Male

2. Age: Under 20 45-49
 20-24 50-54
 25-29 55-59
 30-34 60-64
 35-39 65 & over
 40-44

3. Please rate your fluency in English:

	None	Low	Med.	High
Reading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Writing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Speaking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Are you a: Family Physician
 Other Physician Specialist (Please specify):

Registered Nurse
 Pharmacist: Hospital-based
 Pharmacist: Community-based
 Other Pharmacist (Please specify): _____

- Dentist
- Dentist Specialist (Please specify): _____
- Occupational Therapist. Area of practice: _____

- Physical Therapist
- Other (Please specify): _____

5. Are you currently practicing?
- Yes, in B.C.
 - Yes, in another jurisdiction
 - No, temporarily not practicing
 - No longer in practice

6. To help us determine the geographic distribution of respondents, please indicate the postal code of your location of practice: _____

7. Number of years in active/licensed practice (including current year): _____ years

PART 2 - Learning Patterns and Preferences

8. What motivates you to participate in **Continuing Professional Development (CPD)** activities? Please rate the following possible motivators in terms of how important they are to your participation in CPD:

	Level of Importance			
	N/A	Low	Med.	High
Need to fulfill a professional requirement (e.g. accreditation, continuing competence).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Need to be aware of current professional developments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increases ability to contribute to the professional community.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Interactivity with professional colleagues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Furthers employment opportunities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Increases self-confidence.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Satisfies a personal interest.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personal enjoyment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Specify): _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9. Please consider your CPD activities over the past 12 months. Which of the following formats did you use to access these? (Please check all that apply)

Structured formats

Self-directed formats

Conference/Workshops/Seminars (e.g. conferences, onsite activities delivered by a specialist or peer)

Computer-Based (e.g. CD ROM)

Classroom-Based Courses

Personal Digital Assistants (e.g. Palm)

- | | |
|---|--|
| <input type="checkbox"/> Web-Based Courses | <input type="checkbox"/> Web-based reference materials |
| <input type="checkbox"/> Audio-Conferenced Sessions (live) | <input type="checkbox"/> Print-Based (e.g. books, peer-reviewed journals) |
| <input type="checkbox"/> Video-Conferenced Sessions (live) | <input type="checkbox"/> Audio/Video Taped Sessions |
| <input type="checkbox"/> Work-Based (e.g. clinical traineeship) | <input type="checkbox"/> Work-Based (e.g. self-assessment programs) |
| <input type="checkbox"/> Tele-Tutoring (tutoring delivered via technology) | |
| <input type="checkbox"/> Other (Specify):
----- | <input type="checkbox"/> Other (Specify):
----- |

10. Estimate how many **structured CPD** sessions you have attended over the past 6 months: _____ sessions

11. Of the total number of **structured CPD** sessions you have attended over the past 6 months how many have you:

Attended in your community	_____
Attended outside your community (in person)	_____
Attended via distance education	_____

12. In a typical DAY, estimate how many hours you spend on **self-directed CPD**: _____ hours

13. Please rate your level of **preference** for each of the following educational formats in terms of how helpful they are to your learning:

	Level of Preference			
	N/A	Low	Med.	High
Structured formats:				
Conference/Workshops/Seminars (e.g. conferences, onsite activities delivered by a specialist or peer)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Classroom-Based Courses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Web-Based Courses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Audio-Conferenced Sessions (live)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Video-Conferenced Sessions (live)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Work-Based (e.g. clinical traineeship)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tele-Tutoring (tutoring delivered via technology)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Specify): -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Self-directed formats:				
Computer-Based (e.g. CD ROM)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Level of Preference			
	N/A	Low	Med.	High
Personal Digital Assistants (e.g. Palm)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Web-based reference materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Print-Based (e.g. books, peer-reviewed journals)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Audio/Video Taped Sessions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Work-Based (e.g. self-assessment programs)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Specify): -----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. Do you feel that you need to spend more time than you presently do on CPD to keep yourself up-to-date?

Yes No

Please state your reasons:

PART 3 - Educational Needs

15. Please rate the importance of **structured CPD** to the effectiveness of your practice?

Not important Low importance Medium importance High importance

16. Please rate the importance of **self-directed CPD** to the effectiveness of your practice?

Not important Low importance Medium importance High importance

17. Please indicate two main topics as well as subtopics you would like to see covered in future continuing education programs **within your profession**.

Main Topic	Subtopic(s)
1. ----- -----	----- ----- -----

Main Topic	Subtopic(s)
2. _____ _____	_____

18. Please indicate two **inter-professional topics** (different from the previous question) you would like to see covered in future continuing education programs.

1. _____

2. _____

PART 4 - Technological Profile

19. Do you have access to computers?
- Yes (Please check all that apply):
 - Desktop computer(s) at home
 - Desktop computer(s) at work
 - Laptop computer
 - Personal Digital Assistant (e.g. Palm)
 - Other (Please specify): _____
 - No (Please skip to #24)

20. What do you use the computer(s) for? (Please check all that apply)

- | | |
|--|--|
| <input type="checkbox"/> Accessing web-based courses | <input type="checkbox"/> Checking and writing e-mail |
| <input type="checkbox"/> Participating in professional discussion groups | <input type="checkbox"/> Preparing course-related reports/presentations |
| <input type="checkbox"/> Accessing online journals | <input type="checkbox"/> Playing games |
| <input type="checkbox"/> Accessing library services online | <input type="checkbox"/> Listening to/downloading music |
| <input type="checkbox"/> Accessing online practice guidelines | <input type="checkbox"/> As a calendar |
| <input type="checkbox"/> Getting professional news | <input type="checkbox"/> Surfing the Internet for non-course-related information |
| <input type="checkbox"/> Accessing online textbooks | <input type="checkbox"/> Using messenger services (e.g., MSN, Yahoo, ICQ) |
| <input type="checkbox"/> Keeping patient records | <input type="checkbox"/> Other _____ |

21. Approximately how many hours **per week** do you spend using all computers to which you have access? _____ hours

22. Do you have reasonably convenient access to any of the following? (Please check all that apply):

- World Wide Web
- E-mail
- CD-ROM
- DVD
- Audio-conferencing
- Video-conferencing

23. If you have access to the Internet, please indicate your means of access (Check all that apply):

- Dial-up
- High speed/Broadband (e.g. ADSL, Cable)
- Other: _____
- Not Sure

24. Where would you place yourself along the continuum representing the use of technology for CPD?

- I consider myself a non-user
- I occasionally use technology-enabled methods for CPD
- I frequently engage in technology-enabled methods for CPD
- I consider myself a proponent or "champion" of technology-enabled learning

25. Please rate your level of **comfort** in using technology-enabled CPD delivery methods:

	Level of Comfort			
	Do not use	Low	Med.	High
Structured formats:				
Web-Based Courses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Audio-Conferenced Sessions (live)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Level of Comfort			
	Do not use	Low	Med.	High
Video-Conferenced Sessions (live)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tele-Tutoring (tutoring delivered via technology)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Specify): _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Self-directed formats:				
Computer-Based (e.g. CD ROM)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Personal Digital Assistants (e.g. Palm)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Web-based reference materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Audio/Video Taped Sessions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Specify): _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

26. If you use technology for CPD activities, please rate the importance of each of the following factors in your decision to do so:

	Level of Importance			
	Not important	Low	Med.	High
No need to travel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost savings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Convenience of learning at your own pace	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Convenience of choosing your place of learning (e.g. home, office)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Programs are offered at convenient times	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wider scope of learning resources available	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comfort with technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Effective way of learning about certain topics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to required learning resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please Specify): _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

27. To what degree do the following factors restrict your use of technology for CPD?

	Degree of Restriction			
	Not at all	Low	Med.	High
Access to technological resources (e.g. computers, Internet connection)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Degree of Restriction			
	Not at all	Low	Med.	High
Availability of technological support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cost	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Time available for CPD	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Level of technological skills	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access to technology-supported CPD opportunities in areas of interest	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other. Please specify:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PART 5 - Technological Needs

28. From which of the following do you receive technical support? (Check all that apply)

- Workplace (e.g. technical staff, colleagues)
- Personal resources and contacts (e.g. friends, family)
- Professional organization(s)
- Other (Please specify): _____
- Do not need outside support (self-sufficient)
- No outside support available

29. Please rate your need for training in the following Computer Technology areas:

	Need for Training			
	None	Low	Med.	High
Basic computer skills (e.g. word processing)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
World Wide Web searching techniques	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use of online News Groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Use of E-mail	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Effective participation in online discussion groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Participation in online modules/courses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Issues related to use of information on the Internet (e.g. security, quality of information)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please specify):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
-----	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PART 6 – Online Communities

30. Do you consider yourself a member of an online community of professionals in your field? Yes No

31. During the past 12 months in which of the following activities have you engaged? Please estimate frequency in the table below.

	Never	Occasionally	Monthly	Weekly	Daily
Videoconference professional meetings	<input type="checkbox"/>				
Attending videoconference rounds or educational opportunities	<input type="checkbox"/>				
Presenting at videoconference rounds or educational opportunities	<input type="checkbox"/>				
Engaging in professional discussions in chat rooms	<input type="checkbox"/>				
Using Instant Messaging to have remote meetings or discussions	<input type="checkbox"/>				
E-mailing colleagues to discuss professional issues	<input type="checkbox"/>				
Engaging in online courses or workshops	<input type="checkbox"/>				
Facilitating or developing online courses or workshops	<input type="checkbox"/>				
Moderating or developing online discussion groups	<input type="checkbox"/>				
Learning from a colleague/colleagues how to use learning technologies	<input type="checkbox"/>				
Helping a colleague/colleagues use learning technologies	<input type="checkbox"/>				

THANK YOU FOR YOUR INPUT!

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