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Using E-mail to Transform Patient and Physician Dialogue

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Abstract

Of adults with access to the internet, 90% would prefer communicating with their physician by email. Unclear is under what circumstances would patients prefer email over other modes of communicating with their physician. Patient centered communication increases information seeking behaviors on the part of the patient. Therefore, this study examines the relationship between patient centered and physician centered communication specific to patients' preference for modes of contacting their physician, such as telephone versus e-mail. A survey was conducted using a non-random network sample. Results of the study did not indicate a significant difference between patient-centeredness and the desire to e-mail one's physician. However, of the 14 scenarios considered non-urgent, e-mail was chosen as the preferred mode of communication by the majority of respondents, 85%. Further descriptive data provides insight into the potential value of e-mail communication in a health care setting. Implications of the research are discussed.

Keywords: Physician; Internet; E-mail communication; Health care

Introduction

Communication between physicians and patients is the foundation of a strong physician-patient relationship. It contributes to effective medical care and increases patient satisfaction Leong et al. [1]. Physicians must communicate in ways that are easily accessible and responsive to patient needs. Identifying new ways for physicians to address these information needs is a significant health care issue. Therefore, the Institute of Medicine suggests that care should be provided over the internet and by phone, in addition to in-office face-to-face visits, Patt et al. [2].

According to Houston et al. [3] out-of-office communication is expanding with one fourth of patient-initiated contact occurring by telephone. Although telephone communication has been linked to patient satisfaction and improved patient outcomes, it is not without limitations. Telephone follow-up is time consuming and often requires multiple calls to contact the desired receiver. Time lag in between a return call may be hours and therefore frustrating to patients seeking quick

information or advice. In addition, 65% of telephone conversations are not documented, leading to errors and gaps in medical records. Alternatively, electronic communication, such as e-mail, offers quick, asynchronous communication, with self-documenting capabilities of the message exchange. As the most widely used form of computer-mediated communication, e-mail is a vital tool in developing interpersonal relationships.

Although e-mail communication has seeped into most aspects of our life, one area which it still has not permeated is health care. Ripe with benefits and concerns, e-mail is a growing hot topic in the world of health communication Virji et al. [4]. To further investigate the significance of communication channels in a healthcare setting, the current study seeks to understand the relationship between available modes of communication and their effect on patient participation. Specifically, this study will examine the relationship between patient-centered communication and its impact on out of office communication.

Literature Review

Modes of communication

Mutually beneficial physician-patient communication involves an exchange of valuable information, the development of an interpersonal relationship, and shared decision making Leong et al. [1]. The use of telephone to e-mail brings a plethora of opportunities and challenges in the physician-patient relationship in the delivery of healthcare. According to a 2002 Harris Interactive study, of the approximately 78% of U.S. adults with Internet access, 90% are interested in communicating with their physicians via e-mail. Additionally, 56% of that 90% say that e-mail access would influence their choice of physician. The majority of patients are satisfied with e-mail use with their physician and find it easy to use and are very likely to recommend their physician to others.

Physician-patient e-mail messaging can be defined as a computer-based exchange of information that takes place within a contractual relationship between the health care provider and the patient. Physician-patient e-mail communication is seen as an extension of the office visit in which the physician takes on additional responsibility – beyond face-to-face interactions – to care for the patient. In a study by Houston et al. [3] U.S. physicians were asked about their experience with electronic patient-centered communication

and their perspectives on the driving force behind the use of e-mail with patients. Results determined that patient request was the number one reason for physician's use of e-mail, with e-mail's time-saving capabilities and the ability to deliver better care rounding out the top three; revealing that patient desire for e-mail use is on the rise and that the physician's adoption of an e-mail messaging system may improve overall efficiency.

Advantages of e-mail include quick, asynchronous communication (data messages that can be sent and received at different times), the elimination of telephone-tag and interruptions, and the ability to self-document the dates, times, and content of the messages Liederman et al. [5]. Additionally, physician-patient e-mail communication has the potential to improve health care by increasing access to important medical information via the sharing of electronic resources and linkage to health education websites. The convenience and ease of e-mail communication coupled with the ability for physicians to manage patient care beyond the office are major advantages in establishing an effective physician-patient relationship. The use of e-mail communication to handle administrative matters, answer simple questions, and provide health education to patients could reduce the time needed for face-to-face visits, leading to more efficient care Virji et al. [4].

Leong et al. [1] set out to evaluate the effectiveness of e-mail communication in medical settings through an examination of the e-mail interactions between physicians and patients. Results revealed that over the six month study period both patients and physicians grew increasingly satisfied with the communication and the message system. Patients reported higher levels of satisfaction in the areas of convenience and time spent contacting their physician, while physicians reported high levels of satisfaction in the areas of convenience, time spent addressing messages, and volume of messages received. No significant increase in the number of messages received, as compared to phone messages, was reported, leading to no extra burden for the physicians. In fact, physicians noted that it took them less time to respond to e-mail messages (1-3 minutes per message) than it did to return phone calls. These findings suggest that by improving access to care, e-mail has the potential to enhance health care delivery.

Patient participation

Patient participation in healthcare is crucial to effective diagnosis and treatment; however it is a fairly complex concept and can be difficult to measure. Krupat et al. used categories of sharing and caring to measure attitudes about the roles that patients and physician should play in medical encounters. Sharing describes the extent to which the respondent believes that the patient should be a partner with the physician in the decision-making process, while caring describes the extent to which the respondent sees a patient's lifestyle and values as critical pieces of the treatment plan. In general, patient participation can be defined as the physician handing over some of the power and control to the patient through the sharing of information, joint problem-solving, and

active engagement in the health care process Frank et al. [6]. Through the exchange of e-mail messages, patients have the ability to initiate discussions with their physician free of time constraints and physical constraints. Furthermore, e-mail allows the patient to maintain control of the conversation by determining what topics are discussed and the number of ideas communicated. While some patients may be reluctant to share embarrassing or distressing information during a face-to-face consultation, e-mail provides a safe outlet through which to do so, all while building a trusting and open partnership with the physician by Roter et al. [7].

Patient participation may involve behaviors such as working with the physician to determine the best treatment plan, patient expression of opinion, preference, or disagreement, or patient-initiated communication with the physician to discuss concerns or alternative care options. Aside from the direct results of effective communication on health outcomes, such as decreased stress, effective communication also can result in a positive patient experience in which the physician acknowledges the role of the patient as a partner in health care and contributes to the idea of patient-centered care. Examples may include a lack of physician dominance, physician interest in psychosocial issues, information giving, openly discussing treatment options, and encouraging the patient to ask questions by Clever et al. [8].

Mutual interaction between physician and patient can facilitate understanding, decrease unrealistic expectations, and prompt the patient to actively seek the knowledge, skills, and confidence necessary to manage their health outside of the office Young et al. [9]. According to Street et al. patients who engage in active participation with their physician are more satisfied with their healthcare, receive more patient-centered care, are more likely to adhere to a treatment plan, have a stronger sense of control, and experience better health outcomes than do non-participative patients. A patient's participation efforts in conjunction with the physician's acceptance and encouragement of this behavior can lead to a collaborative relationship in which medical decisions and treatment plans are better tailored to meet the patient's unique needs.

To actively participate in healthcare, patients must be able to express their needs and wants, share concerns, and articulate expectations for care. Through e-mail communication, patients are given the power to initiate conversation with their physician without an appointment, and address health concerns and questions when it's convenient for them. In 2008 study by Roter et al. [7] researchers explored the extent to which physician-patient e-mail communications mimic traditional medical dialogue in terms of dominance, content, and tone. Results found that messages were more likely to be initiated by the patient than the physician. In addition, a word count revealed that patients wrote about twice as many words as their physician. In all, this study suggests that e-mail communication does not follow the same pattern as traditional medical dialogue. Physicians tend to dominate the conversation in face-to-face interactions with patients, averaging three statements for every two patient

statements. Conversely, when communicating through e-mail, patients typically write two-times as much as physicians in terms of the amount of ideas shared and the number of words used. This study supports the notion that patients are able to be more active participants in their health care when the barriers of time constraints, that are common place in face-to-face consultations, are lifted.

Aside from the positive results of patient participation on adherence and health outcomes, patient participation also has been shown to improve patient satisfaction with the physician and the care received. Patient satisfaction can be defined as the degree to which a patient's expectations of ideal care are met by the care that they actually receive Findik et al. [10]. Patients want two main things out of their healthcare experience: (1) an exchange of useful information, and (2) a trusting, personal relationship with their physician Young et al. [9]. Active participation can help to fulfill a patient's expectations through working in partnership with the physician to develop an open and honest platform for information exchange, all leading to a stronger physician-patient relationship. Patients tend to report higher satisfaction and decreased health problems when their information-seeking needs are met Haskard et al. [11].

Young et al. [9] hypothesized that reported patient participation is positively correlated with patient satisfaction when physician feedback is perceived to be positive. Measuring perceptions of patient participation through information giving/asking and decision-making, results found that there was a direct relationship between overall patient participation and patient satisfaction. This study supports the idea that collaborative practice through patient participation may be a healthier and more satisfying approach to healthcare.

While research focusing on the relationship between communication and patient satisfaction is extensive, research on electronic communication in the form of e-mail is lacking. As mentioned earlier, there is a growing demand from our increasingly tech savvy society for everyday personal and professional business to be handled via the Internet and mobile devices – including managing our health Patt et al. [2]. According to Hobbs et al. [12], 57% of online users predict fewer frustrations with their physician if electronic communication was available, and 60% report that they often have follow-up questions for their physician that could easily be handled via e-mail. The convenience of e-mail communication allows for easy access to the physician for non-emergency situations, such as asking questions, clarifying instructions, and receiving test results. In addition, e-mail can help prevent medical errors by allowing patients to immediately contact their physician with concerns about medication or symptoms, as opposed to waiting until their next scheduled appointment Leong et al. [1]. With less time and money spent sitting in a physician's office, patients have more time and money to spend on doing the things they enjoy.

Previous studies on the relationship between physician-patient e-mail communication and patient participation have been completed from a qualitative standpoint and explore e-

mail use from the physician's perspective, or from the perspective of patients who currently have e-mail access to their physician. There is little quantitative research on patients' desire to communicate with their physician via e-mail, or the situations in which they would prefer to do so. Patients vary in their willingness to participate in healthcare decisions and treatment. Because active participation can lead to better quality of care and improved health outcomes, it is important to offer patients multiple means of accessing care. E-mail not only helps to build trusting relationships between physician and patient, but it also keeps the lines of communication open beyond the office doors. Patients often leave their appointments feeling frustrated and confused because their needs are not met or there is some degree of miscommunication Reijonsaari et al. [13]. Moreover, the patient may not fully realize the wider implications of the healthcare visit until after they've had some time to process the information exchanged. The elimination of time constraints offered by e-mail's asynchronous characteristic allows patients to digest all of the information they have received, gather their thoughts, and clearly articulate any concerns and/or follow-up questions. In addition, providing patients with the option to communicate via e-mail sends an encouraging message that physicians welcome active participation from their patients in the exchange of health information. Patient participation is a significant factor in the success of medical treatment and should be considered a valuable influencer in the discussion of healthcare-based electronic communication.

Based on this brief overview of the role of communication in the health care industry, the following hypothesis and research questions were posited:

H1: Patients who rank high in patient-centeredness will have a stronger desire to communicate with their physician via e-mail than patients who rank low.

RQ1: Are patients who are high users of e-mail more likely to want to use e-mail with their physician than low users of e-mail?

RQ2: Will patients prefer to use e-mail communication over voicemail communication to discuss non-urgent issues with their physician?

Methods

Participants

A snowball network sample of U.S. graduate students, family, friends, and coworkers, 18 years of age or older, were sought for this study. A total of 342 people were invited to take the survey with 167 participants completing the survey for a response rate of 48.8%. Of the 167 participants, 71.3% were female and 27.5% were male. Two participants did not record their sex. The age range of participants was 18 to 75, with a mean age of 42. The majority of respondents had completed four years of college (36.5%) or held a graduate degree (35.3%). The majority of participants were white/Caucasian

(97.6%) with the remaining population evenly split between African Americans and Asian/Pacific Islanders.

Procedure

After receiving approval from the IRB committee, an anonymous web-based survey was used to collect self-reported data from a convenience sample of personal and professional contacts. Participants were sought via e-mail and Facebook with a link to the electronic survey for completion. Those contacted were given information about the purpose of the study and were asked to complete the survey through a link provided by Checkbox Survey Software regarding their attitudes toward the patient's role in medical encounters and their preference for modes of communication in contacting their physician. Participants who clicked on the link were taken to a web page that provided further information about the study and explained that participation was anonymous and voluntary. Those who agreed to participate were directed to the beginning of the survey, while those who chose not to participate closed out of the web page. All participants were asked to pass the survey link on to others via email or a post on their personal Facebook page so that a snowball sample could be achieved.

Survey instrument

The survey instrument consisted of Krupat et al. Patient-Provider Orientation Scale (PPOS) and a modified version of Sittig et al. [14] survey on patient-provider communication (Appendix B). Sittig et al. [14] survey focused on how e-mail-ready patients currently use, or potentially view, the ability to exchange e-mail messages with their physician. For purposes of this study, Sittig et al. [14] survey was modified to include respondents who did not have e-mail access to their physician and to compare their responses with those who did have e-mail access to their physician. Therefore, an additional set of questions was added to measure patient attitudes if e-mail communication were available with their physician. Furthermore, supplementary sections were added to the survey regarding patient use of and preference for voicemail communication with their physician, and preferred modes of communication for a given set of urgent and non-urgent scenarios. The questions were used to measure attitudes toward traditional vs. CMC (email) modes of communication, and how these modes would be used by patients in conducting health care business.

Patient participation was measured using the 18-item PPOS Krupat et al. which asked respondents to rate their attitudes regarding the role that patients should play in medical encounters on a six-point Likert scale ranging from strongly agree to strongly disagree. The 18 items included statements such as "The doctor is the one who should decide what gets talked about during a visit," "Patients should rely on their doctors' knowledge and not try to find out about their conditions on their own," and "Patients should be treated as if they were partners with the doctor, equal in power and status." A total score for the PPOS can be calculated ranging

from 18 (doctor-centered) to 108 (patient-centered), as well as two sub-scores; sharing (the first nine items) and caring (the last nine items). For purposes of this study, only a total score was calculated. Cronbach's alpha was used to assess the reliability of Krupat et al. PPOS. The alpha was 0.713, which is acceptable and consistent with the reliability estimates from past research.

Sittig et al. [14] survey was divided into five sections: (A) type of physician and current access to physician's e-mail, (B) experiences and thoughts regarding the patient's use of e-mail with their physician (ex. "If your provider were to tell you that someone in his/her office may screen, read, or perhaps reply to your message before he/she sees it, to what extent would you be concerned about this?") (C) Attitudes toward the potential use of e-mail with their physician if that option is not currently available (ex. "Have you ever wanted to send e-mail to your health care provider?") (D) experiences and thoughts regarding the patient's use of voicemail with their physician (ex. "Do you have the option to leave a voicemail message for your health care provider?") and (E) preferences regarding modes of communication (e-mail, voicemail, or office visit) based on a set of given urgent and non-urgent scenarios (ex. Questions about sensitive issues such as HIV testing or impotence) For purposes of this study, 'non-urgent issues' are defined as situations that do not require immediate attention or response from the physician. Conversely, 'urgent issues' can be defined as situations requiring the patient to seek immediate medical attention.

The last part of the survey instrument asked about general demographic data, such as age, sex, race, and highest level of education completed.

Results

Based on the results of the surveys, an independent-samples t-test and descriptive statistics were used to analyze the relationships among the variables.

H1 predicted that patients who ranked high in patient-centeredness would have a stronger desire to communicate with their physician via e-mail than patients who rank low (doctor-centered). The mean score for patients who preferred to communicate with their physician via e-mail ($m=76.8$, $sd=8.57$) is not significantly higher than the mean score for patients who preferred to communicate with their physician via voicemail ($m=75.3$, $sd=7.49$) at the .05 level ($t=1.17$, $df=165$). Therefore, H1 was not supported.

RQ1 asked if patients who are high users of e-mail (send 5 or more e-mails each day) are more likely to want to use e-mail with their physician than low users of e-mail (send 4 or less e-mails each day). Descriptive statistics were used to analyze the data collected from Sittig et al. [14] modified survey. Of the 167 respondents, 62 (37.1%) answered that they send four or less e-mails (to anyone) each day, and 105 (62.9%) answered that they send five or more e-mails each day. Of the 62 respondents who send four or less e-mails each day, 27 (43.5%) say that they have wanted to send an e-mail to their health care provider. Of the 105 respondents who send five or

more e-mails each day, 44 (42%) say that they have wanted to send an e-mail to their health care provider.

RQ2 asked, "Will patients prefer to use e-mail communication over voicemail communication to discuss non-urgent issues with their physician?" Descriptive statistics were used to analyze the results of Section E of Sittig [14] modified survey. Of the 20 urgent and non-urgent scenarios listed, e-mail was chosen as the preferred mode of communication by the majority of respondents for 11 scenarios (55%), and an office visit was chosen by the majority of respondents for nine scenarios (45%). Voicemail did not rank as a preferred mode of communication for any of the 20 scenarios. Of the 14 scenarios that were considered non-urgent (situations that do not require immediate attention or response from the physician), e-mail was chosen as the preferred mode of communication by the majority of respondents for 12 scenarios (85.7%). For example, for the scenario, "Inquire about preventative medicine/behaviors", 94 respondents chose e-mail (56.3%), 12 chose voicemail (7.2%), and 61 chose office visit (36.5%); for the scenario, "Request a referral", 122 respondents chose e-mail (73.1%), 36 chose voicemail (21.6%), and 9 chose office visit (5.9%); for the scenario, "Questions/comments regarding a recent office visit", 107 respondents chose e-mail (64.1%), 44 chose voicemail (26.3%), and 16 chose office visit (9.6%); and for the scenario, "Questions about medical information found on the Internet", 125 respondents chose e-mail (74.9%), 17 chose voicemail (10.2%), and 25 chose office visit (15%).

Discussion

The purpose of this study was to examine whether a relationship exists between physician-patient communication and patient participation, specifically, whether patients prefer to use typical modes of contacting their physician, such as telephone, versus new age modes of communication, such as e-mail. While this study does not find a significant relationship between patient-centeredness and physician-patient e-mail communication, it does provide several important implications regarding patient desire for e-mail communication and the potential use for e-mail in a healthcare setting.

The first hypothesis was not supported. Reasoning for this may lie in the definitions of patient-centered and doctor-centered as they are described in study Krupat et al. defines doctor-centered as the traditional physician-patient relationship in which focus is on the medical problem and the physician is the main decision-maker. Conversely, patient-centered focuses on the person rather than the problem and involves the patient in the decision-making. While patient-centered patients may desire to use e-mail for purposes of information sharing and to recommend an alternative treatment option, doctor-centered patients may have an equal desire to use e-mail to seek medical advice or seek clarification on treatment instructions. For example, e-mail may serve as a conduit to doctor-centered patients who are reticent about questioning their physician's opinion or sharing their own thoughts and concerns in face-to-face or telephone consultations. Patients who are shy and introverted may prefer

to respond to their physician's advice via e-mail because it allows time for reflection, preparation, and rehearsal in a safe setting Hertel et al. [15]. According to Scealy et al. [16] shy people feel much less reticent in online interactions compared to face-to-face interactions, leading to increased levels of openness and confidence, which in turn allow for the building of strong interpersonal relationships.

Regardless of whether someone was a high user of e-mail or a low user of e-mail, the desire to e-mail their physician was strong. With 42% of high users and 43.5% of low users wanting to send e-mail to their health care provider it can be determined that despite the respondents' frequency of e-mail use, patients want the option to e-mail their physician. In addition, with 62.9% of respondents sending at least 5-10 e-mails each day on average, it can be determined that e-mail, in general, is a frequently used mode of communication. In fact, 102 (61.1%) respondents said that if they were given the preference, they would use e-mail over voicemail to contact their physician. Telephone tag has become a major deterrent for patients hoping for a quick answer to a question. Additionally, voicemail messages are often overlooked, incomplete, or misinterpreted leading to patient frustration Liederman et al. [5] e-mail, on the other hand, allows for rapid, asynchronous communication with self-documenting capabilities. The convenience of e-mail, with access now available on mobile devices, allows patients to multi-task and manage their health care on-the-go, all leading to higher levels of patient satisfaction Houston et al. [3]. A second implication can be drawn from this data in that physicians may not be meeting patients' needs. While the advancement of new technology continues to revolutionize the way people interact and go about their daily lives, physicians continue to rely on traditional modes of communication to interact with their patients. According to a 2002 Harris Interactive study, more than half of 2,000 surveyed adults indicated that the availability of e-mail communication would favorably influence their choice of health care plan and physician Roter et al. [7]. By failing to keep pace with emerging technology and heightened expectations, physicians could potentially be losing patients.

Patients prefer to use e-mail communication over voicemail communication to discuss non-urgent issues with their physician. Support for the use of e-mail over voicemail was strong with the majority of respondents choosing e-mail as the preferred mode of communication for 12 out of the 14 non-urgent scenarios (85.7%). These results follow the literature in that there is an increasing demand by patients to handle health-related business via e-mail. Schedules are busy and time is limited. The ability to send a quick e-mail as opposed to making a telephone call, which often results in being placed on hold or telephone-tag, better fits into the lifestyle of today's average American. While not meant to replace the office visit, e-mail also has the potential to increase physician productivity by decreasing the number of patient visits and telephone calls related to non-urgent consultations Virji et al. [4]. These ideas support previous findings by Patt et al. [2] in which physicians reported that they were able to take care of more patients and address more medical issues during office visits, because the

preliminary history sharing and administrative issues were handled via e-mail prior to the visit. In fact, one physician noted, "E-mail is so much more efficient, you end up knowing the patients so well by the time they come for follow-up, that you can ask more direct questions about what has been going on with their lives, why their blood pressure is consistently up, etc. (p.7)." Here lies a third implication in that offering patients the option to e-mail their physician with non-urgent questions and concerns not only allows for the continuity of care outside of the office, but also allows for a more efficient, comprehensive, and patient-centered in-office experience for both patient and physician. In turn, the patient-physician relationship is enhanced, and patient satisfaction is increased Roter et al. [7].

Limitations

The primary limitation to this study was the small number of respondents who had access to their physician's e-mail address (48) compared to the 119 respondents who do not have access or don't know if they have access. The 31 respondents (18.6%) who stated that they don't know if they have e-mail access to their physician was alarming because it could suggest that physicians are not informing their patients of this additional mode of contact. This lack of understanding could be leaving a huge communication gap between patient and physician, especially for those patients who prefer not to communicate via telephone, and therefore are waiting until their next scheduled office visit to discuss questions and concerns. If these 31 respondents had been properly informed, results of the study may have been more significant.

E-mail is a fairly new topic in the world of health communication. While it is a heavily used mode of communication, with 62.9% of all study participants sending at least 5-10 e-mails each day, e-mail has yet to make a significant impact on the health care industry. According to Virji et al. [4] the use of e-mail among Americans increased from 9% in 1995 to 74% in 2005 with 70-90% interested in using e-mail to communicate with their physician, yet only 5-10% of patients actually use e-mail to communicate with their physicians. In many instances it is the physicians who are acting as barriers to the widespread adoption of e-mail. Increased work load, privacy issues, and lack of reimbursement are just a few of the many concerns preventing physicians from providing e-mail services to patients Hobbs et al. [12]. While physicians are stuck weighing the pros and cons, patient demand continues to grow. Instead of focusing on the drawbacks of e-mail, physicians need to zero in on the immediate benefits that e-mail affords. With the potential for initial triage to be handled via e-mail in advance, office visits become more efficient with more time in the day to see additional patients, which brings in more money to the practice. In the end, patient satisfaction is what determines success. Patients who feel their needs are being met will be more active and adherent participants, will give a more positive opinion of the physician to family and friends, and will be more likely to return to that physician for future care Findik et al. [10].

For purposes of this study, patient participation was defined in the literature review as the physician handing over some of the power and control to the patient through the sharing of information, joint problem-solving, and active engagement in the health care process Frank et al. [6]. The application of this variable in an electronic communication context may have hindered effective use of the survey instruments to measure the degree of and preference for patient participation. Patient participation is usually framed in face-to-face encounters during which verbal cues are exchanged in an effort to build a trusting relationship and make joint decisions Street et al. [17]. Although many studies argue that e-mail has the same emotionally-engaging and partnership building capabilities as face-to-face dialogue Roter et al. [7]. It does not provide the same quality and depth. Therefore, accurate measurement of this variable in an e-mail context was difficult. In addition, the doctor-patient relationship has elements that make it unique from online relationships. Physical touch and disclosure of personal information make trust an essential part of the physician-patient relationship on both ends Andreassen et al. [1]. While patients trust that their physician has the knowledge and expertise to care for them, physicians trust that the patient is being upfront and honest about their medical history and lifestyle. According to Andreassen et al. [18] well-established trust must be nurtured over time through social interaction, implying that e-mail communication may be too impersonal for some patients regardless of patient-centered or doctor-centered views.

A third limitation can be found in the response pool. Participants were mainly solicited from within the researcher's own personal and professional network via electronic means such as e-mail and Facebook. As a result, those who responded were required to have electronic access. This does not reflect a representative cross-section of the health care population. Many patients in lower socioeconomic and minority populations do not have access to the Internet, and therefore would not have the ability to communicate with their physician via e-mail if the option were available. While this population makes up a large percentage of the patients seen at health clinics, the digital divide makes it difficult for physicians to continue care beyond the office doors Virji et al. [4].

Future Research

Since physician-patient e-mail communication is such a new topic, there is abundant opportunity for future research. First, extended research on the impact of physician-patient e-mail communication on time demands and patient management should be conducted. While research states increased workload as a major factor preventing physicians from adopting e-mail communication services, a number of studies have found that many patient requests, typically made via telephone or office visit, can be quickly addressed via e-mail Sittig [19]. In fact, Hobbs et al. [12], reported that physicians spent an average of 60 minutes each day managing patient phone calls, compared to the 10 minutes spent responding to patient e-mails. Less time spent managing phone calls equates

to more time available to spend in face-to-face consultations with patients. Additionally, e-mail allows the physician to distribute health information, specific to each individual patient, in a quick and inexpensive format. The sharing of health information encourages patients to self-monitor and seek medical care when needed, leading to increased levels of patient participation and compliance Hobbs et al. [12]. Therefore, future research could look at the relationship between time spent with a patient and patient compliance.

Secondly, a closer look at patient participation through e-mail communication and its effect on patient outcomes could reveal some valuable information in terms of adherence, satisfaction, and overall health. We know that patient participation is a significant factor in the healthcare process, leading to a stronger commitment to treatment plans, increased satisfaction with the physician, decreased stress, and more patient-centered care Street et al. however little research has been done to measure these variables in an e-mail communication context. Furthermore, based on the findings in this study that doctor-centered patients have an equal desire to e-mail their physician as patient-centered patients, e-mail could be a valuable outlet in encouraging reticent or shy patients to open up, initiate conversation, and become more active participants in their health care. Future research in this area, if found to be encouraging, could prompt more physicians to establish e-mail services with their patients.

Lastly, electronic applications such as Skype and Face Time should be explored as alternative communication modes and extensions of the office visit. The use of these applications takes patient participation a step further by allowing the patient to receive medical advice and/or treatment from the comfort of their own home while maintaining a visual element that is absent in e-mail communication. Technology such as this could be especially useful for patients who are homebound or live in isolated areas of the world and therefore have difficulty traveling to a physician's office. Additionally, patients who are stigmatized due to their illness may be more willing to participate in their health care if they can do so from comfort and anonymity of their home Villagran [20]. With 42.5% of this study's respondents stating that they've wanted to engage in e-mail communication with their physician, it can be expected that these alternative modes of electronic communication would peak interest as well.

Research on the relationship between patient participation and e-mail communication is promising. While e-mail service has yet to be widely adopted by physicians, it is a growing trend with great potential to strengthen the physician-patient relationship and enhance communication. Aside from the convenience and time-saving aspects that e-mail affords, its ability to enhance the delivery of care make it a key factor in the future of health care. As e-mail use continues to grow, so too will patient expectations for e-mail access to their physicians. Development of an effective and efficient e-mail system that encourages participation and helps to manage care will go a long way in creating a more positive experience for both physician and patient.

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