







Role of Social Media for Medical Oncologists and Medical Oncology Fellows (SMARTY): An Italian Cross-Sectional Study

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ABSTRACT

PURPOSE The use of social media is transforming physician-patient communication, mainly in the field of medical oncology. The pattern of social media use by medical oncologists is poorly studied. Therefore, we developed a survey to understand the preferences, experiences, opinions, and expectations of Italian medical oncologists and oncology fellows regarding the use of social media in cancer medicine to identify the different profiles of social media users.

MATERIALS AND METHODS This multicentric, cross-sectional, observational study included oncologists or oncology fellows from Italy, who were surveyed from July to December 2023 on their use of social media. Data were analyzed through K-means clustering, and the Hartigan-Wong algorithm was applied to identify different profiles of social media users among the participants.

RESULTS Of the 245 participants who accepted the invitation, 116 completed the entire survey and were included in the cluster analysis. Three profiles of social media users were identified through clustering: the highly social, the social skeptic, and the moderately social, accounting for 31%, 31%, and 38% of the participants, respectively. In general, older age ($P = .0001$), being a specialized oncologist ($P = .003$), and a higher mean time spent on social media ($P = .0001$) were associated with a greater consideration of the professional use of social media.

CONCLUSION The use of social media among medical oncologists and oncology fellows represents a spectrum ranging from the social skeptic user to the highly social. Age, professional status (specialist or fellow), and frequency on social media use were associated with different patterns, opinions, and behaviors related to social media use.

ACCOMPANYING CONTENT

 Appendix

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INTRODUCTION

The advent of social media has profoundly transformed human communication, significantly affecting health care and oncology,¹ especially now that cancer has shifted from being a taboo and an unspoken disease to an openly discussed topic by both patients and physicians.² Social media offer new opportunities for communication, information sharing, collaboration, and engagement with both patients and the broader oncology community, including the communication of updates in the field.³

In particular, the use of social media by physicians can be aimed at three different purposes: (1) professional education, (2) patient education, and (3) direct interaction with

patients. Indeed, social media networks are useful tools to disseminate and share information with other health care professionals, to foster a sense of community and facilitate intellectual connections, which can even evolve into lasting friendships. In this regard, a study on the use of X (previously, Twitter) concluded that tweets often contained useful information that directed readers' interest toward particular topics.⁴

Furthermore, a significant number of patients look for information about their disease online after receiving a cancer diagnosis.⁵ Therefore, social media can play a crucial role in providing educational opportunities for professionals to disseminate reliable, credible, evidence-based information and combat the spread of misinformation and fake news.⁶

CONTEXT

Key Objective

To identify the different profiles of social media users among Italian medical oncologists and oncology fellows through a cluster analysis.

Knowledge Generated

Three profiles of social media users were identified: the highly social, the social skeptic, and the moderately social, accounting for 31%, 31%, and 38% of the participants, respectively.

Relevance

According to most of the oncologists and oncology fellows, the use of social media for medical communication represents a powerful tool for patient engagement, networking, and dissemination of appropriate medical information.

However, the interaction between physicians or institutions and patients for clinical care via social media brings new challenges and affects ethical and deontological issues, modulating the caution, caveats, and enthusiasm for their use. Notably, in a survey of 480 medical professionals, 68% viewed interactions with patients via social media as ethically problematic.⁷ Therefore, some institutions, such as the ASCO and the American Medical Association, have proposed evidence-based guidelines with experts' opinions to manage communication on social media.⁸

In this context, a better understanding of communication via social media between physicians and patients with cancer is essential to improve patient-centric care. In this paper, we present the results of a survey aimed at describing oncologists' preferences, experiences, opinions, and expectations regarding the use, limitations, and risks of social media in their professional practice.

MATERIALS AND METHODS

Objective and End Points

The primary objective of our study was to understand the expectations and experiences of oncologists regarding the use of social media and to identify different profiles of social media users among the participants through an *ex post* cluster analysis.

The primary end point was the prevalence of participants across the identified profiles.

Survey

We conducted a multicenter, cross-sectional, observational study that included medical doctors, either oncologists or oncology fellows, from Italy. All participants were invited to complete a survey from July to December 2023 via an online protected link, accessible once (a unique identification code was generated per each respondent). The link was

disseminated via the mailing list of the Italian Cancer Association, which represents a secure professional network. Additionally, to ensure that respondents were oncologists, we connected with each of them and requested identification, and then confirmed their profession and role through the Italian public database *FNOMCEO* of physicians with an active medical license.

The survey questions were developed after a brainstorming between medical oncologists, researchers of social media use, patient advocates from the Lega Italiana per la Lotta contro i Tumori, and the president of the Associazione Scientifica Sanità Digitale, who is a patient expert of the European Patients' Academy on Therapeutic Innovation.

The survey included 28 questions, with subquestions ([Appendix](#)). Respondents received an informative introduction to the survey and consented online to the anonymous use of their data. All questions were closed-ended and could involve multiple-choice answers (where only one answer was valid) or a Likert scale ranging from 1 to 7, where 1 indicated the minimum and 7 the maximum. The first six questions explored the demographic information of the participants: age, gender, job role (specialist in oncology or fellow), area where they work in Italy (North-East, North-West, Center, South and Islands), type of hospital where they work (Hub public hospital, Spoke public hospital, university hospital, research hospital, private hospital embedded in national health system [NHS], private hospital not embedded in NHS, and private outpatient clinic), and subspecialization (lung, breast, GI, skin, gynecological, head and neck, urogenital cancers, soft tissue and bone sarcomas, brain neoplasms, other).

Furthermore, 22 questions concerned the use of social media for personal and professional purposes. Participants were asked whether they had a personal, professional, or hybrid profile for social media use; the platforms they used; and the mean time spent on social media (eg, Facebook, Instagram, X). Additionally, their opinion on professional profiles was

asked in terms of communication style, type of interaction between patient and doctor, content of dissemination, possibility of discussing controversial topics, and the image that the professional should project.

The research was conducted in accordance with the principles stated in the Declaration of Helsinki and with the principles of good clinical practice. The survey project was focused on oncologists and did not seek information about patients. It was classified as low risk by the institutional review board (IRB), which resulted in a waiver of the requirement for formal IRB approval.

Statistical Analysis

The ex post cluster analysis was performed on the collected data, considering all of the variables of the survey (Appendix) and using K-means clustering, that is, grouping observations by minimizing Euclidean distances between them. The Hartigan-Wong algorithm was used to minimize the Euclidean distances of all points to their nearest cluster centers by minimizing within-cluster sum of squared errors.^{9,10}

Statistical analyses were performed using SPSS software (version 28.0.1.0).

RESULTS

General Characteristics

Overall, 245 participants filled the survey: their characteristics are available in Table 1. Among them, 116 (47%) completed the entire survey and were eligible for the cluster analysis (Table 1). In this subgroup, the mean age of participants was 43.6 years (range, 26–71), and 51% were female. Furthermore, 76% were medical oncologists and 24% were oncology fellows. The most common subspecialization was breast cancer (58%); 65% of them worked in a research hospital or in a university hospital.

The mean presence on social media, quantified on a scale from 1 (occasional) to 7 (every day, several times a day), was 3.84 (standard deviation [SD], 1.8). Additionally, 95% of participants who completed the entire survey had a personal profile, 22% had a professional profile, and 23% a hybrid profile on social media.

Higher age ($P = .0001$), being a specialized oncologist ($P = .003$), and spending more time on social media ($P = .0001$) were associated with a more positive perception of the professional use of social media. Conversely, younger age ($P = .001$) and being an oncology fellow ($P = .004$) were associated with a higher use of social media for personal purposes.

The ex post cluster analysis identified three profiles of social users: the highly social, the social skeptic, and the moderately social, which accounted for 31% (36/116), 31% (36/116),

TABLE 1. Participant Characteristics

Characteristic	All Participants (n = 245)	Participants Who Completed the Entire Survey (N = 116)
Age, years, mean (range)	44.8 (26-71)	43.6 (26-71)
Gender, %		
Female	56	51
Male	41	47
Unknown	3	2
Professional status, %		
Specialists in oncology	75	76
Oncology residents	17	24
Others	8	0
Provenience (Italy), %		
North-West	33	32
North-East	32	33
Center	11	10
South and islands	24	25
Type of hospital, %		
Hub public hospital	15	22
Spoke public hospital	13	22
University hospital	14	24
Research hospital	21	41
Private hospital embedded in NHS	2	5
Private hospital not embedded in NHS	0	0
Private outpatient clinic	0	0
Specialization (area of clinical and scientific interest), %		
Lung neoplasms	14	26
Breast neoplasms	32	58
Neoplasms of the gastrointestinal tract	15	25
Melanoma/nonmelanoma skin cancer	9	16
Gynecological cancers	9	16
Head and neck cancers	5	9
Soft tissue and bone sarcomas	4	8
Urogenital cancers	12	22
Brain neoplasms	4	6
Other	5	10
Social media profiles, %		
Professional profile	15	22
Personal profile	75	95
Hybrid profile	18	23
Private and hybrid	2	22
Professional and hybrid	24	5

Abbreviation: NHS, national health system.

and 38% (44/116) of the included participants, respectively (Fig 1; Tables 2 and 3).

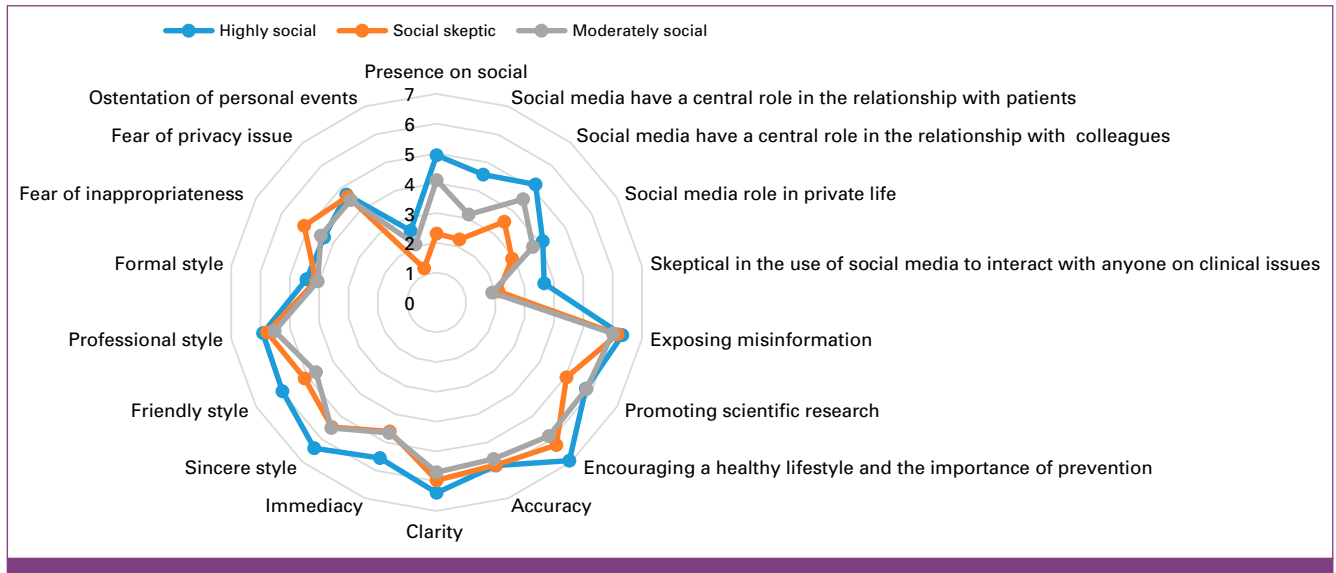


FIG 1. Spider web plot representing the use of social media in highly social, social skeptic, and moderately social responders.

Highly Social Users

Highly social users had a mean presence on social media of $4.94/7$ (SD, 1.55) and a mean age of 45.34 ± 13.28 years; 81% were specialists and 19% were oncology fellows. Among them, 30% had a professional profile, 28% a hybrid profile, and 92% a personal profile. Additionally, 33% and 31% worked in a research hospital and university hospital, respectively; 44% worked in southern Italy or the islands. The most common subspecialization was breast cancer (67%).

Highly social users reported that social media play a relevant role in the relationship with patients (mean \pm SD, 4.56 ± 1.44) and colleagues (5.17 ± 1.40), as well as in their private lives (4.11 ± 1.41). They use social media to interact with patients and with the scientific community (5.36 ± 1.25) but are more hesitant about interactions concerning personal clinical issues (3.67 ± 1.69). They are open to discussing a range of topics and show no reluctance in addressing controversial issues on social media (4.92 ± 1.44). The content of their discussion should aim at promoting scientific research (5.78 ± 1.38), as well as encouraging a healthy lifestyle and the importance of prevention (6.93 ± 0.96).

In terms of their approach to patients on social media, highly social users prioritize accuracy (5.83 ± 1.40), clarity (6.39 ± 0.93), and immediacy (5.56 ± 1.3). However, they also prefer a sincere style (6.39 ± 0.87) and a friendly tone (5.97 ± 1.11) while still maintaining professionalism (5.92 ± 1.11) and a degree of formality (4.44 ± 1.40). Regarding perceived risks and benefits, highly social users express concerns about risks related to inappropriateness (4.36 ± 1.53) and privacy breaches (4.72 ± 1.45). On the benefits side, they highlight improvements in patient competence and increased clinical compliance (4.31 ± 1.4), enhancements to the doctor-patient relationship (4.42 ± 1.34), and greater empathy (4.53 ± 1.61).

They also see opportunities for engaging colleagues in joint presentations (5.56 ± 1.23). Although they do not emphasize a specific appearance for doctors on social media, there is a noticeable preference for formal attire (4.00 ± 1.7). Furthermore, they show a low appreciation for showcasing personal events (2.56 ± 1.36).

Social Skeptic Users

The social skeptic users reported a mean presence on social media of 2.31 (SD, 1.06) and had a mean age of 43.61 ± 11.70 years. Among them, 75% were specialists and 25% fellows; 8% had a professional profile, whereas 97% had a personal profile. Those working in research and public hub hospitals were 36% and 30%, respectively. Overall, 72% worked in Northern Italy.

The social skeptic users assign limited importance to social media, particularly in their interactions with patients (2.25 ± 1.23) and colleagues (3.53 ± 1.75). They also value social media modestly in their personal lives (2.92 ± 1.62) and are generally reluctant to engage in any form of social interaction with patients online (2.25 ± 1.23). They emphasize strict scientific rigor, on the basis of quality scientific literature (6.36 ± 1.18), using social media primarily for distraction (3.78 ± 1.8). They consider interaction with patients (1.08 ± 0.28) and with colleagues (2.36 ± 1.66) on social media to be irrelevant, as well as educational activities (1.42 ± 0.65).

Despite their skepticism, this group recognizes potential benefits of social media in health promotion strategies. They believe the primary goals should be to combat fake news, promote scientific research, and encourage healthy lifestyles and prevention (6.25 ± 1.32). However, they also express strong skepticism about social media effectiveness for

TABLE 2. Results of the Ex Post Cluster Analysis (N = 116)

Characteristic	Highly Social (n = 36/116)	Social Skeptic (n = 36/116)	Moderately Social (n = 44/116)
Frequency on social, mean (SD)	4.94 (1.55)	2.31 (1.06)	4.11 (1.63)
Age, years, mean (SD)	45.34 (13.28)	43.61 (11.70)	42.09 (10.71)
Specialists residents, %	81 19	75 25	72 28
Social media profile, %			
Professional profile	30	8	25
Personal profile	92	97	95
Hybrid profile	28	17	25
Type of hospital, %			
Research hospital	33	36	50
University hospital	31	17	25
Spoke	28	22	18
Public hub hospital	17	30	22
Private hospital embedded in NHS	6	6	5
Specialization (area of clinical and scientific interest), %			
Breast neoplasms	67	58	50
Lung neoplasms	28	22	30
Neoplasms of the gastrointestinal tract	22	19	32
Skin cancer	17	14	18
Gynecological cancers	8	14	23
Head and neck cancers	11	8	7
Soft tissue and bone sarcomas	3	8	11
Urogenital cancers	22	22	21
Brain neoplasms	8	3	7
Other	8	11	9
Provenience (Italy), %			
North-East	25	33	39
North-West	19	39	36
Center	11	17	4
South and islands	44	11	21

Abbreviations: NHS, national health system; SD, standard deviation.

teaching and discussing patient symptoms (2.69 ± 1.74). Regarding the perception of risks, they are particularly concerned about privacy issues (4.64 ± 2.09) and the danger of inappropriate communication and patient engagement online (5.14 ± 2.09).

Stylistically, they prioritize accuracy (5.81 ± 1.64), clarity (5.97 ± 1.70), and immediacy (4.61 ± 1.55), focusing on professionalism (5.78 ± 1.68) and formality (4.11 ± 1.51). Although they do not emphasize a specific image for doctors on social media, there is a preference for formal attire (3.11 ± 1.21) and a low appreciation for sharing personal events (1.22 ± 0.54).

Moderately Social Users

The moderately social users reported a mean presence on social media of 4.11 (SD, 1.63) and had a mean age of 42.09 ± 10.71 years. Overall, 72% of them were specialists; 25% had a professional profile, 95% a personal profile, and 25% a

hybrid profile on social media. Among them, 50% worked in research hospitals, and most (75%) were from Northern Italy.

They place a moderate level of importance on social media in their interactions with patients (3.14 ± 1.60) and colleagues (4.52 ± 1.47), as well as in their personal lives (3.73 ± 1.60). Although they are open to discussing controversial topics, they are relatively strict about limiting interactions on clinical topics (1.89 ± 1.20). They believe social media should be used to combat fake news (6 ± 1.31), promote scientific research (5.18 ± 1.39), and encourage a healthy lifestyle and prevention (5.86 ± 1.29).

In terms of communication style, they value accuracy (5.59 ± 1.17), clarity (5.70 ± 1.21), and immediacy (4.66 ± 1.40), aiming for a tone that is both professional (5.52 ± 1.21) and friendly (4.68 ± 1.27). They prefer wearing formal attire (3.30 ± 1.56) and discourage the ostentation of personal events (2.07 ± 1.37).

TABLE 3. Characteristics of the Social Profiles That Emerged at the Cluster Analysis

Characteristic	Highly Social	Moderately Social	Social Skeptic
Value	They attribute the greatest importance to social in the relationship with patients, colleagues, and in private life	Express average importance to social in the relationship with patients, colleagues, and in private life	They do not attribute importance to social especially in the relationship with patients and also with colleagues. Also the value of social in private life is very modest
Topics	They have no qualms about addressing controversial topics on social media	They are willing to address controversial topics on social media	They are inflexible about scientific rigor and scientific bibliography
Types of interaction	They are willing to promote challenges and surveys, open to all forms of interaction (but still skeptical about interacting with anyone on clinical issues)	They are willing to promote challenges and surveys, open to all forms of interaction (more drastic in excluding interaction with anyone on clinical topics)	Unavailable to any form of social interaction
Reasons	Their main aim is contact evasion and management. Also relevant is the interaction the patient and the scientific community	Their main aim is contact evasion and management. Moderately relevant is the interaction with the patient and the scientific community	Their main aim is contact evasion and management. Interaction with the patient and with colleagues, and educational activity are very unimportant
Risks and benefits	They fear the risk of inappropriateness and privacy The benefit is the improvement of patient competence and clinical compliance, the improvement of the relationship with patients and of empathy	They fear the risk of inappropriateness and privacy The benefit in competence and clinical compliance, relationship with patients, and empathy is considered medium	They fear the risk of inappropriateness (more than the other 2 clusters) and the risk of privacy They share benefits in health promotion strategies The benefit in competence and clinical compliance, relationship with patients, and empathy is considered low
Content	Exposing fake news, promoting scientific research, lifestyle, and prevention	Exposing fake news, promoting scientific research, lifestyle, and prevention	Exposing fake news, promoting scientific research, lifestyle, and prevention They express strong skepticism about their use for teaching and interpreting symptoms
Communication styles	Accuracy, clarity, and immediacy Sincere and friendly style but at the same time also professionalism and formality	Accuracy, clarity, and immediacy	Accuracy, clarity, and immediacy They focus exclusively on professionalism and formality
Social image	The opportunity to engage colleagues in joint presentations The look is not given particular prominence, although there is a clear preference for wearing a gown Low appreciation of the ostentation of personal events and choreography	The opportunity to engage colleagues in joint presentations The look is not given particular prominence, although there is a clear preference for wearing a gown Low appreciation of the ostentation of personal events and choreography	The opportunity to engage colleagues in joint presentations The look is not given particular prominence, although there is a clear preference for wearing a gown Low appreciation of the ostentation of personal events and choreography

DISCUSSION

This study showed that the use of social media among Italian oncologists and oncology fellows represents a spectrum ranging from the social skeptic to the highly social users. Indeed, the cluster analysis revealed that social media users were equally distributed among the three groups, with two thirds of participants usually engaged in social platforms for medical communication. This percentage is consistent with two other surveys, both reporting a 72% rate of social media use for medical and personal communication among medical doctors^{1,11} and highlighting that one third of participants are social skeptic.

When further analyzing the specific use of media, our survey showed that 95% of participants had a personal profile, 22% a professional profile, and 23% a hybrid profile. Similarly, a study conducted in 2011 on more than 4,000 physicians in the United States reported that 90% used social media for personal communication, whereas 65% for professional purposes.^{11,12} Although differences exist, reflecting historical trends and social-cultural patterns, the rates of social media

use are overall comparable in the United States with our results.

We also found that older age, being a specialized oncologist, and spending more time on social media were associated with a greater consideration of the professional use of social media. Conversely, younger age and being an oncology fellow were associated with a higher use of social media for personal purposes. In contrast, the survey by Adilman et al¹¹ described that social media tended to be more used, for both personal and professional purposes, by young oncology doctors, trainees, fellows, and specialists, whereas mid-career oncologists (age 45–55 years) seemed to avoid their use ($P < .05$), especially due to lack of time. Their utilization increased again among late-career oncologists (age >55 years), who nevertheless preferred traditional communication methods. Similarly, other studies conducted 10 years ago across all medical specialties indicated a similar trend, with younger individuals more likely to use social media professionally.¹³ This difference may be related to geographical and temporal differences and changing trends in the patterns of use for digital-naïve individuals who

experienced the digital transition on social media, as opposed to digital-natives, who embed their communication experience through social media as part of common expression.¹⁴

When comparing the results of our and other surveys conducted on oncologists with surveys including all physicians,^{13,15} no differences emerge regarding the perception of social media use. Indeed, the majority of medical doctors consider social media a valuable tool to disseminate novel evidence, provide updates regardless of geography or cost, promote a critical approach to reading opinion leaders' points of view, create new connections and foster new collaborations, and recruit patients for clinical trials.^{1,16,17} Furthermore, even the perception of risks is similar between oncologists and all physicians, such as the spread of misinformation and privacy issue.^{5,16}

The main limitations of this study include the lack of description of patients' point of view on social media use in oncology, which was collected in a separate, parallel survey and will be published in a separate manuscript; the low completion rate of 47%, with many respondents not completing the survey likely due to its multidimensional and omnicomprehensive approach, highlighting the complexity of the topic and the a priori selection bias of survey-based studies on social media (however, most nonrespondents worked in research hospitals); the low prevalence of

respondents from spoke hospitals (22%), which may potentially affect the generalizability of the results in this subgroup; and the exclusion of oncologists and oncology fellows outside the Italian Cancer Association network, as well as the potential exclusion of those within the network who infrequently use e-mail.

In this study, we showed that the use of social media among Italian oncologists and oncology fellows represents a spectrum ranging from the social skeptic user to the highly social. In particular, in this continuum, we successfully identified three distinct patterns of social media users: highly social users, who engage actively with patients and colleagues; social skeptic users, who exhibit limited interaction, emphasizing scientific rigor; and moderately social users, who recognize social media's value while advocating for clear, accurate communication. Each group's distinct attitudes toward social media reflect varying levels of engagement, perceived risks, and desired communication styles. In particular, age, being a specialist or a fellow, and frequency of social media were associated with different patterns, opinions, and behaviors related to the social media use.

The use of social media for medical communication by two thirds of participants represents a powerful tool for patient engagement, networking, and dissemination of appropriate medical information.

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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Open Payments is a public database containing information reported by companies about payments made to US-licensed physicians ([Open Payments](http://OpenPayments)).

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APPENDIX. SURVEY QUESTIONS

Q0. Please confirm that you are:

- A physician with a speciality in oncology
- A medical doctor specializing in oncology
- Other

Q1. Do you have a social profile that you use only for professional reasons as a clinician?

- Yes
- No

Q2. On which platform(s)? (more than one choice is possible)

- Facebook
- Instagram
- YouTube
- Twitter
- LinkedIn
- TikTok
- Other (please specify)

Q3. Indicate how relevant the following reasons are in your choice NOT to activate a social profile as a physician (from 1 to 7, 1: not relevant at all; 7: extremely relevant)

- Real contacts heat loss
- Weakening of the traditional roles of doctor and patient-caregiver
- Increase workload
- Lack of specific features useful to me
- Difficulty evaluating what I do
- Inability to measure the effectiveness of what I do
- No time to use it
- Lack of ability to use it
- Lack of support from my institution
- Perception of risk related to patient privacy
- Perception of legal risk
- I don't see the need for it
- Perception of inadequacy of social media with respect to medical profession

Q4. How likely is the following statement (from 1 to 7, 1: not likely at all; 7: extremely likely)

- I will join a social media with a profile as a doctor in the next 6 months

Q5. Do you have a social profile that you use only as a citizen and not for professional reasons?

- Yes
- No

Q6. On which platform(s)? (more than one choice is possible)

- Facebook
- Instagram
- YouTube
- Twitter
- LinkedIn
- TikTok
- Other (please specify)

Q7. Indicate how relevant the following reasons are in your choice NOT to activate a social profile as a citizen (from 1 to 7, 1: not relevant at all; 7: extremely relevant)

- Real contacts heat loss
- Weakening of the traditional roles of doctor and patient-caregiver
- Increase workload
- Lack of specific features useful to me
- Difficulty evaluating what I do
- Inability to measure the effectiveness of what I do
- No time to use it
- Lack of ability to use it
- Lack of support from my institution
- Perception of risk related to patient privacy
- Perception of legal risk
- I don't see the need for it
- Perception of inadequacy of social media with respect to medical profession

Q8. How likely is the following statement (from 1 to 7, 1: not likely at all; 7: extremely likely)

- I plan to join a social media with a profile as a citizen in the next 6 months

Q9. Do you have a social profile that you use both as a citizen and as a doctor?

- Yes
- No

Q10. On which platform(s)? (more than one choice is possible)

- Facebook
- Instagram
- YouTube
- Twitter
- LinkedIn
- TikTok
- Other (please specify)

Q11. Indicate how relevant the following reasons are in your choice NOT to activate a social profile both as a citizen and as a doctor (from 1 to 7, 1: not relevant at all; 7: extremely relevant)

- Real contacts heat loss
- Weakening of the traditional roles of doctor and patient-caregiver
- Increase workload
- Lack of specific features useful to me
- Difficulty evaluating what I do
- Inability to measure the effectiveness of what I do
- No time to use it
- Lack of ability to use it
- Lack of support from my institution
- Perception of risk related to patient privacy
- Perception of legal risk
- I don't see the need for it
- Perception of inadequacy of social media with respect to medical profession

Q12. How likely is the following statement (from 1 to 7, 1: not likely at all; 7: extremely likely)

- I plan to join a social media with a profile both as a citizen and as a doctor in the next 6 months

Q13. Please rate the degree of agreement with the following statements (from 1 to 7, 1: not at all agree, 7: strongly agree)

- Social media represent an appropriate and important relational tool for the oncologists with their patients
- Social media represent an appropriate and important relational tool for the oncologists with their colleagues
- Social media represent an appropriate and important means of science popularization by oncologists to their patients
- Social media represent an appropriate and important relational tool for the oncologists to discuss with the scientific community
- Social media are an important resource in private life

INTRO 1. Next questions ask for your assessment of the oncologist's dissemination activities toward citizens, patients, and caregivers

Q14. Please rate the degree of importance you assign to the following elements of the online science population style (from 1 to 7, 1: not important at all; 7: extremely important)

- Easy to understand
- Intellectually honest
- Scientifically rigorous
- Cautious
- Noncommittal
- Challenging
- Friendly
- Controversial
- Accurate
- Dramatic
- Effective
- Engaging
- Subjective
- Detached
- Formal
- Jovial
- Vibrant

Q15. Please rate the degree of agreement with the following statements (from 1 to 7, 1: strongly disagree; 7: strongly agree)

- It is appropriate that the medical oncologist in the online dissemination also addresses scientifically controversial topics
- It is appropriate that the medical oncologist in the online disclosure proposes his own vision on a scientifically controversial topic
- The degree of subjectivity of the controversial content disclosed must be clearly stated
- It is necessary to insert bibliographic sources to support the popular contents covered

Q16. Please indicate how appropriate you think the following types of content should be disseminated generally (not aimed at an individual/contact/follower) by a medical oncologist on social media (from 1 to 7, 1: not at all appropriate; 7: extremely appropriate)

- General information on health care
- Promotion of a correct lifestyle and prevention activities
- Ancillary aspects to the disease (not the cure but everything else)
- Results of scientific research
- Explanation of biological phenomena and pathologies
- Unmasking fake news and false beliefs
- Information on the diagnostic and therapeutic services available (services, clinics, procedures, etc)
- Possible interpretations of symptoms
- Possible therapeutic options for specific pathological pictures
- Efficacy information on drugs or therapies not yet approved
- Submission of active clinical trials open for recruitment

Q17. Indicate how appropriate you consider the following forms of expression for a doctor in dissemination activities on social media (from 1 to 7, 1: not at all appropriate; 7: extremely appropriate)

- To wear a physician's gown
- To appear in the act of a clinical activity
- To wear formal clothes without a physician's gown
- To wear casual clothes without a physician's gown
- To appear while playing sports
- To move to the rhythm of music or do choreographies
- To show personal daily life events
- To involve other colleagues/specialists and present shared contents
- To give advice/examples also on nonclinical issues (leisure, culture...)
- To publicly promote one's own skills

INTRO 2. Next questions ask for your assessment of the oncologist's PERSONAL AND INDIVIDUAL RELATIONAL activities through social networks with citizen, parents, and caregivers.

Q18. Indicate how much you think it is appropriate for the oncologist to promote the following types of interaction with the patient on social media (from 1 to 7, 1: not at all appropriate; 7: extremely appropriate)

- To allow public comments without moderation activity
- To select the comments to others' post
- To reply to all private messages
- To allow only known/undertreatment patients to contact you privately
- To reply to private messages only from patients you already know/under treatment
- To launch polls
- To allow the reposting of published content
- To launch contests or other participation initiatives through gaming (challenge)
- Providing free personal clinical consultations (eg, interpretation of reports) only to patients already known/under treatment, highlighting the limitations due to incomplete information and/or lack of visit
- Providing free personal clinical consultations (eg, interpretation of reports) to anyone (even to unknown patients), highlighting the limitations due to incomplete information and/or missing visits
- Manage an anonymized FAQ section

Q19. Please rate the degree of importance you assign to the following elements of the communication style adopted to interact with patients online (from 1 to 7, 1: not at all important; 7: extremely important)

- Empathic
- Sincere
- Noncommittal
- Friendly
- Formal
- Professional
- Participatory
- Relaxed
- Clear
- Immediate
- Authoritarian
- Accurate

- Dramatic
- Surprising
- Detached
- Personal
- Jovial

Q20. Indicate your age in years

Q21. Gender:

- Female
- Male
- I'd rather not answer

Q22. Indicate in which part of Italy or other Country you carry out your professional activity

- Italy North-West
- Italy North-East
- Italy Center
- Italy South and Islands
- Other Country (specify)

Q23. Indicate in which type of structure you carry out your activity (more than one choice is possible)

- Hub Public hospital
- Spoke Public hospital
- University hospital
- Research hospital
- Private hospital embedded in national health system (NHS)
- Private hospital not embedded in NHS
- Private outpatient clinic

Q24. Indicate your main specialization/activity (more than one choice is possible)

- Lung neoplasms
- Breast neoplasms
- Neoplasms of the GI tract
- Melanoma/nonmelanoma skin cancers
- Gynecological cancers
- Urogenital cancers
- Head and neck cancers
- Brain neoplasms
- Soft tissue and bone sarcomas
- Other

Q25. How would you describe the frequency of your social media presence overall? (from 1 to 7, 1: occasional; 7: every day, several times a day)

- Regularity of my social media presence

Q26. Please rate the importance of the following reasons for your use of social media (from 1 to 7, 1: not at all important; 7: extremely important)

- To relax/entertain myself
- To learn something new
- To share my scientific activity
- To perform training activities
- To share private life
- To follow colleagues' activities
- To manage the relationship with patients
- To keep in touch with friends and family
- To express opinions
- To socialize with new people
- To share points of view on specific topics
- To improve my visibility

Q27. Indicate the degree of agreement with the following statements (from 1 to 7, 1: totally disagree; 7: strongly agree)

- The use of social media improves patient competence
- The use of social media leads to an increase in patient clinical compliance
- The use of social media improves the interpersonal relationship between a doctor and patients
- The use of social media represents a valid support for health promotion strategies
- The use of social media allows the doctor to increase his level of empathy
- The use of social media can lead to significant levels of inappropriate patient behavior
- The use of social media can entail significant privacy issues for the patient