

Patients With Cancer and COVID-19: A WhatsApp Messenger-Based Survey of Patients' Queries, Needs, Fears, and Actions Taken

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PURPOSE This descriptive investigation was undertaken at three oncology units to report queries, needs, and fears related to severe acute respiratory syndrome coronavirus 2 (COVID-19) of patients with cancer and to avoid uncontrolled treatment delays or withdrawal, behavioral mistakes, and panic.

PATIENTS AND METHODS All queries spontaneously delivered through the WhatsApp instant messaging system commonly used by patients to communicate with oncology units were collected and grouped by homology in five categories. Responses to the queries were given according to recommendations by the Italian Association of Medical Oncology through WhatsApp and by subsequent phone calls. Patients were also classified according to the site of the primary tumor, stage of disease, and current treatments. Analysis of the association between these data and queries was carried out.

RESULTS The social scenario in Italy is a nationwide lockdown except for hospitals, pharmacies, and food supplies. Overall, 446 different patients' WhatsApp conversations were analyzed between March 1 and March 13 and comprised the following: requirement of visit delay by patients undergoing oral therapies or in follow-up, delays in chemotherapy or immunotherapy administration, queries about possible immunosuppression, and changes in lifestyle or daily activities. Delay requirements were statistically more frequent among patients with prostate or breast cancer compared with those with lung or pancreatic cancer. Actions taken by oncologists are also reported.

CONCLUSION To our knowledge, the WhatsApp instant messaging system has been occasionally used in other medical settings with controversial results. In our experience, WhatsApp turned out to be adequate to give a rapid answer to most queries from patients with cancer in the COVID-19 pandemic scenario.

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INTRODUCTION

To date, patients with cancer and their treating physicians have been facing the severe acute respiratory syndrome coronavirus 2 (COVID-19) outbreak that has spread worldwide from the province of Hubei in China.¹ Person-to-person infection mainly occurs through respiratory droplets, especially if an infected individual coughs or sneezes; however, recent evidence suggests that asymptomatic individuals probably account for most of the spread of contagions.² The basic reproduction number of COVID-19 is in the range of 3-5, but its transmissibility varies according to the outbreak phases and the efficacy, if any, of the control measures adopted to contain its spread.³ The COVID-19 infection usually causes a mild disease that resembles the common cold or influenza, including conjunctivitis and GI symptoms such as diarrhea and nausea/vomiting. Still, a significant percentage of infected people may develop severe acute respiratory

distress or multi-organ dysfunction, which may be fatal in 2%-8% of patients, depending on population characteristics.^{4,5} Severe complications from COVID-19 have been supposedly linked to the significant presence of angiotensin-converting enzyme 2 (ie, the virus receptor) in various human organs.⁶

A recent scientific article on the China outbreak reported that COVID-19-related fatal disease has been more frequently recorded in older patients with severe comorbidities, even though death may also occur in younger, healthy individuals.⁵ In the past weeks, a sudden and sharp increase in patient queries about COVID-19 has been registered in all fields of medicine. Although severe restrictions, such as city lockdowns and quarantines, have been put in place in various countries to contain viral diffusion as much as possible, COVID-19 infections continue to spread rapidly worldwide. The media-related rebound is causing widespread confusion, if not panic, among patients

ASSOCIATED CONTENT

Data Supplement

Author affiliations and support information (if applicable) appear at the end of this article.

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CONTEXT

Key Objective

Are instant messaging systems useful to oncologists to care for patients with cancer and to mitigate their anxieties and fears during the severe acute respiratory syndrome coronavirus 2 (COVID-19) outbreak?

Knowledge Generated

The WhatsApp instant messaging system is a useful and rapid tool to inform and reassure patients with cancer and to facilitate patient triage in a real-world setting of the pandemic spread of COVID-19.

Relevance

Medical counseling is needed even more than usual to protect patients with cancer and to identify those who require prompt, critical treatment. Health care professionals believe that instant messaging systems are useful tools for the multidisciplinary management of patients with cancer in daily practice.

with cancer, survivors, and their families, all of whom feel that they may be particularly prone to infectious diseases.⁷ Possible immunosuppression in patients with cancer is a well-known concern for oncologists, especially if patients have recently received immunotherapy agents.^{8,9} Liang et al¹⁰ and Wang et al¹¹ published brief reports on patients with cancer infected with COVID-19. Both showed that a higher risk of death exists in patients with cancer, especially those with lung cancer, compared to patients without cancer and that older age is associated with higher risk. Therefore, medical counseling is needed even more than usual to protect patients with cancer and to identify those who require prompt, critical treatment.

Generally speaking, most oncologists have not been fully prepared to face the pandemic spread of the viral infection, which may require significant communication skills beyond behavioral and medical guideline recommendations to manage patients. Many patients have used social media tools to ask about their doubts and fears. In this article, we report real-world data and a descriptive analysis of patients' needs and fears as well as of misinformation obtained through the WhatsApp instant messaging system (WM; Facebook, Menlo Park, CA) in daily practice during the COVID-19 pandemic.

PATIENTS AND METHODS

A sharp increase in spontaneous queries about COVID-19 risk of infection has been registered in the past 4 weeks among patients with cancer treated or followed at three oncological institutions in Sicily, Italy. In Italy, the COVID-19 outbreak began in the northern part of the country, but over the past 3 weeks, the infection has spread toward the southern areas, which are preparing to face a wider diffusion of the virus.^{12,13}

Queries were collected through the chat text export tool on WM, which is available for most patients treated or followed up at the participating institutions. The three oncologists involved in this data collection were already experienced in using the WM tool in a urological medical setting.¹⁴ Patients

were informed on the possible use of their conversations for statistical and/or medical reasons and that these conversations may be inserted into their medical records. According to Italian regulations on retrospective studies, this observational, noninterventional study was electronically notified for approval by the ethics committee of the University of Palermo and was carried out in accordance with the Declaration of Helsinki. Privacy was strictly protected during the procedure by replacing each username with a unique code.

The observation period lasted from March 8 to 22. All WM queries included in the analysis were spontaneously sent by patients or their caregivers and not elicited by their oncologists. These conversations also contained the communication that the oncologists had sent in response to each of their patients and their reactions to the recommendations recently given by the Italian Association of Medical Oncology¹⁵ as reported in the Data Supplement. All oncologists have promptly taken these actions with respect to guidelines and ordinances already released at the direction of the involved medical institutions and the Italian government guidelines, which for some aspects refer to the recommendations released by the US Centers for Disease Control and Prevention.¹⁶⁻¹⁸ The demographic and clinical characteristics of patients who sent queries were anonymously collected and analyzed. Queries were also analyzed according to age, sex, type of cancer, active treatment (yes *v* none), Eastern Cooperative Oncology Group (ECOG) performance status (0-1 *v* 2), and stage (metastatic *v* none). Time to response by health care personnel to patient queries as well as the number of queries per patient were obtained. Triage of patients to be admitted to the participating hospitals required evaluation of travel history in the past 4 weeks (with particular attention paid to those coming from high-contagion areas), absence of fever > 100.4°F or 38°C, coughing, and/or shortness of breath. In case of suspicion, patients were subjected to COVID-19 swab and put in quarantine and monitored. To better understand how patients talk and feel about this potential critical health

topic, we also applied to the data set a sentiment analysis of the messages that have been classified by positive emotions (anticipation, trust, and joy) and negative emotions (disgust, fear, and sadness).¹⁹ The analysis was performed using R version 3.6.3²⁰ with the package *syuzhet*.²¹ The NRC Word-Emotion Association Lexicon, which contains 10,170 lexical items that are coded for Plutchik's basic human emotions²² and implemented in the R *syuzhet* package, associates an emotion (or more than one emotion) to each of the 10,170 lexical items. Given a word and emotion *X*, the NRC Word-Emotion Association Lexicon associates a score (range, 0-1) with it. A score of 1 indicates that the word conveys the highest amount of emotion *X*. A score of 0 indicates that the word conveys the lowest amount of emotion *X*.

Descriptive statistics are reported as absolute numbers of patients, and their relative percentages are adjusted to the nearest unit. The χ^2 test was applied to a contingency table for statistical analysis.

RESULTS

Overall, 446 WM-based conversations corresponding to 446 patients were received and considered for the analysis. Table 1 lists the main clinical and demographic characteristics of patients with the most frequent neoplasms included in this analysis. Most of the queries came from patients with the most incident neoplasms, including breast (33%), lung (14%), colorectal (21%), and prostate (9%) cancer, while those from patients with GI stromal tumor (GIST; 1%), sarcoma (2%), head/neck cancer (2%), and gastric cancer (3%) were those less frequently registered. Patients with pancreatic, ovarian/uterine, and CNS tumors represented 6%, 5%, and 4% of cases, respectively. Patients with renal cell carcinoma were not included in the analysis because they were already contacted by phone during the data collection period. Table 2 lists patient queries as grouped by homology and divided into five categories: Can I postpone my control visit or examinations (37% of queries)? Should I continue my anticancer therapy (29% of queries)? Am I an immunosuppressed person (16% of queries)? Should I change my diet or make other lifestyle changes (16% of queries)? Are there any limits on what I can do (25% of queries)?

Figures 1 and 2 show the number of patients who spontaneously required a delay in programmed visits or treatments according to primary disease and the number of patients effectively delayed by their treating oncologists. The difference between groups is statistically significant ($P < .001$). Overall, 198 follow-up visits were delayed after patients' queries or independent oncologist suggestions. The majority of delays were in patients with breast, colon, or prostate cancer with programmed follow-up visits, which were postponed for at least 2 months pending epidemic trend and additional possible new countermeasures. Queries about postponing and/or possibly discontinuing anticancer

treatments were mostly from patients undergoing chemotherapy and/or immunotherapy and in a smaller proportion of patients taking oral drugs, such as oral chemotherapy with capecitabine or trifluridine and tipiracil for colon cancer; tyrosine kinase inhibitors for mutated lung adenocarcinoma; imatinib for GIST; poly (ADP-ribose) polymerase inhibitors for *BRCA*-mutated ovarian cancer; or hormonal agents, cyclin-dependent kinase inhibitors, or oral chemotherapy with capecitabine, vinorelbine, or cyclophosphamide for hormone receptor breast carcinoma. Five patients asked for a delay in adjuvant radiotherapy. No statistical difference was recorded when data were analyzed for sex, type of primary disease, and stage (metastatic v not advanced in an adjuvant setting). A statistically significant association was observed between queries for delays or withdrawals and age > 75 years ($P < .0007$) and ECOG performance status of 2 ($P < .0001$).

Table 2 also lists answers given by treating oncologists and additional actions taken. Briefly, follow-up visits of patients without active chemotherapeutic, biological, or immunological treatments were postponed by at least 2 months in the absence of symptoms or other clinical data suspicious for progressive disease as possibly detected at telephone triage and depending on epidemic trend. Patients who were undergoing the aforementioned cancer treatments were invited to come regularly to the hospital for a checkup in the absence of self-checked fever or other signs of infection. Telephone triage was carried out for all patients expected for infusion, and no relatives were allowed to enter the infusion rooms. Body temperature was recorded before entry into the infusion area. Only if necessary, patients were allowed to be accompanied by a single caregiver who was required to wear a mask and disposable gloves. Appointments were scheduled with a 15-minute interval between visits to avoid contact between patients as much as possible. Patients who required counseling about lifestyle and/or immunosuppression were informed that there is no readily available test to check one's level of immunosuppression but that being in active chemotherapy, having low WBC or low lymphocyte counts, and/or taking immunosuppressive agents are all associated with immunosuppression and an increased risk of infection. Therefore, extra caution was recommended in following physicians' suggestions and government ordinances.

Figure 3 shows the emotion distribution detected. By examining the raw data and the results of sentiment analysis, we see that the intensity of the scores related to the emotions evaluated is greater for the negative ones. The number of patients who reported negative emotion was higher than those who showed positive emotions (57% v 43%). Fear, anger, and sadness were dominant, while trust is represented by at least half of the data set.

DISCUSSION

After the diffusion of COVID-19 in Italy, the current social scenario is a nationwide lockdown except for hospitals,

TABLE 1. Patient Demographic and Clinical Characteristics

Characteristic	Site of Primary Tumor, No. (%)											
	All	Breast	Lung	Colorectal	Pancreas	Ovary/Uterus	CNS ^a	Prostate	GIST	Head/ Neck	Stomach	Sarcoma
No. of patients	446 (100)	146 (100)	62	95 (100)	26 (100)	23 (100)	19 (100)	40 (100)	5 (100)	8 (100)	14 (100)	8 (100)
Median age, years (range)	64 (36-90)	57 (36-8)	66 (45-78)	67 (42-84)	64 (51-73)	63 (50-79)	66 (30-78)	74 (60-90)	64 (50-7)	62 (40-75)	62 (42-76)	41 (18-56)
Sex												
Male	190 (43)	0 (0)	39 (63)	54 (57)	19 (73)	0 (0)	11 (58)	40 (100)	4 (75)	8 (100)	8 (57)	7 (87)
Female	252 (57)	146 (100)	23 (47)	41 (43)	7 (27)	23 (100)	8 (42)	0 (0)	1 (25)	0 (0)	6 (43)	1 (13)
ECOG PS												
0-1	406 (91)	137 (94)	51 (82)	82 (86)	20 (77)	21 (91)	19 (100)	33 (83)	5 (100)	8 (100)	12 (86)	8 (100)
2	40 (9)	9 (6)	11 (18)	13 (14)	6 (33)	2 (9)	0 (0)	7 (17)	0 (0)	0 (0)	2 (14)	0 (0)
Follow-up/no therapy	90 (22)	31 (21)	11 (18)	35 (37)	2 (8)	6 (26)	2 (11)	5 (12)	—	—	2 (14)	4 (50)
Adjuvant therapy	132 (30)	55 (38)	5 (8)	28 (29)	7 (27)	10 (44)	2 (11)	21 (52)	—	—	2 (14)	2 (25)
Hormone therapy	45 (10)	24 (16)	—	—	—	—	—	19 (47)	—	—	—	—
Chemotherapy	75 (17)	30 (20)	3 (5)	28 (29)	6 (2)	4 (17)	2 (11)	—	—	—	2 (14)	—
Biologics ^b	15 (3)	15 (10)	—	—	—	—	—	—	—	—	—	—
Radiotherapy	48 (11)	22 (15)	3 (5)	4 (4)	1 (4)	8 (35)	2 (11)	6 (15)	—	—	—	2 (25)
Metastatic, recurrent, or inoperable disease	216 (48)	60 (41)	46 (74)	32 (34)	17 (65)	7 (30)	15 (79)	14 (35)	5 (100)	8 (100)	10 (71)	2 (25)
Hormone therapy	13 (3)	3 (2)	—	—	—	—	—	10 (25) ^c	—	—	—	—
CDKI	23 (5)	23 (16)	—	—	—	—	—	—	—	—	—	—
Chemotherapy	113 (25)	28 (19)	12 (19)	32 (34)	17 (65)	4 (17)	11 (58) ^d	4 (10)	—	3 (37)	10 (71)	2 (25)
Immunotherapy	18 (4)	0	18 (29)	—	—	—	—	—	—	—	—	—
Biologics ^e	73 (16)	14 (10)	16 (26)	27 (28)	—	3 (13)	4 (21)	—	5 (100) ^f	2 (25)	2 (14)	—
Radiotherapy	26 (6)	5 (3)	2 (3)	0	3 (12)	—	7 (37)	3 (7)	—	6 (75)	—	—

Abbreviations: CDKI, cyclin-dependent kinase inhibitor; ECOG PS, Eastern Cooperative Oncology Group performance status; GIST, GI stromal tumor.

^aIncluded primary brain tumors and metastases from other primary tumors.

^bPatients receiving biologics (trastuzumab, pertuzumab) and chemotherapy.

^cIncluding enzalutamide and abiraterone acetate.

^dIncluding oral temozolomide.

^eTyrosine kinase inhibitors for lung cancer, poly (ADP-ribose) polymerase inhibitors for ovarian cancer, and ramucicromab for gastric cancer.

^fImatinib mesylate.

TABLE 2. Queries From Patients With Cancer, Recommendations Given by Treating Oncologists, and Actions Taken

Patient Query	No. (%) ^a	Oncologist Recommendations	Actions Taken
Can I postpone my control visit or examinations? ^b	166 (37)	Yes: if a normal follow-up visit or receiving hormone therapy other than CDKI or mTOR inhibitors or imatinib No: if under treatment with chemotherapy, immunotherapy, or other biological agents (TKI, CDKI, PARP inhibitors, etc), which may require careful monitoring; single case evaluation necessary	Appointment to be rescheduled Visits are scheduled with wide intervals to avoid contact between patients; only one caregiver allowed if really necessary
Should I continue my anticancer therapy?	131 (29)	Yes: if receiving hormone therapy other than CDKI or mTOR inhibitors, imatinib, or oral chemotherapy Yes but with risk evaluation: if receiving chemotherapy, immunotherapy, or radiotherapy	Evaluation of risk as a result of therapy withdrawal for patients receiving chemotherapy, immunotherapy, or radiotherapy Online counseling when necessary
Am I an immunosuppressed person?	72 (16)	It depends on clinical situation, but in any case, avoid as much as possible contacts with other people, stay at home, do not shake hands or hug or kiss other people, wash hands often Report immediately any flu-like symptoms, fever ≥ 100.4°F (38°C), coughing, or shortness of breath	Evaluation of risk Adequate and careful online counseling In case of symptoms, refer immediately to practitioner, swab for COVID-19, and admit to intensive care hospitalization if necessary
Should I change my diet or make other lifestyle changes? ^c	73 (16)	Yes: avoid as much as possible contacts with other people, stay at home, do not shake hands or hug or kiss other people, wash hands often No specific diet, but avoid underalimentation	Adequate online counseling to avoid panic
Are there any limits on what I can do?	112 (25)	Yes: avoid as much as possible contacts with other people, stay at home, do not shake hands or hug or kiss other people, wash hands often	Adequate online counseling to avoid panic

Abbreviations: CDKI, cyclin-dependent kinase inhibitor; COVID-19, severe acute respiratory syndrome coronavirus 2; mTOR, mammalian target of rapamycin; PARP, poly (ADP-ribose) polymerase inhibitor; TKI, tyrosine kinase inhibitor.

^aConversations may contain multiple queries.

^bFollow-up visits of patients without active chemotherapeutic, biological, or immunological treatments.

^cOther than those released by the government, such as social distancing and reduction in moving about outside.

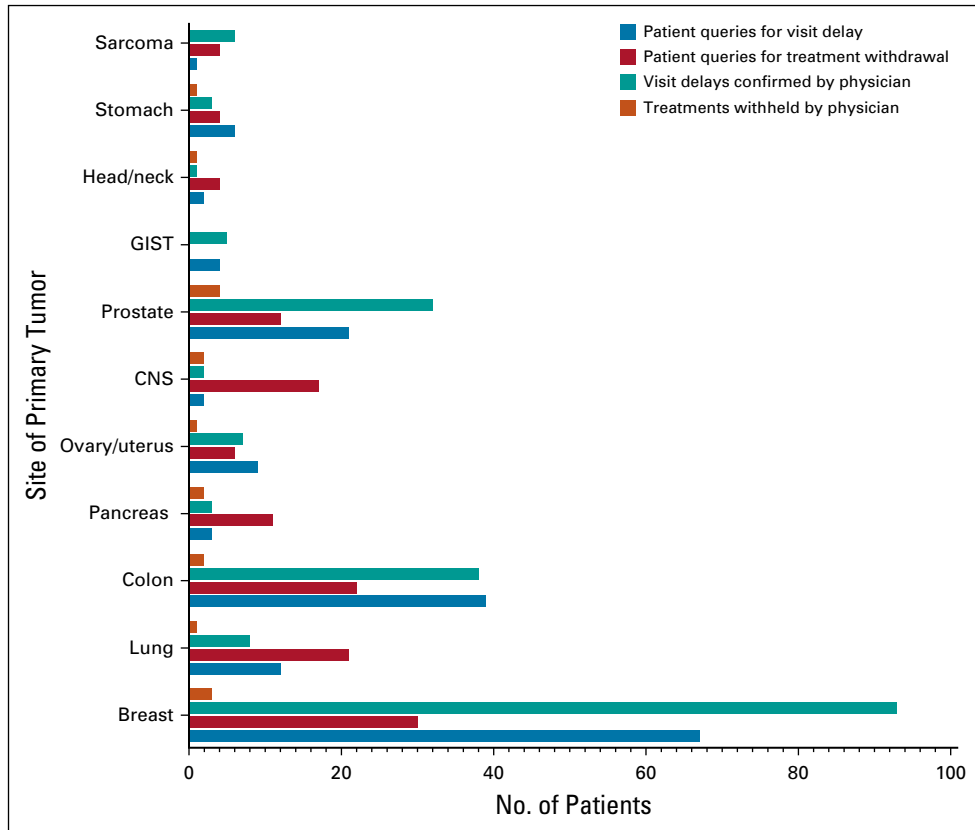


FIG 1. Type of cancer, patient queries for visit delay and/or treatment withdrawal, and treatment withdrawals by physicians. GIST, GI stromal tumor.

pharmacies, and food supplies.¹⁶ The modality of transmission observed in China and Northern Italy has raised considerable fear among the whole population and mostly in patients with cancer as a consequence of the risks linked to potential cancer- and/or treatment-related immunosuppression.⁸⁻¹⁰ The best way of counteracting uncontrolled fears while protecting patients and their families is to provide adequate information.⁷ In this scenario dominated by uncertainty and empiricism, the need for data relative to patients with cancer and COVID-19 infection is urgently needed.^{23,24}

In this study, we collected, categorized, and analyzed WM queries on various doubts, fears, and needs from 446 real-world patients that were received in only 2 weeks. Although some aspects could not have been explored because of the nature of the study, such as the psychological and economic effects of lockdown and/or quarantine, WM gave useful answers required by many, if not most, patients about several issues, which we categorized by homology for practical purposes. As expected, most of the queries came from patients affected by the most incident and prevalent tumors (ie, breast, prostate, colon, and lung cancer). No association was seen between the type of queries and patient characteristics such as sex, type of disease, and stage of the disease. On the other hand, frequency of queries with regard to delays showed a statistically

significant association with older age (≥ 75 years) and poor performance status, which demonstrates that more fragile patients and their families are the most worried. A small, but significant (at least in our opinion) percentage of patients asked for in-progress treatment withdrawal, which showed more fear of possible COVID-19 contagion than progressive

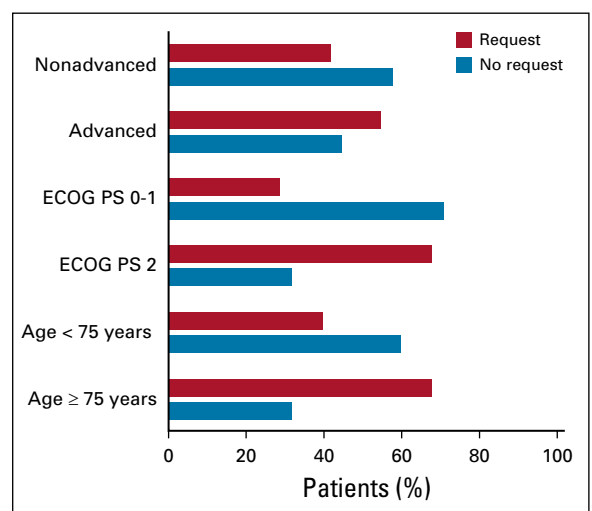


FIG 2. Patient characteristics and requests for visit and/or treatment delay. ECOG PS, Eastern Cooperative Oncology Group performance status.

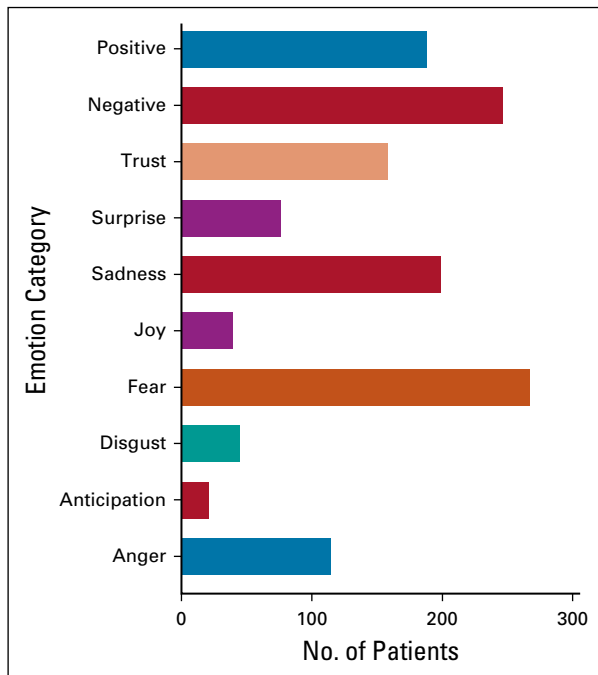


FIG 3. Distribution of emotion categories.

cancer. Answers to these latter queries required an accurate evaluation of the single patient. Despite these mostly empirical efforts, more data are eagerly needed to fill the enormous quantity of doubts, as recently stated by others.²⁴

To our knowledge, reports about the use of WM in any oncological setting are almost entirely occasional in the medical literature, although it has been reported to be widely used mainly because of physicians' perception of advantages.²⁵ Maudgal et al²⁶ reported the successful use of a WM counseling program in a group of women with breast cancer to share their personal experiences, which rendered these patients active in the management of their disease. Nayak et al²⁷ showed WM to be a more effective

tool for providing dental education on tobacco and oral cancer compared with conventional audio visual aids. Our group, which is composed of urologists, medical oncologists, radiologists, and radiotherapists, reported the use of WM as a tool for the multidisciplinary management of patients with prostate cancer in daily practice.¹⁴ A diagnostic and therapeutic agreement was reached in approximately 82% of cases, and these data were shared with patients. Physician satisfaction was measured by using a questionnaire that reported an average satisfaction score of 7.8 on a 0-10 scale.¹⁴ Other authors have reported the use of WM and other applications in endoscopic ultrasound-fine needle aspiration of pancreatic lesions, in self-monitoring of melanoma, and in chemotherapy monitoring.²⁸⁻³¹ This study also explored emotional expressiveness for eight specific types of emotions and identified those particularly expressed through the textual messages of patients with cancer examined in the sample. The intensity of the scores related to the emotions evaluated is greater for the negative ones. Fear, anger, and sadness were dominant, while trust was reported by at least half of the data set. This seems to indicate how strong the emotional impact is in patients with cancer, as already pointed out by other authors.³²

A limitation of the study is that the sample collected was not intended to be representative or a complete set of all the questions asked by patients with cancer during the period under review. The results cannot be considered to reflect all topics of the conversations the patients had with the oncologists involved. In addition, the results of this analysis represent a snapshot of a peculiar time period and have no evaluation comparison back and forth in time.

In conclusion, WM resulted in a useful and rapid tool to inform and reassure patients with cancer and to facilitate patient triage in a real-world setting of the COVID-19 pandemic. Improved and more secure tools are likely to represent a potent way of managing patients with cancer in the near future.

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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