

Secure Messaging and COVID-19: A Content Analysis of Patient–Clinician Communication During the Pandemic

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Abstract

Background: Coronavirus disease 2019 (COVID-19) immediately impacted patient–clinician communication, particularly in the oncology setting. Relatedly, secure messaging (SM) usage greatly increased, yet it is unknown what was discussed and whether the technology was utilized to disseminate information.

Aims: This study aimed at identifying the most frequently discussed topics using SM as well as at understanding how the communication process transpired during the early stages of the pandemic.

Materials and Methods: A mixed-methods design was utilized, consisting of a content analysis of more than 4,200 secure messages, aggregated into 1,454 patient–clinician discussions. Data were collected from February 2020 to May 2020. Discussions were from various oncology departments and included physicians, physician assistants, and nurses. Based on the identified categories, a thematic analysis was conducted to understand the nuances occurring within discussions.

Results: Out of the 1,454 discussions, 26% (n = 373) related to COVID-19. Of the COVID-19 discussion, the most frequently

coded category was “changes, adjustments, and re-arranging care” (65%, n = 241), followed by “risk for COVID-19” (24%, n = 90), “precautions inside the hospital” (18%, n = 66), and “precautions outside the hospital” (14%, n = 52). Natural language processing techniques were used to confirm the validity of the results. Thematic analysis revealed that patients were proactive in rescheduling appointments, expressed anxiety about being immunocompromised, and clinicians were uncertain about providing recommendations related to COVID-19.

Conclusions: The COVID-19 outbreak revealed the need for responsive and effective public health communication. The SM can disseminate information from trusted sources, clinicians, but can be better utilized to deliver tailored information for specific patient populations.

Keywords: content analysis, secure messaging, electronic health records, patient–clinician communication, telemedicine, telehealth

Introduction

Effective communication between clinicians and patients with cancer is essential to patients’ quality of life and satisfaction.¹ Quality communication enables increased patient knowledge and shared understanding, enhances therapeutic alliances, and contributes to higher quality medical decisions.² Compared with other patient populations, patients with cancer desire more communication with clinicians,³ and such involvement in their care promotes positive outcomes, such as reduced anxiety,³ increased satisfaction,^{1,4} and better treatment adherence.⁵ Optimal medical management includes discussions about disease status and the treatment plan. The effectiveness of these discussions is typically determined by assessing patient understanding, satisfaction, and well-being.⁶

When the World Health Organization declared the novel coronavirus disease 2019 (COVID-19) a pandemic in March 2020, visit schedules, treatment plans, and patient–clinician communication were immediately affected. Patients with cancer during or after treatment have an increased risk of complication and death related to COVID-19.^{7,8} As a result,

health systems quickly turned to e-visits and telemedicine (or video conferencing platforms).^{9,10} Similarly, secure messaging (SM), asynchronous electronic communication between patients and clinicians through the electronic health record, allows for a convenient and safe way for patients and clinicians to communicate with one another. Health systems, particularly cancer centers, experienced a sharp increase in SM communication.¹¹⁻¹³

Although SM was relied on during the pandemic, how it was utilized and the type of patient-clinician communication that occurred using the functionality is not known. Therefore, this study aimed at identifying the most frequently discussed topics using SM and at understanding how the communication process transpired during the early stages of the pandemic.

Material and Methods

SETTING

This study was conducted at a large cancer center in the southeastern United States. On average, patients with cancer at the center are female (54%), white (81%), and 43% are 65 years or older. Among the patients who visited an oncology clinic in 2020 (e.g., medical oncology, supportive oncology, bone marrow transplant, radiation oncology, etc.), 48% have active portal accounts, meaning that they have used the portal at least once after initially signing up, and 95% of activated patients have logged in at least once in the past 6 months. During the COVID-19 pandemic, the volume of messages increased 48% from 2019 to 2020 at the site of the current study (496,525 in 2019 to 732,804 in 2020).

DATA COLLECTION

Among the selected clinics, messages from the four most active oncologists and advanced practice clinicians were aggregated. A clinician’s activity using SM was based on the volume of messages received/sent from February 2020 to May 2020. On collection, all messages were de-identified. The entire message exchange (e.g., patient-initiated message, followed by the clinician’s reply, followed by the patient’s reply, and so on) was collected and considered the unit of analysis.

STUDY DESIGN

Two members of the research team (J.M.A., G.C.-S.) independently read through the messages to identify topics related to COVID-19 as well as related broad areas of discussion. This initial step helped to reduce the data to concepts¹⁴ through an iterative and inductive process of constant recoding.¹⁵ Using the identified codes, the two coders discussed the codes with a third author (C.L.B.) until broad categories were finalized. Next, J.M.A. and G.C.-S. independently reviewed a sub-set of

SM discussions ($n=50$) and selected appropriate categories. Categories were not mutually exclusive, meaning a discussion could be classified into multiple categories. Cohen’s kappa was used to test interrater reliability. Cohen suggests a kappa ranging from 0.41 to 0.60 as moderate, 0.61 to 0.80 as substantial, and 0.81 to 1.00 as almost perfect agreement.¹⁶ Once substantial levels of interrater reliability were achieved,¹⁷ 100 additional discussions were independently coded and interrater reliability was checked again to be at least 0.70. This process continued until 20% of the data were coded and checked. Interrater reliability results are provided in *Table 1*. Clinical members of the research team (M.J.M., M.M.) were conferred with to ensure the categories were of clinical relevance. The final categories and their definitions are given in *Table 2*.

DATA ANALYSIS

Codes were imported into SPSS version 26, and descriptive statistics (frequencies and percentages) were calculated for each category. As an added measure to confirm the frequencies of categories, we applied natural language processing techniques to enhance the validity of the results. Coded data from the manual content analysis were used to train a random forest model that was applied to an additional 2,168 discussions. The model predicted similar distributions of the codes in this dataset. Associations based on demographics such as

Table 1. Interrater Reliability Summary		
	% AGREEMENT	COHEN'S KAPPA
Round 1		
Changes, adjustments, and re-arranging care	78	0.66
Risk for COVID-19	92	0.62
Precautions inside the hospital	88	0.55
Precautions outside the hospital	99	0.93
Technical and procedural issues	84	0.20
Questions about symptoms and testing	100	1.00
Round 2		
Changes, adjustments, and re-arranging care	95	0.85
Risk for COVID-19	93	0.74
Precautions inside the hospital	97	0.93
Precautions outside the hospital	97	0.93
Technical and procedural issues	96	0.84
Questions about symptoms and testing	94	0.78
COVID-19, coronavirus disease 2019.		

Table 2. Content Analysis Categories and Definitions of Secure Messages

CATEGORY	DEFINITION
Changes, adjustments, and re-arranging care	Discussions about changes to treatment, appointment adjustments, whether an in-person visit is necessary, sharing preferences about coming into the hospital, or facilitating care instead of coming into the hospital
Risk for COVID-19	Communication about whether a patient may be at higher risk for acquiring the virus due to issues such as compromised immunity
Precautions inside the hospital	Related to measures occurring within the hospital about its safety and COVID protocols (e.g., masks, social distancing)
Precautions outside the hospital	Questions, concerns, statements about precautions when not in the hospital, such as seeing friends/family, social gatherings, vacations, cleaning food...etc.
Technical and procedural issues	Problems or questions about setting up telehealth or using secure messages; frustration with using technology or scheduling
Questions about symptoms and testing	Wanting to know about whether symptoms might be COVID or questions or answers about how/where to get testing, or results of a COVID test

patient age, gender, race/ethnicity, and clinician type were also calculated by using chi-square analysis.

Based on the identified categories, additional thematic analysis was performed to analyze how discussions occurred. Three members of the research team (J.M.A., G.C.-S., C.G.) independently read discussions that comprised each category and performed primary-cycle coding.¹⁸ Coders then met to compare codes and discuss initial findings, which contributed to the creation of a framework for additional coding and theme development. Subsequent meetings discussed themes using a process of constant comparison to build larger-order thematic classifications.¹⁹ To ensure qualitative rigor, the full research team discussed themes until consensus was reached.²⁰

INSTITUTIONAL REVIEW BOARD APPROVAL

This study took place at the University of Florida Health Cancer Center and was approved by the University of Florida Institutional Review Board (IRB202001539). All procedures were performed in accordance with the relevant guidelines and regulations.

Results

SAMPLE CHARACTERISTICS

Among the total of 1,454 discussions that were collected and analyzed, 26% ($n=373$) related to COVID-19. Messages were categorized as COVID-19 if they explicitly mentioned either COVID-19, the pandemic, terms such as “Coronavirus,” the need for telehealth, social distancing, masking, and other related terms. Most COVID-19 messages were initiated by a clinician (53%, $n=196$) compared with the first message being sent by a patient (47%, $n=177$). Of note, representations of message initiators may be skewed due to the inclusion of automated messages, which were classified as originating

from clinicians. In the cancer center where the study took place, a “triage system” is used, in which administrators screen patient messages and forward them to the appropriate clinician if they are unable to answer. Consistent with most health systems, clinicians are not compensated for time spent corresponding with patients using SM.

Among COVID-19 discussions, patients sending/receiving messages were mostly female (84%, $n=310$), white (81%, $n=299$), and with a mean age of 56 (standard deviation=15.4). Clinicians were physician assistants (41%, $n=151$), followed by physicians (23%, $n=87$), nurses (11%, $n=41$), and non-clinician staff (9%, $n=32$). The remaining messages either did not receive a response (6%, $n=21$) or a combination of clinicians participated in the discussion (11%, $n=41$).

CONTENT ANALYSIS

The most frequently coded category was “changes, adjustments, and re-arranging care” (65%, $n=241$), followed by “risk for COVID-19” (24%, $n=90$), “precautions inside the hospital” (18%, $n=66$), “precautions outside the hospital” (14%, $n=52$), “technical and procedural issues” (13%, $n=50$), and “questions about symptoms and testing” (7%, $n=27$).

To examine differences based on patient characteristics, age was dichotomized, splitting messages into two groups: 18–54 years old and 55 years and older. The distinction in age was selected due to a study by Graetz et al.²¹ showing that there was a decline in SM use among 55+ compared with younger groups. Results from chi-square analysis demonstrated a significant association for patients 55 years and older to send/receive messages about “precautions outside the hospital,” $\chi^2(1, N=131)=6.41, p=0.01$. There was also a significant association for patients 55 years and older to send/receive

messages about “risk for COVID-19,” $\chi^2 (1, N=131)=5.83, p=0.01$. The authors also examined differences based on gender. Results from chi-square analysis demonstrated a significant association for female patients to send/receive messages about “technical and procedural issues,” $\chi^2 (1, N=369)=10.03, p=0.01$. It is important to note that the samples of secure messages were overwhelmingly female patients, which may account for the significant sex differences.

THEMATIC CATEGORY ANALYSIS

To further contextualize the six categories, thematic analysis revealed more details about each category. Exemplar quotes were included, and minor edits were made to quotations to improve readability.

Changes, adjustments, and re-arranging care (65% of discussion, n=241). Patients and clinicians used SM to manage uncertainty together. Patients asked clinicians for advice about attending an in-person appointment as well as for sharing their preference to cancel appointments or reschedule it as a telemedicine appointment.

For example, patients sought assistance from clinicians to determine the best way to manage their cancer care. In many cases, clinicians also communicated their uncertainty about how to proceed during the onset of the pandemic:

Patient: “I have a PET scan scheduled for tomorrow. Is it still a good idea for me to keep that appointment, considering the coronavirus?”

Physician: “I am fresh out of good ideas as we are all in uncharted territory. That said, up to you...”

As the pandemic progressed, patients requested to change their in-person appointment to a telemedicine appointment without necessarily asking for the clinician’s advice.

“Can I switch my in-person appointment to a virtual visit? We discussed it during my last appointment and said it might be an option if I had my bloodwork sent to a local lab.”

Risk for COVID-19 (24% of discussions, n=90). Patients sent messages to clinicians expressing anxiety about potentially being immunocompromised due to their cancer treatment. In response, clinicians clarified patients’ immunocompromised status and attempted to reassure patients and calm their fears. The pandemic also motivated patients to seek additional information about their cancer treatment, while managing COVID-19 risks. The risk of contracting COVID-19 during maintenance of cancer care made patients question whether procedures were necessary:

“You know how paranoid I am about my port and needing to access it every 6–8 weeks. I have elected to not getting it flushed for an extended period. I feel it’s too risky for all and wastes two masks.”

Clinicians warned patients about ways of mitigating risks for COVID-19, but they also cautioned patients of other dangers. A physician wrote, “You may have a slightly increased risk for a worse outcome with the virus so be careful, but I wouldn’t recommend strict social isolation...”

Clinicians had to balance their uncertainty about the full extent of the virus with providing advice about how patients could stay safe. A physician responded to a patient’s question about prescribing hydroxychloroquine as a preventive measure by writing:

“You are not immunosuppressed, fortunately. Of course hand hygiene and social distancing as for all of us is imperative. No current use of prophylaxis for immunocompromised patients, but if you can forgive what is becoming rather tired language, this is a fluid and evolving situation.”

Overall, clinicians attempted to quell patient fears but were also realistic about the potential spread of the virus. It was common to observe clinicians recommending masks and good hand hygiene, while also trying to ensure that patients did not neglect their cancer treatment.

Precautions inside the hospital (18% of discussions, n=66). Just as patients were reticent to enter the hospital facilities due to the risk of COVID-19, they sought clarification about measures the hospital was taking to ensure safety. Automated messages were sent to patients about safety procedures for entering the hospital or canceling appointments. These messages triggered patients to contact their clinician to inquire about the need to wear a mask and also brought about general anxiety about upcoming appointments. In response, clinicians reassured patients and provided details about the cleaning and sanitation practices, screening procedures, and in certain situations, clinicians recommended canceling non-essential appointments. A discussion between a patient and physician transpired in the following way:

Patient: “I have an appointment to come in on [date] for my infusion, however I am a little nervous due to the outbreak and was wondering if there were any other available options.”

Physician: “I don’t think you need a clinic visit, so that could be canceled and we can communicate by phone/e-mail; however, there is no way to avoid the infusion room...I understand and share your concerns but would recommend you do the injection.”

Precautions outside the hospital (14% of discussions, n=52). Clinicians received questions about what measures patients should follow to reduce their risk of exposure to the virus. Some inquiries focused on whether patients who were also hospital employees should discontinue going into the hospital and the need for medical notes to allow employees to work from home. In response, clinicians often directed patient requests to primary care physicians.

Since secure messages were collected from the first few months of the pandemic, clinicians faced a lot of uncertainty; they genuinely attempted to provide sound advice, but they underestimated the severity of the virus and gave what we now know to be inaccurate recommendations. In another example, a clinician provided questionable information on the dangers of participating in extracurricular activities related to a cruise:

“Check if the cruise line is taking any precautions...Overall, the risk should be low but any large groups of people with crowded disembarkations in foreign locations is a bit fraught right now. You'll probably have to go with your gut!”

Technical and procedural issues (13% of discussions, n=50). This category encompassed issues about how to connect to videoconferencing software, such as Zoom, for telemedicine appointments. Often, clinicians ran behind schedule, leaving patients to wait in an empty Zoom room. As a result, a patient messaged, “Are we still having our appointment? I have been logged on and waiting.”

Trial and error also occurred, in which patients recognized that their attempt at connecting to Zoom failed. After missing a virtual appointment, patients used SM to acknowledge their error and reschedule. It is unknown whether most telemedicine appointments were patients' first experience with the technology. However, confusion and uncertainty about when they would be able to see their clinician created a sense of urgency. For instance, a patient wrote the following:

“I was supposed to have an appointment today according to the guy I called last week, but I do not see it. I really need this appointment. I need the Zoom login. I will try calling also.”

Questions about symptoms and testing (7% of discussions, n=27). Patients sent urgent questions to clinicians seeking advice about what to do after being exposed to or showing symptoms for COVID-19. In one scenario, a patient was scheduled for chemotherapy but had a high temperature and a cough. A nurse responded by writing:

“We feel you should be tested for the virus to be sure. Also take your daughter since she has been sick and see if they will test her. You will need to call your primary care...We cannot order for your daughter...She will have to have her MD order.”

Discussion

Our analysis revealed that most discussions focused on making changes to appointments and re-arranging care. The delivery of health care services using technology such as SM revealed benefits as well as challenges.²² Although SM allowed patients to rapidly ask questions and voice concerns, clinicians often expressed uncertainty and hesitancy to provide recommendations. During the timeframe that messages were sent and received, effective public health communication about COVID-19 was a challenge due to heightened fear and confusion created by misinformation.²³ The public, including clinicians, had to navigate what the World Health Organization called an “infodemic.”²⁴ We found that patients with cancer turned to their oncology team to get COVID-19 information specifically related to their cancer treatment and personal risks. Despite clinicians initially lacking knowledge about the most effective measures to approach the virus, they were transparent and informative by reiterating recommendations from government agencies. Direct information from clinicians has been shown to enhance patients' trust in their oncological team.^{25,26}

We also found that patients 55 years and older were more likely to inquire about precautions to take outside of the hospital as well as their risk for acquiring COVID-19. Understandably, this patient population would have such concerns, considering that older adults suffered from worse COVID-19 outcomes and a higher mortality rate compared with younger populations.²⁷ During the first few months of the pandemic, there was great uncertainty about which activities were deemed safe. Adults 60 years and older reported that their highest stressors during the pandemic were confinement, isolation, and loneliness.²⁸ Clinicians in our study were cognizant of this reality and warned patients of dangers such as social isolation from home confinement. Lubben et al.²⁹ recommend the importance of creating compassionate social communities for older individuals through innovative formats, such as telehealth, that include laughter, mindfulness, and movement.

Relatedly, the pandemic demanded the need for older individuals to learn new technological skills.³⁰ Since the highest percentages of individuals communicating electronically with their clinicians are 45–64,³¹ the pandemic can serve as a method to identify effective strategies to become a part of clinical practice approaches.³⁰ Patients with cancer have

expressed preferences to using SM over the telephone³² and value clinician communication that includes high levels of support and information-giving.³³ Further, patients in our study expressed uncertainty in secure messages related to using telemedicine. This suggests that there may be a need to provide guidance and reassurance about telemedicine appointments. However, identifying anxiety among patients using SM is difficult due to the asynchronous nature of the technology. The SM lacks non-verbal cues, which can make communication challenging, as demonstrated in the current study when a clinician provided guidance about taking a cruise. Non-verbal expressions can also convey gestures that express doubt or uncertainty. In the current study, clinicians were cautious, knowing their words had the potential to lead patients to engage in risky activities.

The confusion that transpired during the early stages of the COVID-19 pandemic is reminiscent of the HIV epidemic in the 1980s, in which conspiracy theories, rumors, and misinformation persisted.³⁴ In such instances, clinicians are challenged with sifting through data to recommend evidence-based clinical practices. As shown in our results, clinicians also experienced uncertainty about patients' risks and best practices for precautions outside the hospital. Clinicians need assistance from health systems to ensure they are using the most updated evidence, which may also decrease the level of uncertainty that clinicians are managing as they attempt to guide patients.³⁵ Although the hospital disseminated mass automated messages, SM can be more effectively utilized by allowing clinicians to preemptively contact patients with a tailored message.

There are several limitations to this study. First, the sample of messages collected differed from the general patient population. Our data oversampled females, possibly because more messages came from clinics caring for female patients, such as breast cancer. However, most patient portal users tend to be female.³⁶ In addition, messages were aggregated from a period during the onset of the pandemic. We were unable to analyze the exact dates of messages to understand how content may have changed as both patients and clinicians learned more about COVID-19.

Conclusions

Patient-clinician secure messages from February 2020 to May 2020 revealed how patients and clinicians communicated about COVID-19 and worked together to make sense of how best to continue treatment regimens. The SM was used to ask specific questions and get advice about how to proceed during the pandemic. Clinicians attempted to provide recommendations and support, even though they were uncertain of the many details about the virus.

Disclaimer

The content of this publication, presentation, and/or proposal is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

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