The Role of the Physician in the Reach and Adoption of Online Health Resources

A Qualitative Study of the Perspectives of Patients and Health Care Providers

by

Evelyn Elias

A thesis submitted in conformity with the requirements for the degree of Master of Science

Institute of Health Policy Management and Evaluation

University of Toronto

©Copyright by Evelyn Elias, 2018
The Role of the Physician in the Reach and Adoption of Online Health Resources

_A Qualitative Study of the Perspectives of Patients and Health Care Providers_

Evelyn Elias

Master of Science

Institute of Health Policy, Management and Evaluation

University of Toronto

2018

Abstract

**Introduction:** Prostate cancer (PCa) patients are living longer with side effects of their treatments, which are often debilitating. Online health resources (OHRs) could provide PCa patients with health information and support needs they often lack.

**Purpose:** To understand the contextual aspects of _reach_ and _adoption_ within the RE-AIM framework, and how they inter-relate through the role of the physician within the context of online health resources.

**Methods:** Secondary qualitative analysis using data collected to inform the design of an interactive OHR. Inductive/deductive hybrid analysis was used.

**Results:** Findings yielded three main categories of use and uptake of online health resources by patients: (1) reach, (2) patient uptake of OHRs, and (3) physician uptake of OHRs.
Conclusions: By contributing to both *reach* and *adoption*, physicians can increase patients’ use of OHRs. These findings can improve the implementation of OHRs for patients, fulfilling the need for information that PCa survivors have and increasing their quality of life.
Acknowledgements

Firstly, I would like to thank and acknowledge the patients and physician who participated in the interviews that were necessary to collect the data that was used for this secondary analysis. Their participation helped us to understand the role of the physician in the use and uptake of online health resources.

I am also extremely grateful to Julie Gilbert for her endless support, knowledge and guidance, which I could not have completed this study without. Julie and Jackie Bender’s expertise in program evaluation, cancer care and eHealth provided me with insights and feedback, and taught me how to think critically about every decision and conclusion that was made throughout this process. Their guidance helped me through each phase of the study, from the purpose of the study, to study design, data analysis, ethics approvals and writing.

I am also thankful for my reviewing committee, Sara Urowitz and Robyn Urquhart for their interesting questions and helpful feedback.

I am also extremely grateful to my parents and sister for their never-ending support.
Table of Contents

Abstract ................................................................................................................. ii
Acknowledgements ............................................................................................... iv

INTRODUCTION .................................................................................................. 1
I. PROSTATE CANCER IN CANADA ........................................................................ 2
   a. Background on prostate cancer – demographics, statistics and information about disease ........................................................................................................... 2
   b. PCA treatments and treatment side effects ........................................................................ 2
   c. Quality of life in PCA patients and their caregivers ......................................................... 5
   d. Help seeking behaviour and supportive care needs for PCA patients (and their families/caregivers) ......................................................................................... 7
   e. The role of the Internet ................................................................................................. 9
II. TRUENTH INITIATIVE ......................................................................................... 11
   a. Brief Introduction to the TrueNTH Initiative .................................................................. 11
   b. Informing the design and implementation of web-based solutions .................................. 11
III. TRUENTH EVALUATION ................................................................................... 12
   a. RE-AIM Framework ................................................................................................... 12
IV. REACH AND ADOPTION .................................................................................. 15
   a. Why focus on reach and adoption? ................................................................................. 15
   b. Reach and adoption within implementation science ...................................................... 16
   c. Reach and adoption within an eHealth context ............................................................. 17
V. REACH AND ADOPTION – ARE THEY LINKED? .................................................. 20

THE ROLE OF BEHAVIOURAL THEORY ............................................................... 23
I. WHY FOCUS ON SOCIAL/BEHAVIOUR THEORY .............................................. 24
II. THEORY OF PLANNED BEHAVIOUR ................................................................. 26
   a. Attitudes and Beliefs .................................................................................................. 27
   b. Normative Beliefs and Subjective Norms ................................................................... 28
   c. Perceived Behavioural Control .................................................................................... 28
   d. Intentions .................................................................................................................. 29
   e. Conclusions from the TBP ......................................................................................... 30
III. RELEVANCE OF THE THEORY OF PLANNED BEHAVIOUR ON REACH AND ADOPTION OF ONLINE HEALTH RESOURCES ......................................................... 30

METHODS ............................................................................................................... 34
I. STUDY DESIGN ..................................................................................................... 35
II. RESEARCH OBJECTIVES ..................................................................................... 36
   Study Objectives – Secondary Analysis ........................................................................... 36
IV. DATA COLLECTION ............................................................................................. 36
   a. Sample ..................................................................................................................... 36
   b. Eligibility Criteria ..................................................................................................... 37
III. SAMPLING AND RECRUITMENT STRATEGIES ................................................ 38
   a. Patient/family recruitment ......................................................................................... 38
B. HEALTH CARE PROVIDER RECRUITMENT .................................................... 39
IV. DATA COLLECTION, INTERVIEW METHODS AND GUIDES – SUMMARY FROM PRIMARY ANALYSIS ......................................................................................... 40
V. METHOD OF INQUIRY .......................................................................................... 40
RESULTS ................................................................................................................. 51
  a. Ease of Use of Online Health Resources - Implementation and Physician Adoption of Online Health Resource ................................................................. 54
  b. Health Care Provider Views on Physician Referral ........................................... 54
  c. Responsibility .................................................................................................. 55
I. REACH OF ONLINE HEALTH RESOURCES .......................................................... 55
  a. Accessibility of Online Health Resources ........................................................... 55
II. PATIENT UPTAKE OF ONLINE HEALTH RESOURCES .......................................... 58
  a. Credibility ......................................................................................................... 58
  b. Awareness of Online Health Resources ......................................................... 64

AWARENESS OF THE ONLINE HEALTH RESOURCES WAS DESCRIBED AS AN IMPORTANT ASPECT OF PROGRAM REACH AND ADOPTION. PATIENTS SPOKE TO HOW THEIR SOCIAL NETWORKS, FRIENDS, AND MEDIA OUTLETS IMPACTED THEIR USE OF ONLINE HEALTH RESOURCES DURING THEIR CANCER EXPERIENCE .................................................................................................................. 64
C. OTHER REFERRALS ........................................................................................... 66
III. PHYSICIAN ACCEPTANCE OF ONLINE HEALTH RESOURCES .............................. 67
  a. Ease of Use of Online Health Resources - Implementation and Physician Adoption of Online Health Resource ................................................................. 67
B. HEALTH CARE PROVIDER VIEWS ON PHYSICIAN REFERRAL ............................ 68
  c. Responsibility .................................................................................................. 69

DISCUSSION .............................................................................................................. 74
I. REACH OF ONLINE HEALTH RESOURCES .......................................................... 77
II. PATIENT UPTAKE OF ONLINE HEALTH RESOURCES .......................................... 78
III. FACTORS INFLUENCING PHYSICIAN ADOPTION AND RECOMMENDATION OF ONLINE HEALTH RESOURCES .......................................................... 84
IV. PRACTICE IMPLICATIONS – REACH, ADOPTION AND IMPLEMENTATION .......... 87
V. STRENGTHS AND LIMITATIONS ...................................................................... 94
VI. CONCLUSIONS .................................................................................................. 97

REFERENCES .......................................................................................................... 101

APPENDICES ........................................................................................................... 116
  a. Patient Participants: Interview Guideline ........................................................... 117
  b. Health Care Provider Participants: Interview Guideline .................................... 118
  a. UHN initial approval ......................................................................................... 121
List of Tables

Table 1: Patient demographics
Table 2: Health professional demographics

List of Figures

Figure 1: Theory of Planned Behaviour (Ajzen, 1991)
Figure 2: Representation of the deductive coding stages (Fereday and Muir-Cochrane, 2006)

List of Appendices

Appendix I: Interview Guides
   Appendix I.a: Patient Participants: Interview Guideline
   Appendix I.b: Health Care Provider Participants: Interview Guideline
Appendix II: REB Approvals
   Appendix II.a: UHN initial approval
   Appendix II.b: UHN REB amendment approval
   Appendix II.c: University of Toronto RED approval

List of Abbreviations:
Prostate Cancer: (PCa)
Radiation Therapy: (RT)
External Beam Radiation Therapy: (EBRT)
Androgen Deprivation Therapy: (ADT)
Prostate Specific Antigen: (PSA)
Digital Rectal Exam: (DRE)
Health Related Quality of Life: (HRQL)
Theory of Planned Behaviour: (TPB)
Unified Theory of Acceptance and Use of Technology: (UTAUT)
Technology Acceptance Model: (TAM)
INTRODUCTION
I. Prostate Cancer in Canada

a. Background on prostate cancer – demographics, statistics and information about disease

Cancer remains one of the leading causes of death worldwide, with lung, female breast, colorectal and prostate being the four most common cancers (Canadian Cancer Society, 2018). However, screening practices and treatments for these cancers are becoming more and more advanced and successful, leading to a new wave of patients known as “cancer survivors” (Miller et al., 2016). For example, it was estimated that in 2017, 21,300 Canadians were diagnosed with prostate cancer; out of these individuals, the estimates say that 4,100 will have died within that year, leaving approximately 17,200 individuals to live with the disease and/or the treatment side effects (Prostate Cancer Canada, 2017). The need to manage symptoms of both disease and treatment has therefore become exceedingly important.

Prostate cancer (PCa) remains the most common non-cutaneous cancer to affect men; approximately one in seven men will be diagnosed with PCa in their lifetime (Prostate Cancer Canada, 2017). Between 2003 and 2012, the death rate from PCa decreased by approximately 3.1% per year, attributed to improved screening and testing techniques as well as better treatment options. (Prostate Cancer Canada, 2017). Although PCa can be a life threatening disease, because of the high cure rates it is now considered to be a chronic disease. Patients therefore have to live with the side-effects of treatment, which can be distressing and debilitating and have an important impact on their quality of life.

b. PCa treatments and treatment side effects

PCa varies in severity, and different treatment options exist. Each treatment is associated with a variety of side effects, both physical as well as psychosocial.

Radical prostatectomy is a surgical procedure in which the prostate gland, as well as surrounding tissue and organs, such as the seminal vesicle and in some cases part of the
urethra, are removed. Removal of the prostate gland is intended to remove all cancerous tissue from the patient, and is used with curative intent. Although disease-specific mortality, overall mortality rates and risks of metastasis decrease significantly with this treatment method, the morbidities associated with radical prostatectomy may also be significant. Due to the location of the prostate gland, surgery can lead to sexual and urinary dysfunction. The Prostate Cancer Outcomes Study (Stanford et al, 2000) investigated the urinary and sexual function of patients having received radical prostatectomy for clinically localized PCa. The findings showed that 18 or more months following surgery, 8.4% of men were experiencing urinary incontinence and 59.9% were impotent. This study also shed light on the effects of these morbidities on the patients; for example 41.9% of patients reporting impotence stated that sexual performance was a moderate-to-large problem for them. These morbidities can also cause anxiety and depression in men experiencing them.

Radiation therapy (RT) is another common treatment option that is used in a curative manner for PCa treatment. RT comes in two main forms: external beam radiation therapy (EBRT) and brachytherapy (Iwamoto and Maher, 2001).

EBRT involves administering beams of radiation that are focused on the prostate gland using a machine outside the body. This is generally used in early stage cancers, and has a similar cure rate as radical prostatectomy (D’Amico, 1998). Although image guided radiation therapy has improved the sparing of normal tissues surrounding the tumors, it is still common that radiation beams affect the tissues around the prostate gland (Dawson and Jaffray, 2007; Zelefsky et al., 2012). For instance, anatomically the rectum and the bladder are in close proximity to the prostate, and EBRT can lead to both bowel and urinary problems including incontinence, diarrhea and irritations. Sexual dysfunction, such as erection problems and impotence, is also a common effect of EBRT. Additional side effects of this treatment can include fatigue and lymphedema, where lymph fluid cannot flow normally and builds up, causing swelling and pain in the legs or genital region over time. Although these side effects are similar to those occurring after surgery, they generally occur less often and usually improve over time.
Brachytherapy is an alternative mode of RT, involving the insertion of radioactive seeds, or pellets, into the prostate gland. The side effects of brachytherapy are similar to those of EBRT, however they are often less severe: since seed implant brachytherapy releases radiation internally within the gland, the effects on neighboring organs are more limited. (Iwamoto and Maher, 2001)

When the prostate cancer recurs either locally or with distant metastasis, androgen deprivation therapy (ADT) may be used. ADT blocks the production of testosterone and its affiliated effects, such as aiding the proliferation of prostate cancer cells. ADT has numerous possible side effects that can differ from surgery or RT such as hot flashes, decreased libido, fatigue, weight gain, depression, breast enlargement and tenderness, gastrointestinal toxicities including diarrhea and vomiting, dry skin and increased risk of diabetes, heart disease and hypercholesterolemia. Long-term effects of this medication can also include osteoporosis and anemia (Robinson et al., 2010).

It has been shown that of the men diagnosed with early stage PCa, only a small proportion of them (approximately one in seven diagnosed patients) will die within 10-15 years of the diagnosis. (Fradet et al., 2009). This finding led to a change in the attitude towards PCa treatment, and introduced the idea that it is possible that some patients are being over-treated. In older, asymptomatic patients diagnosed with localized low grade, non-aggressive PCa, active surveillance or watchful waiting may be encouraged. Watchful waiting is a “treatment” option often recommended for older patients with low-risk tumours who are not expected to live for a long time due to other diseases separate from their PCa. In this case side effects of treatment are avoided, and the goal is to manage the illness. Active surveillance is similar, however it is seen as a method used to delay treatments; often in these patients treatment is only started when the cancer is growing. This treatment option involves closely monitoring the patient with prostate specific antigen (PSA) blood tests and digital rectal exams (DREs) every six months (American Cancer Society, 2017). Side effects of treatments normally used to treat PCa, which have an important impact on both the patient’s quality of life as well as being taxing on the health care system, could therefore be avoided. However, this option does not come without a price of its own; it has been shown that knowingly living with cancer
and uncertainty can lead to anxiety in some of these patients, decreasing their quality of life (Wallace, 2003).

c. Quality of life in PCa patients and their caregivers

As discussed above, treatment side effects can be significant and debilitating, both physically as well as psychosocially. PCa has a high cure rate, and disease-free survival is a central goal for both physicians and patients, however it is also important to consider how treatment may affect quality of life (Sanda et al., 2008). Although the various PCa treatments have different risks and prevalence of side effects, there are certain commonalities. One of the first studies that examined the quality of life of men with PCa was done by Litwin et al. (1995), where the health related quality of life (HRQL) of PCa patients who received radical prostatectomy, pelvic irradiation, or who had been under active surveillance were compared. They found that men who underwent surgery or radiation reported poor sexual function, poor urinary function, and radiation patients reported poor bowel function. These men also reported that the sexual dysfunction, the urinary leakage, and the poor bowel outcomes were a significant bother to them. Although there have been significant advances in treatment since then, namely that it is more localized, targeted and specific in an attempt to decrease morbidities and their impact on the patients, issues of quality of life remain. The same group of researchers repeated their previous study comparing the HRQL of different treatment options 12 years after the original study was done, using a sample of men recruited from 1999 through to 2003 (Litwin et al., 2007). This study found similar results to the findings of the study of 1995, demonstrating that these symptoms and side effects still pose significant burden, bother and distress on the patients.

Another important aspect of PCa and its treatment is how it affects psychological and social wellbeing. Indeed, Northouse et al. (2007) were interested in investigating the psychosocial status and quality of life of patients living with PCa, as well as their spouses. This study compared quality of life, appraisal of illness, resources, symptoms and risk for distress in men and their partners at different phases of their illness: newly diagnosed, biochemical recurrence, and advanced disease. They found that patients and
spouses reported similar results, showing that it is not only the patients but also their spouses who suffer from the effects of the disease and treatment. Differences were however found between men at the various stages of disease. Poorer physical, emotional, functional and total quality of life was found in the population with advanced disease when compared to those who were newly diagnosed (Smith et al., 2009). Anxiety is also often a factor of psychosocial distress of patients diagnosed with PCa. Uncertainty surrounding the disease, treatment options, side effects, and prognosis can be a major cause of distress and anxiety for PCa patients (Dale et al., 2005). Anxiety was found to be present prior to screening, during diagnostic testing, and around the diagnosis of localized and non-localized PCa. Anxiety levels can vary over the clinical timeline; for example, levels can decrease after a negative screening test, and increase with a positive biopsy result. Anxiety is therefore an important aspect of the psychosocial health and wellbeing of patients and their families and contributes to the PCa experience (Dale et al., 2005).

Informal caregivers such as family members, friends, partners and spouses play a significant role in the care of prostate cancer patients and survivors, and this role can impact their quality of life, and psychosocial wellbeing (Resendes and McCorkle, 2006; Northouse et al., 2012). Cancer and its treatment can affect family identity roles, communication, and daily functioning. There is evidence that spouses of prostate cancer patients may in fact experience higher levels of distress than their partners (Resendes and McCorkle, 2006). Studies have also shown that spouses often feel unprepared for their new role as caregivers, and that they would like more information (Resendes and McCorkle, 2006). It was found that spousal informational needs are highest at the time of diagnosis, during hospitalization, at the start of new treatments, at the time of recurrence, and during the dying phase (Resendes and McCorkle, 2006). Informal caregivers who accompany their family members to medical appointments serve as information sources for physicians, as well as information gatherers, aiding in medical decision making as well as physical care (Bevan and Pecchioni, 2008). Information needs with regards to informal caregivers are therefore a critical aspect of prostate cancer care, and need to be addressed alongside those of the patients themselves.
d. Help seeking behaviour and supportive care needs for PCa patients (and their families/caregivers)

Although most men experience some decrease in quality of life associated with their PCa diagnosis, there is reluctance on the part of patients to seek help and support. As mentioned previously, morbidities of PCa and its treatment options can lead to urinary, bowel, and sexual dysfunctions as well as anxiety, depression, weight gain, and other side effects. These are issues that individuals, men in particular, may find difficult to readily discuss with their peers, family members, or even healthcare professionals in charge of their care. This is due in part to the fact that cultural constructions of “masculine” characterize masculinity as tough, silent, strong, self-sufficient, powerful and successful (Good and Sherrod, 2001). These types of definitions and social/cultural constructions of masculinity can have serious implications on men’s health. For example, men have been shown to be less likely to consult their general practitioners, and are less likely to seek help for medical issues. They are generally less aware of risks to their health and less able to recognize physical or emotional distress when compared to women (Banks, 2001b; Court, 1995; Courtenay, 2000; Rowley and Johnson, 2017). When it comes to self-management for long-term conditions, it has been shown that men will be more likely to use and fully engage with a health-related intervention when it is viewed as action-oriented, having a clear purpose, and overall in line with masculine ideals that are associated with independence, stoicism and control (Galdas et al., 2014).

Information is seen as an essential form of support for men with PCa and their quality of life; however, information needs often remain unmet (Rutten et al., 2005). Indeed, Boberg et al. (2003) conducted a study wherein the needs of PCa patients were assessed in the areas of care delivery, information and support. The group developed the Unmet Need survey, a survey used to assess both the importance of the need as well as the extent that the need was unmet. It was found that support needs scored highest under “unmet needs”, despite their lower scores on the “importance” scale. By contrast, information needs scored high in both “unmet needs” and “importance”, and was described by the authors as having the greatest need for improvement. This study suggested that healthcare
providers need to consider a better means of supporting their patients with relevant health information.

Acquiring more information is a critical way in which PCa patients can gain a sense of control over their diagnosis and their experiences surrounding the disease and its treatment. There is a desire on the part of patients for information about their disease and treatments (Wong et al, 2000). It has previously been shown that gaining relevant information regarding patient’s disease and care can have numerous positive effects: increased knowledge and information leads to increased participation in the decision making process (Cassileth, et al., 1989). Providing patients with information about their disease can also aid in improving their recovery, as well as improved day-to-day functioning (Feldman-Stewart et al., 2000). Furthermore, in a study by Damian and Tattersall (1991), it was found that when patients received a letter summarizing their oncology consultations, they experienced greater satisfaction with their medical appointments as well as improved recall of information given during the consultation (Rainey, 1985). This further shows that providing more information can improve a patient’s experience. In a study investigating information given to radiation therapy patients, when patients were given additional information, they showed improved mental health and enhanced coping skills when compared to those patients that did not receive this information (Johnson et al., 1988).

Evidence suggests that men with PCa often encounter difficulties communicating their psychological difficulties, particularly when it comes to psychosexual health (O’Brien et al., 2011). However, there are several sources that indicate that patients in general and men with PCa specifically, have the desire to have more health information specific to their disease and their wellbeing (Rüesch et al., 2014; Kent et al., 2012; Feldman-Stewart et al., 2010). Indeed, it was found that although there has been a reduction of unmet needs over time, total information needs of cancer patients within the first nine months after diagnosis, remain high (Matsuyama et al., 2013). This paradox of wanting more information while not being comfortable disclosing their needs leaves a gap in the informational needs of PCa patients (Rüesch et al., 2014; Kent et al., 2012).
e. The role of the Internet

The use of online health resources is currently on the rise. As of 2012, over 80% of Canadian households were connected to the Internet and over 70% of Canadians used the Internet to search for health-related and medical information (Statistics Canada, 2017). It has also been reported that the Internet is often the first source of health information for many individuals, superseding even their physicians (Hesse, Moser & Rutten, 2010). In fact, evidence from 2011 suggests the Internet may have surpassed healthcare providers as the primary source of health information for cancer survivors (Dolce, 2011). More recently, it has been shown that the Internet is mainly used as a tool for the sick, more so than an educational resource for those who would like to stay healthy (Pew Research Center, 2017).

The Internet can provide a convenient medium for individuals to search for health information, with the added benefit of relative anonymity that may allow them to share their experiences more readily with their peers and with health professionals. Online health resources can be used not only to increase the patients’ knowledge, which in turn can increase their engagement in decision making and become active partners in their own care, but it also allows them to find answers to questions they may not feel comfortable asking, or had forgotten at the time of their appointment (Iverson et al., 2008). Health-related information found on the internet can also be used by patients and individuals to answer simple questions before their encounters with physicians, allowing patients to deal with the large amount of new information at their own pace, something which can otherwise be overwhelming (Iverson et al., 2008).

While increasingly used and relied upon, online health information can be difficult to regulate, given the vast amount of material available on the Internet (Tabitha, Tonsaker, Bartlett & Trpkov, 2003). A study by Ogah et al. (2012) examined the reliability of “reputable sources” for medical information on the Internet with regards to hormonal treatment for PCa. They found that typing the words “prostate” “cancer” and “treatment” into a Google search bar yielded over 21 million links. The large quantity of information that can be found online raises the issue of variability in the quality of information.
Questions of who authored the material, when the information was last updated and the accuracy of the information are important considerations when assessing online health information (Eastin, 2001). Ogah et al. (2012) found that one of the main difficulties with assessing the reliability of online health information was lack of indication of when the sites had last been updated, leaving patients with information that is potentially out of date. Eysenbach et al. (2002) conducted a systematic review assessing the quality of health information for consumers on the Internet. Of the studies assessing the credibility of online health resources, it was found that there are significant problems with the completeness of sites, the quality of the sites as well as their accuracy. Searching for health information online can therefore also be challenging to patients. With access to information that is not always credible, complete or trustworthy, patients may develop unnecessary fears about their health. It is therefore important to know which websites to use, and be aware of those that are not recommended for patient use (Tabitha et al., 2003). Consequently, physicians need to be aware that patients are seeking information about their health online, and should direct patients to websites that they know are reliable and have up to date information (Ogah et al., 2012).

Patient portals, a type of online health resource are secure online websites that allow patients to have access to their personal health information such as recent doctor visits, lab results and medications, as well as exchange emails with health care providers and access credible, trustworthy educational materials (HealthIT, 2017). These tools can aid patients to become more active in their care and in information seeking (Raisinghani & Young, 2008). In fact, a systematic review of controlled trials evaluating the impact of electronic patient portals on patient care (Ammenwerth et al., 2012) found that patient use of online portals led to improvements of doctor-patient communication, increased rates of medication adjustments, decreases in medical visits, and increased adherence to treatment. When it comes to men with PCa, online health resources could provide patients with the health information and support needs that they often lack (Pai et al., 2013). However, an important consideration in regards to the use of the Internet and online health resources is the older age of this patient population. There are challenges that men with PCa can face when searching for information online. For example, 60% of
men with prostate cancer are over 65 (Canadian Cancer Statistics Advisory Committee, 2018). Technology is rapidly evolving, and older individuals have more difficulties adjusting (Roupa et al., 2010). This means that patients over 65 may not have access to the benefits that the Internet and other technologies can provide (Gracia and Herrero, 2009). Low Internet use has not only been associated with age, but also with socioeconomic status, and education status (Roupa et al., 2010). Health literacy is a significant aspect of searching for information online, and using online health resources. Although there are vast amounts of educational material online, not all individuals are able to access it, understand it, and use it. In fact, 88% of Canadian seniors are not considered health literate (Public Health Agency of Canada, 2017). This inability to understand health information can inhibit communication about important measures that individuals can take in order to prevent disease, or manage their symptoms and treatment side effects (Birru et al., 2004). Given that Internet use is significantly and positively correlated with self-reported health outcomes, contextual issues such as age and education level need to be taken into account (Gracia and Herrero, 2009) when studying the impact of technology on health outcomes.

II. TrueNTH Initiative

a. Brief Introduction to the TrueNTH Initiative

The TrueNTH Initiative is a global initiative funded by the Movember Foundation, which aims to improve the quality of life of those affected by PCa, as well as their families, partners and caregivers. The TrueNTH Initiative spans across eight jurisdictions: Australia, Canada, the United Kingdom (UK), Ireland, the United States (US), New Zealand, Hong Kong and Singapore. Each country has implemented the initiative differently, but together, each contributes to a unified effort.

b. Informing the design and implementation of web-based solutions

The vision of the TrueNTH initiative is to make support programs and services available to as many men as possible, worldwide. These programs focus on supported self-management for symptoms such as urinary and bowel dysfunction, sexual rehabilitation,
enabling men to adopt a healthy lifestyle, and patient navigation. The ASap Survivor Portal SySTem (ASSIST) program was part of the TrueNTH Initiative programs at the inception of the Initiative. It was designed to be a comprehensive site for reliable, relevant and tailored information and support for Canadian prostate cancer survivors.

There is a strong interest in leveraging web-based technology to optimize access to the TrueNTH programs. In order to implement these programs in such a way as to achieve as widespread use as possible, it is imperative to increase our understanding of the way individuals use the Internet for health purposes, specifically in PCa. To reach this goal, a series of interviews were conducted with patients diagnosed with prostate cancer, their family members, caregivers, health professionals and key system stakeholders. They were asked to discuss their preferences, experiences and thoughts on interactive web-based interventions related to PCa. Topics of self-management, quality of life, and integration of such a program in their care were also explored. The main purpose of these interviews was to inform the design of these programs, their effective implementation, and sustainability.

III. TrueNTH Evaluation

The TrueNTH Initiative aims to assess overall impact globally. As such, all programs within the various jurisdictions adopted a common evaluation framework: the RE-AIM framework. The RE-AIM framework will also be used to guide this work.

a. RE-AIM Framework

Glasgow and his colleagues (1999) developed the RE-AIM framework as a model for evaluating public health and health promotion interventions. The RE-AIM framework brings attention not only to a program’s impact and effectiveness, but also to the reach and representativeness of the participants, settings and contexts of the programs being evaluated. Traditionally, the evaluation of an intervention was judged based on the product of the program’s reach and its efficacy (R,E) (Abrams et al., 1996). Glasgow extended the concept of evaluation to also include aspects of the setting, the actual implementation and the context in which a program is delivered. Adoption, Implementation and Maintenance (A,I,M) are thus also key factors in assessing the
success of a program’s impact. With the inclusion of explicit information about the circumstances around implementation, this framework aims for an easier and more complete translation of research into practice. Although the RE-AIM framework originated within the field of public health, its use is expanding and it is now applied to inform program planning, implementation, evaluation and reporting (Finlayson et al., 2014). RE-AIM is a comprehensive framework that targets researchers and program developers, and provides them with interactive tools to assess and plan for programs as well as their dissemination and translation. RE-AIM has an important place in knowledge translation and implementation science in that it encourages researchers to examine contextual factors, demonstrate effectiveness, and create sustainability and maintenance plans for health programs (Glasgow et al., 2003; Dzewaltowski et al., 2004), which can facilitate the translation of research into practice (Glasgow, 2013; Dzewaltowski et al., 2004). The following section will define the elements of RE-AIM in greater detail.

**Reach**

*Reach* pertains to the proportion and characteristic of *individuals* who are receiving or are affected by a policy or program. This proportion incorporates the number of individuals who have joined a program, the total number that would be appropriate or eligible for the program, as well as the representativeness of the participants. (Glasgow et al., 1999).

**Efficacy**

*Efficacy* of a program refers to the outcome of the program or policy that has been implemented. *Efficacy* is concerned with the outcomes seen under ideal or controlled conditions (Gartlehner et al., 2006), and can answer questions of whether an intervention can work (Ernst and Pittler, 2006). *Effectiveness* is a similar term that is generally used in the context of pragmatic trials, or other instances when measuring the effects of a program or implementation under “real world” conditions (Gartlehner et al., 2006), and provides information on whether an intervention will be able to produce the desired outcomes (Ernst and Pittler, 2006). It is important to note that in both cases this includes positive as well as negative outcomes. Often, improvements are reported, while unanticipated negative effects are left unpublished. This can cause problems for those
using the programs, and can also cause societal effects leading to misplaced resources. The outcomes of a program encompass more than just biologic measures – behavioral and quality of life measures are also critical in the evaluation of patient functioning, satisfaction, and impact of the programs being implemented (Glasgow et al., 1999).

**Adoption**

As described within the RE-AIM framework, *Adoption* is the proportion and representativeness of the *settings* where a given program or policy is being implemented. This could be work-sites, health departments, clinical practices, or communities. Determining the barriers and facilitators of institutional adoption of a program into usual care is integral to ensuring the successful implementation of that program (Glasgow et al., 1999).

**Implementation**

The *Implementation* element of the RE-AIM framework assesses how well the program has been delivered. Within implementation, fidelity and resources are also assessed (Harden et al., 2015). Resources pertain to the cost and time that it takes to implement an intervention as it was intended (Harden et al., 2015). Fidelity within the context of implementation refers to the degree to which an intervention or program is delivered as it was intended (Caroll et al., 2007). This can be both at the individual level, where participant adherence is measured, and at the setting level where delivery of the program by staff members is measured (Glasgow et al., 1999).

**Maintenance**

*Maintenance* refers to how viable is the long-term sustainability of the program, at an individual level and at a community level. At an individual level, this means the long-term maintenance of the behaviour change that involves program usage. At the institutional level, this translates to the extent to which the program or policy becomes part of everyday practice within the organization. *Maintenance* evaluates to what extent the innovations become stable both at an individual and organizational level (Glasgow et al., 1999).
Combining these five elements of the RE-AIM framework can give an overall, comprehensive representation of the quality of the development, implementation, and long-term success of the program or policy being put in place.

**IV. Reach and Adoption**

a. *Why focus on reach and adoption?*

Program evaluations often focus on outcomes and efficacy. However, real-world impact requires attention to individual as well as the organizational setting and context variables (Saunders *et al.*, 2005).

Implementation Science (IS) is an important and growing field that has impact on the health system. IS focuses on the methods to promote the adoption and information of evidence-based practices, interventions and policies into usual practice in health care and public health settings (Fogarty International Center at NIH, 2017; Eccles and Mittman, 2006). Each year, billions of dollars are spent on the development of interventions designed to improve the quality of life and quality of care of individuals. However, only a fraction of these interventions are implemented into practice (Chaudoir Dugan and Barr, 2013), and the process of incorporating interventions into general practice can take an average of 17 years (Bauer *et al.*, 2015). Measuring implementation can be difficult; variables related to the intervention itself, the context of implementation, as well as the behavioural strategies used can lead to either the success or failure of an intervention (Chaudoir, Dugan and Barr, 2013). Although many interventions are found to be effective in health services research studies, they often fail to translate into significant patient care outcomes (Damschroder *et al.*, 2009) when delivered in a real-world context. It is therefore critical to understand what makes an intervention successful, and to harness those approaches in order to accelerate the rate at which knowledge can be translated and effectively implemented into practice (Chaudoir, Dugan and Barr, 2013). Investigating the contextual and developmental work of implementing a successful program also allows for better interpretation of results, as well as increases the likelihood of replication of a similar intervention (Eccles and Mittman, 2006).
Setting and context are important factors for both successful implementation and long-term sustainability of a health program or initiative (Glasgow, Phillips and Sanchez, 2014). In fact, failure of a program’s success could be due to a variety of reasons such as poor program design, implementation, or a failure to reach a sufficient number of individuals (Saunders et al., 2005). However, without effective reach there are no participants to utilize and take up a program, rendering the long-term use and potential benefits of the program difficult to achieve. Similarly, without institutional or organizational buy-in, the uptake, adoption and sustainability of the intervention or program are far more challenging to attain (Kilbourne et al., 2007; Frieden, 2014).

Reach and adoption are therefore critical elements for the uptake and implementation of initiatives, whether as signs of program acceptability and feasibility, or as enabling true assessment of its impact.

b. Reach and adoption within implementation science

Settings, and uptake of programs into organizations and institutions play an important role in the sustainability and success of an intervention. Reach pertains to questions such as: “What proportion of the target audience participated in the program?” “What is the total number of individuals who joined the program?” “How representative is the participation population of the target audience of the program?” (RE-AIM, 2017). Within the RE-AIM framework, reach refers to the rate of participation within the target population, as well as the characteristics of the participants and the non-participants. This encompasses the number of participants and the representativeness of that population (Glasgow et al., 2001). Demographic information such as socioeconomic status, health status, age, race, and psychosocial information of participants as well as those who chose to not participate can be used to assess the representativeness of the target population (Glasgow et al., 1999). The size of the potential audience, as well as barriers and facilitators to participation are factors in obtaining the greatest reach for a given program. (Glasgow et al., 2001). Barriers to participation include cost, scheduling, transportation, and other sources of inconvenience or impediment to the potential user of the program.
Adoption is a similar concept; however, it relates to the number and representativeness of the settings that are taking up the program in question. It can be measured by what proportion of settings that were approached did take up the program, as well as the characteristics of the both participating and non-participating settings. Adoption is considered at the individual level, or at the organization level (Kessler et al., 2012). Questions such as “What percentage of settings and intervention agents within these settings were excluded or participated?” “How representative were they?” (RE-AIM, 2017) are asked when exploring adoption.

Aspects of program adoption are often overlooked or misrepresented in the reporting of program evaluation and implementation. In fact, in a systematic review of studies evaluating behavioral interventions found that only 16% of the studies described information about the rate of program adoption at the setting level (Dzewaltowski et al., 2004). However, when it comes to program sustainability, adoption at the organizational or institutional level becomes very important. Program sustainability is of great concern, as many programs are discontinued soon after their initial funding period ends (Shediac-Rizkallah & Bone, 1998; Scheirer & Dearing, 2011). Conceptualizations of sustainability differ, focusing either on the development of the intervention itself, while others concentrate on the system in which it is introduced (Stirman et al., 2012; Scheirer & Dearing, 2011).

c. Reach and adoption within an eHealth context

The term eHealth is used to describe the use of information and communications technologies in health care (Eysenbach, 2001). As technology evolves, its potential for use within healthcare grows. Online health resources directed at patients are becoming increasingly used, and their benefits are evident. In addition to improving aspects of care such as the collaboration between patient and health care provider (Ammenwerth et al., 2012; Lyles et al., 2013), online health resources can help programs overcome many of the barriers to reach and adoption.
Within the context of eHealth, *reach* and *adoption* can take several additional meanings. When using online health resources, there are various considerations to *reach* in addition to demographic factors and representativeness of the population using the tool (the two determinants most commonly associated with *reach*). For example, the appeal of the website, the ease of use, user proficiency and characteristics of the user interface can affect whether a person will use the program or not (Hartmann *et al.*, 2013; Venkatesh *et al.*, 2003). Indeed, several theories and frameworks have explored the role of ease of use as well as the perceived usefulness of eHealth innovations, and these factors have been shown to be of utmost importance in program and online portal use by patients. More specifically, in the widely used and validated Technology Acceptance Model (TAM), Davis (1989) describes two factors as having impact on the acceptance and use of an information technology by the user: (1) *Perceived usefulness* as the idea that people tend to use an application or program if they believe that it will help them obtain a better performance; and (2) *perceived ease of use* as the degree to which someone using the program believes that it is not too hard to use, and that the benefits outweigh the effort of using the program or application. Similarly, in an extension of the TAM, Venkatesh and his colleagues (2003) stated in their Unified Theory of Acceptance and Use of Technology (UTAUT) that there are four key constructs that influence the intention to use a technology: (1) *social influence* (the degree to which an individual perceives that important others believe they should use the innovation), (2) *facilitating conditions* (the degree to which an individual considers that an organizational or technical infrastructure is present to support the use of the innovation), (3) *performance expectancy* (the degree to which an individual believes that the system in use will help them excel in performance), and (4) *effort expectancy* (the degree of ease associated with the use of technology).

In the theory of planned behaviour (TPB), Icek Ajzen explored what influences individuals’ behaviour, and found that perceived behavioural control, an individual’s perception of how easy or difficult it is to perform certain behaviours, can have an important impact on whether or not they perform that behaviour (Ajzen, 1991). Accessibility, accuracy, and understandability of information have also contributed to the
success of the consumer health movement, especially within the older patient population (Turner et al., 2015).

With regards to the RE-AIM framework, adoption typically assesses the number of institutions and organizations taking up the program. It also refers to the representativeness of the settings in which a program or intervention is being implemented. However, within the context of eHealth, adoption can also refer to the long-term use, adherence to, and compliance with online resources by individual users (Irizarry et al., 2015). Adoption on the part of the patient is closely linked to institutional adoption. In fact, findings show that increased advertisement of online health services and system-wide encouragement of use of portals will increase adoption by patients (Crotty and Slack, 2016). Much like the initial reach of online health resources, their long-term use and adoption are also dependent on the ease of use, intuitiveness, and level of language used (Crotty and Slack, 2016; Shahrabani and Mizrachi, 2016).

When it comes to the benefits and barriers of reach and adoption, there are several considerations to take into account in the context of eHealth and online health resources. For example, when reflecting on reach, issues of scheduling and transportation are reduced or eliminated with use of online health interventions, as they can be available from anywhere at any time, given accessibility to the Internet. However, availability of the Internet and proficiency of use of electronic devices are potential barriers to the usage and uptake of online health resources. It has also been shown that factors such as socioeconomic status, health literacy, and cultural differences can play a role in the use of online health resources (Ancker et al., 2011; Sarkar et al., 2010; Byczkowski, Munafo, & Britto, 2011; Goel et al., 2011). There are other examples where the apparent removal of a barrier to reach and adoption can create another. For example, it was found that there is greater attrition in web-based interventions compared to clinic-based interventions (Greenhalgh et al., 2010). On the one hand, the Internet can provide relative anonymity to patients, allowing them to discuss sensitive issues more freely. Conversely, this feature of online portals has been shown to contribute to resistance and abandonment of web-based health interventions in part due to the distance that online mediums place between individual users (Bender et al., 2011; Greenhalgh et al., 2010). Although the benefits of
health portals that provide information to patients are clear, there still exist important barriers to the success of the implementation of these interventions, namely in aspects of reach at the patient level and adoption at the institutional level.

V. Reach and Adoption – are they linked?

Within the RE-AIM framework, reach and adoption are defined as two separate concepts, each having a distinct role within implementation and evaluation. However, reach and adoption are often not well defined or used in practice, as revealed by several systematic reviews and studies analyzing the use of RE-AIM in real world settings (Gaglio, Shoup & Glasgow, 2013; Kessler et al., 2012). These reviews found that reach was the most commonly reported element of the framework. When it came to adoption, however, they found that although adoption was mentioned, none of the studies that employed RE-AIM addressed all the criteria of this item and therefore it was not properly used.

We propose that the physician has a critical role in both the reach and adoption of online health resources, and therefore provides a link between these two implementation phenomena. In the scope of reach, it has been shown that physicians play a crucial role in patients’ decision-making process when it comes to their health, and patients want information regarding their care to come from their doctors (Charles, Gafini & Whelan, 1997; Beisecker & Beisecker, 1990. In a recent study by Feldman-Stewart et al. (2018) using population surveys in four Canadian provinces in 2014-2015, found that prostate cancer patients prefer getting their information from their urologists, and optimal information supply requires that the information be provided both online and in print. From an implementation point of view, it has been described that perceived factors in the use of and attendance at health education programs include the awareness of the existence of such programs, as well as encouragement from the patients’ physicians to join programs (Graziani, Rosenthal & Diamond, 1999). Indeed, an additional factor in the use and adoption of patient facing online health resources is the acceptance and promotion of the intervention by providers (Irizarry et al., 2015). Physicians play a crucial role in providing patients with reliable information such as what may be found on
online health resources. Given the shift of care to a patient-centered model, physicians now have a responsibility to provide trustworthy resources to patients in order to assure that patients are receiving reliable information, and being directed to resources that will improve their patients’ outcomes (López-Gómez et al., 2012).

Likewise, physicians have an important role to play when it comes to institutional adoption of interventions. Physicians have strong influence within the hospital institution and therefore can also play a crucial role in the adoption of web-based health intervention at the organizational level. With the introduction of new technologies, administrators and physicians are becoming more and more dependent on each other when it comes to administrative decision-making within hospitals and health care (Gray, 1983). The interests of physicians and administrators converge in the areas of expanding hospital programs and services (Gray, 1983). Indeed, it has been shown that when physicians engage in leadership and administration activities, hospitals are higher performing, with higher physician and patient satisfaction (Taitz et al., 2012). For example, when employing a physician-engagement agreement at the Ottawa Hospital, by working together physicians and hospital employees reduced the rate of surgical-site infections, urinary tract infections, reduced the length of stay and number of readmissions among surgical patients (Roth, 2017). Similarly, it has been shown that physician involvement is a key component to hospital quality initiatives (Liebhaber et al., 2009). This is because physicians are the key decision makers in relation to the care that hospital patients receive, and therefore form an integral part within the hospital organization and how it is run (Liebhaber et al., 2009). This joint decision-making between physicians and hospitals could therefore also be used in the context of promoting eHealth innovations such as online health resources for patients.

Physicians play the role of champions both with respect to patients as well as within health organizations. Physician champions are physicians who: actively promote a new innovation; make connections between various individuals in the organization; mobilize resources; navigate the political environment within organizations; build support for organization members; and ensure that the innovation is implemented in the face of resistance within the organization (Shaw et al., 2013). It has been shown that physicians
acting as champions and being engaged in quality initiatives within hospitals is key for 
fostering broader physician participation, and therefore increases the overall uptake of 
quality improvement initiatives within hospitals (Liebhaber et al., 2009). It has also been 
found that when it came to initiatives requiring behavioural changes, more than one 
champion was needed in order to gain widespread engagement in hospital quality 
improvement initiatives (Damschroder et al., 2009). Although there is limited research on 
the role of physicians as champions for the institutional uptake of patient-facing online 
health resources, these findings on quality improvement can be used to help the 
understanding of the potential role physicians can have in the institutional uptake of those 
resources.

Barriers to physician uptake of initiatives within the hospital setting have also been 
previously studied. In a study investigating the utilization and perceived problems of 
online medical resources and search tools among different groups of European 
physicians, it was found that barriers for physicians accessing relevant information 
include lack of time, and trustworthiness of the resources (Kritz et al., 2013). Indeed, it 
has been shown that providing physicians with credible, reliable and risk-adjusted data 
motivates them to get involved in quality improvement initiatives within hospitals 
(Liebhaber et al., 2009). Quality and trustworthiness are therefore important factors in 
physician uptake of initiatives, including online health information interventions. 
However, to our knowledge, there are limited findings about the barriers to physician 
uptake of patient-facing online health resources, as well as their influence of patients’ use 
of these resources. There is therefore a gap in the knowledge of what the role the 
physician has in the reach and adoption of patient-facing online health resources. With 
the potential influence that physicians have on both reach and adoption, their impact 
could be leveraged to increase the number of patients joining a high quality program as 
well as its uptake within the institutions and organizations of which they are part. Given 
the unmet informational needs of PCa patients, and the potential for online health 
resources to help patients improve their quality of life, assuring the successful 
implementation of such web-based health interventions is becoming increasingly 
important. Through this work, the author proposes that the two fundamental items of RE-
AIM, *reach* and *adoption*, are not completely separate entities, but rather that they can interconnect through various mechanisms and relationships. Working together, through the physician, they can lead to successful program implementation. The objective of this work is therefore to understand the contextual aspects of *reach* and *adoption* and how they inter-relate through the role of the physician within the context of online health resources.

2

The Role of Behavioural Theory
RE-AIM is the model being used by the TrueNTH Initiative to evaluate the implementation of its programs. The RE-AIM framework provides us with a comprehensive overview of program planning, implementation, evaluation and sustainability; however it does not directly take into account the fact that individuals’ behaviours are critical considerations in the successful implementation of the intervention. The role of behaviour will be considered in this section.

Human behaviour is a widely studied field, with applications spanning from marketing to organizational psychology to health (Godey et al., 2016; Bolino et al., 2015; Hayden, 2017). In health, behaviour is important in understanding a multitude of facets of healthcare and health delivery. Indeed, many aspects of health such as immunization, addiction, screening behaviours, risk-factor behaviours, medication compliance behaviours, dieting behaviour compliance, or examining health service utilization require an understanding of health behaviours for explanation and prediction (Janz & Becker, 1984). Explaining human behaviour is a complex and difficult task, and has been the goal of many psychologists and sociologists as it helps us to understand why individuals act and do things the way they do. There are many theories that discuss human behaviour, as well as human behaviour specifically as it relates health.

I. Why Focus on Social/Behaviour Theory

The physician-patient dynamic is a social interaction, which involves communication of information with regards to the patients’ health status, health behaviours, and health education among other topics (Emanuel & Emanuel, 1992). Aspects of social psychology theories can help explain these types of interactions and may also contribute to our understanding of the physician’s influence on a patient’s decision-making process when it comes to accessing and using online health resources.

The physician-patient relationship is a complex one, where multiple factors such as trust and credibility come into play. Shared decision-making and patient centered care are now considered the gold standard of medical practice, taking the place of a dynamic that has been called “benevolent paternalism” (Truog, 2012). In this new paradigm, patients and
physicians work together: physicians providing expertise and authority over medical matters, and patients contributing to those decisions with values and preferences (Truog, 2012). This change in dynamic affects patient-physician interactions that can in turn affect the reach and adoption of online resources. Patient-centered care promotes communication between patients and physicians, enables patients to be more informed about their health, and facilitates the patient’s involvement in their own care (Epstein and Street, 2011).

Although the model of patient-centred care focuses on patients being involved in their care, the guidance of physicians remains a critical aspect of healthcare delivery and decision-making among patients. For example, in a study looking at factors influencing participation in screening mammography practices for older women, it was shown that the most important element that predicted whether a woman had ever had a mammography was whether her physician had talked to her about it (Fox, Murata & Stein, 1991). Although this study focuses on screening practices, these conclusions are likely transferable to online resources and shed light on the importance of the physician referral. Indeed, the importance of the role of the physician in patient adherence to programs and resources has spanned many different aspects of health care and health programs. For example, physicians’ advice has been shown to have an impact on smoking cessation and other behavioural changes such as weight loss and increased physical activity (Kreuter, Chheda & Bull, 2000; Pederson, 1982). This is exemplified in Pederson’s review (1982) where he describes the history of the role of the physician as an agent for patient behaviour change, specifically in smoking cessation. Research on the physician’s role in assisting their patients to quit smoking goes as far back as 1931, where Kress (1931) suggested that physicians’ advice to quit smoking and provide them with guidance impacted the patients’ decision to quit, and led to improved cardiopulmonary function in those patients.

There are several theories and frameworks that examine the impact of social interactions on learning as well as behavioural change when it comes to health. Evidence pertinent to health behaviour and health promotion is also relevant when considering online health resources. Many studies have investigated the use of online health resources to change
health behaviours. For example, many eHealth interventions have focused on physical activity and dietary habit changes (Norman et al., 2007).

Searching for health information has been identified as a key factor of arming oneself with information, as well as maintaining one’s health, and helping adjust to psychosocial aspects of illness (Lambert & Loiselle, 2007). Several studies have been conducted to determine the characteristics of individuals that use the Internet when it comes to health information seeking (Neil-Sztramko et al., 2017; Cotton & Gupta, 2004; De Choudhury et al., 2014). However few studies, to our knowledge, have investigated more specifically the “use of online health resources” or “use of online interventions” as a health behaviour in itself. Yet, patients first need to access online health resources in order to benefit from their content. Therefore, we will be using “use of online health resources” as the health behaviour in question.

It is important to explore not only theories and frameworks related to the implementation and evaluation of programs like RE-AIM, but also to explore how human behaviours impact constructs such as reach and adoption and lead to their success. Of the theories that examine human and social behaviours, the Theory of Planned Behaviour is especially relevant to the research question being posed.

II. Theory of planned behaviour

The Theory of Planned Behaviour (TPB) is one of the most frequently cited models used to predict and explain human social behaviour (Ajzen, 2011). It is an evaluation of the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). The TRA was developed in order to understand relationships that exist between attitudes, intentions and behaviour, seeking not only to predict human behaviour but also to explain it. The TRA stated that the most important factor in whether an individual performs a behaviour is the behavioural intention (Montano and Kaspryk, 1999). According to the TRA, intention to perform a behaviour is influenced by attitudes toward the behaviour and subjective norms. In 1991, Ajzen expanded the model and published the TPB, which adds the concept of perceived behavioural control, which accounts for factors outside of
the individual control that could have an effect on intentions and behaviours (Azjen, 1991; Montano and Kaspryk, 1999). The TPB accounts for actions within a specific context. This is especially relevant when considering a complex intervention such as using an online health resource.

The TPB postulated that intention to perform a behaviour is determined by (a) attitudes towards behaviours, (b) perceived behavioural control, (c) subjective norms, and (d) intentions. Ajzen postulated that these factors all contribute to whether or not the individual will or will not perform a certain behaviour.

![Figure 1 Theory of Planned Behaviour (Ajzen, 1991)](Copyright © 2002 Icek Aizen)

a. **Attitudes and Beliefs**

In his theory, Ajzen states that attitudes towards a behaviour is a function of beliefs relevant to that behaviour. Each belief connects the behaviour to a certain outcome or other attribute. Positive outcomes and consequences lead to preferred behaviours, whereas undesirable consequences often lead to unfavourable attitudes towards a behaviour (Ajzen, 1991). An individual is therefore more likely to partake in a behaviour that they believe has more desirable consequences, and whose subjective value is
positive. According to the TPB, beliefs come in three main forms: (1) behavioural beliefs, which influence attitudes towards a behaviour; (2) normative beliefs, wherein subjective norms determine one’s attitude towards a behaviour; and (3) control beliefs, which provide the basis for one’s perceived behavioural control.

b. Normative Beliefs and Subjective Norms

Subjective norms refer to the degree to which a person has influence on another individual’s behaviour. It is the perceived social pressure to perform, or not to perform, a behaviour. In general, if the attitude and subjective norm towards a behaviour is more positive, then the intention to perform that behaviour will be stronger (Ajzen, 1991). With regards to this research project, the influence of normative beliefs and social norms are relevant. Normative beliefs relate to the likelihood that an important referent individual or group (“important other”) will either approve or disapprove of a certain behaviour, and therefore can influence behaviour change (Blanchard et al., 2002). In the context of a health program, a clinician is an “important other”. The theory proposes that it is very likely that persuasive communication directed at a belief will influence the subjective norms an individual has about that belief as well as their perceived behavioural control.

Personal and moral norms, such as moral obligations or feelings of responsibility can also be a factor in behaviour change. These norms can influence intention, as well as action. Perceived costs and benefits, as well as the role of past behaviours have also shown to impact behaviour change, actions and intentions (Ajzen, 1991).

c. Perceived Behavioural Control

Ajzen suggests that the likelihood of behavioural achievement is, at least in part, dictated by the resources and opportunities that are available to a person. Given the proper resources, the intention to perform a behaviour should be predictive of whether he or she should succeed in doing so. Resources and opportunities are considered “actual” behavioural controls, as they must, to some degree, dictate the probability of achieving a behaviour. However, he was more interested in how individuals perceived this
behavioural control, and how this may impact one’s intentions and actions. Perceived
behavioural control therefore indicates people’s perception of how easy or difficult it is to
perform certain behaviours. This perception varies across different situations and actions.
Ajzen’s perceived behavioural control closely mirrors Bandura’s definition of self-
efficacy: the belief one has in their ability to succeed in specific situations, or accomplish
a certain task (Bandura, 1977). Self-efficacy also impacts health behaviors such as
smoking, exercise, breast self-examination, and other similar behaviors. In the scope of
health behaviors, self-efficacy influences the initiation, the effort and the length of time
the effort will be sustained when faced with obstacles, failures and frustrations (Bandura,
1977). Indeed, individuals have greater confidence when they demonstrate increased self-
efficacy, making them more likely to engage and adopt healthy practices (Bandura,
1977).

The concept of perceived behavioural control is in line with Bandura’s theory of
perceived self-efficacy: individuals’ behaviours can be strongly influenced by their level
of confidence in their ability to perform (Ajzen, 1991; Bandura, 1982). The concept of
self-efficacy is important when considering online health resources, in that if the
participant believes that they are able to succeed at certain behaviour, they will be more
likely to do so and more likely to use the program. In the case of online health resources,
a successful behaviour would entail the patients’ use of the resource, as well as their
long-term uptake and adoption of the resource.

A person’s beliefs and perceptions of their ability can influence which activities a person
will take part of, as well as the effort put into that activity. According to the TPB,
intentions and perceived behavioural control together can predict behaviour. Perceived
behavioural control can have an important impact on both intentions and actions.

d. Intentions

Intentions are indications of how much effort an individual plans to put towards a certain
goal, or to perform certain behaviours. In general, one is more likely to engage in a given
behaviour if the intention is stronger. Intentions to perform a behaviour are impacted by
the attitudes one has in regards to a behaviour; the opportunity and resources that are available to the individual in order to perform the behaviour; their perceptions of whether they can perform the behaviour, known as perceived behavioural control; and the social norms associated with the behaviour (Ajzen, 1991).

e. Conclusions from the TPB

In conclusion, the TPB is focused on predicting and understanding behaviour. According to the TPB, the intention to perform behaviours is indicative of the likelihood that an individual indeed does so. Intention is determined by attitudes towards the behaviour, subjective norms surrounding the behaviour, and the degree of perceived behavioural control one has about performing the behaviour. In general, the more approving the attitude and subjective norm with regards to a behaviour, and the greater the perceived behavioural control, the more robust should an individual’s intention be to perform that behaviour.

The TPB is a comprehensive theory that can be used to predict, understand and change behaviour, and impact action. Indeed, since its introduction, the TPB has been widely used to predict and understand human social behaviour (Ajzen, 2011). Intentions, behavioural control, and social norms aid researchers and program planners to comprehend behaviours, and can be used help individuals change their course of action in order to achieve their goals. It is important to note that intentions, perceived behavioural control, and beliefs play an integral role in whether or not patients use and adopt health related interventions. Perceived behavioural control is related to self-efficacy. As we’ve seen above, self-efficacy and the belief that one can change their behaviour is critical in the process of achieving goals.

III. Relevance of the Theory of Planned Behaviour on Reach and Adoption of Online Health Resources

The TPB has been used and validated in many domains within health: in the design of interventions focused on physical activity behaviour change, eating behaviours, and smoking cessation, among others (Motalebi et al., 2014; Cooke et al., 2014; McDermott
et al., 2015; Hukkelberg et al., 2013). However, in general, within the scope of online health and information resources and eHealth there is limited attempt to use the TPB to understand behaviour. Perceived social norms have been shown, in many studies, to affect intention and behaviour change (Jemmott & Jemmott, 1991; Ross, Kohler, Grimley & Anderson-Lweis, 2007; Fisher, Fisher & Rye, 1995). However, there have been mixed findings when it comes to the role of social norms in health behaviour specifically. For example, Lin (2006) found that social norms do not impact intention and therefore have no impact on behaviour (Lin, 2006). Others on the other hand, have found that all three constructs of the TPB (attitudes, behavioural control, and subjective norms) are important in ensuring a behaviour occurs in the scope of an eHealth intervention (Bender et al., 2013).

When it comes to social norms and social influences, it has been shown that there is a significant impact on behaviour, specifically within eHealth. For example, in a study investigating social cognitive factors and perceived social influences that improve adolescent eHealth literacy, perceived social influence variables had a significant positive effect on eHealth literacy (Paek & Hove, 2012). Variables included how much students thought close friends, parents and other most important people had an influence on their use of the Internet to find health information (Paek & Hove, 2012). Similarly, in a study exploring the determinants of Chinese adult children’s intention to use online health information for their parents, it was shown that subjective norm was a significant predictor for the use of online information by adults (Bao, Hoque & Wang, 2017). When it comes to the influence of physicians on eHealth behaviours, Buti et al. (2013) found that supportive perceived social norms from clinicians were associated with positive intentions to adopt computer-assisted interventions in the implementation a computer-assisted intervention for alcohol and drug use disorders.

This is pertinent when reflecting on how to increase the reach of a program such as an online health resource. Given that clinicians have a critical role in patients’ decision-making processes when it comes to their health (Charles, Gafini & Whelan, 1997; Beisecker & Beisecker, 1990), it can be proposed that when clinicians adopt positive
attitudes towards a program, and refer that program to patients, the patients in turn are more likely to use the program. This project focuses on the impact that physicians have on their patients’ use and uptake of an online resources. With regard to the role that the physician has, we believe that perceived social norms are particularly relevant: they address how the attitudes of others, specifically “important others”, influence attitudes towards certain behaviours.

The TPB is a fitting theory to this research topic and can be useful to the understanding of the various mechanisms at play. Indeed, this study was focused on the role of the physician in patients’ use of online health resources and the physician-patient dynamic is characterized by a social interaction. Aspects of human behaviour, expectations, attitudes, beliefs, intentions and norms are key factors within this interaction. Intentions are an important factor in determining the extent to which an individual is willing to attempt a new behaviour, and how much effort they are willing to put in to pursue the behaviour (Ajzen, 1991). The TPB is a validated theory within many health domains, and has been used in various different contexts to understand the attitudes and beliefs of individuals with regard to behaviour. The TPB assumes that individuals’ behaviours are purposive and/or goal oriented, and that individuals are capable of assessing and evaluating their own thoughts and experiences.

An important aspect of this research study in addition to the role of the physician on the reach of online health resources for patients, is their role in the institutional adoption of online health resources. The TPB is an individual level theory – it focuses on what influences individuals to perform a certain behaviour. Although this study was interested in both individual and organizational adoption, the TPB can still be a useful theory as the physician is an individual taking part of the organization: physicians are employees of the hospital. However, physicians still act as individuals within these organization. Given the importance of individual physicians acting as champions in order to gain widespread adoption of innovations and interventions within hospital organizations (Liebhaber et al., 2009; Damschroder et al., 2009; Shaw et al., 2013), physicians practicing in hospital still follow the tenets of the TPB: that attitudes towards the behaviour, behavioural control
and subjective norms continue to play a role in the behaviours of physicians. We further propose that by individually adopting online health resources into their practice, physicians can increase the institutional adoption of online health resources.

There is therefore evidence, albeit limited, supporting the role of beliefs, attitudes, behavioural control, social and subjective norms influence on behaviours, and intent of use when it comes to eHealth. However few studies, to our knowledge, have explored the role that physicians specifically have in the use and uptake of patient-facing online health resources. This analysis will use the concepts developed in the TPB to investigate this role that the physician plays in the reach and adoption of online health resources.
Methods
I. Study Design

This study was a secondary analysis of data collected during interviews related to the use of the Internet for self-management in prostate cancer to inform the design of an interactive website for men living with prostate cancer, their partners, and family members. The study aimed to gain a deeper understanding of the perspectives and experiences of men with prostate cancer as well as their health care providers by using interviews that had already been conducted on this population. This falls within the approach of a “supra-analysis”, meaning that the study involves examining a new research question that transcends the original focus of a study (Heaton, 2004). Supra-analyses investigate new theoretical, empirical or methodological questions. Thorne (1994, 1998) identified a similar concept as “armchair induction” of qualitative data, where theorists have no direct engagement with the individuals who obtained the data, and treat the data as text available to be analysed with various methods of textual analysis. However, Thorne’s definition of “armchair induction” restricts the analysis to theorists, whereas Heaton’s definition of “supra-analysis” does not restrict the use of this method to theoreticians, and also allows for the researchers who carried out the primary research to conduct the secondary analysis. Therefore, Heaton’s definition of “supra-analysis” is most fitting with this research project, as we examined comments that were not necessarily solicited however were important to the participants and the themes that were widespread throughout the interviews (Heaton, 2004).

Our research question revolved around understanding the factors that contribute to the relationship of reach and adoption within an eHealth context, notably the role of the physician. The data collected for the planning and development of the ASSIST portal was focused on the perspectives of patients and health care providers, and explored their views on contextual factors that impact patient and family experience with web-based interventions, and how these interventions are/could be integrated into ‘usual’ care. The data from that study was therefore appropriate and fitting for our research inquiries.
II. Research Objectives

The objectives of the study for which the interviews were originally conducted were:

1. To explore the thoughts, perceptions, experiences, and patterns of use of men with prostate cancer, and their partners/family caregivers of interactive web-based interventions related to prostate cancer, and how these interventions are/could be integrated into their care to support self-management to enhance quality of life throughout survivorship.

2. To explore the thoughts and perceptions of health care providers and system stakeholders related to web-based interventions for patients and families for the management of prostate cancer, capturing their views on contextual factors that impact patient and family experience with web-based interventions, and how these interventions are/could be integrated into ‘usual’ care.

The results of the initial study were used to inform the design of the ASSIST portal, a comprehensive secure web-based platform for relevant health information, tools and support as part of the TrueNTH Initiative.

Study Objectives – Secondary Analysis

The objective of this work was to understand the contextual aspects of *reach* and *adoption* and how they inter-relate through the role of the physician within the context of online health resources.

IV. Data Collection

a. Sample

Study participants were recruited from 4 populations: 1) men who have been diagnosed with prostate cancer; 2) their partners and family members; 3) health care providers caring for men with prostate cancer; and 4) health system stakeholders who currently address the needs of this population via web-based interventions (eg. Canadian Cancer Society, Prostate Cancer Canada Network). The definition of ‘family members’ in this
study included informal caregivers and friends supporting the man diagnosed with prostate cancer. Although the initial study included patients, caregivers and health care providers, in this secondary analysis only the interviews with patients and healthcare providers were analysed. Although caregivers play a critical role in the patients’ experiences, this project was looking specifically at the patient-provider relationship and therefore caregiver data was not used.

b. **Eligibility Criteria**

Eligibility Criteria were as follows:

**Inclusion Criteria**

1. Patients must:
   - Be diagnosed with prostate cancer,
   - Be 19 years of age and older,
   - Provide written, informed consent,
   - Understand, speak, read and write English,
   - Be willing to complete a phone interview lasting approximately 45 minutes,
   - Access the Internet (any extent of access, access from any location), and
   - Reside in British Columbia or Ontario

2. Health Care Providers (e.g. general practitioner, librarian, nurse, nutritionist, navigator, oncologist, psychologist, radiation therapist, social worker, urologist, volunteer) must:
   - Care for/oversee programs or services for patients with prostate cancer or their partners/family members,
   - Be 19 years of age and older,
   - Provide written, informed consent,
   - Understand, speak, read and write English,
   - Be willing to complete a phone interview lasting approximately 30 minutes,
   - Access the Internet (any extent of access, access from any location), and
- Reside in British Columbia or Ontario.

III. Sampling and Recruitment Strategies

Maximum variation of the following patient characteristics was sought: disease stage (I-IV, with minimal sampling within stage IV), timing in the disease trajectory (upon diagnosis/watchful waiting, active surveillance/undergoing treatment, completion of treatment, recurrence/metastases/palliation), treatment type (surveillance, surgery, radiation-internal and external, chemotherapy), extent of Internet use (low, med, high), geographic location (urban, rural, remote), marital status, age (<=65, >66), cultural background, and education. Maximum variation sampling is a commonly used technique in qualitative descriptive studies. By selecting participants with different backgrounds, characteristics and experiences, the researcher is able to gain a better understanding of variations in experiences, as well as commonalities of the experiences (Patton, 2002). Maximum variation sampling can yield findings that are: high quality, detailed descriptions of each case; as well as important patterns that are shared and which are found across cases that emerge out of heterogeneity (Patton, 2002).

A purposeful sample of patients with prostate cancer and their partners/family members was recruited, with patients and partners/family members being recruited as a unit. The goal of purposive sampling is to recruit cases which are rich in information and from which a lot can be learned about the important issues related to the purpose of the inquiry (Eitkan et al., 2016).

a. Patient/family recruitment

Patient and family recruitment was 3-pronged: 1) via clinics (one in Victoria BC, one in Toronto, ON located at the Princess Margaret Cancer Centre, one in Mississauga, ON at the Carlo Fidani Cancer Centre); 2) via the Prostate Cancer Canada Network (PCCN) website; and 3) via PCCN face to face support groups in Victoria, BC and the GTA.

Advertisements were posted in participating cancer clinics, physicians’ offices, and agencies serving prostate cancer patients, in addition to the circulation of an online poster.
via the Prostate Cancer Canada Network website. Posters were distributed in newsletters and magazines via psychosocial programs and cancer support groups for interested participants to contact the research team. The study was presented at the Prostate Cancer Canada Network face to face support groups in the GTA and in Victoria.

Staff within participating clinics provided prostate cancer patients with an information sheet about the study. The information sheet explained the purpose of the study, what participation would entail, and the phone number to call in order to participate.

Potential participants who called the research assistants were provided with a study overview, and were assessed for study eligibility. Eligible participants were mailed an Information Sheet, Demographic form, Screen Shots (i.e. pictures of the computer screen), and Informed Consent form along with a stamped self-addressed envelope. They were asked to return the completed demographic form and signed informed consent prior to the date of the telephone interview.

b. Health care provider recruitment

A purposeful sample of health care providers and key system stakeholders was recruited from participating clinics and relevant organizations (eg. Canadian Cancer Society, Prostate Cancer Canada) to ensure representation across disciplines, specialties, health care sectors, experience with patient portals, and geographic locations.

A purposeful sample of health care providers was recruited in person or by phone from participating clinics. Variation within (eg. oncologist, urologist, general practitioner; nurse practitioner, nursing assistant) and between disciplines (eg. medicine, nursing, social work, library sciences) and roles (eg. clinical, patient education, research, managerial) within the participating clinics were sought. Five health care providers were recruited: an oncology nurse, a health librarian, a health promotion specialist, a radiation oncologist and a palliative care physician.
IV. Data Collection, Interview Methods and Guides – summary from primary analysis

Data was collected via semi-structured interviews conducted over the telephone. Qualitative methods were employed - data collection and analysis were an iterative process throughout the study period. The interviews were audiotaped, transcribed verbatim, and analyzed for themes and patterns following procedures for qualitative content analysis. Interviews lasted between 30-45 minutes in length, and were held from November 2014-April 2015.

Interview questions served as guides, with all interviews being semi-structured with open-ended questions. The overall purpose of the patient participant interview questions was to probe patients and understand their experiences with, and thoughts about, online resources related to prostate cancer. Questions referred to past experiences with online resources, what role they play in their healthcare journey, useful features of the tool, as well as aspects of ease of use for the patients with regards to the ASSIST portal tool. When it came to health care providers, questions were asked in order to ascertain what types of information and components they saw as being helpful or not helpful to them as well as to patients. They were asked demographic questions, as well as questions relating to their thoughts and feelings about an online resource to manage their patient/client’s prostate cancer. Please see Appendix 1 for more information and full interview guides.

V. Method of Inquiry

Secondary analysis provides an opportunity to generate knowledge from a qualitative dataset that has already been collected (Sandelowski, 1997). Qualitative secondary analysis not only allows for the investigation of new questions (Heaton, 2004), but it also maximizes the use of existing data (Bernard et al., 1986).

Interviews were held to understand various perspectives including patient, family, health professional, and key system stakeholders. “Family members” here included all family members (spouses, children, siblings), as well as informal caregivers and friends.
supporting the man diagnosed with prostate cancer. In the secondary analysis, the caregiver interviews were not explored.

The research method used in the secondary analysis was a fundamental qualitative description as outlined by Sandelowski (2000). Qualitative description is defined as a comprehensive summary of an event or phenomenon, an accurate description of an event in the everyday terms of that event. Qualitative description is best suited when seeking to explore and identify the ‘who’, ‘what’, and ‘where’ of events or phenomena (Sandelowski, 2000).

When conducting qualitative description, the researcher is to stay close to the data, the words, and events (Sandelowski, 2000). Indeed, qualitative description is the least interpretive and least abstract of the different forms of qualitative inquiry. Although there is always some level of interpretation within the description, qualitative description involves a “low-inference” form of interpretation (Sandelowski, 2000). Other forms of qualitative inquiry such as phenomenology or grounded theory involve the description of events with specific philosophical or conceptual frameworks that can be very abstract (Wolcott, 1994). In those cases, the researcher is the one to choose what to describe and makes choices that present certain views or interpretations of the event being studied (Sandelowski, 2000). Qualitative description on the other hand provides an accurate description of events or an experience, in that it reflects the meanings attributed to the events by participants. The data therefore is analysed in a less abstract manner (Sandelowski, 2000).

The goal of this secondary analysis was to examine the perspectives, expectations and experiences of patients and health care providers. We sought to understand patient preferences regarding the role that health care providers play in patients’ use of online health resources designed to help them manage their health after a cancer experience. We also sought to understand the health care providers’ perspectives on what they perceive as their role in promoting patients’ use of online information. Given that this was a secondary analysis, the researcher was not the one to conduct the interviews and probe participants in order to stay more in line with the research questions. It was important to
stay as close to the data as possible - qualitative description was the most appropriate research method to attain the study goals.

**VI. Philosophical Orientation**

This study follows the philosophical approach of pragmatically oriented inquiry. The pragmatic approach is particularly useful in applied research, as well as mixed methods studies (Creswell, 2000; Robson, 2002). Pragmatism involves using the philosophical or methodological approach that is the most logical and works best for a particular research inquiry or issue. In this approach, the problem is considered the most important aspect of the research study, rather than the methods; it is suggested that researchers use pluralistic approaches to obtain information and knowledge about the research inquiry (Creswell, 2000). As such, pragmatic studies are not limited to one system or philosophy, and they do not need to ascribe to one particular research method (Creswell, 2000; Robson, 2002).

This study fits well within the pragmatic orientation, as it derives from a very applicable set of interviews, and the objectives are clinically relevant. Based on the nature of the research question, a pragmatic approach to qualitative description was the most applicable method for this study.

**VII. The Researcher**

In qualitative research, the researcher is the instrument of data collection and analysis; the researcher asks questions, interprets the answers, makes field notes, and decides how the research will be conducted (Creswell, 2003). Given that the researcher plays such an integral role in the research process as well as the interpretation of the results, the reflective process is an important part of conducting qualitative research (Creswell, 2003). Even qualitative descriptive studies, which are less interpretive and stay closer to the data, have an aspect of researcher interpretation of the data (Sandelowski, 2000).

Although I have not directly experienced the need for information and support related to cancer, my grandfather was diagnosed with locally advanced prostate cancer in 2009. My
grandfather lived with us and was a primary caregiver for myself and my sister, and even in our young age we in turn became caregivers to him. We attended appointments with him as translators and played an active role in helping him through his appointments and the treatments he received. My grandfather was a caring, funny, animated and loving man; however, he was also very stoic and rarely showed any feelings of pain, discomfort, sadness, or anxiousness. Fortunately, both of my parents are physicians, and therefore took over the role of information seekers and helped him throughout the decision-making process. Equally as important, they knew what to expect from the treatments my grandfather was receiving and were able to get a better sense of what he might be going through, even if he did not express it. It was because of this experience that I have an understanding of the struggles that men with prostate cancer can have with decision making, treatment side effects, and the role of information in the process.

In everyday life there are people accessing health information that is neither correct, credible nor reliable. With the use of social media for example, the spread of unreliable health information is as easy as the click of a button. I am lucky: having my parents as physicians meant that the information my grandfather, as well as my sister and I as family members, received was credible and reliable information. However, I am very aware that many people do not have this luxury, and thus I was drawn to studying how the access of correct, credible and reliable information can be improved through the role that physicians play in individuals’ lives.

Given my experiences, as well as the review of the literature on information needs of prostate cancer patients and the role that the physician may have in the reach and adoption of online health resources for credible sources of information, I did have certain assumptions and expectations of what I would discover within the interview transcripts. I did expect that the physician would play a primary role in increasing the reach of online health resources by referring their patients to them. From my search of the literature, I also expected that the physician, being a part of hospitals and other organizations, would have an important role in the organizational adoption of online health resources. However, I made every effort to ensure that I remained open to different experiences and
perspectives, while being aware that my past experiences and information I had gained throughout the research process may have given me certain biases that shaped the way I viewed and interpreted the interviews being analyzed.

VIII. Data Analysis – Secondary Analysis

1. Definitions

This study aimed to understand the role of the physician in the reach and adoption of online health resources. However, reach and adoption can take on several meanings within the contexts of RE-AIM and eHealth. Therefore, the definitions used during the data analysis for these two concepts will be outlined here.

In this analysis, reach was defined as it is in the RE-AIM framework when RE-AIM is employed as an implementation framework: the proportion and representativeness of individuals who will be using the program. In an implementation lens, this translates to the potential reach of the intervention, that is, factors that will increase the likelihood that individuals will use the online health resource (King et al., 2010). This encompasses barriers and facilitators to use of the intervention. These concepts tie into the eHealth definitions of reach as well – factors that facilitate the use of online resources.

Adoption however was a more difficult concept to define within the context of this study. This is because the definition of adoption varies from the way it is defined within RE-AIM and within eHealth. In this study, the focus was on exploring the role that the physician plays in the institutional uptake of online health resources – taking the definition of RE-AIM. However, adoption as it is described within eHealth was not to be ignored. Therefore, aspects of patient uptake, as well as physician uptake of and compliance to online health resources were also explored.

2. Methods of Analysis
The analysis used a hybrid of inductive and deductive coding methods. The hybrid inductive/deductive coding method allowed the author to complement the deductive thematic analysis by allowing the integration of themes that emerged from the data using the inductive coding method (Feredey and Muir-Cochrane, 2006). It was known that the Theory of Planned Behaviour (TPB) was used to guide the interviews, and therefore it was expected that themes and subthemes of the TPB would be found within the data. The TPB was therefore used as a deductive coding framework. However, it was not clear at the start of this analysis whether the constructs of the TPB corresponded with the perspectives and determinants of the intentions of individuals to use an online health resource, given that the questions asked did not correspond exactly with the research question of the secondary analysis. Therefore, it was appropriate to use an inductive descriptive analysis in addition to the deductive process to ensure all factors related to the research question were fully explored.

The data was first assessed for fit, in order to ensure that it provided information to address the research question. Interview transcripts were read and re-read to verify familiarization. The research team met several times to ensure appropriateness and fit of the data to the research question, as well as to share early interpretations of the data with regards to the research goals. Transcribed data were downloaded into NVivo 10.0, a qualitative software program used for data management, organization and analysis.

The deductive approach used an a priori template as outlined by Crabtree and Miller (1999). This involved using a template in the form of codes from a codebook as a way to organize the text for the ensuing interpretation of the data (Crabtree and Miller, 1999). Codes are descriptors that are given to words, phrases or paragraphs that relate to each other through context and content (Graneheim & Lundman, 2004). The chart shown below (Figure 2) represents the coding stages as described by Crabtree and Miller (1999).
The coding process was influenced by the theoretical concepts of the TPB as well as the research question; however, constructs of the TPB were not used directly as a codebook, and were not imposed on the data if they did not fit. The data was closely re-read line-by-line, while highlighting and labeling sentences and paragraphs with a code: this was stage 1 and 2 of the deductive coding phase. This process was deductive; although the constructs of the TPB were not explicitly used, they were always in mind and guiding the analysis. Patient transcripts were coded first, followed by health care provider interviews. Although the codes from the deductive phase were already starting to connect and themes
were being identified, it was thought best to determine the themes only after the inductive coding was complete.

Qualitative thematic analysis was the strategy used as the inductive method in this qualitative descriptive study. Thematic analysis searches to find themes that emerge as being important to the description of the phenomenon being studied (Daly, Kallehear and Glikzman, 1997). Sandelowski’s (2000, 2010) guide of qualitative description was followed. Descriptive coding was conducted using exploratory methods in order to permit open-ended investigation of the data (Saldana, 2014).

In each of the study populations, the coding process was iterative rather than linear, and a constant comparison method was used. Although this method is more common in studies using grounded theory, it was found to be an important tool as we had a variety of perspectives and populations within our sample. The codes were therefore compared within the same sample (patients vs. patients; health care provider vs. health care provider), as well as across study populations (patients vs. health care providers). This allowed the researcher to detect similarities and differences in perspectives across the interview populations.

Although the data was not independently coded by two members of the research team, a member of the research team who was close and comfortable with the data from the previous analysis was often consulted in order to assess the codes and ensure their validity and prevent any biases that may arise from a single researcher influencing the findings (Giancomini & Cook, 2000).

Once the codes from both the deductive and inductive coding were developed, they were compared based on differences and similarities and sorted into three overarching categories. Within these categories, themes were identified, sorted and formulated. Themes contain data that are recurring within categories, or crossing categories (Polit & Hunger, 1999). Each theme was also later classified and interpreted according to the elements of the TPB.
IX. Quality and trustworthiness of research findings

Quantitative research prioritizes internal and external validity of the research study; assessments of qualitative research are not so black and white. Indeed, there is a longstanding debate as to whether qualitative research can or should be assessed according to the same criteria as quantitative research. There are some who advocate that qualitative research cannot be scrutinized according to quantitative measures of validity, generalizability and reliability (Mays and Pope, 2000). Validity refers to whether the research is true to the reality of the event; generalizability focuses on whether the findings can be applied to a wider population than that which made up the sample of the study; reliability refers to the extent to which the findings can be reproduced by repeating the same study procedures (Mays and Pope, 2000). Given the belief that these quantitative measures and definitions cannot be used, different criteria for evaluating the quality of qualitative research have been identified, focusing on concepts such as credibility, dependability and transferability: credibility is defined as the degree to which the phenomenon under study is accurately described; dependability refers to consistency within the data analysis; transferability is the extent to which the findings from one study can be transferred to other settings (Lincoln and Guba, 1985). However, others argue that qualitative research can be evaluated with the same standards and criteria used by quantitative methods to assess construct validity, internal and external validity, as well as reliability (Sparkes, 2001).

Hammersley (1990) postulates that concepts and techniques used to assess qualitative research should be appropriate for the aims of the research, and that those assessments should be tailored for qualitative research depending on the goals of the research. For example, given that qualitative research focuses on the thoughts, feelings and experiences of individuals, generalizability as it is defined through quantitative would not be appropriate to use, nor would it be useful. Hammersley’s (1990) views are in keeping with the orientation of pragmatism, whose tenets are that qualitative research is not committed to a single system of philosophy.
Several strategies were used in order to ensure credibility and trustworthiness of the research findings. First, the description of the methods, interests and assumptions of the researcher allow readers of the study to judge the way in which the conclusions were drawn and therefore evaluate the trustworthiness of the findings. Furthermore, frequent consultation with other members of the research team who were close to the data reduced the risk that personal biases the author may have had were introduced during the analysis of the data. The deductive/inductive hybrid method of data analysis ensured that the TPB was not forced onto the data, allowing themes that did not fit within the TPB to emerge through the inductive process of analysis. This provided the research and the methodology with additional rigour (Fereday and Muir-Cochrane, 2006), and contributed to the authenticity and trustworthiness of the results (Tobin and Begley, 2004). Having various perspectives (patients and health care providers) and using constant comparative methods also added rigour to the analysis (Glaser, 1965; Boeije, 2002; Neergaard et al., 2009).

X. Ethics and Human Participant Protection

a. Ethics Approvals

The University Health Network (UHN) Research Ethics Board (Appendix 2a) granted ethics approval for the primary study.

Ethics approval for the secondary analysis was granted by both UHN’s Research Ethics Board through an amendment of the original REB approval (Appendix 2b), as well as by the University of Toronto Research Ethics Board (Appendix 2c).

b. Human Participant Protection

Evaluation of Risks/Discomforts/Benefits

There were minimal risks involved in this study. Possible risks may have included discomfort with sharing opinions with the research staff conducting the interviews. Participants were reminded that they could withdraw from the study at any time and were also made aware that their participation in the study had no effect on the care provided to
them. Participants were made aware that they would not receive direct benefits as a result of participating in the study. Participants took part in a user-centered design process where they were told that their input would shape the development of a resource that they may be able to use at a later time to improve their access to information and support, to enhance self-management in prostate cancer care.

**Data Safety and Monitoring**

All information obtained during the study was held in strict confidence. Neither participants’ name nor identifying information was used; they were only identified through a coded identification number. The master list linking the participants’ names to the unique identifier could only be accessed by the project team. The data were kept in a locked cabinet in the research associate’s work space and was only be available to the project team. Electronic data (including audio recordings) were stored on a secure server that is password protected. The information would be kept for 25 years and destroyed in accordance with policies of the University Health Network.
RESULTS
Characteristics of Study Participants

A total of 16 patients were recruited in order to obtain a sample with adequate variation across relevant characteristics, (e.g. time since diagnosis, cancer stage, treatment type, internet use, geographic location) continuing recruitment until saturation was achieved. Five health care providers from various backgrounds were recruited, giving different perspectives from different areas of expertise. A health librarian, health promotion specialist, urology floor nurse, radiation oncologist and a palliative care physician were interviewed.

Demographics collected for patients included age, highest level of education, time since diagnosis, disease stage, cancer treatment trajectory, cancer treatments received, language spoken, location and internet use (see table 1). Demographics collected for health care providers only included their profession (see table 2).

Table 1 – Patient demographics

<table>
<thead>
<tr>
<th></th>
<th>Patients (n = 16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age range</td>
<td>58-83</td>
</tr>
<tr>
<td>Median Age</td>
<td>69.7</td>
</tr>
<tr>
<td>Highest level of education</td>
<td></td>
</tr>
<tr>
<td>Less than High School/Other</td>
<td>1</td>
</tr>
<tr>
<td>High School</td>
<td>4</td>
</tr>
<tr>
<td>College/University Degree</td>
<td>6</td>
</tr>
<tr>
<td>Graduate/Post Graduate Degree</td>
<td>5</td>
</tr>
<tr>
<td>Relationship status</td>
<td></td>
</tr>
<tr>
<td>In a relationship</td>
<td>13</td>
</tr>
<tr>
<td>Not in a relationship</td>
<td>3</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
</tr>
<tr>
<td>1-6 months</td>
<td>5</td>
</tr>
<tr>
<td>6-12 months</td>
<td>2</td>
</tr>
<tr>
<td>12-24 months</td>
<td>1</td>
</tr>
<tr>
<td>&gt;24 months</td>
<td>7</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
</tr>
<tr>
<td>Disease stage</td>
<td></td>
</tr>
<tr>
<td>1 &amp; II</td>
<td>2</td>
</tr>
<tr>
<td>III</td>
<td>1</td>
</tr>
<tr>
<td>IV</td>
<td>3</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---</td>
</tr>
<tr>
<td>Uncertain</td>
<td>9</td>
</tr>
<tr>
<td>No response</td>
<td>1</td>
</tr>
<tr>
<td>Cancer trajectory</td>
<td></td>
</tr>
<tr>
<td>Undergoing treatment for initial diagnosis of PC</td>
<td>3</td>
</tr>
<tr>
<td>Completed of tx</td>
<td>5</td>
</tr>
<tr>
<td>Undergoing tx for disease recurrence</td>
<td>4</td>
</tr>
<tr>
<td>Palliative Care</td>
<td>1</td>
</tr>
<tr>
<td>Watchful waiting</td>
<td>2</td>
</tr>
<tr>
<td>Awaiting surgery</td>
<td>1</td>
</tr>
<tr>
<td>Treatments received</td>
<td></td>
</tr>
<tr>
<td>Androgen Deprivation Therapy</td>
<td>5</td>
</tr>
<tr>
<td>Brachytherapy</td>
<td>5</td>
</tr>
<tr>
<td>Radiation – External beam</td>
<td>2</td>
</tr>
<tr>
<td>Surgery</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>2</td>
</tr>
<tr>
<td>TURP</td>
<td>1</td>
</tr>
<tr>
<td>Prednisone+Abiraterone</td>
<td>1</td>
</tr>
<tr>
<td>First language</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>13</td>
</tr>
<tr>
<td>French</td>
<td>1</td>
</tr>
<tr>
<td>German</td>
<td>1</td>
</tr>
<tr>
<td>Chinese</td>
<td>1</td>
</tr>
<tr>
<td>Location</td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>10</td>
</tr>
<tr>
<td>Rural</td>
<td>6</td>
</tr>
<tr>
<td>Internet use (range hours/week)</td>
<td>1-17</td>
</tr>
<tr>
<td>Internet use (mean hours/week)</td>
<td>8.6</td>
</tr>
<tr>
<td>Internet use for health (range hours/week)</td>
<td>0.25-1</td>
</tr>
<tr>
<td>Internet use for health (mean hours/week)</td>
<td>0.76</td>
</tr>
</tbody>
</table>

Table 2 – Health professional demographics

<table>
<thead>
<tr>
<th>Profession</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiation Oncologist</td>
<td>1</td>
</tr>
<tr>
<td>Health Promotion Specialist</td>
<td>1</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---</td>
</tr>
<tr>
<td>Health Librarian</td>
<td>1</td>
</tr>
<tr>
<td>Nurse/Urology Clinic Coordinator</td>
<td>1</td>
</tr>
<tr>
<td>Palliative Care Specialist</td>
<td>1</td>
</tr>
</tbody>
</table>

The results of this qualitative analysis brought to light several themes that help explain the role physicians play in helping patients access and use online health resources. Themes and subthemes were related to the TPB through various mechanisms that will be further discussed within the discussion section. The following themes and subthemes were found through the analysis of the dataset:

I. Reach
   a. Accessibility of Online Health Resources

II. Patient Uptake of Online Health Resources
   a. Credibility
   b. Awareness of Online Health Resources
   c. Other Referrals

III. Physician Uptake of Online Health Resources
   a. Ease of Use of Online Health Resources - Implementation and Physician Adoption of Online Health Resource
   b. Health Care Provider Views on Physician Referral
c. Responsibility

**I. Reach of Online Health Resources**

Reach was found to be a main theme within the interviews. It was described through accessibility, in terms of presentation of the website and access to resources. The role of the physician in the reach of online health programs was also discussed as being valuable.

a. Accessibility of Online Health Resources

Accessibility of online health resources arose frequently, and is an important aspect of program reach when it comes to online health resources. Reach is defined as the proportion, characteristic, and representativeness of individuals who are using the online health resource. Participants described that an online resource that is inaccessible will result in lower reach and uptake. Topics of presentation, target populations, and language accessibility were discussed throughout the interviews.

**Presentation of Online Health Resources**

When it came to the presentation of the online health resource, it was described that the website needs to be attractive and easy to use. The idea portrayed in the quote below, by participant V18H, is that if the website is more pleasing to look at and intuitive to use, patients will be more likely to use it and to follow the information that is presented on it.

“I mean so what it really means, just like anything else in life, you can pick up a book and you can think, oh this is an attractive book I think I’ll read this, and you pick up the same book with a different cover, or a different typeset, or a different paper quality and say, this doesn’t really interest me as a book I’d read. So as human beings we’re very much influenced by presentation of data. The same thing, I mean, the same thing as individuals, if you go to see a therapist and you don’t like the way he presents..."
information you’re less likely to follow the advice. So presentation is very
important.” [Health Care Provider – radiation oncologist (V8H)]

**Target Populations and Language Accessibility**

The interview participants brought up other important aspects of the reach of online health resources. For example, participant V16H, a healthcare professional, examined the topic of targeting specialized groups, and tailoring information to them. According to this participant, it is essential to target the resource and the information to populations of people that will likely be using the online health resource. This should be kept in mind when designing the resource.

“Um because there’s – there is, um, a gap in – in knowledge and
information out there. I mean some of the knowledge might be available, but
then it’s not widely available or, um, to – to those population, and they’re
not really targeted.” [Health Care Provider – health promotion specialist
(V16H)]

Health professionals also raised the subject of priority populations. In this context, priority populations were referred to as the “hard to reach populations”, those of low socioeconomic status, individuals who may not readily have access to the Internet, or those who do not have adequate access to information and other services.

Additionally, health professionals discussed the topic of language. Language is a possible barrier to many individuals and potential online resource users. They spoke of the difficulties that arise when the patient does not speak the language in which the information is given through the portal. In this case, they would be unable to access that information and may rely on other family members to provide them with the information. Otherwise, reach of the resource may be limited.
“I think it would be good if you – if the actual website had, you know what I mean, like sort of, um, sort of the bigger languages, you know what I mean? Like if you had like the Mandarin or if you had the Portuguese, you know what I mean? Like, um, some of the subgroups that kind of went into this and they can click on that and follow their process through that.” [Health Care Provider – urology floor nurse (V34H)]

**Health Professional Engagement – Physicians’ role in increasing Reach**

Patients’ feelings about reach and adoption focused mostly on the importance of health professionals, specifically physicians, supporting patients’ use of the online health resource, through awareness, buy-in, and referral. The views of the health professionals mirrored the opinions of the patients. As conveyed in the quote below, health professionals stated that it is important to involve physicians both in the creation of online health resources as well as in their promotion. The health professionals discussed the importance of having the opinion of the physician when considering how to increase participation, as they are the ones who often have the most contact with patients and the clinic.

“So I think it has to be like, um, multidimensional, um, many different approaches, so just, uh, having it in the packages is a very very good start, but you need other ways of actually promoting this, and you almost need the buy-in of the professionals as well.” [Health Care Provider – health promotion specialist (V16H)]

“So ask them, um, maybe ask those professionals how do you think we should get this information out, how are we gonna increase the participation of this. They will know because they’re in the clinic, they know their patients.” [Health Care Provider – health promotion specialist (V16H)]
Physicians therefore can have an important impact on the reach of programs, and their insight is a valuable addition to promotion strategies.

II. Patient Uptake of Online Health Resources

a. Credibility

Credibility was a theme that was very often expressed by patients. Credibility in health care providers, as well as credibility in the online health information itself were discussed during the interviews. When it comes to online health resources, patients view the role of the physician as an expert who can add credibility to the resource. Patients used credibility to explain the reasoning behind the importance of physician referrals, as well as general use of online health resources to obtain information about their health.

Credibility of the Referring Source

i. Credibility of the Physician as a Referring Source

Credibility was a common theme used to explain why physicians’ opinions and referrals are important to patients. As described by patients, the credibility of physicians comes from the physicians’ knowledge, experience, and expertise in their disease and treatment. Patients believe that physicians have a certain objectivity, lack of bias and detachment that a family member or a friend may not have. Therefore, it is believed their opinions can be more reliable. Patients further conveyed a lack of trust in lay individuals sharing information on forums and other means of communications, as those individuals will generally use such platforms to discuss personal experiences that do not always align with their experiences. As such, many patients described wanting to get information directly from their doctors. In fact, certain patients indicated that they only had trust in their physician, and did not want information from any other source. This includes any Internet resources, such as support groups, online forums, and other sources or means of sharing information. For those patients, physicians were the primary and only reliable source for all of their health-related information. These findings show how important the physicians’ opinions are, in particular when it comes to patient resources. As these quotes
demonstrate, patients hold the physician’s opinion at high value, and if a member of their health care “gang” (team) states that a resource is credible they will count on that:

“And know that it’s credible, so I don’t even have to worry about it because you know, if-if your uh, your gang says that this is um, is credible, and I could probably just take it on face value that it is.” [Patient Interview (V12PG)]

“So you obviously trust the information that you get from – from [ASSIST Team Member] and other physicians” [Patient Interview (V6PD)]

Patients described the difficulties of sifting through the vast amount of information that can be found online. They explained that receiving recommendations of online resources from their physicians not only allowed them to have confidence in the websites, but this referral also saved them from having to filter through websites whose credibility may be questionable. Patients are often wary of information that is found online, not knowing whether the information they are reading is correct and trustworthy. They expressed that hearing about an online resource from their physician would give them the confidence to trust the information on that website, and therefore increase their likelihood to use the resource. If the patient trusts the physician’s advice, then they will be more likely to use the resource that doctors say is credible. The following quotes are taken from patient interviews, and demonstrate patients’ difficulties related to finding credible resources:

“Well I think the reason I put it at that level is a matter of trust, and not really knowing, uh, I mean there’s – you just never know as you’re well aware, of what you’re reading on the net, whether it’s correct or whether it isn’t. Now were that a site such as what we’re sort of discussing here, one that in my mind would be 100% trustworthy, well then that number [level of trust] would definitely go up pretty close to the top.” [Patient Interview (V20PK)]
“I found everything from: ‘maybe you should buy a plot’ to ‘maybe you should try my pickle juice recipe’, uh to some valid information, but I – I found that I was never quite comfortable with any of the resources I looked at. Many of it was couched in medical language that I didn’t really understand, uh, I would have uh really died to have found a site that I could trust and knew that the information was valid” [Patient Interview (V20PK)]

“My surgeon kind of cautioned me against um, um, too much online research or at least too much unaccredited research, to be careful with what I’m – cause, you know, a lot of advertisements exist and things like that, so you’ve gotta be able to weed through what’s an ad and what’s information.” [Patient Interview (V17PH)]

Furthermore, many patients communicated the feeling of being overwhelmed with the amount of online health information. Patients conveyed that going through the plethora of information that can be found online is both time consuming and adds stress to their information seeking. They spoke about not being sure whether what they are reading is trustworthy information. The quote below describes the expression that if a physician provides them with a resource, they would be more comfortable with the information, and it would save them time and stress.

“‘To narrow down the research, that would be uh, very helpful’”. [Patient Interview (V1PA)]

**ii. Credibility of Online Information provided by the “lay Person” or the “non expert”**

Opinions on whether to trust the information and experiences of lay people through the use of forums and other online tools were mixed. Some patients participate in discussion boards and other online forums and find this helpful during their healthcare journey. However, many struggle with the information provided by lay people, other patients, or friends and family members. These patients prefer obtaining answers to their questions
by an expert in the field. Given that the physician is seen as the expert, patients would rather acquire all health-related information from them, rather than from other, “non-expert” individuals:

“I’d be more than happy if I could ask questions of a – of an expert, you know, in the field rather than individuals.” [Patient Interview (V3PB)]

As is described by patient participant V6PD below, some patients believe that health-related information coming from non-experts can be biased, and does not always reflect the patient’s own experiences when it comes to their disease. They find that that type of information is not useful information to them:

“I find friends and relatives sometimes give you advice that’s not necessarily useful” [Patient Interview (V6PD)]

Patients place a high level of importance on the opinions of physicians. Physicians give patients the confidence to use a resource, as they add credibility to both the resource, as well as the information that is provided by the resource.

Indeed, when answering the question on how they would like to be referred to the program, the majority of individuals responded that their preferred way of obtaining such information would be directly from the physician. Given that these interviews were done within the realm of prostate cancer, the types of physicians that patients spoke about during these interviews included family physicians, oncologists, and urologists, as is explained by participant V6PD:

“Either my family doctor or my – at least I think someone who is diagnosed with cancer would have at least three doctors to go to. Your family doctor, the urologist, the oncologist […]. So the three of them will at least give you something to – to get you started.” [Patient Interview (V6PD)]
Patients also gave suggestions on how they think the physicians should communicate their recommendations of online health resources. The majority of patients stated that being handed the resource, whether through a pamphlet or brochure, or simply a business card with the URL written on it would be more helpful than the patients themselves having to write it down. For example, the following two patient participants explained when, how and from whom they prefer to get their recommendation of online health resources:

“Yeah, if they had some little pamphlets or something they could give you on say [INAUDIBLE] you’ve got questions, um, ask me but here’s – here’s an online resource you can also use that we recommend, you know.” [Patient Interview (V29PS)]

“When you went to see the specialist I would think would be the best time, and he could just hand you a pamphlet and – which would give you the website, the directions, I would think that would be the best.” [Patient Interview (V3PB)]

Credibility was described to be an important factor in the trust that patients have in their physicians. Patients have trust in the knowledge, experience and expertise of physicians; they attach high value to the recommendations that physicians make, due to their perceived credibility.

_Credibility of the Information Source_

In addition to the importance of the trustworthiness of the referring source, patients also talked at length about the credibility of the organization or author behind the information and the message itself. The source of the information also has a critical part in the trustworthiness of information.
i. Recognizing the Institution

Patients want the information they receive from online sources to be unbiased, substantiated, and reliable. Patients expressed that when they recognize the names of agencies and institutions providing websites and information, they are more likely to use them. Institutions such as BC Cancer Agency, Prostate Cancer Canada, Johns Hopkins, American Cancer Society, Canadian and American Urological Associations, Mayo Clinic and other University websites were amongst the commonly cited sources seen as reliable by patients in this study (experiencing prostate cancer). As described in the following quotes taken from patient interviews, when the information comes from an institution that is considered reputable, the patients view this information as valid. Patients describe these websites as “official”, “reputable”, “valid”, “reliable” and “accurate”.

“So basically – or if it was, you know, American Cancer Society – you know I can’t remember exactly what it was called but if it was a name that I recognized as a large national cancer society or – or group like that, I started actually – or a university like UBC or something, but I stopped actually bothering with a lot of sites that I didn’t, like I didn’t really actually recognize who they were or who they were attached to.” [Patient Interview (V12PG)]

Further, patients emphasized that when physicians specifically gave them a website or resource, they took that information as trustworthy and followed the physician’s suggestion. Physicians therefore instil credibility in a particular source, such as an organization or university, by vouching for the source. For example, one patient described the role that their physician had in their use of particular websites and resources:

“My doctor, my urologist [Dr. NAME REMOVED] restricted my reading to uh, American Urological Association and Canadian Urological Association, Johns Hopkins and um, Mayo Clinic.” [Patient Interview (V18PI)]
Recognizing the institution that provides patients with resources, and having physicians vouch for the source of the information is therefore important in giving credibility to the resources.

b. Awareness of Online Health Resources

Awareness of the online health resources was described as an important aspect of program reach and adoption. Patients spoke to how their social networks, friends, and media outlets impacted their use of online health resources during their cancer experience.

**Patient Social Networks**

Health and disease is a common topic of conversation, even outside of the medical encounter. Although patients stated that they prefer to get information regarding their health directly from their doctors, they also discussed other means of receiving health-related information and resources that they come across in day-to-day life. This includes information from the media, friends and family members as well as other social networks like support groups.

i. Media influence

Some patients described receiving information about their health through mass media public health campaigns or advertising on public radio and the news on television. Although this information was not directly related to online health resources, it did demonstrate the impact that media can have on patient decision-making. One patient described making a decision about treatment options for his prostate cancer based primarily on what he was exposed to through the media:

“I had been vaguely aware for many, many years about brachytherapy and the different treatments for prostate cancer. I was peripherally aware from basically the media [...] I knew what brachytherapy was and I know I
wanted it just – just – just from, as I said, peripheral information that one absorbs during the year.” [Patient Interview (V23PM)]

This example shows how important media outlets can be to promote health related information, and therefore could also be used to raise awareness of online health resources to individuals.

**ii. Encouragement from “Non-Expert” Individuals**

As previously discussed, some patients did not always feel comfortable with health information that they read online or that they receive from “non-experts”. However, patients described how this type of “non-expert” opinion and information is present in everyday life; patients often have someone within their friend groups who has been through a similar experience, either with prostate cancer or with another type of cancer. Some patients recounted sitting down with friends and talking about their various experiences, sharing stories and resources amongst them. These were friends from various different social groups, including neighbors, cycling groups, and contacts from the cancer lodge. It was mentioned that relatives often will give their opinions, and will also seek out information and resources to share with the patients. For example, a patient that came from Germany conveyed their experience with exchanging resources used by their friends in Germany, suggested by their doctors, and sharing cross-cultural information and resources amongst them in order to not “miss anything” (Participant V14F).

“We have lots of friends and family, we have lots of friends and they have some experience, not necessarily with this kind of cancer but with different kinds of cancer, like off in Germany and they would ask their doctors and get – so they’re collecting information and that you don’t miss anything, and then [participant’s spouse] and me come from the doctors, and we sit down and we talk about it, what road to go and then we go for it.” [Patient Interview (V14FF)]
Individuals, groups and networks can have an influence on the patients, and their choice of resource to use. Some patients also described receiving information about health resources from support groups that they attend. In the support group meetings, patients will often share experiences of their disease. Patients described that information related to where to stay while getting treatment (for patients residing outside of the city where they were receiving treatments), treatments decisions and associated side effects, as well as online resources they have used, were discussed in the support group meetings. Patients often found this information helpful. Patients rely on peer and lay sources for information to expand their awareness of resources, however they rely on more credible sources such as the physician for advice and direction.

c. Other Referrals

Alongside recommendations from physician, family and friends, and media outlets, other methods of promoting the resource were discussed. These included posters, brochures, and other forms of public advertisement. Both patients as well as health care providers recommended these options. Many participants believed that the best way to promote online health resources is through multiple points of contact, in order to ensure that the message gets across and that individuals can be made aware of the resource. The following quote from a patient participant conveys this point:

“I mean I can’t think of sort of one way that’s going to be the magic bullet, I think ultimately it’s a multiplicity of different ways, and it’s probably, um, emphasizing on repeating. So it’s not just like a one time, hey did you know about this resource, and then it never gets mentioned again.” [Patient interview (V2FA)]

As one of the study participants was a health librarian, the role of the library as a means to get information about health programs to patients was discussed at length. The individual mentioned that librarians will gather resources that they find relevant and reliable and mount them on the library website homepage for patients to be able to
access. The librarians themselves will also refer patients to websites and resources or provide them through other means such as on bookmarks. Librarians therefore constitute an important resource, both for information for patients, as well as spreading the knowledge about resources.

III. Physician Acceptance of Online Health Resources

a. Ease of Use of Online Health Resources - Implementation and Physician Adoption of Online Health Resource

Within the cohort of individuals who participated in this study, there were a number of health care providers with a variety of specializations in the fields of health promotion and health education, including a health librarian and a health promotion specialist. There were also clinical specialists such as a nurse, a radiation oncologist, and a palliative care physician. Questions around how best to promote and implement programs arose both within the patient cohort, as well as during the interviews with these health care providers. Based on the expert opinions of the health care providers, as well as the patients’ views, the following trends were found describing the adoption of online health resources by the physician into the clinical care they provide.

When it comes to the adoption of an online health resource, interview participants with expertise in health promotion and health education brought several issues to light. For example, in order for physicians to adopt and promote online health resources to their patients, it must be as easy as possible for the health professional to integrate it into their workflow:

“Um, usually a barrier, um I would say is, you have to make it, how should I even frame this, you have to make it easy as possible for the actual health care provider to integrate, so, it can’t be a very huge long cumbersome process where they have to sit there for, you know, half an hour explaining this tool to the individuals, there has to be kind of an easy way.” [Health Care Provider – health promotion specialist (V16H)]
It was explained that health care providers have limited time to spend with patients during their appointments, and therefore may not have enough time to go over resources that would require explanation. Physicians must often prioritize their time during appointments and encounters with the patients, putting more emphasis on things directly related to the clinical case such as treatment plans, medications and side effects. Therefore, an online health resource must be simple with easily understandable language, on a platform that is accessible if a health professional is to explain the concept, promote it to patients and adopt it. The importance of having information that is simple to have on hand in the clinic was also alluded to; for example, a postcard that includes the website information that can be provided by the physician and also found in the offices (e.g. waiting room).

Although *ease of use* was found to have a critical role in the physician *adoption* and integration of online health resources into their practice, neither patients nor health care providers spoke directly to the role of the physician in the *institutional adoption* of online health resources.

b. Health Care Provider Views on Physician Referral

Health care providers shared similar views with the patients – that it is ideal to have the physician hand out and refer information resources to their patients. Although they did generally agree that the best way to give information resources to patients is during their medical encounters, health care providers, and physicians especially, expressed certain concerns with this approach.

The physicians that were interviewed agreed on the benefits that an online health resource could have for patients. However, they also stated that they believe their patients are often already overwhelmed by information they receive during their appointments, and giving them more information may not help them but could in fact make them feel more anxious.
“Sure, I mean I – I think that – I think that, um, just because I haven’t to date doesn’t mean there isn’t a – that it wouldn’t be useful. I think that – like there are sometimes paper resources that I give people, and – and I think sometimes frankly people are actually overwhelmed with information when I’m seeing them and so sort of giving them a website to say oh here’s more information. But certainly that can be a resource for them when they are ready to access information.” [Health Care Provider – palliative care physician (V15H)]

It was also suggested that this resource be incorporated within other existing resources. For example, when giving a pamphlet about radiation therapy, the TrueNTH website could be included in the existing pamphlet, for patients to seek out additional information when they are ready to do so. Another option proposed was to collect e-mail addresses from patients, and connect with them through e-mail, providing them with information about the program through electronic means.

c. Responsibility

A common theme that arose in the transcripts was that of responsibility. Both patients and physicians expressed what they feel are the responsibilities of physicians, as well as patients in regards to online health resources. The perspectives were not, however, altogether consistent.

As this analysis has shown, patients place a high degree of importance on physicians’ opinions and recommendation. Further to this finding, during the interviews, most patients stated that they expect physicians to refer them to online health resources, conveying that it is the physicians’ responsibility to do so. The patients themselves expressed that they do not know what to look for when searching online– that they often get overwhelmed with the amount of information and deciding what is relevant and what is not.
Many patients also stated that given their expertise, physicians know what information is valid and pertinent, and therefore should provide patients with that information and those resources.

However, one patient made a noteworthy remark, relating to the cultural change that is occurring within the health system regarding roles and responsibilities. He discussed how in the past, the focus was on what the doctor told the patient. Increasingly, he explained, patients are taking responsibility for their own health and are often very involved in making decisions for their health – the doctor acting as more of a guide through their illness. This individual rationalized that it is for this reason that the Internet plays such an important role in today’s health culture.

As described in the quote below, health care providers perceive that older patients might not want to take initiative in their care and in searching online for information. This is especially pertinent in prostate cancer, as patients are generally part of an older demographic. This is where the role of the physician can become even more important, as those patients will put even more weight on the physician’s opinion and referral.

“A lot of patients don’t want to self-manage their – their cancer care, you know what I mean? So we still find that a lot of the population wants to be directed, so it’s a small percentage that actually self-direct, you know, their care. So within that I think it’s more the younger generation that you kinda look at where, um, they – they – they’re more consumers as opposed to a little bit of the older population that sort of says this is what, um, the diagnosis is and this is – the doctor says I should go with this and I’m gonna go.”

[Health Care Provider – floor nurse/clinical care coordinator in urology department (V34H)]

In contrast to what patients expressed in regards to how they would like to hear about online health resources, those health care providers interviewed described that patients do not often ask them for online information resources, and therefore they have not referred
them. For example, as described in the following quotes, participant V8H and V15H both expressed that they do volunteer information about online resources for their patients but wait for them to ask if they want such information:

“Um, I suspect the ones that have done their own research have already found what they’re looking for, um, and I’ve never had anyone actually ask me directly for where to – I mean they’ve asked me general questions like about health information or using the Internet, and I answer it in a general fashion about using sites which [are] reputable”. [Health Care Provider – radiation oncologist (V8H)]

“I think if they’re looking for information I could point them to where they might find reliable information but would I say oh yeah, this person had a bowel obstruction and – and describe what it means and say if you want to read more about it go here, probably I’d do it more if they asked me, but I probably wouldn’t, um, volunteer” [Health Care Provider – palliative care physician (V15H)]

In these discussions, physicians also spoke about how patients’ preferences can sometimes be divergent from physicians’ opinions and this can be the reason why they do not offer information about online health resources. In the physician’s opinion, the patients will likely find the information that fits their needs regardless of what the physician believes, and at the end of the day it will be the patient who decides. On this point, participant V8H expressed the following example:

“Steve Jobs. Yeah so why did he decide to use alternative methods to treat his cancer and then die? I mean he didn’t – it wasn’t because he wasn’t intelligent enough, or able to distinguish good data from bad data, or that he didn’t have access to good data, he chose that, that was his choice. He has a reason to choose that particular piece of information because it fitted his needs, or wants, or whatever at that point in time. So I think people
choose data based on their needs and wants. I mean you and I, the scientists or whatever, may not think it’s credible, but that’s their choice.” [Health Care Provider – radiation oncologist (V8H)]

When speaking about health care providers’ responsibility to refer patients to online health resources, scope of practice was a theme that came up multiple times. Physicians stated that they were primarily concerned with their patients’ diseases and how to effectively treat them, and therefore their priorities rested predominantly with planning and executing treatments, and tracking the state of their patients’ disease. The physicians interviewed felt that referrals to social support or educational resources should fall within the responsibilities of other health care providers: nurses, health librarians, social workers, etc. For instance, participant V8H expressed:

“It wouldn’t necessarily have to be me that [introduces them to the resource and explain its use and the options], and I would hope that the institution would have a resource available to support patients and guide them through the process.” [Health Care Provider – radiation oncologist (V8H)]

At the same time, some health care providers emphasized that patients’ complete health and wellbeing is of their concern, and they expressed that whatever is helpful for the patient is of interest to them. In the opinion of these health care providers, if a resource is helpful for patients, then it is also valuable for physicians. As participant V8H said:

“At the end of the day what’s useful to me should be what’s useful to my patient. Like I’m only a tool, I’m – I’m not the one with the disease, it’s that individual that has the disease, he is the one that’s going to have to live with it and suffer the side effects of treatment and so on and so forth. I just personally interact with them at some point in the process of the prostate cancer, so it’s really irrelevant what – what I find useful, it’s what they find useful.” [Health Care Provider – radiation oncologist (V8H)]
Health care providers, including physicians, agree that physicians play an important part in patients’ health care decision making and information gathering. Although some physicians view themselves as tools to help patients get past their disease states, in general they do not view referring online health resources to their patients as part of their responsibilities. They also expressed that patients often feel saturated with information, and providing them with more information can make them feel even more overwhelmed. Physicians do not deny the benefits of credible online health information and have the view that whatever is helpful for their patients is also helpful to them. However, they also stated that it is not in their scope of practice but rather falls within the responsibilities of other health care providers such as social worker or those specialised in health promotion.
Discussion
Prostate cancer and its treatments can be physically and psychosocially traumatic and debilitating, and these effects can be long-term, given the increasing survival rates among prostate cancer patients (Sanda et al., 2008). The Internet provides a medium for individuals to search for health information, and increase patients’ knowledge. It offers patients a place where they can find answers to questions, and it allows them to digest the large amounts of information at their own pace (Iverson et al., 2008). Informing themselves is an important strategy for patients to gain a sense of control over their diagnosis, to take an active part in their own care, and improve their day-to-day functioning (Wong et al., 2000; Cassileth, et al., 1989; Feldman-Stewart et al., 2000). Information and online health resources can therefore help improve the quality of life of patients, however, the information needs often remain unmet (Rutten et al., 2005; Boberg et al., 2003).

The TrueNTH Initiative seeks to bridge the gap in supportive care for prostate cancer patients by providing them with online support and education resources. The TrueNTH Initiative has the potential to make an important impact on the lives of prostate cancer patients. However, in order to do so, TrueNTH programs must be properly implemented. Implementation science seeks to understand the factors that promote the use and uptake of interventions that have been proven to be effective (Eccles and Mittman, 2006). It has been said that up to two thirds of implementation efforts fail (Burns, 2004). Therefore, the main goal of implementation science is to ensure that individuals reap the maximal benefits of interventions by easing the translation of evidence-based interventions into practice (Eccles and Mittman, 2006).

The objective of the secondary analysis was to understand the contextual aspects of reach and adoption and how they inter-relate through the role of the physician within the context of online health resources. The perspectives of patients as well as health care providers were explored through a secondary analysis conducted on semi-structured interviews. The interviews were part of the planning and implementation process of the ASSIST portal, a comprehensive site for reliable, relevant, and tailored information and support for Canadian prostate cancer survivors.
The TrueNTH initiative used the RE-AIM framework as a common evaluation framework throughout the jurisdictions in which it was implemented. The RE-AIM framework was also a core aspect of this research project, and a guiding framework throughout this work. Although the RE-AIM framework was initially constructed as an evaluation framework, it is applicable in all stages of research from planning to evaluation and reporting (Gaglio et al., 2013). In this context, RE-AIM was used as a tool for the planning and implementation of online health resources. Thus, the interest was in the potential reach and adoption of online health resources and what factors could have a positive impact on their use. In the context of this project, adoption was described not only as it is defined within RE-AIM, but also in terms of the barriers and facilitators to the individual uptake of online health resources. Although the definition of adoption within an eHealth context encompasses aspects of long-term use and compliance, in the scope of this project these concepts were not necessarily relevant. This is because a resource such as a comprehensive site for prostate cancer information may not be conducive to long-term use, as the informational needs of patients vary throughout their healthcare journey. For example, some patients may only feel the necessity for a one-time information search at the time of diagnosis or treatment decision-making, whereas others may use online information resources on an ongoing basis (Flynn et al., 2006).

We were particularly interested in the role that the physician plays in the uptake of online health resources - promoting the uptake of the resource by patients. The results yielded three main categories of findings: reach, patient uptake, and physician uptake of online health resources. Within those categories, themes of accessibility, credibility, awareness, ease of use, and responsibility emerged.

This final chapter will discuss our findings by providing context and interpretations using previous research, theories, and frameworks. A discussion of the strengths and limitations of the study will follow, and the implications of this research will be described.
I. Reach of Online Health Resources

*Reach* was a main and overarching theme found throughout the analysis. *Reach* was often described through accessibility of online health resources for patients. *Accessibility* was defined in various ways. It was stated that in order for patients to use the resource, it must be presented in such a way that it looks and feels easy to use. This relates closely to the construct of perceived behavioural control within the TPB. According to Ajzen (1991), perceived behavioural control indicates individuals’ perceptions of how easy or difficult it is to perform a certain behaviour, in this case the use of an online health resource. Intent to use is a commonly studied area of adoption of innovations, specifically within eHealth. These findings also align with constructs of the TAM and UTAUT. Specifically, *ease of use, effort expectancy, and performance expectancy* relate closely to the construct of *perceived behavioural control*. Indeed, the data in this study suggests that when individuals perceive a resource to be pleasing to look at and easy to use, the intent to use it will be stronger. The TPB states that intent to perform a behaviour is directly related with the actual performance of the behaviour, meaning that increased intent to perform a behaviour increases the likelihood that the behaviour will in fact be performed (Ajzen, 1991).

*Accessibility* was also addressed through the lens of “harder to reach” populations; attention needs to be paid to populations that may not necessarily have access to the resources, either through lack of knowledge of the Internet, or language barriers. Within the TPB, “actual” behaviour control refers to the skills, resources, and opportunities that are available to the individual, which can each impact behaviour, in this case the use of online health resources (Ajzen, 1991). Thus, efforts must be made to increase the opportunities that patients have to become aware of and access online resources as well as decrease barriers to use such as lack of knowledge or skills to use the Internet effectively. Without providing patients with the proper opportunities, patients’ intent and ability to use the online health resource will be limited; it will be more difficult to achieve widespread *reach* of the resource. Indeed, it has been shown that the digital divide still exists, where inequalities that are associated with age, income, education and
socioeconomic status are linked to lower use of the Internet (Brady et al., 2016). Although “digital divide” seems like an out-dated term, it was found that even in developed areas such as California the digital divide in fact still persists, and healthcare providers must be part of the collaborative effort to narrow this divide (Nguyen, Mosadeghi & Almario, 2017). Access to the Internet as well as health literacy play an important role in online health seeking behaviour of individuals (Brady et al., 2016), and therefore attention should be paid to reaching ‘hard to reach’ populations as well. When it comes to “hard to reach” populations, for example those who do not speak English, actual behavioural control plays a significant role in the reach and use of online health resources (Ajzen, 1991). In order to surmount this barrier, one health care provider participant suggested translating the resources for commonly spoken languages in the country where the resource is being implemented. This could help in the reach of the program to those subgroups of populations who may be in need of such a resource.

II. Patient Uptake of Online Health Resources

Patient uptake of online health resources was found to be influenced by a number of factors including credibility, the influence of important others, as well as awareness of online health resources.

Credibility was the theme that was most commonly expressed by patients. Credibility arose in terms of the referring source, as well as the source of information; the physician was found to play a critical role within credibility. It is important for patients to know which websites to use, and be aware of those that are not recommended for patient use (Tabitha et al., 2003). Consequently, physicians need to be aware that patients are seeking information about their health online, and should direct patients to websites that they know are reliable and have up to date information (Ogah et al., 2012).

According to the TPB, attitudes towards a behaviour refer to “the degree to which a person has a favourable or unfavourable evaluation or appraisal of the behaviour in question” (Ajzen, 1991). Attitudes can have a significant impact on one’s actions or intentions to perform a behaviour. In several meta-analysis of studies using the TPB to
predict various health behaviours including smoking and alcohol consumption, it was found that attitudes towards the behaviour had the strongest relationship with intentions, and consequently with performance of the health behaviour in question (Cooke et al., 2016; McEachan et al., 2011; Topa and Moriano, 2010). In the case of credibility of an online health resource, physicians have a strong influence on patients’ attitudes towards health information and online health resources. Patients described that the credibility of physicians arises from their knowledge, experience, and expertise in the disease and treatment options. This view that patients have towards physicians relates to the idea of knowledge power (Raven, 1993). Knowledge power is a type of non-coercive power, and is the ability to convince another with clear logic, argument, or information based on having superior skills or knowledge (Raven, 1993). Knowledge power can enhance trust, and can be used to influence behaviour through helpfulness (Jain et al., 2014). Accordingly, patients suggested that if their physician informs them that a website is credible, they will trust that information because it is coming from a reliable, knowledgeable source.

Source credibility has previously been defined as “judgments made by a perceiver […] concerning the believability of a communicator” (O’Keefe, 1990, p.181). Three main factors have been associated with source credibility: expertise/competence, trustworthiness, and goodwill (McCroskey and Teven, 1999). It has often been reported that source credibility is a significant factor for individuals when it comes to their perception of reliability of online health information (Tu and Hargraves, 2003; Escoffery et al., 2005; Feathers et al., 2004; Nahm et al., 2004; Peterson et al., 2003; Stavri et al., 2003; Dutta-Bergman, 2003; Stella, 2003). Therefore, patients perceiving physicians as having expertise and being competent and trustworthy makes physicians a credible source.

Furthermore, when comparing the information patients receive from lay people on various platforms, such as forums and discussion boards, patients preferred obtaining answers to their questions from experts in the field. In a study investigating the trust and sources of health information, specifically for cancer information sources, it was found that physicians remained the most trusted source of information to patients (Hesse et al.,
 Patients also described wanting their primary source of information to be from their physicians (Hesse et al., 2005). This concept also spans further than the context of cancer care; Coulson and Knibb (2007) found similar results when exploring the use of online forums for individuals with food allergies. Although the participants described many advantages to using online forums to gain information, it was found that the only disadvantage expressed by participants was about the accuracy and trust in the information exchanged via the group bulletin board provided by laypersons. Similarly, the findings of this study showed that patients often found information from friends, forums and chat boards helpful, however they preferred information coming directly from their physicians.

Combining what is known about source credibility with the TPB’s description of beliefs and attitudes, it can be concluded that patients believe that physicians have the knowledge to appraise online health resources. This in turn leads to patients having a positive attitude towards using those resources that are promoted by their physicians. Those positive attitudes can then have an important impact on their use of the online health resources referred to by their physician. Credibility of the referring source, in this case the physician, therefore instils credibility in the resource itself, and can increase a patient’s intent to use an online health resource. The idea of credibility in the physicians, and the weight their opinion carries can, at first glance, be reminiscent of benevolent paternalism, where patients adopted a passive role and physicians have control over a patient’s health (Badcott, 2005). However, the importance of the physicians view and recommendation is not incompatible with patient-centered care concept fits within the scope of patient-centered care. Indeed, in patient centered care, the aim is for patients and physicians to work together. By providing their patients with credible resources, physicians are aiding their patients in becoming better able to take charge of their own health, making this a patient-centered approach (Thakkar, 2018). Indeed, it has been shown that even patients with high levels of perceived health literacy preferred having a shared role with the physician when it comes to decision-making. This was found to be due to the trust that patients had in their physicians. (Thakkar, 2018).
Attitudes towards the information source were also influenced by the credibility of the actual resource. Patients were more likely to use a resource that was familiar to them, or that they recognized. University websites, government websites, cancer agency websites, and other similar resources were more used than others. Patients found these “reputable” sources of information to be “unbiased”, “official”, “valid”, “accurate” and “reliable”. Recognizing the institution that provides patients with information and resources is therefore an important aspect of providing credibility to the resources. Indeed, the idea of “institutional quality” was described by Olaisen (1990) when it was proposed that the greater the institutional quality, the more credible and persuasive the information. It has previously been shown that institutional trust is crucial in increasing perceived behavioural control during the process of online health information seeking, and therefore increases the intent to use the Internet for health information (Xiao et al., 2014). Thus, it is important that the institution that hosts online health resources are seen as credible in order for the information provided through the resource can be seen as credible.

Along with the importance of attitudes, subjective norms can have a strong impact on individuals’ intentions towards behaviours and actions. In the frame of the TPB, subjective norms refer to the degree to which a person has influence on another individual’s behaviour (Ajzen, 1991), or the likelihood that important referents approve of performing a given behaviour (Ajzen, 1991). It relates to those whom one regards as important and what they think, and the motivation to comply with their beliefs and suggestions. Generally, the more positive the attitude towards and subjective norm regarding a behaviour, the stronger the intention is to perform the behaviour (Ajzen, 1991). Attitudes towards the behaviour are therefore closely linked with subjective norms. For example, in a study investigating the moderating effects of subjective norms on attitude and perceived behavioural control with regards to buying organic food, it was found that subjective norms significantly moderate the relationship between attitudes and organic food purchasing intentions (Abdullah et al., 2014). In the present study, patients viewed physicians recommending online health resources as the expression of a norm. This norm then in turn impacts their attitude towards using online health resources.
The idea of the impact of social norms was also discussed within the UTAUT model, as one of the four key constructs of technology acceptance and adoption (Venkatesh et al., 2003). The social influence construct focuses on the degree to which an individual perceives that important others believe they should use the innovation. When the use of an IT program is mandated, social influence is high and is significantly correlated with use of the program. However, when use of the program is voluntary, the “important other” can influence perceptions about the innovation, thus indirectly affecting use of the technology.

The “important other” within this study was the physician. Specifically, the importance of physicians’ recommendations and influences were discussed. When asked how a patient would like to obtain information about an online health resource, the majority of participants responded that they would like to be made aware of online resources directly by the physician. This could be through pamphlets or brochures, or even a business card with the website of the resource written on it. Patients stated that they would like to be given the option of searching for their questions online after the encounters with their physicians, and to be provided with a reliable and credible resource to do so.

To our knowledge, there are limited studies investigating the role of subjective norms alone on patient intention to adopt or use online health resources. Here, patients explicitly expressed their views on the impact that an influential or important individual has on their intention to use online health resources. The link between patients’ views on the subjective norms physicians hold and the intent to perform a behaviour is quite clear. This should be taken into account when considering implementation, dissemination and promotion strategies for the uptake of online health resources. By combining what we know from the UTAUT and the TPB, we can conclude from our findings that “the important other” can play an integral part in the use and uptake of online health resources.

Being referred to online health resources (by physicians or others) also serves to increase the awareness of the existence of online health resources. The theme of awareness is
relevant to the TPB in that being aware of the existence of an online health resource influences the patients’ attitudes and judgments, which in turn influences their intent to use the resource. Patients described various ways in which they had previously become aware of different information and online resources. Social networks, influences from the media, as well as encouragement from friends and family all played a role in their decision making and their use of resources. Individuals, groups and networks that patients come into contact with can therefore have an impact on their choice of information to follow or resource to use. Awareness has previously been shown to be an important aspect of health technology use. Bauer et al. (2017) undertook a study investigating patients’ views on their comfort in sharing health information through mobile devices, as well as patients’ awareness and use of portals. They found that patient awareness was a main factor in the use of patient portals, and health literacy limitations were associated with lower awareness of patient portals in family health clinics. Low awareness of health information technologies representing a significant barrier to use has been shown previously as well (Goel et al., 2011; Amante et al., 2014; Ronda et al., 2014). Investing in efforts to promote physician and patient awareness of patient-facing health technologies such as patient portals is clearly important. Combining different promotional methods such as posters and brochures in addition to physician referrals can provide a certain repetitiveness that helps promote online health resources, and make patients more aware of them. This in turn impacts the intent to use online health resources, and further increases the likelihood that patients will use them.

Indeed, it was stated multiple times during the interviews that in order to obtain maximal uptake of an online health resource, that resource should be promoted through multiple points of contact and through various different mediums. For example, posters, brochures, and public advertisements were all described as being useful in promoting online health resources, and combining them would reinforce their benefits and ultimately increase their uptake and use. Repetition was also described as an important factor in the uptake of online health resources, in the sense that patients felt that in order for them to use an online health resource, it needs to be described to them on several occasions. Repetition has been found to be an effective method when it comes to other
health related issues such as the uptake of adult preventative healthcare. In a systematic review examining the use of cue-automaticity interventions to improve the uptake of preventative dental visits, it was shown that applying repetitive behaviours, such as consistent cues provided by dental offices to their patients, can increase the uptake of preventative healthcare (Raison et al., 2018).

III. Factors Influencing Physician Adoption and Recommendation of Online Health Resources

Although ease of use was a main focus and theme within the scope of patient uptake of online health resources, it was also found to be a critical factor in the physician uptake and adoption of online health resources, as physicians will often use online health resources before recommending them to their patients. Online health resources need to meet certain criteria in order for physicians to adopt them, and subsequently refer their patients to them. Health professionals described a number of these criteria during the interviews. The most prominent example is the ease of use and simplicity of an online health resource. The same concepts of ease of use that have been described in terms of patient reach apply to physician adoption of online health resources: according to the TPB, TAM and UTAUT, the online health resource must be presented in such a way that looks and feels easy to use in order for physicians to refer them to their patients. Ease of use was expressed with regards to implementation and promotion: in order for physicians to adopt and promote an online health resource to patients, it must be easy to explain and simple to promote.

Although not directly addressed within these interviews, this concept of “ease of use” of the online health resource in order for physicians to recommend them to their patients expands into the concept of integration of the tool into health care providers’ workflow. Indeed, integration into physician work flow aids in making a lasting and wide-ranging impact within the existing health delivery system. There is often the perception that the use of electronic health systems takes time and effort compared to already established practices and procedures (Apkon and Singhaviranon, 2001). Although the results of this
study did not speak to the integration of online health resources into clinical practice, several studies have investigated the implementation of electronic medical records (EMRs) into usual practice. It has been shown that the integration of health information technologies within hospital is often multifactorial and can depend on varying characteristics of the healthcare institution in which the interventions are being implemented (Jena and Shah, 2018). The results of this study did not uncover aspects of integration into workflow of online health resources. Therefore, the question of integration of online health resources should be studied further. This could be done by exploring the perspectives of both physicians as well as health care management teams on how a resource of this type could be successfully integrated into the workflow of the physicians.

The health professionals in our study believed that it is important to involve physicians in the creation and promotion of online health resources. This was explained by the fact that physicians have the most contact with the patients in clinic, and therefore could have a more realistic view of what patients want and need. Physician champions have been shown to play a key role in the design and implementation of health information technology projects in hospital settings (Cohn, 2009). This is due to the fact that physicians are experts in the workflow, and therefore their input can increase the probability that other clinicians will use the health information technology (Cohn, 2009). While that study focused on physician-facing resources, the same can be said about patient-facing online health resources: having physician input can not only aid in the uptake of online health resources by the patients (they are aware of patient needs and therefore can provide the proper input), but also in the uptake by other clinicians.

Given the critical role physicians play in patient reach and adoption, they likely play a key role in institutional reach and adoption. Physicians play a central role within the hospital organization, as chief clinical decision-makers and care providers for their patients, as well as in their role of champions for innovation (Liehaber et al., 2009; Damschroder et al., 2009; Shaw et al., 2013). Hence the factors that will influence a
physician to accept and endorse an online health resource and refer it to patients will also lead to the organizational uptake of those resources.

Other factors such as timing and responsibility also arose throughout the interviews. Although physicians agreed with patients and other health care providers that it is beneficial to have doctors hand out and refer information resources to their patients, they also expressed concern with overwhelming patients with too much information.

Physicians also spoke to their responsibility in regards to their patients and scope of practice. This shed light on another discrepancy between patient and physician views: although patients described that they expect physicians to provide them with links to online health resources, physicians did not think that it is their responsibility to do so. The physicians suggested that it aligns more with the work of other health care providers such as social workers or nurses. Physician participants discussed that patients do not ask them for online resource, and therefore physicians do not refer them to online resources. Although, to our knowledge, few studies have examined the role of physicians in non-medical referrals and non-pharmaceutical prescriptions such as referring of online resources, similar findings have been found in studies examining the role of physicians in prescribing physical activity to patients. Galaviz et al. (2015) conducted a study that described the physical activity prescribing behaviours of Mexican physicians in the primary care setting. They found only a third of physicians provided physical activity prescriptions to their patients. Similarly to our findings, barriers to prescription of “non-pharmaceuticals” included lack of time, and perceived lack of interest on the part of patients. Indeed, perceived lack of interest has previously been identified as a barrier to health prevention practices (Abramson et al., 2000; Cornuz et al., 2000). Although those findings date back to the year 2000, and Internet use has increased exponentially since that time, based on our findings physician views have not changed significantly with the times. Perrson et al. (2013) found similar results to ours when conducting focus groups to talk about physicians’ experiences in prescribing physical activity to their patients. This study has found that physicians do not deny the benefits of online health resources and believe that whatever is helpful for their patients is helpful for physicians as well. Perrson
established similar findings in that physicians do not deny the benefits of physical activity. Nevertheless, as we found, physicians thought that prescribing physical activity to their patients is not necessary and not their responsibility, and would rather refer their patients to other health professionals to prescribe non-pharmaceuticals (Perrson et al., 2013). However, studies have shown that when physicians work together with other health professionals, such as community stakeholders, patient uptake of programs increases (Trinh et al., 2012). Although the study by Trinh et al. also focused on physical activity promotion, the same principles can be applied to referring and prescribing online health resources to patients. Instead of viewing this as out of the physician’s scope and within the scope of a social worker or a nurse, physicians could work together with other health professionals to help promote online health resources and ultimately increase the patient uptake and use of online health resources.

IV. Practice Implications – Reach, Adoption and Implementation

This study makes an important contribution to the understanding of the reach, and uptake of online health resources by patients by demonstrating the role the physician has in patient use and uptake of online health resources. This is an important issue given the widespread use of the Internet to search for health information – it is essential to understand the factors that can promote the use of online resources for patients. Particularly in the realm of chronic disease, such as cancer, information is an indispensable form of support that can improve the quality of life of patients (Rutten et al., 2005). The results that were found through this analysis allowed us to gain a deeper understanding of the role of the physician in the promotion of online health resources: physicians recommendations increase patients’ intent to use online health resources, and therefore increase the likelihood that they use them.

Within this dataset, conclusions about the role of the physician in the adoption of online health resources were more difficult to draw. Although the hope was to find information about adoption throughout the health care provider interviews, there was in fact no direct
mention of the institutional level of adoption of online health resources. Indeed, the study
for which the interviews were conducted was focused on patients’ potential use of an
online health resource, in some future state - the topic of institutional adoption was not
addressed as clearly as we had hoped. This challenge speaks to limits of data fit within
secondary qualitative analysis, a phenomenon that will be discussed further in the
“strengths and limitations” section of this chapter.

This study, however, does make a valuable contribution to program implementation as
not many studies, to our knowledge, have explored the factors influencing the reach and
uptake of patient-facing online resources from the perspectives of both patients and
health care providers. Previous studies have investigated the information preferences of
patients who have completed active cancer therapy and found similar results. Results
suggest a possible strategy for providing information for patients: that physicians provide
their patients with a list of trusted and credible websites that contain specific information
for the patient’s cancer type (Shea-Budgell, 2014). However, this study failed to take into
account physicians’ thoughts and feelings about this process of referral and
recommendation, and their role.

Having the views of both patients and health care providers proved to be very valuable,
as the present study found a number of discrepancies between patient views and
physician views. These areas of discrepancy highlight opportunities for learning and for
improvement. For example, patients had expressed that they would like to hear about
online health resources from their physicians; however, physicians expressed that patients
do not often ask them for online information resources and therefore they have not
referred them. This scenario represents a feedback loop where patients expect providers
to refer them to online health resources and therefore don’t ask, while providers won’t
refer patients unless the patient shows interest in having an online health resource
provided to them.

The Oxford dictionary defines norm as: “a standard or pattern, especially of social
behaviour, that is typical or expected”. Throughout this study, it has been found that
patients perceive the referral of online health resources by physicians as something that should be standard: they view it as a norm. However, this norm needs to also be recognized by physicians in order to have widespread change within the health organization. Indeed, it has been shown that a culture change is often necessary to achieve widespread change and reform within hospitals and health organizations (Roberts & Perryman, 2007; Jones et al., 2013). These studies were done in the context of quality improvement and safety within the hospital setting; however the findings are applicable in this case as well: in order for physicians to be aware of this norm perceived by patients, there must be a culture change throughout the organization. This can be managed through collaboration and training (Jones et al., 2013), sharing information among clinicians (Roberts & Perryman, 2007), promoting physicians and other staff engagement, as well as support from governing bodies (Willis et al., 2016). The present study also found that repetitiveness can aid in creating the norm of using online health resources.

Although it was expected that the perspectives expressed by patients and providers would clarify the relationship between reach and adoption and their impact on implementation, it was not expected that the study participants would describe and recommend real-world suggestions for implementation. Implementation strategies can, however, be extrapolated from the results of this work.

Implementation strategies are defined as methods, techniques and recommendations that can be used to enhance the adoption, implementation and sustainability of a program or intervention (Proctor et al., 2013). Implementation strategies outline specific means or methods that can be used to overcome barriers of adopting and sustaining interventions (Proctor et al., 2013). They are used to bridge the gap between innovations and their delivery into routine practice (Powell et al., 2012). The implementation strategies that have emerged from this work will be categorized according to the Consolidated Framework for Implementation Science (CFIR). The CFIR is a comprehensive framework that embodies constructs found across the breadth of published implementation theories (Damschroder et al., 2009). The CFIR provides researchers,
program planners and program implementers with a list of constructs to aid in the understanding about what works in which context, and why (Damschroder et al., 2009). The CFIR encompasses 39 constructs organized into five domains: (1) the intervention characteristics, (2) outer setting, (3) inner setting, (4) characteristics of individuals, and (5) process. The CFIR is considered an appropriate choice for framing practice implications of this work, as Damschroder et al. (2009) have stated that “the CFIR opens the ‘black box’ of the ‘I’ (implementation) component” of the RE-AIM framework. In fact, the RE-AIM framework, among other theories, was used in the construction of the CFIR. Given that this project was interested in how different constructs of the RE-AIM framework work together to aid implementation, it was a fitting choice of framework for the interpretation of the results. Furthermore, the CFIR is a framework that can guide and unify results from implementation and evaluation studies, and using it will make the results applicable in a real-world setting.

The results of this project are best aligned with the domain of “characteristics of individuals” of the CFIR. Although classically the CFIR is interested in the individuals who are acting within an organization, this domain also applies to the individuals who would be using an online health resource. Within this domain, there are 5 constructs. Of these constructs, this project focuses particularly on “knowledge and beliefs about the interventions”, “self-efficacy”, as well as “other personal attributes”. Knowledge and beliefs about the intervention pertain to “individuals’ attitudes toward and value placed on the intervention as well as familiarity with facts, truths, and principles related to the intervention” (Damschroder et al., 2009). As described by the TPB, attitudes towards the health behaviour, which in this case is the use of an online health resource will influence the likelihood that health care providers will adopt and promote it to patients. Within the CFIR is a construct that relates to the “individual’s belief in their own capabilities to execute courses of action to achieve implementation goals” (Damschroder et al., 2009). Self-efficacy proved to be relevant to the findings when it came to both patients’ views of their abilities to use the online health resources, as well as physicians’ recommendations of the resource to their patients. Specifically, patients stated that they would be more likely to use the online resource if it was easy to use, and physicians stated that they
would be more likely to adopt and recommend the online health resource to their patients if it was easy to use and to explain to their patients. Within the CFIR, “other personal attributes” related to reach and adoption were expressed by the study participants, including language preferences, digital literacy, and time availability.

The results yielded findings that were able to be explained and interpreted using the theory of planned behaviour (TPB) and other frameworks such as the TAM and UTAUT. The TPB was used to interpret and understand the experiences and motivations of both patients and health care providers in order to gain a better appreciation for their perceptions on the reach and adoption of online health resources. The CFIR was used to translate that information into applicable implementation strategies, as described below.

(A) Implementation Strategies related to Reach of Online Health Resources

The findings on reach were most applicable to the CFIR constructs of “self-efficacy” “other personal attributes”, and “knowledge and beliefs about the intervention”.

1. **Self-efficacy – ease of use of online health resources:**
   Ease of use is an important factor for patients’ use of online health resources and relates to their self-efficacy.
   Strategies: (1) In order to increase the likelihood that individuals will use an online health resource, program planners and developers must make it easy to use, with clear and concise steps to follow in order to reach the desired goal. (2) Providing patient users with an informational guide on how to use the online health resource could facilitate the use of the resource.

2. **Other personal attributes – language translation:**
   Language falls within other personal attributes as it reflects individuals’ capacity to use online health resources. All individuals that could benefit from the use of online health resources may not speak English.
Strategy: Program developers should translate the information provided and offering options for additional languages other than English, which can aid in increasing the reach and use of online health resources.

3. **Knowledge and beliefs about the intervention – physician input:**
   Physician input relates to knowledge and beliefs about the intervention and buy-in from a physician depends on their attitudes and values relative to the intervention. The input from physicians as well as their buy-in impacts the reach of online health resources, and therefore physicians should play an active role in their development and promotion.
   Strategy: Program planners and developers should therefore consult with physicians, and physicians in turn should play an active role in developing and further promoting the online health resources.

(B) **Implementation Strategies related to Patient Uptake of Online Health Resources**

All strategies relating to patient uptake of online health resources fall within the construct of “knowledge and beliefs about the intervention”. This is because uptake reflects the individuals’ attitudes toward and value placed on the intervention, as well as familiarity with the principles related to the intervention (Damschroder *et al*., 2009).

1. **Knowledge and beliefs about the intervention – source credibility:**
   Credibility of the referring source is critical in patient uptake of online health resources, as credibility of the source ensures credibility of the online resource, leading to an increased intent to use and increased likelihood of use. Referral from a credible, trusted and knowledgeable source such as a physician can increase the uptake of online health resources by patients.
   Strategy: Physicians should refer their patients to online health resources, in order for patients to use the resource and feel comfortable with the information they are obtaining.

2. **Knowledge and beliefs about the intervention – awareness:**
Awareness plays a critical role in the use and uptake of online health resources. Patients would like to be made aware of online health resources through recommendations from their physicians.

**Strategy:** Physicians should hand out brochures and pamphlets containing credible and reliable websites to patients, increasing the patient uptake of online health resources.

3. **Knowledge and beliefs about the intervention – multifaceted approaches and repetition:**

A multifaceted approach to the promotion of online health resources (e.g. verbal recommendation, pamphlets, posters, library homepage, etc.) can aid to increase the uptake of online health resources. Having a multifaceted approach enables repetition of the message, and therefore can lead to a culture change within the institution.

**Strategy:** Program planners should ensure that when promoting online health resources, they use a multifaceted approach that is focused on repetition.

**(C) Implementation Strategies Related to Factors Influencing Physician Adoption and Recommendation of Online Health Resources**

The implementation strategies related to physician uptake of online health resources build on our findings related to “self-efficacy” as well as “other personal attributes”.

1. **Self-efficacy – ease of use for physician:**

Much like in the case of patient use, ease and simplicity of use of online health resources are important not only in patient uptake but also in physician uptake as shaped by their self-efficacy.

**Strategy:** Program planners and developers should make online health resources easy to use and easy for physicians to describe and promote to patients, in order for physicians to easily implement them into their usual practice.

2. **Other personal attributes – cooperation between physicians and other health care providers:**

Cooperation between physicians and other health care providers falls within “other
personal attributes” as it relates not with the attitudes towards the intervention itself, but rather with motivation, learning style, and attitude changes.

**Strategy:** Instead of viewing referrals and “non-pharmaceutical prescriptions” as out of scope, physicians can increase the use and uptake of online health resources for patients by working together with other health professionals to help promote, raise awareness and add credibility to those resources. This could be done through open communication and training.

3. **Knowledge and beliefs about the intervention – awareness of patient needs**

Patients would like to hear about online health resources from their physicians and expect physicians to refer them to credible sources; however, physicians are not likely to refer their patients unless the patient explicitly expresses an interest.

**Strategy:** Physicians should act as champions within the hospital and health organizations to help motivate a culture change within the organizations, and promote the referral of online health resources to patients.

V. **Strengths and Limitations**

This study was a secondary qualitative descriptive analysis. Qualitative research allows health science researchers to seek truth within individual stories, and gain perspectives on the experiences, perceptions, inclinations and sensibilities of individuals. The secondary analysis allowed the author to use pre-existing data to uncover important factors of the use and uptake of online health resources that had not previously been examined.

To our knowledge, few studies have sought to understand and compare the views on patient use and uptake of online health resources from the perspectives of both patients and health care providers. Indeed, this study provided a more fulsome perspective on the question posed, and enabled us to uncover applicable implementation strategies in order to increase the use and uptake of online health resources by patients.

Qualitative inquiry offers a rich description of an experience or an event (Sandelowski, 2000; Neergaard, 2009). Although subjectivity and interpretation is always present within qualitative analysis (Sandelowski, 2000), researchers using qualitative description stay
closer to the data (Neergaard, 2009). This was a secondary analysis; although the data was generally a good fit for our research question, it remained possible that the questions we were investigating were not necessarily asked. For this reason, it was important to remain as objective as possible during the analysis so as to keep an open mind and be able to fully explore the data without searching solely for evidence that matched our research inquiries.

Secondary analysis comes with certain limitations. Firstly, it has been stated that secondary analysis may have ethical problems in regards to sharing of data, or that those conducting the research were not involved with data collection (Ruggiano and Perry, 2017). It is important to note that during the consent process of the original qualitative research study, participants were informed that the data they provide might be used for other research purposes and inquiries. Furthermore, all transcripts analysed had been de-identified, and no identifying information was disclosed in the reporting of the results. Thus, any ethical issues were avoided.

A second problem was that of “data fit” (Heaton, 2008) was the biggest limitation faced, and arose when considering our initial definition of adoption. Although the aim of the study was to determine the role of the physician in the individual and institutional adoption of online health resources, we did not find any information relevant to institutional adoption, or long-term individual adoption within the dataset. Without the ability to probe the participants further into this question during the interviews, it was difficult to fully investigate this part of the research question. However, by drawing on previous research, we are able to make certain statements about adoption. For example, numerous health quality improvement initiatives have found that physicians are critical in the successful implementation of those interventions. Furthermore, it has been shown adoption on the part of the patient is closely linked to institutional adoption (Crotty and Slack, 2016). Therefore, findings on patient adoption of online health resources are still relevant to the institutional adoption as it is defined within RE-AIM. Further research into the role of the physician on the institutional adoption of online health resources should be conducted to understand how this can be optimized.
Maximum variation sampling was used in order gain the perspectives from participants with different backgrounds, characteristics and experiences, and achieve a better understanding of variations in experiences, as well as commonalities of the experiences. The author was therefore able to uncover themes from different perspectives, adding depth to the results.

It is important to note that although a main focus of the project was on the perspectives of the physician on their role on the *reach* and *adoption* of online health resources, the sample for this study only included two physicians. However, other health care providers working in the health care field were able to provide their insights as well, and contributed to the conclusions that were made throughout this study. Furthermore, although the two physicians had different specialties, one a radiation oncologist and the other a palliative care physician, they both shared common views in regards to what they perceive as their role in the *reach* and *adoption* of online health resources, further strengthening the conclusions.

This project was focused on men with prostate cancer, as it was part of the TrueNTH initiative. This work has led to a better understanding of what factors may influence men to use online health resources, both the perspective of those men themselves as well as from healthcare professionals specialized in the prostate cancer field. However, it is important to note that the experiences of men with prostate cancer may differ from others; the implementation strategies suggested through this work may not be applicable to a breast cancer patient, for example. Indeed, gender acts as an influencer of online health information-seeking and decision-making behaviour (Rowley and Johnson, 2017). Women tend to be more proactive in their health information seeking than men (Rowley and Johnson, 2017), and therefore the role of the physician in referring online health resources may not be as important among women. However, this study has provided an in-depth analysis of how the needs of prostate cancer patients can be better met by increasing the reach and adoption of online health resources such as the ASSIST portal.
Using multiple theories and frameworks to interpret the findings of the analysis added additional depth to this study. It allowed us to understand the mechanisms behind the relationships, and the potential behaviours of patients in using online health resources. Indeed, theory can lead to better understanding of motivations and mechanisms. Use of theory has previously been shown to increase the effectiveness of eHealth interventions (Webb et al., 2010). Theory helps the researcher define analytic strategies, and to describe the way decisions are made within the analysis (Kelly, 2009). It also adds depth and transparency to the research design and the analytical process (Kelly, 2009).

VI. Conclusions

This study has confirmed that physicians play an important role in the reach of online health resources. The present study provided less insight into adoption, especially institutional adoption of online health resources. Based on previous research, however, we know that physicians have the ability to drive both reach and adoption, and this occurs through a number of different mechanisms.

First, the online health resource must be easy to use in order for both patients and physicians to adopt them. With regards to the role of the physician, several findings demonstrated the link physicians with both reach and adoption. Healthcare providers stated that the input from physicians can be a valuable asset to the planning of programs, leading to better reach and adoption of programs. Physicians also give credibility to online health resources, which in turn gives patients more confidence in using them to increase their knowledge and familiarity with their disease and treatment side effects. By referring patients to online health resources, physicians also make the patients aware of the program, therefore also increasing reach and adoption. Physician referral holds an important weight in patients’ intent to use online health resources, and patients would like to be recommended to websites by their physicians.

However, this study identified a number of barriers that may impede patient use, as well as physicians’ role in this regard. Barriers to patient use included language barriers; these
should be addressed by offering online health resources with different language options. Furthermore, although the role of the physician was clear from the patients’ perspective, physicians were not as aware of these views – physicians are not likely to refer online health resources to their patients unless the patients ask. Given the patient preferences that we uncovered around the role of the physician, it seems reasonable that physicians need to know that this expectation exists among patients, in regards to online health resources.

It was clear throughout this study that patients prefer to receive their information about online health resources from their physicians. However, it is important to ask the question of whether or not this is in fact realistic. Is this a role that is better suited for other health care providers? The role of a social worker for example is to help individuals cope with problems they are facing, and improve the lives of patients, by referring their clients to various resources. Therefore, the referral to online health resources to patients falls precisely within the scope of practice of a social worker. There needs to be better alignment between the hospital organization, physician practice and patient perspectives of the roles of various health care providers or the healthcare team. Further research on the views of patients on other health care provider roles in their care could aid in determining the areas where there are gaps in patients’ knowledge of resources and health care providers that are available to them, and the scope of the services they provide.

The role of the physician in the organizational uptake and adoption was not as evident as we had hoped in this dataset. However, previous research has shown that physicians do have a strong influence within the hospital institution (Gray, 1983) when physicians engage in administration activities. Physician engagement leads to higher hospital performance, as well as patient satisfaction (Taitz et al., 2012). Along with the critical role that physicians play in patient reach and adoption of online health resources, we would also expect that physicians could play a key role in the institutional reach and adoption: what influences the physician to accept and endorse the online health resources and refer it to patients will then lead to the organizational adoption of online health resources. However, further research should be done in order to investigate more
specifically the organizational buy-in and adoption of online health resources and the role of the individual physician. To do this, physicians could be asked more directly what they believe their role is in the institutional adoption of online health resources. The views of health care managers could also be explored, as they can work together with physicians in the implementation and integration of resources into usual practice by aiding in including such interventions into clinical workflow, as well as encouraging employees to use innovations.

The analysis of the results as well as the use of well-established theoretical frameworks allowed us to make concrete conclusions about the multi-dimensional phenomena of reach and adoption. Few studies have explored “use of online health resources” or “use of online interventions” as a health behaviour in itself. However, accessing and using online health resources is a necessary first step in order for patients to benefit from their content. Furthermore, prior to this study there has been limited use of the TPB specifically to understand the barriers to physician uptake of patient-facing online health resources, as well as their influence of patients’ use of these resources. This study therefore makes a valuable contribution, by showing how physicians impact the behaviour of “use of online health resources”, using the TPB to do so.

Although our findings do not speak to adoption in terms of institutional uptake of online health resources, with the aid of previous research we were able to determine that reach and adoption could work together through the physician in order to improve the implementation process of online health interventions. Physicians have critical impact on patients and their health behaviour choices, and their recommendations will increase patients’ intent to use online health resources, and therefore increase the likelihood that they use them. Physicians also are an integral part of the health care team and contribute to the organizational buy-in of online health resources, at very least by making recommendations to their patients. The role of the physician in regards to reach and the uptake of online health resources is therefore evident and conclusive within our study: they play a critical role in the implementation of online health resources.
By contributing to both the *reach* and *uptake* of online health resources, physicians can aid patients by increasing their access to, and use of online health resources. These findings can improve the implementation of online health resources for patients such as the TrueNTH ASSIST portal and other patient-centred interventions, fulfilling the need for information that cancer survivors have and increasing their quality of life. Improving implementation of online health resources betters overall patient outcomes, and improves the lives of patients.
References


Brady, E., Segar, J., & Sanders, C. (2016). “You get to know the people and whether they’re talking sense or not”: Negotiating trust on health-related forums. Social Science and Medicine, 162, 151–157. https://doi.org/10.1016/j.socscimed.2016.06.029


Etikan, I., Musa, S.A., Alkassim, R.S. Comparison of convenience sampling and purposive sampling. American Journal of Theoretical and Applied Statistics, 5(1), 1-4


Appendices
I. Appendix 1 - Interview Guides

a. Patient Participants: Interview Guideline

PREAMBLE - We are planning to develop a comprehensive online resource to assist people diagnosed with prostate cancer as well as their partners and family caregivers. Our project is part of a national initiative that is funded by Prostate Cancer Canada and Movember.

We would like to ask you a few questions to help us understand your experience with, and thoughts about, online resources related to prostate cancer.

1. Please describe your present and past experience with online resources and tools related to prostate cancer. (PROMPT- When, why and how did you access this resource? How did you learn about this resource?)

2. What role do you feel an online resource could or should play in your prostate cancer care? (PROMPT- How could this resource be integrated with your ‘usual’ care?)

3. What are your thoughts on the use of a mobile device like a smartphone or tablet to access an online resource related to prostate cancer? (PROMPT- Can use an example of an iPhone, iPad, Android Phone)


5. What do you think would make interactive online health resource difficult to use? (PROMPT- something about the way the web site looks, works or your comfort level with computers)

6. What do you think would be helpful to encourage you/make it easier to use an online health resource? (PROMPT- something about the way the web site looks, works or a person)

7. What are your thoughts on the Screen Shots that you received in the package mailed to you with the information sheet and consent form?
8. How and when do you feel an online resource for prostate cancer would best be presented to you? (PROMPT-When would you like to receive information about this resource? Who do you feel should provide the information? How do you think it would be best presented -email, email, in person)

9. Describe any concerns you may have regarding security or privacy with the use of an online resource in prostate cancer care. (PROMPT-Would you feel comfortable sharing personal information online with health care providers? Why/why not?)

10. Would you be willing to pay for an interactive online resource for prostate cancer? How much?

11. Are there any features that I have not listed that you think may be valuable? Is there anything else you would like to add before we end?

Thank you for your time, and for sharing this valuable information with me. Your answers will guide the development of a new online resource to support men living with prostate cancer and their partners and family caregivers.

b. Health Care Provider Participants: Interview Guideline

PREAMBLE-We are planning to develop a comprehensive online resource to assist people diagnosed with prostate cancer well as their partners, families and caregivers. Our project is part of a national initiative that is funded by Prostate Cancer Canada and Movember. We would like to ask you a few questions to ascertain what types of information and components you may see as being helpful or not helpful. We will start by asking your some background questions. We will then continue on to ask you questions relating to your thoughts and feelings about an online resource to manage your patient/client’s prostate cancer.

A. Demographics of Health Care Provider

1. What is your profession?
2. What type of care do you provide to patients/partners/caregivers?

3. Are you comfortable using a computer, tablet or iPad?

4. How many hours a week do you use the internet?

**B. Thoughts and perceptions related to web-based health management systems for prostate cancer**

1. Do you think that interactive web-based health management interventions will enable self-management by men with prostate cancer? Why/why not?

2. What are the barriers/facilitators to the integration of web-based health management interventions into ‘usual care’ for men with prostate cancer?

3. For whom, under which conditions, would an interactive web-based health management interventions play the greatest role in their care?

4. For whom, under which conditions, would interactive web-based health management interventions play the least important role in their care?

5. How would the patient’s use of an interactive web-based intervention impact your ability to treat/support your patients/clients?

6. How would the partner’s use of an interactive web-based intervention impact your ability to treat/support your patients’ partner/family or caregivers?

7. How would you integrate an interactive web-based intervention into your practice (prompts: provide access in your clinic, offer intervention prior to first visit, include a staff member to assist patients to use this application)?

8. How would the family caregivers’ use of an interactive web-based intervention impact your ability to treat/support your patients/clients?

9. What time in the disease trajectory would it be best to present this resource?
10. What specific features of web-based interventions do you perceive assist with care and self-management for:
   a. Patients with prostate cancer
   b. Partners of patients with prostate cancer
   c. Family Caregivers of patients with prostate cancer

11. What would be the best way to inform patients/partners/family caregivers about an online resource for prostate cancer?

12. Would you be willing to pay for this type of online resource to manage your patient/patient’s [partner/family/caregiver]/client’s prostate cancer? How much?

13. Are there any features that I have not listed that you think may be valuable? Is there anything else you would like to add before we end?

Thank you for your time, and for sharing this valuable information with me. Your answers will guide the development of a new online resource to support men living with prostate cancer and their partners and family caregivers.
II. Appendix 2 – REB Approvals

a. UHN initial approval

III.
Furthermore, members of the Research Ethics Board who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB.

Best wishes on the successful completion of your project.

Sincerely,
b. UHN REB amendment approval

CAPCR ID: 14-8364.3

PI: Jacqueline Bender

Study Title: A COMPREHENSIVE SITE FOR RELIABLE, RELEVANT AND TAILORED INFORMATION AND SUPPORT FOR CANADIAN PROSTATE CANCER SURVIVORS

Amendment Description: ASSIST

This amendment has been reviewed and has been granted Institutional Authorization.

The following Department(s)/Group(s)/Committee(s) have reviewed this submission:

REB (Research Ethics Board), GCS (Grants & Contract Services)

This is an automated message. Please do not reply to this email as it will be forwarded to an unattended mailbox.
c. **University of Toronto REB approval**

The University has approved the following protocol document:

Protocol #: 00035717  
Protocol Title: The physician-patient dynamic and how it affects the Reach and Adoption of online health interventions  
Document Type: Original

Should you require a copy of the approval, a copy may be printed by logging in to the My Research System at [http://aws.utoronto.ca/services/my-research-mr/](http://aws.utoronto.ca/services/my-research-mr/). Select the protocol from the My Human Protocols tab and navigate to the "Current Approved Protocol" tab.