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Physician leaders' cross-boundary use of social media: what are the implications in the current COVID-19 environment?

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Abstract

Purpose – The purpose of this study is to better understand social media (SM) factors that physician leaders need to consider, as they adapt their cross-boundary practices to engage with colleagues and patients. Firstly, this study explores why SM is being used by physicians to cross horizontal (physician to physician) and stakeholder (physician to patient) boundaries prior to COVID-19. Secondly, based on the studies reviewed, this study provides insights on the practical SM implications for physician leaders working in the COVID-19 environment to actively enhance their practices, reduce public confusion and improve patient care, thus informing health-care practices.

Design/methodology/approach – A systematic literature review was used to conduct a structured transparent overview of peer reviewed articles that describe physicians' use of cross-boundary SM across several disciplines (e.g. health, information science). As a baseline assessment prior to COVID-19, the review synthesized 47 articles, identified and selected from six databases and Novanet. This study used NVivo 12 to thematical code the articles, leading to the emergence of four broad factors that influence SM use.

Findings – A key reason noted in the literature for physicians use of SM to cross horizontal boundaries is to share knowledge. Regarding stakeholder boundaries, the most cited reasons are to improve patient's health and encourage behavioural changes. Insights garnered on the practical SM implications include the need for physicians to be stronger leaders in presenting trustworthy and consistent facts about health information to the public and fellow peers. As role models for the effective use of SM tools, physician leaders can mentor and coach their colleagues and counterparts.

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Research limitations/implications – As this was a literature review, the authors did not collect primary data to further explore this rapidly changing and dynamic SM world. Next steps could include a survey to determine firstly, how physicians currently use SM in this COVID-19 environment, and secondly, how they could leverage it for their work. Findings from this survey will help us better understand the role of physician leaders as health-care influencers and how they could better create trust and inform the Canadian public in the health information that is being conveyed.

Practical implications – Physician leaders can play a key role in positively influencing institutional support for ethical and safe SM use and engagement practices. Physicians need to participate in developing regulations and guidelines that are fundamentally to physician leader's SM use. Central to this research would be the need to understand how physicians cross-boundary practices have changed during and potentially post COVID-19. Physician leaders also need to monitor information sources for credibility and ensure that these sources are protected. As role models for the effective use of SM tools, physician leaders can mentor and coach their colleagues and counterparts in this area.

Originality/value – Although there have been studies of how physicians use SM, fewer studies explore why physician leaders' cross boundaries (horizontal and stakeholder) using SM. Important insights are gained in physician leaders practical use of SM. Key themes that emerged included: organizational and individual, information, professional and regulations and guideline factors. These factors strengthen physician leaders understanding of areas of foci to enhance their cross-boundary interactions. There is an urgency to study the complexity of SM and the effectiveness of regulations and guidelines for physicians, who are being required, at an accelerated rate, to strengthen and increase their cross-boundary practices.

Keywords Physician leaders, Social media, COVID-19, Cross-boundary

Paper type Literature review

1. Introduction

Since the emergence of the coronavirus crisis (COVID-19) in March 2019, there has been an acceleration in the need for physician leaders both to work on social media (SM) virtual platforms and have the skills to use the technology efficiently. For example, Shah *et al.* (2020) note that since the start of the pandemic, physicians have reduced facetime with their patients, but the uptake of SM technology to conduct telemedicine visits with patients and virtual meetings with colleagues has increased. Subsequently, physicians also appear to now be more comfortable using a variety of technology platforms and techniques to engage with their patients to review medication histories (Shah *et al.*, 2020) and with colleagues on health education and drug use reviews (Bokolo, 2021; Gomez *et al.*, 2021).

SM technology is defined as "web-based services that allow individuals, communities, and organizations to collaborate, connect, interact, and build community by enabling them to create, co-create, modify, share, and engage with user-generated content that is easily accessible" (McCay-Peet and Quan-Haase, 2017, p. 17). The acceleration of SM technology use can be described as a form of swift trust. This kind of trust is developed "when there is not time to engage in the usual forms of confidence-building activities that contribute to the development and maintenance of trust in more traditional and enduring forms of organization" (Meyerson *et al.*, 1996). Yet, there is also a need to use the technology in a professional manner to maintain patient confidentiality. One of the earliest policies on issues and rules of engagement for physicians using social media was issued by the Canadian Medical Association in 2011 (Canadian Medical Association, 2011).

The increased and accelerated use of SM has led to some public confusion about the prevention and treatment of COVID-19 (Reddy and Gupta, 2020). Hence, one of the most important factors in preventing the spread of the virus is to empower people with the right information (Reddy and Gupta, 2020). Furthermore, inadequate, contradictory, or shifting

messages from government officials and health-care providers are further complicated by rumours and conspiracy theories from groups like QAnon and other pseudoscience sources (Spring and Wendling, 2020, September 3). With physicians receiving increasing amounts of information, it is important that information is portrayed on SM correctly.

COVID-19 has also demonstrated that there is an immediate and critical need for physician leaders to become more adaptive and innovative in their use of SM practices. CanMEDS is a competency framework designed by the Royal College of Physicians and Surgeons of Canada for all family physicians regardless of practice type, location, or populations served. The framework identifies and describes the abilities physician leaders require to effectively meet the health-care needs of people they serve (Frank *et al.*, 2015). These abilities are grouped thematically under seven roles – communicator, collaborator, leader, health advocate, scholar and professional and medical expert, the integrating role (Frank *et al.*, 2015). The process physician leaders use to communicate and navigate these different domains can be conceptually framed as boundary spanning. Yip *et al.* (2016) identify three types of boundary spanning: vertical, which cuts across levels and hierarchy (e.g. physicians versus nurses), horizontal (e.g. across functions and expertise) and stakeholder (e.g. beyond the organization to include the larger medical neighbourhood). In this paper, we focus on horizontal and stakeholder boundary spanning.

Some of the benefits of cross-boundary spanning using SM include a more effective system of people and organizations working together to manage and tackle common issues, better coordination and integration of information sharing, reduction of duplication and resource use and an enhanced ability to address gaps in service provision (Williams, 2011). SM has also been changing health care by eliminating traditional boundaries of geography, organizations and fields of medical practice. For instance, the use of SM such as Twitter and Facebook enable physicians to establish themselves as online sources of medical knowledge and anticipate ongoing collaboration between researchers, patients, and their advocates in trial design and accrual (Lewis and Dicker, 2015).

1.1 How physician leaders use social media tools

The use of SM platforms by health-care professionals has grown considerably in the last decade and will continue to grow as new technologies develop (Cooper *et al.*, 2012; Panahi *et al.*, 2016a). SM is reshaping health-care services with the potential to improve quality and safety of patient care (Zhou *et al.*, 2018). For example, SM offers opportunities for physicians to rapid share their experiences and knowledge with a large audience at a very low financial cost (Duymuş *et al.*, 2016).

Timeliness is a key consideration when physician leaders are deciding whether SM is an efficient approach for conducting cross-boundary activities. For instance, colleagues in developing countries can connect with counterparts in medically advanced locations to exchange medical information in real time (Ventola, 2014). SM may also be a valuable resource for detecting disease outbreaks quickly, which in turn shortens the response time for health professionals (Charles-Smith *et al.*, 2015). Comparisons have also been made between traditional mechanisms such as publishing in a print journal, which is often slow and time-consuming and the faster turnaround of e-journals (Panahi *et al.*, 2016a).

Many physicians who use SM daily adopt different tools to access and share information (Robertson, 2016). An extensive list of SM tools and platforms is presented in Appendix (Table 1 – SM platforms used by physician leaders: Purpose, content, contributors and audience) from which the following examples are drawn.

SM sites build networks or relationships among people who share similar personal or career interests, activities, backgrounds or real-life connections. Often private and protected

from non-members, these sites include Sermo and Doximity, Doctors Lounge, Figure 1, Medscape, Mayo Clinic Social Media Network and BroadcastMed.

SM caters to special interest groups. Examples include Physicians Practice, Medical Group Management Association (MGMA) and QuantiaMD. A key focus of these groups is sharing knowledge with colleagues in the same field and/or other health-care professionals.

Wikis are public forum websites featuring text and multimedia content that can be edited by users. Examples include EyeWiki, WikiDoc and WikiLectures, which focus on medical education.

Blogs are online journals or informational websites that display information in reverse chronological order. Examples of blogs include the Sharing Mayo Clinic blog and the Doctors Lounge discussion board.

Media sharing sites allow for a short piece of content designed for quick audience interaction. Social channels like Twitter, Instagram, Facebook and Pinterest offer popular platforms that enable users to store and share their multimedia files (photos, videos, music) with others. For example, WeMedUp and Duke U Medical Centre (YouTube) focus on medical education and Veterans' Health Administration (Facebook) connects veterans and their families with health-care news and information.

Horizontal cross-boundary (*physician to physician*)	Stakeholder cross-boundary (*physician to patients*)
Knowledge sharing with colleagues	Health improvement and behavioural changes
Networking and staying connected	
Medical education	
Promotion and career development	

Table 1.
Top reasons why physician leaders us SM to conduct cross-boundary activities

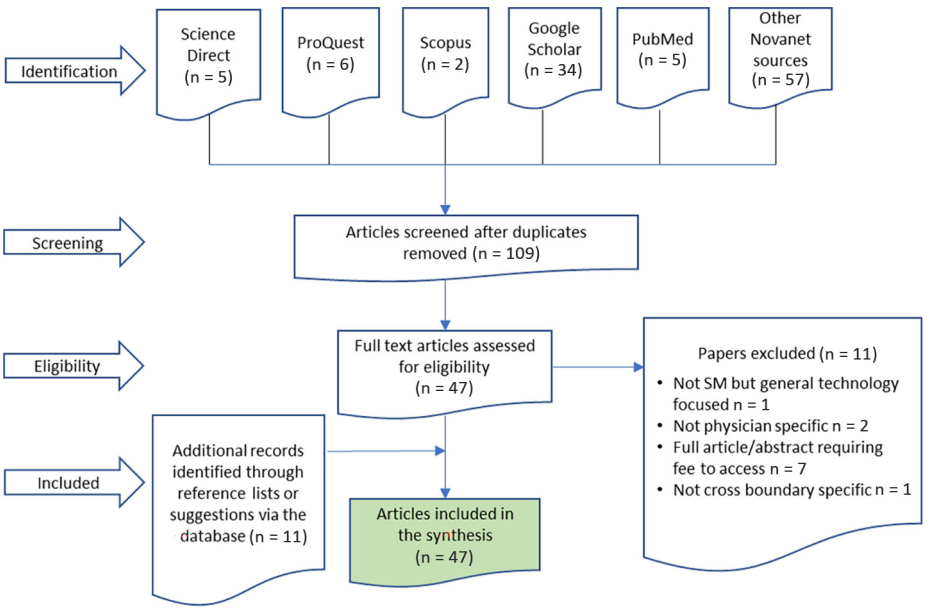

Figure 1.
Literature review process

1.2 Social media tools used by patients and the public

Patients also use SM sites to connect and share information with other patients (Appendix). Patients support other patients through sharing their stories and experiences through such sites as the Mayo Clinic Social Media Network and PatientsLikeMe. Patients are empowered through SM to find medical information online and communicate about their conditions and experiences as patients (Fisher, 2012). Mobile digital technologies have made life more convenient, and patients want to use these technologies to access health care and health-care information (Karpeh and Bryczkowski, 2017). Wong *et al.* (2019) notes that Instagram lends itself well to patient education, particularly if using photography and images. For example, patients can review other cases of their disease, see before and after photos of treatments and form support groups (Wong *et al.*, 2019).

The aim of this study is to better understand SM factors that physician leaders need to consider as they adapt their cross-boundary practices to engage with colleagues and patients. Our first objective is to explore how SM was used by physicians to cross horizontal (physician to physician) and stakeholder (physician to patient) boundaries prior to COVID-19. Based on the studies reviewed, our second objective is to provide insights on the practical SM implications for physician leaders working in the COVID-19 environment to actively enhance their practices, reduce public confusion and improve patient care, thus informing health-care practices.

2. Methodology

A systematic literature review approach described by Cooper *et al.* (2010) was applied to provide a structured overview of peer-reviewed articles that described physicians' use of SM across several disciplines (e.g. health, information science). The focus of the review was to better understand how physicians conduct cross-boundary activities on SM and why. A sub-question focused on identifying and describing SM factors that could negatively or positively influence the cross-boundary - horizontal (physician-to-physician) and stakeholder (physician-to-patient) practices of physician leaders.

Six databases and Novanet, a Nova Scotia consortium (Dalhousie University, 2021) that specialize in interdisciplinary, or health-related literature was used for this review, conducted in 2017. An update of the literature using the same approach was performed in early 2020. Search strings included *social media AND physician AND (boundary crossing OR boundary crossings OR cross-boundary OR crossing boundaries OR cross boundaries)* with different filters based on different databases. We did not assign a specific timeframe for the review, as the focus was on how SM is being used for cross-boundary communication.

Figure 1 describes the criteria used to determine the articles included in this review. We identified 111 abstracts of which 2 were duplicates, resulting in 109 articles for the initial assessment. Of these, 62 were excluded if physicians were not the focus of the research, boundary crossing was not evident, or the focus of the research, such as media or technology, was not relevant. A full review of the remaining 47 articles resulted in 11 more being excluded and 11 new ones added. Papers were excluded if the focus was only on general technology, were not physician specific and were not related to cross-boundary processes (Figure 1). After the full-text assessments, 47 articles were included in the next step of synthesis. Of those 47 papers, 12 provided generalized information on physicians' SM use regarding health-care policies, practices and regulations.

The PDFs articles were imported into NVivo 12 (qualitative data analysis software), and thematic coding was applied to the research goals and objectives, findings and discussion of each article. Articles were not mutually exclusive as some authors referred to more than one factor. We first coded to identify the top reasons physician leaders used SM to conduct

cross-boundary activities. We then coded the articles to explore key factors that enabled and/or created challenges for physician leaders' who are using SM to conduct cross-boundary activities. Four main factors emerged from this analysis. Associated with these factors were six sub-factors.

3. Results

3.1 Reasons physician leaders use social media to conduct cross-boundary activities

To address objective one of this study, we first provide an overview of key reasons why SM is being used by physicians to cross horizontal (physician to physician) and stakeholder (physician to patient) boundaries. How physicians use SM to conduct cross-boundary activities has been briefly described in the introduction, with additional details provided in Appendix. Table 1 provides a summary of the top reasons why physician leaders use SM to conduct cross-boundary activities.

3.1.1 Horizontal cross-boundary (physician-to-physician). In this literature review, the most frequently mentioned reason for physicians to use SM to cross horizontal boundaries is to share knowledge. As seen in Table 1, other reasons included networking and staying connected, medical education and promotion and career development opportunities. Medical education is defined as being related to the initial training to become a physician, i.e. medical school and internships and additional training thereafter, such as residencies, fellowships and continuing medical education (CME), whereas information and knowledge sharing have broader objectives such as knowledge dissemination, organizational learning, collaborative problem solving, peer support and capacity building (Abidi, 2017).

3.1.1.1 Knowledge sharing with colleagues. SM can be a powerful tool for communicating with colleagues (Budd, 2013). Panahi *et al.* (2016a) uses the term crowdsourcing, which involves harnessing the knowledge and skills of a community to solve problems or gather information and opinions on a certain topic. Private SM networking communities allow physicians to communicate and express themselves freely and securely (Adilman *et al.*, 2016). Campbell's (2016) study describes physicians as finding SM a fun and empowering medium to engage with other colleagues. Professional Facebook pages, Twitter accounts and blogs allow physicians to easily share useful links to articles and videos, thus allowing others to learn by reading tweets and keeping up with the literature (Campbell, 2016). McGowan *et al.* (2012) noted that of 485 physicians surveyed, 24% contributed new information via SM, 57% perceived it to be beneficial, engaging, and a good way to get current, high quality information and 57% believed it helped them provide better patient care.

3.1.1.2 Networking and staying connected. Social astuteness and networking abilities are two of four key competencies in physician leadership (Comber *et al.*, 2016). Canadian physicians have stated that they need stronger connections between themselves and accessibility to other colleagues (Comber *et al.*, 2016). Physicians from different counties noted that being able to connect with colleagues and network from a wider community to share knowledge and participate in medical education programs were their main reasons for using SM (Panahi *et al.*, 2016a). The access and ease of SM made staying in contact with past and present colleagues very convenient (Panahi *et al.*, 2016a). By removing traditional barriers of networking, both within and across institutions, physicians were able to locate and develop relationships at different intersectoral, inter-organizational and international levels.

Recent studies have described strategic actions by health-care professionals to become members of specific networking initiatives such as ICUConnect because they need to network with colleagues in other facilities to remain up to date on clinical practices and

related topics (Rolls *et al.*, 2019). However, Schot *et al.* (2020) notes that more is needed to understand the contributions, roles and collaborative settings between different health professions from a theoretical, methodological and empirical perspective.

3.1.1.3 Medical education. Studies have indicated that SM tools have the potential to enhance medical education. For example, Twitter accounts may augment medical trainee education through announcements, exam preparation and locating CME opportunities (Budd, 2013). SM can also be an innovative and an inexpensive supplement to traditional education resources by reducing time constraints and increasing international learning and collaboration (Wong *et al.*, 2019). This blurring of formal and informal teaching boundaries may also enhance medical education as students create their own knowledge by facilitating engagement, self-reflection and active learning (Davies *et al.*, 2015).

3.1.1.4 Promotion and career development. Physicians use SM to develop personal branding opportunities and promote their specific area of knowledge, expertise and research findings (Panahi *et al.*, 2016a). For example, plastic surgeons use SM to educate, advertise and present themselves to the public (McEvenue, 2016). Campbell (2016) also notes that physicians use SM to advance their career or research endeavours, as it is easier to reach a wider audience. In addition, employers and residency program directors are now more likely to search Facebook and other social networking sites before hiring new applicants, especially in competitive subspecialties (Chauhan *et al.*, 2012).

3.1.2 Stakeholder cross-boundary (physicians-to-patients). The meaningful use of health information technologies is an important way to engage patients and families in the management of their own health care and to improve communication between patient and physician (Budd, 2013; Dantu, 2014; Ventola, 2014; Campbell, 2016). Although there has been reluctance among health-care professionals to use SM for direct patient care, physicians are increasingly interested in interacting with patients online (Househ, 2013). In our review, the most frequently mentioned reason was to provide health-care information and education. Other reasons include collecting data on patients' experiences and opinions and reducing illness stigma (Moorhead *et al.*, 2013).

3.1.2.1 Health improvement and behavioural changes. Many of the studies reviewed in this paper identified the benefits of using SM in health-care practices, but there are limited studies on how SM can affect the knowledge, skills, or behaviour changes of their patients (Fisher, 2012; Campbell, 2016). A few physicians noted anecdotally that patients would mention topics that physicians had posted about online; however, they had no data on behaviour change or on the outcomes of their SM content in terms of improving their patient's well-being (Campbell, 2016).

Househ (2013) found that approximately 60% of physicians were in favour of interacting with patients through SM for the purpose of providing patient education and health monitoring, and for encouraging behavioural changes and drug adherence. Another study noted that at an outpatient family practice clinic, 56% of the patients surveyed wanted their health-care provider to use SM for reminders, scheduling appointments, diagnostic test results, prescription notifications and answering general questions (Chretien *et al.*, 2009). The same study found that patients who did not use SM indicated they would if they knew they could connect with their health-care provider (Chretien *et al.*, 2009).

Patients want to be educated consumers of health-care services, which allows them to have a better understanding of their condition and treatment options (Fisher, 2012). For example, patients will consult online resources including SM platforms to obtain information about their symptoms, diagnosis, or treatment (Dorfman *et al.*, 2017). The engagement of physicians in these discussions is an important opportunity to present

evidence-based information to counter misinformation and inaccurate material that is very easily accessible on the internet (Dizon *et al.*, 2012).

SM can also be used as a follow-up method for communicating with patients to reinforce key themes, improve treatment success and manage disease (Budd, 2013). For instance, daily text messaging has enhanced anti-retroviral therapy compliance in target populations (Castaño *et al.*, 2012). SM has also been used to target adolescents who demonstrate health risk behaviour associated with tobacco use, substance abuse and sexual activities (Charles-Smith *et al.*, 2015). Some medical practices have created a Facebook page with the intent of posting medical information, answering questions, or just providing access for non-urgent inquiries, thus easing workloads related to follow-up inquiries (Karpeh and Bryczkowski, 2017).

In summary, we identified the five most frequently mentioned reasons (Table 1) why physicians use SM when crossing horizontal and stakeholder boundaries. Marketing physician services and being able to provide accurate and reliable information extends beyond just the physician-to-patient interaction to include families, caregivers and the public. Moving forward, the role of the physician leader will be both to seek out and create their own networks, lobby for organizational and government support and in the interim not wait for others.

3.2 Factors that influence social media use

This section explores factors that emerged from the literature that have the potential to influence the SM practices of physician leaders (positively or negatively) as they cross horizontal and stakeholder boundaries. Consequently, it will be the onus of the physician leader to determine when and how to apply or mitigate these factors to strengthen the perceived benefits of SM tools and practices that can enhance cross-boundary interactions. Table 2 presents the top four factors and sub-factors of SM use.

3.2.1 Organization and individual factors.

3.2.1.1 Institutional attitudes towards the use of social media. Canadian physicians have expressed the need and value of SM tools, such as a patient portal to provide better access to health information for their patients (Razmak and Bélanger, 2017). Hospitals such as Sunnybrook in Toronto (Curtis *et al.*, 2011) have launched a patient portal as a website, to allow patients and physicians to have direct and instant access to accurate health information at home and across hospital settings (Ahern *et al.*, 2011). At the Georgia Health Sciences University in the United States, patients using "WebView" can have access to their doctor or their lab reports, ask for prescription refills and have their questions answered (Chauhan *et al.*, 2012).

Factors	Sub-factors	*% of papers that referred to key factors
Organization and individual factors	Institutional attitude towards the use of SM	15
	Individual attitude towards the use of SM	
Information factors	Information quality and credibility	36
	Privacy, confidentiality, and technology security	
Professional factors	Responsibility and professionalism	23
Regulations and guideline factors	Regulations and policies	26

Table 2.
Top factors that influence physicians' use of SM for cross-boundary activities

However, Panahi *et al.* (2016b) notes that many institutions do not support or have banned SM use by physicians. Reasons included senior health-care managers and administrators not understanding the value of SM, concerns about wasting time and the risks of compromising patient privacy (Panahi *et al.*, 2016b). Although there has been in increase in SM use by physicians, there is still some resistance towards adopting these tools in daily practices. In a survey of 480 practicing and student physicians, 68% felt it was ethically problematic to interact with patients on social networks for either personal or professional reasons (Ventola, 2014). Other reasons include the individual's uncertainty with the technology and unwillingness to adapt to new approaches. For example, Chang *et al.* (2015), Campbell (2016) and McEvenue (2016) describe studies where physicians (and in some instances, patients) have felt unprepared when they started using SM because they were unfamiliar with the various platforms. Campbell (2016) also notes that unless physicians have editorial control over what is published, they would not use SM.

3.2.1.2 Individuals' attitudes towards the use of social media. 3.2.1.2.1 Age..A few studies have found that a physician's age is an indicator of their willingness to use SM tools. For example, Chauhan *et al.* (2012) notes that younger physicians who have grown up during the internet revolution may find it easier to engage in SM and even expect it as the norm. Another study found that mid-career physicians (aged 45–54) had statistically significantly more hesitation around joining medically geared SM sites for professional purposes, compared with those aged 25–34 (Adilman *et al.*, 2016). McEvenue (2016) also noted that older Canadian surgeons were significantly less likely to use websites or SM tools. However, as discussed in more detail later in the section, younger physicians may not always have the maturity and professional knowledge and/or guidance on how to use SM in a medical/health care environment.

3.2.1.2.2 Cost-effectiveness.. SM can be a very cost-effective, easy and accessible way to increase interactions between physicians and their patients. Advanced technologies such as the smart phone are changing the way many people behave. The flexibility and ease of use of these devices enables people to have health information at their fingertips wherever and whenever they wish (Razmak and Bélanger, 2017). Mobile apps are also easy to download and to use (Bibault *et al.*, 2014). Consequently, health interventions, patient education, health self-management, drug and health-care service promotions can be easily and quickly transmitted and accessed in real time (Zhou *et al.*, 2018).

3.2.1.2.3 Time as a commodity.. A physician's time is a very valuable commodity. Engaging in SM may require them to decrease their patient load and/or add additional worktime to their already busy schedules (Campbell, 2016; Panahi *et al.*, 2016a, 2016b). Although keeping track of the many SM channels and newsfeeds is time-consuming, allocating a couple of hours each day may help physician leaders be more aware of what is being posted online and be able respond to misinformation in a timely manner (Karpeh and Bryczkowski, 2017). With the pandemic, rules and regulations will change, hence physician leaders are in an important position to guide and influence these reforms as they relate to SM.

Indes *et al.* (2012) and McMenamin (2011) also highlight the risk of patients relying on SM as a substitute for immediate communication with providers, which could potentially delay diagnoses or treatments that would impact the overall patient care. Despite SM being a quick and efficient means of connecting at a time when communication may be urgently needed, a patient or helper may be unable to use the technology correctly and/or provide a coherent accounting of the injury (McMenamin, 2011). As such, time may be better used to get the patient urgent in-person medical assistance.

3.2.2 Information factors.

3.2.2.1 Information quality and credibility. Many physicians are concerned about the credibility of information available online and their patients' ability to interpret it correctly (Raliski, 2013). While this can be true of traditional, more static websites, SM tools allow people to rapidly disseminate and download information, regardless of the quality of the information and how the end user might understand the material (Duymuş *et al.*, 2016; Zhou *et al.*, 2018).

Physicians also need to be aware of both their active and passive online presence. Active presence refers to their interactions online, whether it is a blog post, tweet, like, or Facebook comment. Passive presence refers to sites like "RateMDs" where patients and the public rate and post their experiences and opinions about their physicians. As such, physicians may need different strategies to manage their active and passive SM presence because of the high visibility of these sites and their potential influence on their patients and their own reputation (McEvenue, 2016).

3.2.2.2 Privacy, confidentiality and technology security. Important factors that influence physician use of SM are privacy and confidentiality, particularly for patients. Physicians need to be aware that they may unintentionally reveal information about patients that can allow people to identify a particular patient, thus violating their patients' privacy (Chauhan *et al.*, 2012). Panahi *et al.* (2016b) also note that sharing any patient's specific or identifiable information on SM is considered a breach of patient privacy rules such as noted in the United States Health Insurance Portability and Accountability Act (HIPPA).

Ethical issues arise when physicians have increased access to patients' stories on SM, even though it could improve health care as they become more aware of the experiences and reaction to treatment of their patients (Raliski, 2013). Potential breaches of patient privacy and confidentiality and resulting legal issues are among the key challenges and risks to patients and health-care professionals (Moorhead *et al.*, 2013; Ventola, 2014). The privacy of medical records is becoming an increasingly serious concern, and numerous lawsuits have arisen from disclosures of the medical records (McMenamin, 2011). Furthermore, although physicians have the right to engage in professional conversations and debates using SM, defamation law still applies to content online (Budd, 2013). Yet, it is not always very clear what sort of malpractice coverage the ordinary policy provides for claims based on statements made on SM (McMenamin, 2011).

Other legal issues relate to integrating SM into mainstream medical education, sharing copyrighted educational material, data and record ownership, governance and policy and privacy setting for technology systems (Davies *et al.*, 2015; Razmak and Bélanger, 2017). Physicians may also be unable to regulate patient access to their online personal information.

3.2.3 Professional factors.

3.2.3.1 Professionalism. The CMA notes that "social media pose a challenge for physicians (and other professionals) in terms of separating one's personal and professional lives (Adilman *et al.*, 2016). For example, becoming friends with patients on Facebook can put pressure on professional limits and result in differences of opinion among staff as to where appropriate boundaries lie in the context of legal and ethical considerations, work-life balance and institutional responsibility (Wiener *et al.*, 2012; Ginory *et al.*, 2012).

Building rapport between physicians, patients and the public often relies on trust – trust that the physician is professional, knowledgeable in their field and that they can help the patient. A study that explored establishing trust on SM found that previous personal interaction, authenticity and relevancy of voice, professional standing, consistency of communication, peer recommendation, non-anonymous and moderated sites helped

strengthen trust between patients and physicians (Panahi *et al.*, 2016b). Panahi *et al.* (2016b) also noted that physicians were able to strengthen SM trust by connecting with people they already knew and had met in person, only trusting physicians well known in the field or recommended by close peers, observing online behaviour by sharers, critically reviewing their posts and carrying out background checks on the internet to evaluate the professional standing of sharers.

SM provides the opportunity to learn from and increase health communication, which may lead to an increase in patients' willingness to seek medical attention (Smailhodzic, 2016). Many Canadian health-care institutions are gradually adopting e-health applications as a primary and routine component of their practices (Razmak and Bélanger, 2017). However, physician leaders, patients and the public who use SM must do so responsibly (Karpeh and Bryczkowski, 2017). People often feel less restricted when engaging in online interactions and express opinions that would not normally be communicated in face-to-face meetings (Budd, 2013). For example, medical students are often technologically savvy, are just beginning to develop their sense of professionalism, and may not fully understand that publicly available content can directly reflect on their professional reputation (Bottles and Kim, 2013). Intentional or unintentional biases may also play a role in clinical research as patient recruitment companies are increasing their use of SM to boost trial recruitment (Decamp, 2013).

3.2.4 Regulations and guideline factors.

3.2.4.1 Regulations and policies. Many professional organizations, hospitals and medical schools are developing guidelines to direct physicians and medical students towards appropriate and ethical use of SM (Fisher, 2012). The American College of Physicians (ACP) Ethics board recommends that physicians recognize the importance of protecting the privacy and confidentiality of their patients (Duymuş *et al.*, 2016). Similarly, the Federation of State Medical Boards (FSMB) recommends that patients' privacy always be protected on social networking sites (Chauhan *et al.*, 2012). Both ACP and FSMB recommend physicians separate their professional and personal lives and not contact patients through SM sites (Bottles and Kim, 2013).

Other examples include the Massachusetts Medical Society (MMS), one of the first state medical associations to develop comprehensive guidelines and principles to help physicians in their decisions around SM (Fisher, 2012). The British Medical Association (BMA) has also published guidelines that discourage physicians from interacting with their patients on social networking sites (Dolan, 2011; Duymuş *et al.*, 2016). Yet, it is not clear how these regulations apply to physicians living in small towns where everyone knows each other, and it is very difficult to keep professional and personal boundaries separate (Petersen, 2015).

While there is a growing number of regulations about use of SM by health providers, many people believe that there is not enough guidance on how to implement policies in practice. For example, the US Health Insurance Portability and Accountability Act, 1966 (HIPPA) does not restrict distribution of de-identified medical information (Fogelson *et al.*, 2013). Strict regulations can also reduce the incentive for using SM; one study distributed a questionnaire to 321 orthopaedists and found that although Facebook was the most popular, use of this platform to communicate with patients was low (23 %), which may be due to legal or ethical concerns (Duymuş *et al.*, 2016).

In summary, the literature review has highlighted some key areas that physician leaders can focus on when using SM to conduct cross-boundary activities, namely:

- Rapid sharing of trustworthy information and knowledge among themselves and with patients;
- Creating trusting relationships with their peers, patients and public;

- Enhancing medical education and communication;
- Keeping their practices current; and
- Increasing their SM networks, and networking skills and abilities.

4. Discussion

In this section we address objective 2 of our study and provide insights on the practical SM implications for physician leaders working in the COVID-19 environment. Cross-boundary communication via SM channels is an emerging area of study. Prior to the pandemic there were many assumptions relating to ethical implications and conflicts of interest, but not enough evidence about the benefits or harm that SM could bring. For example, there is a distinct cultural difference between traditional medicine, which values privacy, confidentiality, one-on-one interaction and professional conduct and SM, which values openness, informality and transparency and connection (Duymuş *et al.*, 2016; George, 2011). It also appears that existing studies do not provide enough evidence on which method or hybrid method is more beneficial in terms of promoting patient care and good health outcomes.

The CanMEDS framework (Frank *et al.*, 2015; Shaw *et al.*, 2017) states that physicians as leaders should engage with others to create a high-quality health-care system through their medical, administrative and teaching roles. One of these roles is to communicate effectively, including the use of SM. As communicators, physician leaders develop professional relationships with patients and their families that facilitate the gathering and sharing of essential information for effective health care. They also communicate with their colleagues in sharing information, networking, medical education and in advancing their careers.

COVID-19 has highlighted the need for physicians to be stronger leaders in presenting trustworthy, consistent information about the crisis and other health matters to the public and to peers, specifically using SM. COVID-19 has forced and accelerated the need for physicians and their patients to create networks across numerous boundaries including physician-to-physician and physician-to-patient engagement. The pandemic has also accelerated the use of technology for physician-to-patient interactions, including initiating appointments online, and as such, physicians are required to rapidly trust SM and its supporting technology a lot more.

COVID-19 has also provided an opening for physician leaders to take a lead role in the development of protocols that will increase the effective and ethical use of SM. To cross boundaries effectively, all physicians will need to leverage SM platforms and technology to fully realize SM's use in health care. This could ultimately lead to improved overall health outcomes. As such, they will need to understand their role as public influencers. Physician leaders as influencers can positively or negatively impact medical practices for both patients and other physicians, and thus patient outcome.

Moving forward, physicians (as leaders and public figures of trust) will need to develop a strategic and effective plan for key message development and the use of SM and other mass media platforms. An effective plan would be jointly created by physician leader organizations and other community leaders to address current and future community health crises.

5. Implications for organizations (policies, guidelines)

One of the challenges emerging from the review relates to the complexities and differences between specialities not being adequately identified, even though this distinction affects the

type, communication pattern and indicators of effectiveness when physicians use SM. SM has many forms and uses that result in different practices and outcomes. With the current crisis, physicians are required to adapt and redefine their engagement practices using online platforms to meet the needs of their patients (e.g. consultations and diagnostic services) and to communicate with colleagues for sharing health information.

Prior to COVID-19, there were already several shortcomings in current regulations and guidelines. First, regulation and guidelines are neither practical nor effective in eliminating grey areas such as physicians using blogs to advertise their preferred procedures and practices (Jesitus, 2010). Most regulations and guidelines emphasize the importance of separating personal presence from professional presence on SM. Yet these regulations were not always effectively reaching physicians. For example, one study mentioned that only 36% of urologists were aware that such guidelines existed and just 19% had read any such guidelines or relevant legislation (McGowan *et al.*, 2012).

SM regulations and guidelines are often complex and do not create incentives to initiate cross-boundary activities. Strict regulations may prevent useful cross-boundary communications because physicians do not wish to bring unnecessary consequences upon themselves. Hence, it is crucial for regulations and guidelines to give room for physician leaders' judgement while providing targeted and detailed directions for physicians to responsibly connect with patients on SM. This highlights the need for physicians to have proper SM training, including an understanding of the guidelines to help reduce their apprehension about using SM tools.

6. Implications for practicing physicians

Physician leaders have a key role in positively influencing institutional support for ethical and safe SM use and engagement practices. Physicians need to participate in developing regulations and guidelines that are fundamentally to physician leader's SM use. Physician leaders also need to monitor information sources for credibility and ensure that they are protected. Strong physician presence can provide patients with professional online content to counterbalance opinionated information, contribute expert advice and validate posted material (Budd, 2013). By increasing the amount of controllable content, physician leaders can optimize their online presence by populating search results with information they have created, as opposed to opinions from physician-review websites like RateMDs (McEvenue, 2016).

All physicians have a responsibility to always follow their medical oath to be professional in all aspects of SM use. The pandemic has created an opportunity for physician leaders to build and leverage the trust currently accelerated use of SM by health professionals (Shah and Schulman, 2021). Moving forward, it will be important to better understand how physicians' cross-boundary practices have changed during and potentially after COVID-19. For example, what are the most effective uses of SM tools to enhance cross-boundary communications during a pandemic or crisis, what is needed to improve the quality of information and identify ways to positively leverage the SM's factors identified in the review, and how to develop regulations and guidelines to promote ethical cross-boundary interactions in this new normal.

7. Implications for medical education

Ethical physicians will find ways to use SM that are professional, innovative and helpful to their patients, while protecting themselves and their patients (Bottles and Kim, 2013). Even though there are benefits in physician-patient relationship, effective standards and regulations should be developed to enable a safe environment and to resolve ethical and

legal uncertainties (Duymuş *et al.*, 2016). As noted above, physician leaders must be involved in developing SM guidelines to fully understand their impact.

As role models for the effective use of SM tools for medical education, physician leaders can also mentor and coach their colleagues and counterparts in this area. There is also an opportunity for younger and mid-career physician leaders to share; younger physicians may have more technology knowledge, whereas mid-career physicians have medical expertise and professional experience.

8. Implications for future research

SM is an emerging and complex area, especially in the current COVID-19 climate (Cinelli *et al.*, 2020). There is an urgency to recognise and study the complexity of SM in its various forms (Monaghesh and Hajizadeh, 2020). For example, the distinction of specialties and the effectiveness of regulations and guidelines for physicians who are being required to strengthen and increase cross-boundary practices.

The use of SM is an art and skill and one that most physicians may not have or be fully conversant with. It would be helpful to explore the role of physician leaders as influencers and develop better ways to inform the Canadian public and create trust in the information conveyed. If we expect physician leaders to be SM influencers across boundaries and impact health-care practice, they need the required skills to influence and therefore they must also develop these capacities through training in this area.

The COVID-19 health care and communication environment indicate the need for a Canadian SM integrated, and systemic health-care strategy, and one that is led by physicians (Standiford *et al.*, 2020). This approach will provide physicians with SM knowledge and guidelines but also opportunities for training in the effective establishment of virtual networks. Taking this approach will also require health care organisations, such as CanMEDS, CMA and medical schools to come together and provide physicians with essential training in SM skills.

9. Conclusion

COVID-19 has forced physicians into the world of technology as appointments, diagnostic sessions and consultations have transitioned to an online environment. This new reality has changed their practises as they are required to cross many horizontal (physician-to-physician) and stakeholder (physician-to-patient) boundaries. Physicians now, more than ever, have a greater need to collaborate across Canada, to both inform and improve health care practice and associated health outcomes through SM platforms.

The current crisis has also illuminated opportunities such as increasing trust in physician-patient virtual interactions, while leveraging SM platforms. In doing so, this has also enhanced physicians' cross-boundary SM skills and providing the potential to increase overall health outcomes. Physician leaders will need to be actively engaged in developing the guidelines and protocols required to leverage the benefits of SM while also sustaining and enhancing privacy regulations.

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Appendix

Table A1.
SM platforms used by physician leaders: Purpose, content, contributors, and audience

Social Media Sites					
Platform	Purpose	Content	Contributors	Audience	Website
Doctors Lounge	Doctor's Lounge is a website focused for health professionals.	Articles, academic journal papers, medical news, tutorials, and study aids	Physicians, students & allied professionals	Physicians, students, & allied professionals	www.doctorslounge.com
Sermo	Virtual doctors' lounge" that facilitates medical collaboration and crowdsourcing	Open forum of expression of and for physicians, where doctors can express their opinions, provide feedback, relate to one another personally and professionally.	Physicians and health care professionals	Physicians and health care professionals	https://www.sermo.com/about/
Doximity	A professional medical network for physicians	Physician-only social networking community that offers text and images	Physicians	Physicians	https://www.doximity.com/
Figure1	To democratize medical knowledge and improve the future of healthcare.	Leading physicians and world-class institutions share rare conditions, innovative treatments. & teaching cases	Healthcare professionals and students for education and collaboration purposes	Nurses, medical students, and allied healthcare professionals	https://figure1.com/
Medscape	Improve patient care with comprehensive clinical information and resources	Medical news and expert perspectives; essential point-of-care drug and disease information; and relevant professional education and CME	Physicians and healthcare professionals.	Physicians and healthcare professionals.	www.medscape.com/
Mayo Clinic Social Media Network (MCSMN)	A professional social network for people and organizations using online digital communication tools	Social network and collaborative learning community for people and organizations using social media to enhance health care delivery and advance careers	Hospitals, healthcare communications professionals and medical providers, as well as patients and caregivers	Hospitals, healthcare communications professionals and medical providers, as well as patients and caregivers	https://socialmedia.mayoclinic.org/

(*continued*)

Table A1.

Social Media Sites					
Platform	Purpose	Content	Contributors	Audience	Website
BroadcastMed	Engages, educates, and inspires physicians and other providers by producing, promoting and distributing health related video content	Support product launches, peer-to-peer education, continuing medical education (CME), clinical affairs and patient-focused health information, among other applications.	Physicians and healthcare professionals.	Physicians and healthcare professionals.	https://about.broadcastmed.com/
Social Media Groups					
Platform	Purpose	Content	Contributors	Audience	Website
Physicians Practice (on LinkedIn)	We help U.S. physicians and practice administrators effectively manage the operation and business aspects of their practices.	Sharing news, information, etc. for feedback from the entire group. Engage in discussions about these issues affecting healthcare.	U.S. physicians and practice administrators	U.S. physicians and practice administrators	https://www.linkedin.com/groups/47211/profile
Medical Group Management Association (MGMA) on LinkedIn	To create successful medical practices that deliver the highest-quality patient care.	Members connect with other medical groups, ask questions and serve as a resource for peers across the state. Group provides support, training, and resources for its members.	U.S. physicians, health care professionals, and allied health programs	U.S. physicians, health care professionals, and allied health programs	https://www.linkedin.com/groups/8910841/
QuantiaMD (on LinkedIn)	A social learning and collaboration platform designed for physicians to interact with and learn from experts and peers.	Web and mobile community where physicians learn from top experts, seek advice, and collaborate on a wide range of topics.	Physicians	Physicians	https://www.linkedin.com/company/quantiamd
Physicians Practice (on LinkedIn)	Support U.S. physicians and practice administrators effectively manage the operation and business aspects of their practices.	Sharing news, information, etc. for feedback from the entire group. Engage in discussions about these issues affecting healthcare.	U.S. physicians and practice administrators	U.S. physicians and practice administrators	https://www.linkedin.com/groups/47211/profile

(*continued*)

Table A1.

Social Media Sites					
Platform	Purpose	Content	Contributors	Audience	Website
Forums					
MomMD	MomMD is a leading online magazine, community, and association for women in medicine	Provides unique content, resources and information for women physicians, resident physicians, medical students and premedical students.	Physicians, students & allied professionals	Physicians, students & allied professionals	https://mommd.com/
PatientsLike me (website forum, and blog)	To improve the lives of patients through new knowledge derived from shared real-world experience and outcomes.	People share personal stories and information about their health, symptoms, and treatments, with a goal to improve the lives of all patients through knowledge derived from shared real-world experiences and outcomes	Researchers, clinicians, patients, and families.	Researchers, clinicians, patients, and families.	https://www.patientslikeme.com/
Medical Directors Forum	Exclusively for Medical Directors - specialized consultation, communication, and information exchange	News, career alerts, real-time consultation on challenging patient cases and exchange clinical experiences.	Healthcare professionals	Healthcare professionals	https://medicaldirectorsforum.com/user-activity?destination=stream
Doctors Lounge discussion board	'Ask a Doctor' link to enter the medical forums.	A patient resource	Doctor, Pharmacist, PA, or a Nurse	Public/patients forum	http://www.doctorslounge.com/forum.htm
Student Doctor Network (SDN)	A nonprofit service to help build a diverse doctor workforce	Provides free advising resources, tools, and peer-support forums	Students, doctors, and academicians	Current and future healthcare students and professionals	https://www.studentdoctor.net/
Wikis					
Platform	Purpose	Content	Contributors	Audience	Website
EyeWiki			Ophthalmologists		

(*continued*)

Table A1.

Social Media Sites					
Platform	Purpose	Content	Contributors	Audience	Website
	Patients view only; Ophthalmologist (or in training) can contribute	Articles, covering the vast spectrum of eye disease, diagnosis and treatment		Ophthalmologists, other physicians, patients, and the public	http://eyewiki.aao.org/Main_Page
WikiDoc	WikiDoc is designed to facilitate collaborative authoring	WikiDoc is an open-source website that allows an international community of healthcare professionals to add and edit medical content.	Health professionals	Health professionals and patients (WikiPatient)	https://www.wikidoc.org/index.php/Main_Page
WikiLectures	A student's guide to the examiner's mind: for effective learning and proper questioning	A project focused on creating and storing medical study materials. Part of the project MEFANET – network linking medical schools in the Czech Republic and Slovakia	Students and teachers of all medical faculties.	Students and teachers of all medical faculties	https://www.wikilectures.eu/w/Main_Page
HemOnc.org	A free Hematology /Oncology reference	Medical wiki of interventions, regimens, and general information relevant to the fields of hematology and oncology.	Healthcare professionals	Healthcare professionals	https://hemonc.org/wiki/Main_Page
Radiopaedia	To create the best radiology reference and to make it available for free, for ever, for all	Open-edit educational radiology resource articles, cases, and playlists	Radiologists and other health professionals can edit.	Radiologists and other health professionals	https://radiopaedia.org/
Blogs					
Doctors Lounge discussion board	'Ask a Doctor' link to enter the medical forums.	A patient resource	Doctor, Pharmacist, PA, or a Nurse	Public/patients forum	http://www.doctorslounge.com/forum.htm

(*continued*)

Table A1.

Platform	Purpose	Content	Contributors	Audience	Website
Social Media Sites					
Sharing Mayo Clinic	Stories from patients, family, friends, and Mayo Clinic staff	A place for this community to connect and share their experiences. A hub that links to Mayo Clinic's pages on other social networking sites, such as Facebook and YouTube.	Patients, families, and Mayo Clinic staff	Patients, families, and Mayo Clinic staff	https://sharing.mayoclinic.org/
Media Sharing Sites					
WeMedUp (Twitter, Facebook)	WeMedUp is a community for medical professionals to connect and collaborate on research and patient case studies.	Discuss cases and search for job openings worldwide.	Physicians, dentists, allied health professionals, administrators & staff and students	Physicians, dentists, allied health professionals, administrators & staff and students	https://www.facebook.com/WeMedUp/ https://twitter.com/wemedup?lang=en
Duke U Medical Centre (on YouTube)	To further educational, research, clinical, and administrative activities in the medical field.	Education programs, information, and achievements	Faculty, staff, and students in the School of Medicine, School of Nursing, allied health programs, and graduate programs in the basic medical sciences.	Faculty, staff, and students in the School of Medicine, School of Nursing, allied health programs, and graduate programs in the basic medical sciences.	www.youtube.com/user/dukemedicine
Veterans' Health Administration on Facebook	To provide our audience with Veteran news and information while maintaining an issue-driven, audience-focused conversation online.	Largest integrated health care system in the United States, providing care of varying complexity to Veterans enrolled in the VA health care program.	U.S. physicians, health care professionals, and allied health programs	US Veterans and family	www.facebook.com/VeteransHealth