An Exploration of the Content and Usability of Web-Based Resources Used by Individuals to Find and Access Family Physicians

Exploration du contenu et de l'utilisabilité des ressources Web employées par des particuliers pour trouver et consulter les médecins de famille

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Abstract

Background: The most commonly recommended strategy in Canada for patients wishing to find a regular family physician (FP) is through the use of websites with FP listings. We aimed to explore the content and usability of these websites.

Methods: We identified publicly available websites with FP listings in Western Canada, analyzing them thematically through open coding for website content and conducting framework analysis for website usability.

Results: Twelve unique websites were identified and grouped into three categories: (1) Physician regulatory authorities ("Colleges"); (2) Governmental; and (3) Miscellaneous. College websites provided the greatest detail about the FPs and enabled searching, though had low readability. Governmental websites listed basic contact information and were credible but contained less detail than College websites. Miscellaneous websites were narrower in focus and therefore easier to navigate but lacked updated and accurate information.

Conclusion: Many websites help patients find FPs. Their content and usability are variable, suggesting a need for guidance in the development of these resources.

Résumé

Contexte : La stratégie la plus recommandée aux patients canadiens pour trouver un médecin de famille régulier (MF) est le recours aux sites Web qui listent les MF. Notre objectif était d'explorer le contenu et l'utilisabilité de ces sites.

Méthode : Nous avons répertorié les sites Web disponibles au public dans l'Ouest canadien, nous les avons analysés au moyen du code ouvert et nous avons recouru à un cadre d'analyse pour en évaluer l'utilisabilité.

Résultats : Douze sites Web ont été répertoriés et regroupés en trois catégories : (1) organismes de réglementation (« collèges de médecins »); (2) gouvernementaux; et (3) divers. Les sites Web des collèges fournissent plus de renseignements sur les MF et permettent de mener des recherches, bien qu'ils offrent une plus faible lisibilité. Les sites Web gouvernementaux présentent les coordonnées de base et sont crédibles, mais ils contiennent moins de renseignements que les sites des collèges. Les sites Web divers sont plus ciblés et offrent donc une meilleure navigabilité, mais les renseignements y sont moins précis et moins actualisés.

Conclusion : Plusieurs sites Web permettent aux patients de trouver un MF. Leur contenu et leur utilisabilité varient, ce qui laisse croire qu'il y a un besoin en matière d'orientation pour le développement de ces ressources.

Introduction

In Canada, there are 83,159 active physicians, of whom 52% are family physicians (FPs) or General Practitioners (CMA 2017). This equates to 115 FPs per 100,000 persons in the population (CMA 2017). These FPs may work in healthcare facilities and hospitals, although most are based in community clinics. Patients of all ages present to FPs with undifferentiated medical or psychosocial problems, and the FPs use their expert clinical knowledge to diagnose and treat the patients (CMA 2017). They provide continuity of

care to patients through repeated clinical contacts (The College of Family Physicians of Canada 2017; Walter and Jan 1999). In the Canadian healthcare system, out-patient access to diagnostic testing, procedures and referrals to specialist physicians can only be obtained through the FP.

Having continuity of care through a regular FP is associated with perceived increased access to care (Stewart et al. 1997), increased patient satisfaction (Saultz and Lochner 2005), increased use of preventative services (Bindman et al. 1996), and lower rates of hospitalizations and emergency department visits (Fung et al. 2015; Saultz and Lochner 2005). Despite their importance, 15.5% of Canadians report not having a regular FP (Statistics Canada 2014). Without a standardized or centralized method of contacting available FPs, individuals must use their own time, networks, resources and acumen to find and obtain a regular FP, by asking friends or family, or by going to websites with lists of available FPs (Alberta Health 2015; Crooks et al. 2012; MOHLTC 2009).

A majority of unattached patients indicate that they want a regular FP but attempts to find one can end in failure (MOHLTC 2009; Statistics Canada 2014). Frustrations with the process of finding an FP include the lack of FPs accepting new patients (Asanin and Wilson 2008; Randall et al. 2012; Sanmartin and Ross 2006), the inability to identify FPs who are accepting new patients resulting in the need to phone many clinics (up to 84 in one account) to inquire about FP availability (Galloway 2011; Randall et al. 2012), and the presence of outdated and inaccurate information (Randall et al. 2012). The success of finally finding an FP is seen to be a combination of luck, connections and self-reliance (Randall et al. 2012), with patients feeling the need to mobilize their own resources given systemic failures. In a universal healthcare system, these barriers in accessing primary care are seen by many Canadians as a "loss of a basic right" (Freeman et al. 2013).

Despite their accessibility, availability and high frequency of use, there has not been a study that explores the web-based resources that the public uses to search for FPs. In general, the usefulness of a website depends upon its ability to meet the user's needs by having relevant content, and also by having high usability (i.e., easy to use and is acceptable to the user) (Bevan and Maissel 1991; Interaction Design Foundation 2018; Mich et al. 2003; Nielsen 1994, 2012). There is no value in a website that is easy to use but does not meet the goal of facilitating the user in finding an available FP. Conversely, a website with valuable information that cannot be easily found or understood due to poor usability is equally inadequate (Nielsen 2017; Nielsen and Loranger 2006). We therefore undertook a research study with the dual objectives of exploring the content and usability of websites used to help individuals search for and access FPs in Western Canada (British Columbia [BC], Alberta [AB], Saskatchewan [SK] and Manitoba [MN]). An understanding of these resources is essential to develop policies and procedures related to web-based resources and begin to address some of the barriers patients face in accessing primary care.

Methods

Identification of websites

We identified websites used to help individuals find or access FPs in the four provinces in Western Canada. These provinces were specifically chosen for their similarities in size, geography, culture, and need for improved resources, given their high proportions of unattached patients at 15–20% of the population (Statistics Canada 2014). Study investigators independently identified websites for evaluation by using a Google search for the phrase "Find a family physician in 'province'", where "province" was substituted by British Columbia, Alberta, Saskatchewan and Manitoba. The only inclusion criterion was that the website must allow or facilitate contact by patients to FPs or vice versa. Websites that give general suggestions regarding modalities of finding an FP or that only link to other websites were excluded. All websites meeting this inclusion criterion were identified. If an organization (such as a provincial government) created similar websites within a province, one representative website from each rural and urban location in the province was analyzed. If an organization created identical websites across the four provinces with the only difference being a province-specific directory of FPs, only one representative website from one province was analyzed.

Within the included websites, the web pages that were analyzed were: (1) the home page, (2) the web pages that described the organization responsible for the website (usually "About Us", "Mission, Vision and Values", "Goals" and "Frequently Asked Questions" pages), and (3) the web pages used to find or search for physicians (usually "Find a Physician" or "Physician Directory" pages).

Data analysis

The websites were accessed and analyzed between February and March 2015. Two separate approaches were undertaken to address the separate objectives of exploring website content and website usability. The approach used to explore website content was thematic content analysis (Braun and Clarke 2006; Braun and Clarke 2013; Braun et al. 2015). Study investigators thoroughly read all the included web pages from all websites to familiarize themselves with the data. Both text and images were included in data analysis. The investigators independently performed open coding of each web page, where codes identified data that aligned with the study objectives and represented the most basic segment of data that could be meaningfully analyzed (Braun and Clarke 2006). Web pages were analyzed in a systematic line-by-line fashion. When new codes were generated, each team member re-reviewed previously analyzed web pages looking for these newly generated codes in an iterative way through constant comparison. After coding of the web pages was completed, the study investigators met to group the codes into potential themes and sub-themes related to website content. An inductive approach was used to explore website content, as there are no standards or framework by which to study this topic area. That is, the study team had no pre-conceived ideas of what content would be found on these websites; themes were generated through observations of the data.

The approach used for the second research objective, to explore website usability, was framework analysis. This, in contrast, was more deductive in nature, as usability has been widely studied and there are known features that are important in enhancing usability. The study team familiarized themselves with the data and performed open coding of the web pages as previously outlined. In framework analysis, additional steps were undertaken, which included the grouping of codes into pre-determined themes on website usability, then indexing these themes (that is, applying them to the entire data set), and charting or summarizing the data by this thematic framework (Gale et al. 2013; Green and Thorogood 2014; Smith and Firth 2011). The four pre-determined usability themes were: (1) ease of search; (2) ease of navigation; (3) accuracy and ease of understanding of information; and (4) typography (i.e., readability and legibility) of websites. These four themes were obtained from the literature, where empiric studies utilizing user testing have identified these as the most important features in web usability (Nielsen and Loranger 2006), especially for websites that provide medical or health information, provide educational resources or are governmental in nature (Zhang and von Dran 2001).

For both analytic approaches, the study team met consistently to compare codes, constructively question each other's coding and interpretations, and have a critical dialogue to reach a consensus about coding wherever there were coding differences. Because all websites included in data analysis were publicly available, and because there were no human participants recruited for the study, institutional ethics board approval was not required.

Results

A total of 12 unique websites were included in data analysis (Table 1). A salient theme that emerged was the "identification of the organization and individuals responsible for the website." The identified organizations fell into three groups: (1) Physician Regulatory and Licensing Authorities (also known as the "Colleges"); (2) Governmental; and (3) Miscellaneous. The College websites were those of the regulatory/licensing bodies for physicians and surgeons (College of Physicians and Surgeons of Alberta 2015; College of Physicians and Surgeons of British Columbia 2015; College of Physicians and Surgeons of Manitoba 2012; College of Physicians and Surgeons of Saskatchewan 2013). Websites created by primary care networks (Primary Care Network Calgary Foothills 2010; Primary Care Networks 2015), health regions (Saskatoon Health Region 2014; Sunrise Health Region 2015) and the ministries of health (Province of Manitoba 2015) were deemed to be governmental. Miscellaneous websites included those created by business organizations (Alberta Doctor Directory 2014) or those where no information was provided regarding the organization represented by the website (Canadian Office for Applied Research Studies 2015; FindaBCdoctor 2010). Instead of referencing websites directly, we have denoted the College websites (*n* = 4) as "C1" to "C4", governmental websites (*n* = 5) as "G1" to "G5" and miscellaneous websites (*n* = 3) as "M1" to "M3".

TABLE 1. Identified websites for inclusion into the study, by province

Province	Name of website/identifier	URL
Alberta	College of Physicians and Surgeons of Alberta	*www.cpsa.ab.ca*
	Urban Primary Care Network (representative example: Calgary)	*www.needadoctorcalgaryandarea.ca*
	Rural Primary Care Network (representative example: Alberta Heartland)	*www.albertaheartlandpcn.com*
	Alberta Doctor Directory	*www.albertadoctordirectory.ca**
British Columbia	College of Physicians and Surgeons of British Columbia	*www.cpsbc.ca*
	Find a BC doctor	*www.findabcdoctor.ca*
	British Columbia Doctor Directory	www.bcdoctordirectory.ca*
Saskatchewan	College of Physicians and Surgeons of Saskatchewan	*www.cps.sk.ca*
	Urban Health Region (representative example: Saskatoon)	*www.saskatoonhealthregion.ca*
	Rural Health Region (representative example: Sunrise Health Region)	*www.sunrisehealthregion.sk.ca*
Manitoba	College of Physicians and Surgeons of Manitoba	*www.cpsm.mb.ca*
	Government of Manitoba Family Physician Finder	*www.gov.mb.ca/health/familydoctorfinder/index.html*
	Manitoba Doctor Directory	www.manitobadoctordirectory.ca*
National	Canada's local directory (representative example: Calgary, Alberta)	www.cofars.ca[§] *(www.calgary-ab.cofars.ca)*

URL = uniform resource locator. *Note:* The italicised URLs (*n* = 12) are those included in final analysis.

*These websites are identical, aside from a province-specific directory of doctors. Alberta Doctor Directory (www.albertadoctordirectory.ca) was selected for analysis as a representative example.

[§]The national home page consists of a set of links, sorted by province, leading to city-specific directories. For each of the cities in each of the provinces, the web pages are identical other than the city-specific directories. The Calgary web page (www.calgary-ab.cofars.ca) was selected for analysis as a representative example.

Content of websites

We identified five elements that comprise the content of these websites (Table 2). First, websites within each of the three categories contained similar objectives. The goal of College websites was to regulate the medical profession, while a key purpose of governmental websites was to help individuals find FPs. None of the miscellaneous websites explicitly stated their objectives. Second, the methods by which websites assisted patients in finding FPs differed. College websites tended to contain search functions such that a list of FPs matching the inputted characteristics could be obtained. Governmental and miscellaneous websites often provided an undifferentiated physician directory. Two governmental websites (G1, G5) provided a service to directly connect individuals to available FPs. Third, the extent of detail available for listed FPs varied. Although all College websites provided sufficient name, specialty and contact details, half (C1 and C4) did not contain information about whether doctors were accepting new patients, making these websites incomplete resources on their own. In contrast, governmental websites listed only FPs who were accepting new patients.

TABLE 2. Key concepts emerging from thematic analysis regarding content of websites

Themes	Physician regulatory and licensing authority websites	Governmental websites	Miscellaneous websites
Primary purpose of the website	• Primary aim is to serve and protect the public through self-regulation of the medical profession, licensing of physicians and developing standards of practice. "Serving the public by guiding the medical profession." (C3) • Ability to search for physicians is not explicitly stated as a goal or mission of the organization, but implied through the presence of a search function for doctors on the home page.	• There are two types of websites: – Holistic: Purpose is not explicitly stated, but websites provide news, events, announcements and information about the health region. FP search is only one function of many. (G2, G3, G4) – Targeted: Website exists solely for the purpose of registering and connecting patients with individual FPs. (G1, G5)	• Provides a listing of service providers that may not be restricted to doctors. For example, directories are available for "Calgary accountants, Calgary doctors, Calgary lawyers, Calgary hairdressers, Calgary mechanics, Calgary insurance, Calgary car rental, Calgary items for sale, Calgary employment, Calgary gas stations …" (M1)
Process required to find an FP	• Search fields are used to find doctors matching the search characteristics. • Most College websites also include practice- and access-related characteristics by which individuals can search for doctors if desired. For example: on the C3 website, search fields include name, physician type (FP versus specialist) postal code or city, gender, languages spoken, special interests, wheelchair accessibility and house calls. • Only 2/4 College websites allow searching only for physicians who are accepting new patients. (C2, C3).	• Listing of names, sorted by town/cities within the health region (with no search fields). • Websites with purpose of registering or connecting patients with an FP require patients to fill in an application that includes personal information (name, address, postal code, phone number and e-mail, all of which are required before application can be submitted).	• Ability to browse by pre-selected towns/cities or clinics only with no ability to search by any characteristic.
Extent of detail available for the listed FPs	• Most websites provide enough information to allow individuals to contact potential FPs (including name, address, contact information, practice discipline). • Websites that do not allow searching specifically for doctors who are accepting new patients also do not provide this information in their search results. (C1, C4). • Detailed information on FPs are available: – Gender of FP is available on all College websites. – Nearly all College websites have information about certification, qualifications, training, history of disciplinary action and languages spoken. – Accessibility details (wheelchair accessibility, house calls) are available on 2/4 College websites.	• Websites with a listing of names provide enough information to allow individuals to contact the doctor (name, location, phone number, specialty/interest and whether accepting new patients). • Websites with purpose of registering patients with FPs do not provide any information about FPs (with no names or contact information). • Some variability for rural versus urban regions: – Urban regions provide gender, access-related details (languages spoken) and comments regarding special interests and restrictions. An example of such a comment is: "No Narcotics – No Marijuana. Special interests managing patients with diabetes and hypertension." (G2) – Rural regions provide no further detail beyond name, specialty and contact information of the doctors.	• Variable extent of detail: 1. M1 provides enough information to allow individuals to contact the FP (name, location, phone number, specialty/interest and whether accepting new patients). 2. M2 provides similar information to M1, with the addition of languages spoken, and an updated monthly schedule for the doctors at each clinic. 3. M3 provides names only with no contact information and no information about whether physicians are accepting new patients. There is no information about practice discipline (FP versus specialist) for most doctors listed.

TABLE 2. Continued

Themes	Physician regulatory and licensing authority websites	Governmental websites	Miscellaneous websites
Other health-related resources for the public	• Many of the resources are not targeted to the public, such as news, events, newsletters and recruitment information that are targeted to doctors. • Information on other methods of finding an FP provided, although these tend to be vague and refer back to their own websites: "Many patients will try to find a family physician through the advice or recommendation of friends, relatives, or work associates. The online physician directory is available to assist patients in finding a new FP who is accepting new patients." (C2)	• Most websites have information about recent events, news, programs and campaigns in the health region: "Menu Planning Workshop: Learn how to plan nutritious meals and snacks in this workshop! Register for our Menu Planning Workshop ..." (G3) • Websites with the purpose of registering patients with FPs do not provide any other health-related resources.	• There are no other health resources provided for 2/3 websites. • M3 had articles on popular health and wellness topics: "Nutrition: the pros and cons of coconut oil." (M3)
Visual impressions and multimedia elements of websites	• Colleges each have an emblem or logo that makes the website seem "official". • The College websites tend to have minimal images and graphics. • The images that are present tend to focus on the doctor and the traditional doctor–patient relationship, with images showing a single doctor with a single patient. There are few team-based images. • Although the extent of diversity seen varies by individual website, each of the Colleges tends to show some racial and age diversity, and both male and female health professionals. • Social media presence is variable (with links on 2/4 websites) and seems to be targeted to health professionals rather than the public, with icons that link to LinkedIn and Twitter, but not Facebook or Google Plus. • Even when present, the social media links and icons are small and hard to find. • No advertisements.	• Images tend to be community-focused, with pictures of large communities and teams of health professionals treating families. The images of health professionals are predominantly team-based, rather than showing single physician–patient encounters. • Diversity in race, age, gender is shown consistently. • The graphics used appeal to a wide range of ages, including the use of cartoons. For example, there is a picture on the home page of the influenza virus, drawn as a cartoon to look like a monster hiding behind a door, that accompanies the announcement "Why wait? Vaccinate." (G4) • Variable social media presence, with links to Facebook, Twitter and/or YouTube on 2/5 websites. • Even when present, the social media links and icons tend to be small and hard to find. • Videos are used to provide information about the health region and organization, and to increase patient engagement. • No advertisements.	• Use of images varies significantly across different websites with no clear underlying similarities. For example: The only images used outside of advertisements are Canadian landscapes on M1 with no health-related images, whereas the images used on M2 include numerous images of doctors interacting with patients. • The presence of advertisements varies, although they are generally present in high volume (M1, M3). Advertisements are both health-related and non-health-related and present on every page. • Social media, if present, limited to the ability to "like" the website on Facebook, Twitter or Google Plus. • These social media links and icons are small and hard to find.

FP = family physician.

Miscellaneous websites were variable, although they tended to lack basic information, with practice discipline (i.e., FP versus specialist) not even being universally available. Fourth, websites contained a diverse set of health-related resources. These resources were targeted to doctors rather than the general public on the College websites, while the resources were

relevant to the public on governmental and miscellaneous websites. Lastly, websites contained varying degrees of visual and multimedia elements. There were few graphics on College websites in direct contrast to governmental websites that contained many graphics and images including cartoons that were likely to appeal to the public. Advertisements were present only on miscellaneous websites (M1 and M3) and were often not health-related.

Usability of websites

We examined website usability specifically with regard to the search function and results, navigation, accuracy and ease of understanding of information, and typography (Table 3). College websites consistently had a search function, although the ease of use of this search function was variable, with some websites having excessive options for search inputs, and others having too few search parameters. Governmental and miscellaneous websites provided a listing or directory of doctors by city. When this list was small (such as with smaller towns), it was easy and quick to browse and no additional search function was needed. However, when this list was long, the user was required to browse through many pages of FPs without the ability to select certain preferred characteristics, such as location of the clinic. This resulted in a long and tedious search, especially for urban areas where there is a large number of available FPs. Navigation on College websites was compromised by not having a clear division between physician-specific web pages and those targeted to the public. Duplication in links or having multiple ways to arrive at the same destination, as well as links not being clear (for example, a picture could act as a link, but it was not immediately clear that the picture was clickable), were issues with both governmental and miscellaneous websites. The information provided on College and governmental websites was current and credible, while the information provided on miscellaneous websites was often out of date, wrought with errors, compromised by advertisements, and lacked basic information about the organization or individuals represented and responsible for the websites. All three categories of websites had a high Flesch–Kincaid reading level (between grades 10 and 12). College websites were text heavy, while the legibility of governmental websites was weakened by the use of many different font types, colors and sizes that competed for attention. The legibility of miscellaneous websites was variable, although they tended to be low due to small font sizes and dense text.

Discussion

Given that websites are a primary way by which patients find FPs, an exploration of their content and usability is imperative in understanding how they may facilitate or hinder Canadians seeking to access primary care. To our knowledge, this is the first study to examine these websites. We classified these websites into three categories (physician regulatory authorities or the "Colleges", governmental and miscellaneous) based on the organizations responsible for the website. There was wide variability in terms of both content and usability across websites, although some similarities existed within the three categories.

TABLE 3. Key concepts emerging from thematic analysis regarding usability of websites

Usability dimension	Physician regulatory and licensing authority websites	Governmental websites	Miscellaneous websites
Ease of search	• All College websites have a search function to search doctors by name and/or location and other sociodemographic attributes. • Ease of use of the search function is variable: – C3 and C4 have excessive search input options that may be irrelevant to the public. For example, individuals can search for physicians by "practice discipline", which consist of over 90 choices. – C1 has too few search input options, where individuals can search only by physician name. This is not helpful if patients do not have a specific physician for whom they are searching. • Search is not specific to family doctors (specialists included): – 2/4 websites allow users to select "Family doctor" versus "Specialist" in the search. • There is no ability to sort search output.	• Minority of governmental websites have a search function but this does not present a major barrier: – G1, G5 provide a service to match patients to family doctors so there is no need for a search function or directory as patients do not contact the doctors themselves. – G2, G4 are websites from smaller centres that provide a physician directory. The directories are well organized, short and contain important information, so there does not appear to be a need for a search function.	• Although all three websites provided a list of doctors through which users can browse (like a directory), only one site also provided a search function (M3): – This search function is not useful for patients who do not have a specific family doctor for whom they are searching (search function returns results only when the last name of a family doctor is inputted; there are no other fields upon which to search). • The directories on all three websites are not specific to family doctors (specialists included): – There is no method to sort the directory or limit the directories to family doctors only. – This is especially problematic with M3, where there is a long list of names of doctors, but users cannot determine which doctors are family doctors versus specialists without clicking on each individual name.
Ease of navigation	• Although all College websites have certain web pages that are intended for the public, how easy these web pages are to find is variable. For example, C1 and C4 home pages clearly state where to find web pages intended for the public, whereas the "For the Public" links are small, hidden within a drop-down menu, or at either the very top or the bottom of the page for C2 and C3. • Home pages are dense, cluttered, with many links and resources that have no clear hierarchy. • When the "Find a Physician" search box is highlighted in the centre of the home page in a different colour (such as in C3), this makes the function much easier to find compared to when the search box is small and to the side or requires scrolling below the fold (such as with C1 and C2). • Similar sounding links ("Physician profile search" versus "Physician Directory" versus "Family Doctor Finder") that lead to different pages are confusing and decrease usability (C4).	• Patient-relevant web pages are easy to find. • "Find a Physician" function varies in terms of navigational ease : – Drop-down menus tend to be long, so having the "Find a physician" option at the top of the drop-down menu (G4) or as its own menu item (G3) makes it much easier to find than when it is in the middle of a drop-down menu (G2). • Duplication in links (having multiple ways to arrive at the same destination, or having multiple links to the same destination scattered throughout pages) results in the websites appearing disorganized and cluttered (G1, G2). • Links are not easily identifiable, with pictures often acting as links. • Websites with broad objectives are difficult to navigate. For example, G1's menu consists of general information about the province such as the governmental make-up, visitor attractions and information on how to set up a business.	• Ease of navigation varies widely among the websites: – M1 is difficult to navigate given the attention to advertisements (with advertisements being in big orange boxes that attract attention and yet are unrelated to the content), the many steps needed to arrive at the city-specific physician directories, and that ads and content are difficult to distinguish. – M2 has no ads and is easier to navigate with a clear menu at the top of the home page. It is not immediately clear that there is a listing of family doctors from the home page though. – M3's construction is compromised by FP listing consisting of doctor names only with no information about specialty, contact information and whether doctors are accepting patients. Individuals need to click on each doctor to see this pertinent information. The list of doctors also contains duplicates and is not sorted in a consistent alphabetical manner. • Duplication in links and having multiple ways to arrive at the same destination with no clear logical pathway result in confusion.

Usability dimension	Physician regulatory and licensing authority websites	Governmental websites	Miscellaneous websites
Accuracy and ease of understanding of information	• All College websites appear credible, with much information about each College and their legislated authority and mandate. • Information is current. • Web pages tend to be text heavy. Features that make the content more user-friendly include: – Use of headings and bullets and short paragraphs, which improve scannability (C3). – Frequently Asked Questions section to highlight important information that is relevant to the public (C2). • Overall, the text is written at high reading levels and medical jargon is used: – All websites have a reading grade level of at least 10–12. – The Physician Search fields contain medical jargon. – There are often undefined abbreviations.	• Governmental websites appear credible, with meeting minutes, comprehensive information about the health jurisdictions and information about leadership. • Information is current. • For websites that match patients to family doctors (G1, G5), clear instructions are provided and a phone number is provided if patients require assistance to fill out registration forms. • There is no medical jargon or undefined abbreviations, which work to improve clarity, although there is a high reading level for all the governmental websites (grade level 11–12).	• Credibility is low due to: – Lack of information about the organization behind the creation of the website. – High volume of advertisements. – Organizational make-up of website creators (having no relevant health experience). – Broken links, errors in content and inconsistencies. – Unprofessional name of website developers. • Clarity is compromised due to high reading levels (reading levels 10–12), use of medical or business jargon, and undefined abbreviations. • It is unclear whether the physician listing is current, with no dates provided of the latest updates for the physician directories. • Objectives for 2/3 websites are unclear (M1, M3).
Typography	• Small font sizes and low contrast between font (particularly links) and background colours are prevalent. • The dense text is overwhelming, with minimal images or use of colour.	• Font sizes are generally sufficiently large and fonts contrast well with background for good readability. • The use of many different fonts, colours, font sizes, use of bolding and pictures compete for attention. • Presence of different boxes containing unrelated information on home page result in a disorganized appearance.	• Readability is variable across the three websites: – M2 has sufficiently large font size, font contrast with background and concise text. – M1 and M3 have poorer readability, with low contrast between text and background, small font sizes, links situated at the very bottom of the page that are hard to find and long, dense paragraphs of text.

The importance of website content cannot be overstated; the "ultimate failure" of a website is the inability to provide the information that users are seeking (Nielsen 2011). Whether a listed physician is an FP (rather than a specialist) and whether FPs are accepting new patients constitute essential information for patients searching for an available FP. However, this information was not universally available. Furthermore, in contrast to College and governmental websites, which otherwise provided current, robust and credible physician information, the information provided on miscellaneous websites was outdated and replete with errors. This is a significant shortcoming of miscellaneous websites, given the importance of accurate information (Hoffmann and Worrall 2004).

Usability depends upon the target audience, which varies across the three categories of websites. Regardless of the broader context though, the function of helping patients find an FP is specifically intended for the general public. Therefore, if there are other intended target audiences, there should be a clear division between public-facing web pages versus those targeting these other audiences (such as physicians, on College websites) (Hoffmann and Worrall 2004;

Hussey 1997). Furthermore, the physician directory or "find a physician" function was at times difficult to find. Given the importance of this function, the link/search should be placed at the top of the web page (as only 12% of users will get to the bottom of a web page) (Nielsen 2013) and should be distinct, rather than being hidden within long multi-level drop-down menus (Nielsen and Loranger 2006). We also found very high reading levels for all websites, across all three categories. The average reading level of patients is 6th grade (Davis et al. 1990); websites should therefore have reading levels no higher than this (Safeer and Keenan 2005).

Our findings suggest that many websites that exist with the purpose of helping individuals search for FPs are of varying quality and usability. We have summarized the unique strengths and limitations of three categories of websites (Table 4). The ideal website would combine the strengths of each, such as by having comprehensive and up-to-date physician information and by containing a search function to allow narrowing of searches by desired characteristics such as clinic location. The weaknesses of the websites analyzed in this study also provide important lessons learned. For example, the ideal website should be written at a much lower reading level and the presence of less relevant information (such as information on specialists, which the Canadian public cannot access without a referral) minimized. This study has the potential to inform the optimization of existing websites and the creation of new ones.

TABLE 4. Strengths and limitations of websites

	Physician regulatory and licensing authority websites	Governmental websites	Miscellaneous websites
Strengths	• Comprehensive information provided on physicians, which include accessibility details, qualifications, areas of special interest and expertise. • Information on physicians is current and up to date. • Presence of a search function allows the user to search for FPs based on desired characteristics, such as clinic location or gender of physician.	• Information provided on FPs is up to date and concise. • Purpose of the websites and information about the organization represented by the website are clear, comprehensive, credible and transparent. • The use of images and videos makes the websites visually attractive and increases user engagement with the content.	• Websites have a narrow focus (such as providing a physician directory only) making menus smaller and navigation subsequently easier.
Limitations	• High reading level (minimum Flesch–Kincaid reading level of grade 10). • There is often no clear division between the web pages that are specific to physicians versus the web pages that are for the public, resulting in cumbersome websites that are difficult to navigate. • Websites are difficult to read, with long paragraphs, dense text and medical jargon.	• High reading level (minimum Flesch–Kincaid reading level of grade 10). • Websites tend to have broad objectives, to provide general information on the health jurisdiction/health authority. The consequences of this are: – It is often not immediately apparent on the home page that the website provides information for patients to find available FPs. – The relevant web pages that are designed specifically to help patients find FPs can be difficult to find due to the broad and large menu of items offered. • There can be an excessive use of colour, boxes and shapes, animation, font sizes and effects, which paradoxically results in difficulty finding important and high-priority web pages.	• High reading level (minimum Flesch–Kincaid reading level of grade 10). • The objectives of the websites and the organizations represented by the website are unclear. This, in combination with the presence of large and distracting advertisements, results in loss of credibility. • Inaccurate and irrelevant information (such as combining FPs and specialists in a directory with no ability to sort the two) limits usability.

FP = family physician.

Limitations

We recognize that there are several limitations to our study. First, our study is based on an evaluation of publicly available websites, with no input from end users. Although we feel that our data sources adequately address our research question, eliciting views of individuals who have tried using these websites may enhance our discussion on essential website elements. Second, we limited our study to websites from Western Canada. This restriction improved comparability across the provinces and allowed us to concisely synthesize a diverse and large volume of data. It does, however, limit transferability of findings to the provinces not included in the analysis, although there is no reason to believe that there are major differences in website content based on geography alone.

The current landscape of web-based resources to help patients find an FP in Western Canada is diverse and varied in both content and usability. In exploring these websites, we encountered content and usability elements that made the search for FPs difficult and time-consuming; this echoes the same frustrations that have been reported by the public (Asanin and Wilson 2008; Galloway 2011; Randall et al. 2012; Sanmartin and Ross 2006). In laying out differences in how websites present key content elements and their potential implications, our findings can inform efforts to improve the content and construction of the resources used by Canadians to find and access FPs.

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