"I don't bother with the phone!"
Feeling Closer to Physician using Secure Messaging

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Abstract

This study explores the use of phone and secure messaging via an online patient portal in mediating the communication between patients and their healthcare providers. In analyzing the messages handling processes, we found that although both phone and secure messages were answered in similar manners, the interplay of the front- and back-end roles in collaborative work resulted in patients' preference for secure messages in communication as they believed it offered direct and empowered communication experiences. This study offers insights on the choice of how different communication media affect patients' perception toward the quality of the communication and patient-provider relationship.

1. Introduction and Background

Effective communication is crucial for maintaining healthy and trustworthy relationships between patients and their healthcare providers [8][21]. To promote the quality and satisfaction of communication, a wealth of research has been conducted to study this in a variety of healthcare settings, such as in pediatric care [15] emergency rooms [22], and in self-management of chronic illnesses like diabetic and cancer care [1][[7].

Patient-provider communication is especially important in primary care as patients routinely visit their primary care physician (PCP) over a long period of time. The long-term nature of primary care renders it necessary for patients and their PCPs to communicate not only in the exam-room during scheduled medical visits, but also outside of the visit times when patients have unanswered questions, new issues, or requests for prescription refills **Error! Reference source not found.**. In particular for patients who have chronic illnesses or multiple health conditions, health management usually involves repeated interplay of activities taken place in both the clinics and at homes [3]. As a result, frequent communication is often needed between medical visits

in order to uphold the quality and continuity of care. Nevertheless, the majority of studies on patient-provider communication only focused on the quality of interactions, questions asked, and patient satisfaction toward communication with their providers during the brief medical visits [15][18]. What communication is needed and how different communication media are used to mediate patient-provider interaction outside of clinical visits are less studied.

Patients' communication needs are increasing given the prevalence of patient-centered care models which expect the patients to be more actively engaged in their own healthcare [20]. Activities such as self-tracking of diet, exercises, and symptoms, obtaining health information online, or in general adopting healthy lifestyles can generate different health-related questions that need to be addressed by a healthcare provider [4][20]. Since PCPs serve as the overall health manager of their patients, questions and concerns are often directed to them.

In recent years, online communication has emerged as a significant new medium in enhancing the effectiveness and efficiency of patient-provider interaction, and consequently for improving patient-provider relationship. Latest advances in technology, specifically Personal Health Records (PHR) and online patient portals are gaining acceptance as they were found to be effective in facilitating patient-provider interaction outside clinical environments [9][19].

The PHR was initially designed for patients to securely access their medical records. Previous studies identified usability [12] and privacy [2] issues in these systems. Moreover, the barriers to adoption and its usage patterns in the elderly populations were examined [10][13]. Yet, many of these systems were intended for the storage and retrieval of health information and medical records, instead of facilitating communication. On the other hand, online patient portals, which were typically connected with the enterprise Electronic Medical Record (EMR) systems, encompass secure messaging features that allow

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patients and providers to communicate with each other privately and securely at any place and any time. Thus these portals afford a much more convenient and flexible communication channel [9][19]. In fact, a paucity of research conducted, via patient surveys, has shown that the use of secure messaging could improve the quality of patient-provider communication and patient satisfaction of care [7][11] [16][17].

In contrast to previous research that examined patient satisfaction with secure messaging using survey tools, the current work examined the use of two different media: phone calls and secure messaging, for patient-provider communication in a setting where strict communication protocols and a collaborative message handling process are enforced. Our participants perceived the use of the two communication media differently. While phone and secure messages were managed and responded in a similar manner, the different interfaces and the interplay of the front and back-end personnel resulted in a patients' preference for secure messages over phone calls. In addition, the use of secure messages was perceived to be a more direct communication method and to promote closer patient-provider relationship. We thus suggest that communication media adopted in similarly high reliability domains should be carefully designed to balance the front- and back-end activities so that customers could perceive better benefits and communication experiences. A collateral benefit is the persistent and complete documentation of all communication using secure messaging, which is not as complete or consistent with phone message documentation.

2. Methodology

We conducted a field study to investigate patient-provider interactions in an outpatient clinic affiliated with a large healthcare organization. What makes this clinic particularly suitable for studying a patient portal and the secure message use is because the healthcare organization is known for its pioneering work in technology adoption and the majority of patients, including elderly, are active users of the online portal. The goal of this research was to examine how the online portal was used to mediate patient-provider communication and relationships. IRB approvals from both the field site and the university were obtained prior to data collection.

2.1. Data Collection

Our study was conducted in two stages. First, we observed the general practices in the outpatient clinic to understand patient-provider interactions that occurred during medical visits, and the daily routines of the healthcare providers. Second, we interviewed patients to examine their attitudes toward the online portal and how they currently interacted with healthcare professionals using the portal.

Observations. Observations were conducted in the primary care unit of the outpatient clinic through shadowing both clinical and non-clinical personnel. In total, 14 staff members were shadowed in the study -- 5 primary care physicians (PCP), 2 medical assistants (MA), 3 clinical team leads (TL), 3 licensed vocational nurses (LVN), and 2 schedulers. Our participants represented over half of the clinicians and staff working in the unit and were selected for a good diversity of professional personnel. In the following, unless specified otherwise, healthcare provider is used to refer to any clinician or staff in our study.

Each shadowing session lasted for 3-5 hours. We shadowed physicians, nurses, and medical assistants in their offices or workstations, and inside exam-rooms. To be minimally intrusive, we passively stayed back when patients were present. We observed their technology use and patient-physician interactions, and handwritten notes were taken. When patients were not present, observations were supplemented with informal interviews with the healthcare providers to better understand their work practices. Moreover, we shadowed other healthcare providers in their workstations. We asked all our clinical and non-clinical participants to think aloud during our observations, during which the researchers sat at the back of the office to observe the participants' behaviors while they think aloud. A total of 120 hours of observations were conducted in shadowing individual providers. In addition, we enrolled in two training classes that were designed for promoting technology use in the healthcare organization. An additional 60 hours of observations were conducted in these training and meeting sessions.

Interviews. We conducted semi-structured interviews with patients at the clinic to understand their use of technologies with regard to their preferences and attitudes. We particularly inquired about patients' use of the patient portal in supporting their relationship with their PCPs, such as messages sent and received through the patient portal, and their perception and experiences with patient portal use in the past. Patients were recruited through physician referrals and all the interviews were conducted in a conference room on-site after their medical visit. Since the patient portal used at the clinic allows PCPs to see whether a patient has activated his/her online portal, 16 patient enrollees were selected and interviewed. The age distribution of the interviewees is 18-30 (1), 31-40 (3), 41-50 (2), 51-

60 (5) and over 60 (5). Among them, 7 were female and 9 were male. Each interview lasted approximately forty minutes and was audio-recorded.

2.2. Data Analysis

Two experienced researchers iteratively open-coded the observation and interview data using grounded theory to reveal common themes [6] regarding the use of the patient portal and patient-provider interaction. We first individually coded the observation notes and interview transcripts to reveal interesting themes. We then discussed our findings in a series of meetings. We identified patient-provider communication as a key theme from the analysis. We also extracted all the relevant observation and interview data related to communication technology use, communication preferences, and factors that influenced communication behaviors to separate files for closer examination. Each round of the coding was discussed, including disagreements, among the researchers, and revised until consensus was obtained.

3. The Patient Portal

The patient portal used at our field site is called *My Health Manager*. The patient portal is part of the EMR system that allows patients to view their medical records, access reliable health information, and communicate with their healthcare providers electronically. Secure messaging is the specific feature in the patient portal that we studied. To use the secure messaging, patients must first enroll to the patient portal using an email address. The secure messaging allows patients to send and receive secure messages to and from their healthcare providers asynchronously. Secure messaging differs from regular emails in that secure messages are only accessible through the patient portal. To illustrate, when a provider sends a secure message to a patient, the patient will receive an email notifying him that a message from the provider is available in the secure messaging center. The patient then has to log on the patient portal in order to check and to respond to the message. Similarly, the patient can send messages to the provider via the secure messaging after logging into the patient portal.

Secure messaging offers an alternative way for patients to communicate with their providers outside of the clinical visits, whereas previously, they could only rely on phone calls during business hours. Patients can now log on the patient portal anywhere, anytime. As observed in our field study, physicians always encouraged patients to use the "website" (i.e. the patient portal) to check for messages after their visits. Consequently, most patients at our field site have enrolled in the patient portal, and thus were identified as active users of the system. The participants in our study were all active users.

4. Findings

In this paper, we report different communication media use between patients and their healthcare providers, specifically their PCP, outside scheduled medical visits. We examined patients' underlying perceptions toward the use of two communication channels: phone calls and secure messaging. Quite unexpectedly, almost all our participants, including the providers, staff, and patients, strongly preferred using the secure messaging in the patient portal and many believed that it made them feel closer to their PCP. Below, we describe the communication needs of the patients and the healthcare providers, followed by the communication process in the use of the two channels. We also highlight the importance of triaging messages in the process. Finally, we present the benefits of the communication channels perceived by the patients.

4.1. Why communicate outside of visits?

Our analysis revealed that patients and their healthcare providers often needed to communicate with each other beyond exam room consultations. Typical reasons for patients to communicate with their PCPs include seeking clarifications after their medical visits, such as medication instructions, asking questions that they had forgotten to ask during consultation, inquiring lab results, and requesting for medication refills or advices about new medical concerns they may arise. Most patient interviewees indicated that they have communicated with their healthcare providers outside of their medical visits, either initiated by themselves or by the providers. The patients also pointed out that back and forth communication was usually needed before their issue was resolved, depending on the goal of the communication and the complexity of the issue. As expected, patients with more severe illnesses have communicated more frequently with their providers.

Our interviews revealed that many patients considered their PCPs as their first point of contact, and sometimes their personal helpline, for all their medical concerns. This is likely because PCPs often oversee their patients' all-round health and well-being and often over a long period of time. For example, a patient inquired whether he should seek immediate medical attention when his thumb was injured.

Kevin: um, when I initially had this thumb injury, uh, I called… [I] got [the] nurse's advice because I wasn't sure whether or not I needed to go to the emergency or it can wait till the following day.

Like this patient, not knowing where and how he should seek medical help triggered his question for the PCP. The clinical staff also pointed out that patients might sometimes contact their PCPs for critical symptoms, like when they had breathing difficulty or chest pain, which could indicate life-threatening issues like a heart attack. Such messages indicated a high level of trust for the PCP, but they could also reflect the patients' ignorance of the urgency of their symptoms. Therefore, it is imperative to advise patients not to rely on secure messaging for urgent issues and to remind them to check messages in a timely manner in order to avoid serious consequences.

Not only can patients initiate communication, providers may also contact patients when they need to discuss with the patients about new (often undesirable) lab results, and changes in their care plan or medications in response to changes in the lab results.

4.2. Who handles the messages?

As described above, healthcare providers working at the clinic consist of PCPs, RNs, LVNs, and MAs. They play different roles in the practice based on their respective training and expertise. Both MAs and LVNs work under the supervision of the RNs and PCPs according to the licensing and credentialing regulations and protocols. MAs are responsible for scheduling and reminding patients of their appointments, and notifying them of any changes in medications as instructed by their superiors. MAs possess just a few months training so they have to direct all the medical questions to their superiors. LVNs may help with some of the patients' impromptu questions related to their health given their limited medical training (usually two years). In the clinic, RNs and PCPs are the only providers who can see patients and discuss their health issues during scheduled appointments. RNs are capable of handling many medical inquiries particularly those related to nursing care, based on their years of training. PCPs are typically the most medically knowledgeable in the clinic. Not only do they see patients on site but are also responsible for inquiries made through phone or secure messaging that require their medical expertise.

For communications outside of patient visits, two of the RNs serve as Team Leads (TL) who do not typically see patients, but are mainly responsible for reviewing and triaging incoming messages made through phone calls and secure messaging for the PCPs they support. This function requires someone with a high level of medical expertise, like an experienced RN, to interpret medically related messages. At the clinic, each medical team consists of a TL with four PCPs and RNs (if they are scheduled to see patients), and the assigned MAs or LVNs.

4.3. How do patients and health providers communicate?

Outside of scheduled medical visits, patients and providers may communicate either by phone or via secure messaging in the online patient portal. Although these two communication channels appeared distinctly different, we found that the messages were handled similarly in the healthcare organization. One common feature is that all messages were first routed to the TL for review and triage. A PCP at the clinic acknowledged the importance of the TL's role in triaging messages:

All our calls, emails need to be triaged first by the RN (who serves as the TL), so if there is anything urgent, they will deal with it first. Usually RN will call and follow-up.

4.3.1. Phone communication. Since our study clinic is part of a large healthcare network, it employs a centralized call center to handle all patient phone calls. Instead of calling the clinic directly, patients in the entire region have to phone the call center when they want to reach their PCPs. During business hours, an operator in the call center just takes a detailed message from the patient for his/her health provider. The phone message is then transcribed and attached to the patient's chart in the EMR system.

Instead of reaching the PCPs' inbox directly, all the phone messages first go to a specific TL for triaging. The TL typically reviews the messages to identify any issues that need urgent attention. Such as the case of chest pain described earlier, the TL will contact the patient to advise him/her to go to an emergency room immediately. For less urgent messages, she will route them to the inbox of specific providers, for example, those that require the PCP's attention and those that can be handled by the supporting MAs or LVNs independently. For phone messages intended for the PCPs' attention, the PCPs will typically advise the TL or a MA to call the patients with their advice and instructions since they are often occupied with patient appointments during the day and seldom have time to make phone calls.

Thus, as far as the patients are concerned, every time they call, they will not be able to talk to their physicians directly. Instead, they can only leave a message through the call center and have to wait for a call back. When they finally receive a response from the clinic, they will often not be talking to the PCP but to a RN or an MA, who calls the patients back with the physician's advice.

4.3.2. Secure messaging. In order to send a secure message, patients must first log on the online patient portal, where they can choose a healthcare provider

whom they have previously received medical care. Secure messages are then sent to the TL's inbox for reviewing and triaging in the same manner as phone messages. In fact, the TL sees two lists of messages, phone messages and secure messages, on her computer simultaneously, and handles them in the same manner. The major difference is that phone messages must be responded through phone calls, but secure messages can be replied either through secure messaging, or by phone when the questions needed clarification or when urgent medical conditions are identified. In the latter case, the TL calls the emergency contact number in the patient's EMR. The triaged secure messages are then routed to the PCPs, who compose their replies and respond directly to the secure message. The patient will be notified through his/her personal email registered in the patient portal that a response to the secure message has been received, which works in the same way as the secure messaging in systems like online banking.

4.4. How are messages handled behind the scene?

Regardless of which communication channel used - phone or secure messaging - the patients' messages never reach the doctors directly. Instead, a great deal of behind-the-scene work was involved in the process to ensure that more urgent messages are handled promptly (Figure 2). The providers work as a team, not only in caring patients but also in communicating with them. Communication is also guided by the organizational protocol, which stipulates that phone messages and secure messages must be responded to patients within 2 and 24 hours respectively to ensure the quality of patient care. Phone messages are supposed to be responded more quickly since phone calls are typically perceived to be for more timely issues and synchronous communication so that patients likely desire for a prompt response. On the other hand, secure messages are similar to emails that are perceived as asynchronous communication, thus a longer waiting time is more socially acceptable. As such, the TLs often regard the phone messages as of higher priority, and make sure someone from the clinic will call back as soon as possible, after consultation with respective PCPs. During the observations, we often saw MAs and PCPs discuss how the patients' messages should be responded when doctors return to their offices after a patient appointment. The MAs will then call the patients to relay the PCPs' advice.

The 2-hour rule for responding to phone messages is for messages received between 7am and 7pm, and only applies to the first attempt to call the patient back. If the phone call was not answered, the phone message will remain outstanding in the system until after the patient and the provider spoke. In our study, sometimes it may take more than a day and also a few back-and-forth phone calls for the TL to be able to speak to a patient directly on the phone.

For secure messages, most PCPs we observed have back-to-back patient appointments during the day. In order for them to review and respond to patients' messages in a timely manner, many of them had to work on their "inbox" during lunch time, between patient visits, or after clinic hours. To ensure messages to be answered within 24 hours, the clinic manager and the TL closely monitor the handling of incoming messages so that they are responded timely. In situations where the intended PCP is not working on-site or is behind schedule, another PCP or LVN will be assigned to cover for the off-site PCP if his/her
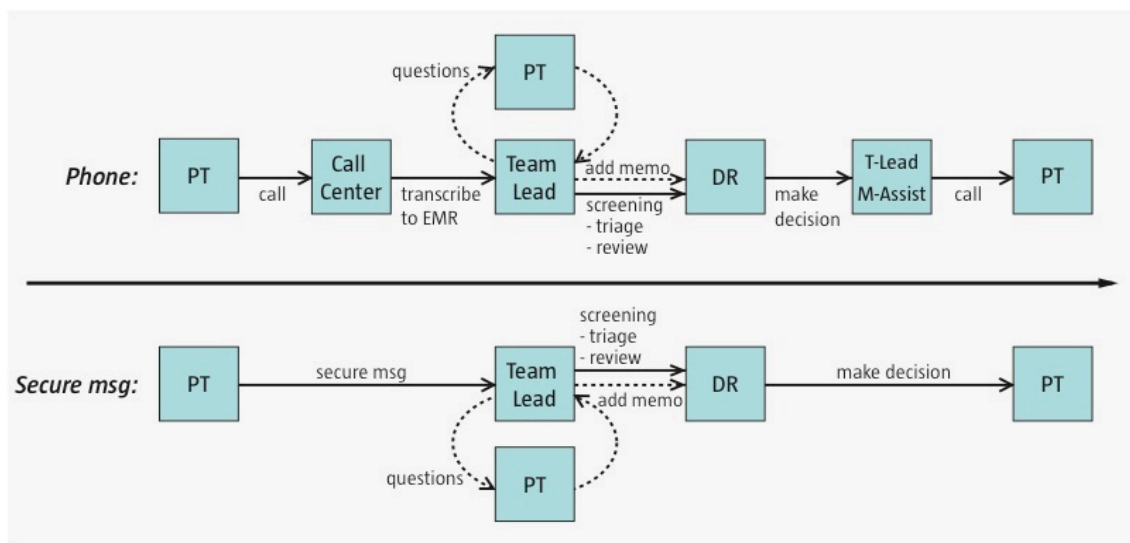

Figure 1: The communication processes by phone (above) and via secure messaging (below).

messages are not responded in time.

Ideally, a TL would respond to patient messages directly, such as for ordering blood tests, or providing instructions on how specific tasks should be performed when triaging messages to LVNs and MAs. These messages are then considered completed. However, TLs often have to gather relevant information, such as retrieving medical history from the patient records or by communicating with patients over the phone. The TL then annotates the acquired information in the message before routing it to the intended PCP. In this way, the PCP can make an informed decision efficiently. For example, if a patient requested medication refills through a secure message, the TL would first check the dosage of his/her previous prescription, then added this information as a note in the message for the PCP to review. The following observation shows such behind-the-scene work.

Dina, a TL, reviewed a phone message sent by the call center. In the message, a patient complained that she has coughed for a few days and requested an x-ray. Since the TL cannot order an x-ray on her own, she had to ask the doctor to decide whether it is necessary. Before routing this message to the doctor, TL reviewed the patient's medical history in the EMR, and called the patient to clarify some issues. She then noted in the message, "patient has had dry cough for 2-3 months and is worried about lung cancer." In the meanwhile, the TL documented in the record, "pt [patient] informed that Doctor will get back to her tomorrow"

Like this vignette shows, message triage is much like patient triage in an emergency room, except that the former is based only on the patients' message, and possibly additional information gathered over the phone or from the patients' medical records, rather than seeing and checking the patients' conditions in person. Despite merely for handling messages, the triaging task requires a high level of medical knowledge as well as ample experiences in interacting with patients. As such, TLs are typically RNs with many years of experience and are capable of assessing the acuity and severity of health conditions so they can more accurately route messages to appropriate personnel, gather more information through talking to patients, or urge patients to seek immediate medical attention for life-threatening issues.

4.5. How were the communication channels perceived?

In general, our patient interviewees expressed very positively toward the secure messaging. They described their experience as being "*wonderful*," "*extraordinary*," and "*great*". This was especially true for patients who were suffering from chronic or severe diseases, since they had to communicate frequently with their PCPs. In particular, we are intrigued that the majority of our elderly patients over 60 years old preferred secure messaging. We had expected that older adults would prefer the more traditional phone communication, as secure messaging is only accessible through the online patient portal. It appears that these older adults did not find the portal system difficult to use. But it could also be because older adults have more frequent communication needs with their PCPs given that they often have multiple health issues, including chronic conditions.

Some patients also informed the clinic that they only wanted secure messaging communication.

Sam: don't call me. I want email only.
Richard: probably today I forgot a couple of things I wanted to ask him but you know what I can go home and e-mail him and it's taken care of, you know, and he'll respond to me. So it's just um so much more efficient and like I said to me it's comforting. I, I really like this whole system it's good for me.

The providers also showed similarly positive experience with the secure messaging.

Dr. Blake: I prefer them [patients] to email me. Sometimes when I called, it got to their mailbox, and when they called back, I am not here. Email is faster, on the phone, people just talk and talk, it's hard to cut the conversation done.

All the providers in our study preferred secure messaging to phone calls since the nuisance of phone tags when trying to reach a patient could be avoided. Secure messaging also allowed them to respond at their convenience such as during lunch or breaks. In the study, we identified three benefits perceived by patients with regard to communicating via secure messaging with their providers: finding providers more accessible, feeling empowered, and perceiving closer patient-provider relationship.

4.5.1 Finding providers more accessible. Albeit through the call center, patients can only call the clinic between 7am and 7pm. Some patients found it difficult when their work or other commitments made them unable to make phone calls during that time. In contrast, they could compose secure messages whenever they wanted to. Importantly, patients perceived that the secure messages would reach their PCPs once the message was sent, and their PCP would respond when they could.

Kathy: I just feel like he [the PCP] is more accessible…anytime of the day or night I can send that email and I know that as soon as he can, he'll respond… if I call and they say "well,

you know he's busy right now, he can't get to you but we'll have him call you back"… I just feel like, I know he's not accessible at every moment, day and night.

As Kathy pointed out, using the secure messaging allowed her to contact her PCPs any time without worrying about their availability. The flexibility of the online messaging system made patients feel that their healthcare providers are now more accessible to them, which was indeed an intended benefit when the secure messaging and online patient portal was introduced.

4.5.2. Feeling empowered. Most patients we interviewed disliked being unable to speak with their PCPs when they called. They were also frustrated with the uncertainty of when their provider would respond, and whether they would be available to answer when the provider called back. The feeling of being not in control exacerbated when phone tags occurred.

Juan: we've been playing phone tag. Sometimes I'm in meetings or I'm with a client and I can't answer the phone on the spot, so now I have to call back. Sometimes they give you numbers that – the other day, for example, they gave me a number to call back, and when I called back, the voicemail was full and there was no way of talking to anybody.

Just as what Juan complained during the interview, not being able to answer returned phone calls often resulted in more subsequent phone calls, and worse, disappointment. Therefore, the patients generally preferred communicating via secure messaging, since they knew that they would be notified by email when their PCP responded. Many patients also felt that they received quicker responses through secure messaging than phone callbacks, even though secure messages are supposed to be responded within 24 hours whereas phone calls are to be returned in 2 hours. Phone tags are likely to be blamed, and it was also because phone calls are only taken care of during business hours.

Richard: Well, I've left messages and they call you back. But email [secure messaging], it's just a quick response. You don't have to deal with waiting on the phone and talking to a nurse and online you can ask a question and then you get the response.

Since secure messages can be checked at the patients' convenience without interfering with their daily activities, the patients have a better control of the communication with their providers. Not only can the patients save time and effort in waiting for a callback, but such empowerment can also help shape their involvement in their healthcare.

4.5.3. Closer patient-provider relationship. In the forefront of healthcare, PCPs typically maintain a steady set of patients for an extended period of time. While it is important for PCPs to maintain professional relationships with their patients, it is not surprising for patients to increasingly share more personal information including their emotional and mental states with their PCPs over time. As such, some patients like Kevin perceived trust, closeness, and even personal relationship with their PCPs.

Kevin: – but, I mean, already, you know, uhm, I've seen her like maybe 3 times and already. I do feel…I trust her… I do feel a certain amount of closeness to her… another doctor I saw him for about 3 years. We actually had a good personal relationship…I wouldn't say a personal relationship, we didn't talk outside of the medical.

With secure messaging, patients can contact their PCPs and receive responses from them directly. They can also express their feelings and thoughts more freely and more frequently with the use of secure messaging. Therefore, many patient interviewees felt that they have become closer to their PCPs. They believed that their messages would "*go straight to their doctors*" and "*it [secure messaging] was the most efficient way to get [to the doctor]*". We also captured a number of interesting messages that patients sent to their PCPs. For instance, a patient in our study sent a secure message to his PCP asking whether his son should choose to be a DO or MD in graduate school. Another patient interviewee secure-messaged his PCP after the interview to propose splitting the study compensation with him. We believe that this kind of personal communication revealed considerable trust and closeness the patients perceived with their PCP.

More importantly, as we found in this study, though handled in similar manner, secure messages are perceived as direct replies from the PCPs, while phone calls are normally considered proxy for being answered by a RN or a MA only.

Jessica: when I call, I never talk to the doctor. I talk to the appointment desk and maybe someone who can give me some advice. When I email [send secure message], I seem, I guess- unless there's someone else answering his emails [secure messages] – I get an email [secure message] directly from him...it just seems like it's a little more personal when you email [send secure message to] the doctor, cuz I don't ever talk to the doctor when I call.

Quite clearly, Jessica perceived that her secure messages would directly reach her PCP. Her perception has led to more personal bonding with the PCP. It appears that being able to directly

contact one's PCP not only results in better patient-provider relationship, but also a stronger sense of trust. Another patient also shared the same sentiment toward phone calls.

> *Austin: I get on the phone very often. It's the nurses, so that's why I don't bother with the phone.*

Since phone calls to the clinic often ended up with callbacks from a RN or a MA, a TL we interviewed disclosed that many patients blamed the nurses for hindering them from communicating directly with their PCPs. This happened particularly when patients requested medications or controlled substances over the phone. Since they could not talk to their PCP directly and these orders could not be filled over the phone, the patients offloaded the anger upon the nurses who returned the patients' phone call. Like what we showed here, being able to connect directly with the PCPs is regarded highly by patients in our study, and it affects not only their perceptions about the communication channels, but their perceived relationship with the providers and the healthcare organization at large.

5. Discussion

Effective patient-provider communication and trustworthy relationship is crucial for enhancing healthcare quality and patient safety [8]. Much effort has been devoted to designing digital communication systems for bridging the gap. Secure messaging is a promising technology that allows patients and providers to communicate privately and securely through an online patient portal that is integral to the EMR system. The use of both secure messaging and phone calls in our study clinic aligns with previous prediction that mixed-mode communication will prevail in patient-provider communication [16].

In our study, we examined the use of two communication modes, phone calls and secure messaging. We found that although the two kinds of messages are handled similarly within the clinic, patients perceived them very differently. Specifically, the secure messaging enabled patients to feel empowered, to find providers more accessible, and to perceive closer relationship with their PCPs, while phone messages were often viewed as not having direct communication with the providers. In this section we discuss how the providers' roles in the communication process helped shape the patients' perceptions toward the two messaging functions.

5.1 Collaborative message management

Through this study, we uncovered a highly collaborative messaging handling process that is important to the practice of patient care. Unlike personal phone calls or emails that are typically dyadic, multiple healthcare providers, depending on their medical expertise and their role in the clinic, carefully handled the messages in our study. In other words, no messages were responded by one person only, and it is never directly routed to a PCP's inbox. Instead, every incoming message has to be reviewed, triaged, and responded properly and timely through multiple healthcare providers.

Collaborative work is necessary in monitoring the incoming messages since each message itself may convey acuity and urgency of the patient's medical issues and it should be treated with caution. Similar to the example described in the findings section, messages that mention chest pain or other urgent information must be handled promptly and patients are to be advised to visit urgent care or emergency room immediately in order to avoid serious consequences. Alternatively, non-urgent messages can be addressed in due course. However, given the ever-busy schedule of PCPs and other health providers, the intended recipients may not be able to review messages in a manner that corresponds to the urgency of the messages. For example, if a message about an awful headache was only checked at the end of the day, the patient's health may be unintentionally jeopardized. To address the temporality issue of the messages, it is advisable to have multiple healthcare providers to collaboratively monitor the messages so that they will be checked multiple times to ensure that responses are made in a timely manner.

5.2. Interplay of front- and back-end communication

In our study site, all messages, whether they are transcribed by the call center or composed by patients through the online patient portal, are first routed to a TL's inbox and are handled in the same way for review and triage. Yet, our study revealed dramatic differences in patients' perceived timeliness of responses, accessibility to providers, and patient-provider relationship when communicating by phone or via secure messaging. We attribute such differences largely to how the responses are handled – whether the PCPs, the intended recipients, conduct front-end or back-end communication with their patients.

When responding to phone messages, the TL who is an experienced RN, or a MA who assists PCPs, always plays the spokesperson in the forefront on behalf of the PCPs, despite that the advice and instructions are mostly originated from the PCPs. Patients seem to see TL and MA as those who block their communication to their PCP, without realizing that it is their PCP who stays in the backend of the

phone communication process. When patients, who felt that they had a strong sense of trust and close relationship with their PCP, found that their PCP is not the one answering their phone calls, they would feel frustrated, as our study participants indicated. In addition, even though the responses relayed to the patients were originated from the PCPs, the patients did not seem to perceive such relayed responses as credible as when they came directly from the PCPs. This likely has to do with the general perception that doctors are superior to nurses with regard to their expert knowledge and status, ignoring the fact that they possess different professional competencies and that such inter-professional collaboration is crucial to patient care [5].

On the other hand, the PCPs are always seen to be at the forefront of the secure message communication, despite the fact that the messages were triaged, reviewed, and even prepared by the TL or a MA. Thus many patients perceived that secure messages are responded directly by PCPs whom they trust, and know personally. They also believe that the PCPs are more medically knowledgeable in addressing their concerns. In addition, many patients perceived that secure messages are often responded more quickly than phone messages, even though phone messages are typically handled with higher priority.

While previous research indicated that email was often regarded as "impersonal" [14], we found that patients preferred and felt more satisfied with secure messaging. Secure messages exposed the intended communication recipient, and did not explicitly expose the other supporting roles behind the scene. Thus, we recommend that the interface of the communication channels used in similarly high-reliability settings should be carefully designed to accommodate the interplay between the front- and the back-end communication roles. It is also important to let the consumers, in our case, patients, know that their intended communication recipient is actively involved in the communication process and make sure they understand that the information is credible as it is sanctioned by the knowledgeable health providers, namely the PCPs, in the organization.

5.3. Impacts of perceived direct and close communication

As described in the findings, patients felt empowered when using secure messaging since they were able to communicate directly with their PCPs and they believed that their PCPs would respond to them directly when the messages were sent. Such direct communication led patients to believe that they could discuss any issues they desired with their PCPs and had more control on when, and how the messages were

sent. The flexibility of online messaging can empower patients beyond their face-to-face communication with their providers such that they can articulate their thoughts and discuss their concerns more clearly with their health providers, who used to be difficult to reach outside of clinic visits.

In addition, our findings also suggested that patients using secure messages formed a closer bond with their PCPs as they perceived the communication coming directly from the PCPs. As shown in our study, when patients believed that the nurses or the call center no longer blocked the communication, they were more likely to share non-medical issues with their health providers. The perceived closeness in patient-provider interaction was thus not determined by who actually responded the messages, but who was visible in the communication process. Such closeness can further enable patients to form a better, and trustworthier relationship with their health providers.

In addition, our study showed that being able to connect and directly communicate with PCPs could help motivate patients to adopt the online patient portal. Here we highlight an interesting finding that 4 of our 5 elderly patient interviewees (60+) preferred secure messaging to phone call. Since these older adults grew up with phone communication, we had expected that they would prefer communicating with their provider by phone, as found in prior research [17]. In our observation, one older adult even mentioned that she asked her son to teach her to use the Internet because she wanted to connect with her PCP through the online portal. This further indicates that when the perceived benefits outweigh the technical challenges, adoption should not be an issue. This finding further shows that being able to connect with health providers directly is important for patients, and this can be used as an opportunity for patients to adopt new technologies that afford them direct communication with their providers.

Nevertheless we should not ignore the negative impact when patients communicate with their providers excessively frequent, particularly on issues unrelated to their health. To review, triage, and respond to messages can be very time-consuming. Therefore, it is also important to educate the patients not to abuse the communication system.

5.4. Limitation of the study

This study was limited by the fact that the selected patient interviewees were referred by the PCPs based on their activity on the patient portal. This means these patients were likely more technology-inclined than others as they were all active users of the patient portal, and they may have already built a close relationship with their PCPs. Thus these patients may not truly represent the patient population at the clinic.

In addition, we only inquired patients' perceptions and experiences about the patient portal use. This research could benefit from analyzing the message logs of both the phone and secure message communications. A follow up survey to validate the results from broader population would also be useful.

6. Conclusion

Patients always desire to have close relationships with their PCPs and want to communicate with them directly. However, calling the doctors often result in what our study participants described as a frustrating experience. Our study revealed that the different perceptions toward phone and secure messaging as a result of the interplay between the providers' front- and back end roles made patients to prefer secure messages to phone calls and offered them closer and empowered communication experiences. We suggest the design of communication devices to embrace the visibility of different roles in mediating patient-provider relationship. Beyond healthcare, insights learned in this study can be used to inform the design of communication systems in managing professional and customer relationship in other customer facing domains.

7. References

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