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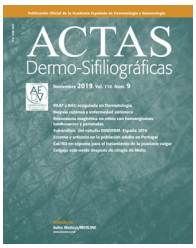

ORIGINAL ARTICLE

# Teledermatology by WhatsApp in Valencia: Characteristics of Remote Consultation and Its Emotional Impact on the Dermatologist☆

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**KEYWORDS**
WhatsApp;
Teledermatology;
Remote consultation;
Emotional impact

**Abstract**
*Background:* WhatsApp is a preferred method of remote consultation for patients. However, the lack a legal framework for this type of patient-physician contact or the inappropriate use of the application can have negative emotional effects on the dermatologist.
*Objectives:* To determine the basic characteristics of WhatsApp consultations, quantify the time spent on them, and assess the emotional impact on the dermatologist.
*Material and methods:* Retrospective, descriptive, observational, cross-sectional study of responses to a 43-item online survey sent to 275 dermatologists who were members of the Spanish Academy of Dermatology and Venereology (AEDV) working in the Spanish autonomous community of Valencia.
*Results:* A total of 128 dermatologists (46.6%) responded. All reported that they used WhatsApp or Telegram; 93% received consultations by this means and 88.3% responded to the messages. Acute inflammatory conditions, usually requiring medication, accounted for 74.1% of the messages. Nearly a third of the consultations required a visit with the dermatologist.The respondents thought that patients used this means of consultation because they felt at ease with the dermatologist, the app was a convenient tool, and they received quick responses. Thirty-one percent of the dermatologists reported that WhatsApp consultations had a negative emotional impact on them, and 82.3% would prefer not to receive these messages.
*Conclusions:* WhatsApp consultation should be regulated. Few studies have looked at this type of consultation and many questions remain to be answered.


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**PALABRAS CLAVE**
WhatsApp;
Teledermatología;
Teleconsulta;
Repercusiones emocionales

## Teledermatología por WhatsApp en la Comunidad Valenciana. Características de esta teleconsulta y su repercusión en la vida del dermatólogo

### Resumen

*Introducción:* La aplicación WhatsApp es la herramienta preferida de los pacientes para realizar teleconsultas. Sin embargo la falta de un claro marco de legalidad o un mal uso puede tener repercusiones emocionales negativas en el dermatólogo.

*Objetivos:* Determinar las características básicas de la consulta realizada por WhatsApp, cuantificar objetivamente la repercusión en tiempo consumido y evaluar las consecuencias emocionales en el dermatólogo.

*Material y Método:* Es un estudio descriptivo, observacional, transversal y retrospectivo elaborado a partir de la información recogida en una encuesta de opinión online, compuesta por 43 preguntas, que fue remitida a los 275 dermatólogos de la Sección Valenciana de la Academia Española de Dermatología y Venereología.

*Resultados:* La encuesta fue contestada por 128 dermatólogos, el 46.6% de los encuestados. Todos los participantes manifestaron utilizar WhatsApp ó Telegram. El 93% recibía consultas por esta vía, y de estos, un 88,3% admitió responder a este tipo de mensajes.

El 74.1% de las consultas fueron sobre patología inflamatoria aguda en las que se suele aconsejar un tratamiento farmacológico. Casi un tercio de las mismas necesitó de una visita presencial.

La confianza con el dermatólogo, la comodidad y la rapidez de respuesta fueron los motivaciones para este tipo de consulta. El 31% los dermatólogos participantes reconoció que este tipo de consultas repercute negativamente en su estado de ánimo y el 82.3% preferiría dejar de recibirlas.

*Conclusiones:* Es necesario regular este tipo de consulta. Hay muy pocos estudios sobre este ámbito y quedan abiertas muchas cuestiones todavía por esclarecer.



## Introduction

With advances in information and communication technologies (ICTs) and reductions in their cost, teledermatology (TD) started to become more generalized at the beginning of the 21st century and its practice continues to expand exponentially.[1] Since its invention in 1876, the telephone has undergone many changes and become an essential tool in our daily lives throughout the developed world. In fact, mobile telephony is the most widely used technology in the world, outstripping both computers and landlines[2,3]; the global number of mobile devices now exceeds the number of inhabitants on the planet (8 billion). The telephone's original function has evolved to meet the new needs that have emerged in a process driven by social change, the most decisive change undoubtedly being its connection to the Internet, which became possible in 1994.[4]

WhatsApp, an app created in 2009 by Jan Koum and Brian Acton, currently boasts more than one billion users in over 180 countries.[5] The Telegram messenger app was launched a few years later, in 2013, by the brothers Nikolai and Pavel Durov. Although originally designed to provide an alternative to cell phone text messaging, today both these apps also allow users to make voice calls and to send and receive all kinds of media, including text, files, images, videos, and even the current location of the device. The availability of all these functions at no cost has made WhatsApp a fundamental instrument in the day-to-day activities of modern life; so much so that over 55 billion messages are sent every day.[5]

Apps facilitating instant communication via new technologies have inevitably begun to play a growing role in the doctor-patient relationship. While pediatricians and obstetricians are the specialists most often contacted via WhatsApp,[6] a growing number of dermatologists are now also being exposed to this new variant of TD. The possibility of communicating directly and at no cost with a dermatologist via instant messaging, and even being able to attach images and other files, makes WhatsApp the preferred tool of patients using TD.

As a new way to consult a specialist remotely, WhatsApp could be very useful for resolving basic questions and reducing the backlog in face-to-face health consultations. However, we must also take into account the potential for the misuse of this tool, which can lead to the abuse and harassment of dermatologists, who may feel that they are always on duty and may be consulted at any time. Furthermore, diagnosis via WhatsApp can be difficult because the quality of the photographs received is very often poor and the clinician does not have the necessary clinical information to facilitate a diagnosis. This situation can lead to errors that would not occur in a face-to-face consultation.

Another issue arising from the use of WhatsApp as a form of TD is the need to establish who bears the ultimate responsibility for these consultations, in terms of both diagnosis and treatment. Given the current lack of clarity on

this issue, specialists feel unprotected and exposed by the absence of a legal framework.

Furthermore, it not been established whether specialists are obliged to respond to this type of consultation. The question has been posed as to whether WhatsApp consultations should be considered another type of medical act: another service that will be offered by the professionals of the future.[7] This raises additional questions about whether and how such consultations should be paid for, as well as the issues of confidentiality, patient consent, data security, and data storage.[8]

Finally, it is also important to consider the potential emotional impact of WhatsApp consultations on the professionals who deal with them, as these messages can often be intrusive[9] and annoying because they are sent directly to a personal phone and may arrive outside of working hours.

In light of this evaluation and given the exponential growth of this type of consultation, the need arises to investigate in greater depth the practice of TD via WhatsApp. This was the motive for the present study, which was undertaken to elucidate the current situation by gathering the opinions of dermatologists and contributing new information on aspects that are still poorly understood.

To this end, and given the scant literature available owing to the novelty of the subject, we carried out a survey of the dermatologists registered in the Regional Section of the Spanish Academy of Dermatology and Venereology (AEDV) in the autonomous community of Valencia. Respondents completed a survey on the characteristics of the consultations they received via WhatsApp, the patients who sent them, and the frequency and outcomes of such consultations. The following objectives were defined.

## Objectives

To clarify the basic characteristics of the typical WhatsApp consultation.

To objectively quantify the impact on the dermatologist in terms of time spent on such consultations.

To determine the emotional impact of this type of consultation and its repercussions on the specialist's mood.

## Material and Methods

This was a descriptive, observational, cross-sectional, and retrospective study based on data gathered using an opinion survey relating to consultations received through the physicians' personal accounts on WhatsApp and other instant messaging apps. The invitation to participate in the survey was sent to the 275 dermatologists registered in AEDV's Regional Section for the Valencian Community.

The online survey was made available through the web platform www.e-encuestas.com. It consisted of 43 questions, which were grouped into the following categories (Table 1):

- General and demographic information
- The timing of consultations
- The patient profile
- The characteristics of the consultations: time of reception, number of messages, time spent dealing with them, etc.
- The type of disease
- The impact of these consultations on the specialist.

Only the respondents who answered questions 6 and 7 affirmatively were invited to continue the survey (Question 6: Are you a current user of WhatsApp or Telegram?; Question 7: Do you receive dermatology consultations on either of these apps?).

An email was sent to the members of the Valencian Regional Section of the AEDV inviting them complete the survey. This was done with the collaboration of the regional secretariat and with the permission of the national secretariat. Each one of the 275 registered specialists received an e-mail explaining the purpose of the study and including a link with direct access to the survey website. The survey was active from November 12, 2017 to January 31, 2018, and was answered by 128 physicians. The sample obtained represents 46.6% of the total population (128 responses collected from the 275 dermatologists registered in the Valencian Section).

The results obtained were analyzed by subgroups according to characteristics, such as age, place of work, etc., in an attempt to correct for the effects of these variables.

We performed a more exhaustive analysis of the results to identify possible associations between different groups of variables as follows:

- Timing of message and average interval before response
- Physician's age, whether they tended to receive this type of consultation or not, number of consultations received per week, and engagement in the response
- Engagement of the specialist in this type of consultation, average time between consultation and response, and resolution by means of a voice call or face-to-face consultation
- Type of disease, total number of messages in conversation, photographs required, and eventual need for a voice call or face-to face consultation
- Length of time in practice, tendency to take greater risks in decisions on diagnosis and treatment, and eventual need for a voice call or face-to-face consultation
- Total number of photographs and messages involved with type of illness, image quality, and time at which the consultation was received
- Time slot, weekly timing and vacation/work situation during which the physician receives the consultation with the possible repercussions of the timing
- Need for a voice call or face-to-face visit to resolve the consultation with the impact on the dermatologist's mood and their willingness to continue receiving messages on their personal cell phone
- Time spent resolving the consultation with the willingness of the physician to continue and the repercussion on their mood.
- Average length of interval between consultation and response with timing of receipt of the message
- Nature of the disease with the timing of the consultation and the eventual need for a voice call, face-to-face visit and/or treatment recommendation to resolve the problem

**Table 1** Questionnaire.

| **Demographic data** |
|---|
| *1. Sex* |
| - Man |
| - Woman |
| *2. Age* |
| - Under 30 y |
| - Between 30 and 50 y |
| - Over 50 y |
| *3. Location of workplace* |
| - Valencia |
| - Castellón |
| - Alicante |
| - Other (outside the Valencian Community) |
| *4. Work Sector* |
| - Public health sector |
| - Private health sector |
| - Both |
| *5. No. of years in practice as a dermatologist* |
| - Less than 10 |
| - Between 10 and 20 |
| - Over 20 |
| **Use of WhatsApp or Telegram** |
| If your answer to the next 2 questions is not affirmative, you should not continue with the questionnaire. |
| *6. Are you a current user of WhatsApp or Telegram?* |
| - Yes |
| - No |
| *7. Do you receive dermatology consultations on either of these apps?* |
| - Yes |
| - No |
| *8. Do you normally respond to such consultations?* |
| - Yes |
| - No |
| *9. Number of consultations received in the last week* |
| - None |
| - 1 |
| - 2 |
| - 3 |
| - More than 3 |
| **Timing of receipt of consultation** |
| Answer the following questions only if you have answered yes to the last 3 questions. For this block of questions we will refer to the most recent consultation received on WhatsApp or Telegram that you responded to before answering this survey as ''consultation N''. Do not take into account consultations received from another physician about a patient. Some of the questions are general and therefore unrelated to consultation N. |
| *10. Time slot during which consultation N was received* |
| - Between 8:00 h and 15:00 h |
| - Between 15:00 h and 22:00 h |
| - Between 22:00 h and 8:00 h |
| *11. Day of the week on which the consultation was received* |
| - Between Monday and Friday |
| - Saturday and/or Sunday |
| - Any day of the week |
| *12. Do you also receive consultations via WhatsApp or Telegram during vacation periods?* |
| - Yes |
| - No |
| *13. Average length of time between receipt of a consultation and your initial response* |
| - Less than 1 hour |
| - Between 1 and 12 hours |
| - Between 12 and 24 hours |
| - More than 24 hours |

Table 1 (*Continued*)

| **Demographic data** |
|---|
| *14. How do you usually deal with these consultations?*<br>- One by one as you receive them<br>- You wait till you have several before dealing with them as a batch<br>**Profile of the person consulting you**<br>When answering these questions, take consultation N as the prototype of the consultation you usually receive and the sender of that message as the prototype of the person who initiates the consultation.<br>*15. Relationship with the person consulting*<br>- First-degree relative<br>- Second-degree relative<br>- Inner circle (friend or close friend or someone who exercises influence or to whom you owe an obligation)<br>- Casual acquaintance or unknown third person<br>*16. Does the person consulting live in your city?*<br>- Yes<br>- No<br>*17. If not, do they live the same autonomous community as you?*<br>- Yes<br>- No<br>*18. If not, do they live in the same country as you?*<br>- Yes<br>- No<br>*19. Do you often receive such messages from N?*<br>- Yes<br>- No<br>*20. If yes, how many consultations does this person usually send you in a month?*<br>- 1<br>- 2<br>- 3<br>- More than 3<br>- Not applicable<br>*21 In your opinion, why does N consult you using WhatsApp or Telegram?*<br>- Ease of use<br>- Familiarity with or trust in the dermatologist (you)<br>- Speed of response<br>- All of the above<br>**Characteristics of the consultation**<br>Answer the following questions in relation to consultation N.<br>*22. Who sent consultation N?*<br>- The patient<br>- A third party intermediary<br>*23. Was there an image attached to consultation N?*<br>- Yes<br>- No<br>*24. How many images are usually involved in consultation N.*<br>- 0<br>- 1<br>- 2<br>- More than 2<br>- Not applicable<br>*25. How good is the quality of the images sent with the initial message?*<br>- Good. They help you diagnose the condition and make it possible for you to respond to the consultation.<br>- Acceptable. They allow you to make a preliminary diagnosis on which to base a decision about what should happen next.<br>- Poor. The quality is not good enough to support any diagnosis and additional images or an in-person consultation is necessary.<br>- Not applicable<br>*26. What was the total number of messages (including questions and answers) in consultation N?*<br>- 1 to 5<br>- 6 to 10<br>- Over 10 |

Table 1 (*Continued*)

| **Demographic data** |
|---|
| *27. Did the consultation ultimately give rise to a voice call?* |
| - Yes |
| - No |
| *28. If yes, were you the caller?* |
| - Yes |
| - No |
| *29. Did the consultation lead to a face-to-face consultation?* |
| - Yes |
| - No |
| *30. If yes, where would the in-person consultation generally take place?* |
| - In your home? |
| - In the hospital or specialist clinic? |
| - In a private dermatology office? |
| - In another location |
| - Not applicable |
| *31. How old was the patient in consultation N?* |
| - Under 18 |
| - Between 18 and 67 |
| - Over 67 |
| **Type of Disease** |
| *32. What type of disease was the topic of the consultation?* |
| - Inflammatory |
| - Infectious |
| - Benign tumor |
| - Malignant tumor |
| *33. What was the course of the disease?* |
| - Acute |
| - Chronic |
| *34. Did you have to consult another dermatologist about the case?* |
| - Yes |
| - No |
| *35. Did the consultation involve a treatment recommendation or prescription?* |
| - Yes |
| - No |
| *36. Will the consultation require follow-up?* |
| - Yes |
| - No |
| **Impact on the dermatologist's life** |
| *37. How much time did it take you to deal with consultation N?* |
| - Less than 5 min |
| - Between 6 and 10 min |
| - Between 11 and 15 min |
| - More than 15 min |
| *38. In general, what are the repercussions of consultation N? (You can indicate more than one answer.)* |
| - Receipt of the message led to a loss of concentration on current activity |
| - Consultation interrupted current activity |
| - Negative repercussion on mood |
| - Positive repercussion on mood |
| - No repercussion |
| *39. In your opinion, does the patient value digital consultations as highly as in-person consultations?* |
| - Yes |
| - No |
| *40. How would you assess you own engagement in the response to WhatsApp or Telegram consultations compared to face-to-face consultations?* |
| - Greater |
| - Less |
| - The same |

Table 1 (*Continued*)

| Demographic data |
|---|
| *41. Do you take greater risks when making a diagnosis in a WhatsApp consultation?* |
| - Yes |
| - No |
| *42. Do you take greater risks when you recommend treatment in these consultations?* |
| - Yes |
| - No |
| *43. Would you prefer not to have to deal with this kind of consultation in your practice.* |
| - Yes |
| - No |

- Dermatologist's age with average number of consultations received and the impact of these interactions on his or her mood and average response time
- Degree of engagement in this type of consultation with average time spent resolving the problem and the eventual need for a voice call or face-to-face visit
- Years of practice as a dermatologist with level of risk taken in both diagnostic and therapeutic decisions and with the eventual need for a face-to-face consultation or consultation with a colleague
- Relationship between the specialist and the person consulting them with the number of consultations
- Number of messages of this type received per week with average time between receipt of a message and the initial response

The statistical analysis was carried out using the Epi Info® application, version 7.2.0.1 compatible with the Windows XP® operating system, using the $X^2$ test with P values.

## Results

The results of the survey are shown in Table 2.

## General Information and Demographic Data

The Valencian Section of AEDV has 275 members. Of these, 128 started the survey: 60 women (47.2%) and 67 men (52.8%) (demographic data is missing for 1 respondent). The age distribution was as follows: 61 (48%) were between 30 and 50 years; the next largest group of 52 (40.9%) were over 50 years; and the smallest group was made up of 14 members under 30 years of age (11%). With respect to number of years in practice, 54 (42.5%) respondents reported 20 years, 38 (29.9%) between 10 and 20 years, and 35 (27.6%) had been working as dermatologists for less than 10 years (Table 2).

The majority of those surveyed (69 [54.3%]) were working in the province of Valencia, 20 (15.8%) practiced in the province of Alicante, 12 (9.4%) in the province of Castellón, and 26 (20.5%) said that they worked outside the Valencian Community. In total, 74 (58.3%) reported practicing medicine in both the public and private sectors, whereas 32 (25.2%) practiced exclusively in the public sector and 21 (16.5%) only in the private sector.

## Use of WhatsApp or Telegram

Only respondents who answered questions 6 and 7 (Table 1) affirmatively continued with the survey.

All of the 128 participants (100%) reported using either WhatsApp or Telegram: 9 (7%) said that they did not receive medical consultations via instant messaging applications and 119 (93%) said that they did. In total, 113 (88.3%) respondents said they had responded to consultations on these apps and the other 15 (11.7%) said that they had not.

With respect to the number of consultations received on the apps during the week preceding the survey, the dermatologists responded as follows: 25% received more than 3, 18% received 3, 22.7% received 2, and 21% received 1. The remaining 17 respondents (13.3%) had received no consultations in the previous week.

## Timing of the Consultation

Respondents only answered this section if they had answered the 3 preceding questions (7, 8 and 9) affirmatively.

In the following section, the letter ''N'' was used to refer to the most recent consultation received and answered using WhatsApp or Telegram before the survey was taken. Consultations received from a medical colleague requesting an opinion on a case were not taken into account.

In all, 80 respondents (69.6%) received consultations during the afternoon and evening between 15:00 and 22:00 h; 29 (25.2%) received them during the morning between 8:00 and 15:00 h; and only 6 (5.2%) received messages at night (between 22:00 and 8:00 h) (Fig. 1).

Most of the respondents reported no fixed pattern in terms of the day of the week consultations were received: 63 (54.8%) said that there was no fixed pattern, 42 (36.5%) said that the patients respected the weekend and only consulted them between Monday and Friday; and 10 (8.7%) reported receiving messages only on non-working days (Saturday and Sunday). The lack of a pattern was also observed with respect to the distribution of messages throughout the year according to the 118 respondents who answered this question: 116 (98.3%) reported receiving messages during normal vacation periods and 2 (1.7%) said that they did not.

When asked how long it took them to respond to consultation N, 66 respondents (56.4%) said that they answered within a period of between 1 and 12 hours, while 42 (35.9%) reported responding in less than 1 hour (Fig. 2). In other

Table 2 Results.

| Variable | Response Items | N (%) |
|---|---|---|
| Sex | Man | 67 (52.76) |
| | Woman | 60 (47.24) |
| | Total | 127 (100.00) |
| | No answer | 1 |
| Age, y | Under 30 | 14 (11.02) |
| | Between 30 and 50 | 61 (48.03) |
| | Over 50 | 52 (40.94) |
| | Total | 127 (100.00) |
| | No answer | 1 |
| Location of Workplace | Castellón | 12 (9.45) |
| | Valencia | 69 (54.33) |
| | Alicante | 20 (15.75) |
| | Outside of the Valencian Community | 26 (20.47) |
| | Total | 127 (100.00) |
| | No answer | 1 |
| Sector | Public | 32 (25.20) |
| | Private | 21 (16.54) |
| | Both | 74 (58.27) |
| | Total | 127 |
| | No answer | 1 |
| No. of years in practice | Under 10 | 35 (27.56) |
| | Between 10 and 20 | 38 (29.92) |
| | More than 20 | 54 (42.52) |
| | Total | 127 (100.00) |
| | No answer | 1 |
| Use of WhatsApp | Yes | 128 (100.00) |
| | No | 0 (0.00) |
| | Total | 128 (100.00) |
| | No answer | 0 |
| Receipt of digital consultations | Yes | 119 (92.97) |
| | No | 9 (7.03) |
| | Total | 128 (100.00) |
| | No answer | 0 |
| Response to consultations | Yes | 113 (88.28) |
| | No | 15 (11.72) |
| | Total | 128 (100.00) |
| | No answer | 0 |
| No of consultations during last week | None | 17 (13.28) |
| | 1 | 27 (21.09) |
| | 2 | 29 (22.66) |
| | 3 | 23 (17.97) |
| | More than 3 | 32 (25.00) |
| | Total | 128 (100.00) |
| | No answer | 0 |
| Time slot during which the consultation was received | Between 8:00 h and 15:00 h | 29 (25.22) |
| | Between 15:00 and 22:00 h | 80 (69.57) |
| | Between 22:00 and 8:00 h | 6 (5.22) |
| | Total | 115 (100.00) |
| | No answer | 13 |
| Timing of receipt of message | Monday to Friday | 42 (36.52) |
| | Saturday or Sunday | 10 (8.70) |
| | Seven days a week | 63 (54.78) |
| | Total | 115 (100.00) |
| | No answer | 13 |

Table 2 (*Continued*)

| Variable | Response Items | N (%) |
|---|---|---|
| Receipt of messages during vacations | Yes | 116 (98.31) |
| | No | 2 (1.69) |
| | Total | 118 (100.00) |
| | No answer | 10 |
| Response time in hours | < 1 | 42 (35.90) |
| | 1-12 | 66 (56.41) |
| | 12 to 24 | 2 (1.71) |
| | > 24 | 7 (5.98) |
| | Total | 117 (100.00) |
| | No answer | 11 |
| Method of dealing with consultation | One-by-one when the message is received | 116 (100.00) |
| | IAs a batch when several have been received | 0 (0.00) |
| | Total | 116 (100.00) |
| | No answer | 12 |
| Relationship with person consulting | First degree relative | 2 (1.68) |
| | Second degree relative | 8 (6.72) |
| | Inner circle | 97 (81.51) |
| | Acquaintance or complete stranger | 12 (10.08) |
| | Total | 119 (100.00) |
| | No answer | 9 |
| Does the patient reside in your town or city | Yes | 68 (57.14) |
| | No | 51 (42.86) |
| | Total | 119 (100.00) |
| | No answer | 9 |
| Patient resident in same autonomous community | Yes | 46 (66.67) |
| | No | 32 (33.33) |
| | Total | 69 (100.00) |
| | No answer | 59 |
| Patient resident in same country | Yes | 36 (83.72) |
| | No | 7 (16.28) |
| | Total | 43 (100.00) |
| | No answer | 85 |
| Patient often consults using this method | Yes | 48 (40.34) |
| | No | 71 (59.66) |
| | Total | 119 (100.00) |
| | No answer | 9 |
| No of consultations received from this patient | 1 | 22 (30.14) |
| | 2 | 17 (23.29) |
| | 3 | 3 (4.11) |
| | More than 3 | 6 (8.22) |
| | Not applicable | 25 (34.25) |
| | Total | 73 (100.00) |
| | No answer | 55 |
| Reason patient uses instant messaging | Ease of use | 15 (12.71) |
| | Trust in specialist | 26 (22.03) |
| | Speed of response | 3 (2.54) |
| | All of the above | 74 (62.71) |
| | Total | 118 (100.00) |
| | No answer | 10 |
| Person sending the consultation | The patient | 52 (45.61) |
| | Intermediary | 62 (54.39) |
| | Total | 114 (100.00) |
| | No answer | 14 |
| Image attached | Yes | 113 (98.26) |
| | No | 2 (1.74) |
| | Total | 115 (100) |
| | No answer | 13 |

Table 2 (*Continued*)

| Variable | Response Items | N (%) |
|---|---|---|
| No. of images attached | 0 | 0 (0) |
| | 1 | 13 (11.30) |
| | 2 | 55 (47.83) |
| | More than 2 | 43 (37.39) |
| | Not applicable | 4 (3.48) |
| | Total | 115 (100.00) |
| | No answer | 13 |
| Quality of images attached | Good | 8 (6.90) |
| | Average | 63 (54.31) |
| | Poor | 41 (35.34) |
| | Not applicable | 4 (3.45) |
| | Total | 116 (100.00) |
| | No answer | 12 |
| Number of messages in conversation | 1 to 5 | 57 (50.00) |
| | 6 to 10 | 41 (35.96) |
| | More than 10 | 16 (14.04) |
| | Total | 114 (100.00) |
| | No answer | 14 |
| Voice call | Yes | 24 (20.87) |
| | No | 91 (79.13) |
| | Total | 115 (100.00) |
| | No answer | 13 |
| Voice call made by specialist | Yes | 32 (42.11) |
| | No | 44 (57.89) |
| | Total | 76 (100.00) |
| | No answer | 52 |
| Face-to-face consultation | Yes | 37 (32.46) |
| | No | 77 (67.54) |
| | Total | 114 (100.00) |
| | No answer | 14 |
| Venue of face-to-face consultation | In the specialists' home | 1 (1.32) |
| | In the hospital or dermatology clinic | 25 (32.89) |
| | In the dermatology office | 17 (22.37) |
| | In another location | 2 (2.63) |
| | Not applicable | 31 (40.79) |
| | Total | 76 (100.00) |
| | No answer | 52 |
| Patient age, y | Under 18 | 17 (15.04) |
| | 18-67 | 94 (83.19) |
| | Over 67 | 2 (1.77) |
| | Total | 113 (100.00) |
| | No answer | 15 |
| Disease type | Inflammatory | 83 (74.11) |
| | Infectious | 14 (12.50) |
| | Benign tumor | 15 (13.39) |
| | Malignant tumor | 0 (0.00) |
| | Total | 112 (100.00) |
| | No answer | 16 |
| Course of the disease | Acute | 91 (80.53) |
| | Chronic | 22 (19.47) |
| | Total | 113 (100.00) |
| | No answer | 15 |
| Consultation with colleague | Yes | 6 (5.31) |
| | No | 107 (94.69) |
| | Total | 113 (100.00) |
| | No answer | 15 |

Table 2 (*Continued*)

| Variable | Response Items | N (%) |
|---|---|---|
| Treatment recommended or prescribed | Yes | 95 (84.07) |
| | No | 18 (15.93) |
| | Total | 113 (100.00) |
| | No answer | 15 |
| Follow-up required | Yes | 49 (43.36) |
| | No | 64 (56.64) |
| | Total | 113 (100.00) |
| | No answer | 15 |
| Time spent on response | Less than 5 min | 48 (42.48) |
| | Between 6 and 10 m in | 48 (42.48) |
| | Between 11 and 15 min | 15 (13.27) |
| | Over 15 min | 2 (1.77) |
| | Total | 113 (100.00) |
| | No answer | 15 |
| Repercussions | Loss of concentration | 48 (42.48) |
| | Interruption | 66 (58.41) |
| | Negative repercussions | 35 (30.97) |
| | Positive repercussions | 1 (0.88) |
| | No repercussions | 25 (22.12) |
| | Total | 113 (100.00) |
| | No answer | 15 |
| Does patient value digital consultation equally? | Yes | 34 (30.09) |
| | No | 79 (69.91) |
| | Total | 113 (100.00) |
| | No answer | 15 |
| Physician's engagement | Greater | 2 (1.77) |
| | Same | 46 (40.71) |
| | Less | 65 (57.52) |
| | Total | 113 (100.00) |
| | No answer | 15 |
| Greater risks in diagnosis | Yes | 53 (46.90) |
| | No | 60 (53.10) |
| | Total | 113 (100.00) |
| | No answer | 15 |
| Greater risks in treatment decision | Yes | 36 (31.86) |
| | No | 77 (68.14) |
| | Total | 113 (100.00) |
| | No answer | 15 |
| Would prefer not to receive such messages | Yes | 93 (82.30) |
| | No | 20 (17.70) |
| | Total | 113 (100.00) |
| | No answer | 15 |

words, this type of query is usually answered very quickly: only 2 (1.7%) of the respondents said they responded in the period between 12 and 24 hours and the group of respondents who took more than a day to answer was small (7 [6%]). All the respondents (100%) dealt with each consultation when it was received, that is, they did not wait to accumulate more than one and deal with them as a batch.

## Who Consults a Dermatologist Using Instant Messaging Apps?

Of the 118 members who answered this question, only 2 (1.7%) stated that the person sending consultation N was a first degree relative and only 8 (6.7%) that they received it from a second degree relative. By contrast, 97 (81.5%) said that WhatsApp or Telegram consultations usually came from a friend or close friend, and 12 (10%) stated that they mainly received these messages from acquaintances or strangers.

This new form of communication with the specialist is not conditioned by the patient's residence: 68 of the 119 dermatologists who answered this question (57.1%) stated that the person sending the message lived in the same city or town as themselves, while 51 (42.9%) said that they lived in a different town. Moreover, 66.7% lived in the same Autonomous Community and 83.7% in the same country.

The 119 responses to question 19 reveal that over half of the consultations came from people who communicate with

| | % | n |
|---|---|---|
| Between 8:00 h and 15:00 h | 25.22 | 29 |
| Between 15:00 h and 22:00 h | 69.57 | 80 |
| Between 22:00 h and 8:00 h | 5.22 | 6 |
| | | 115 |

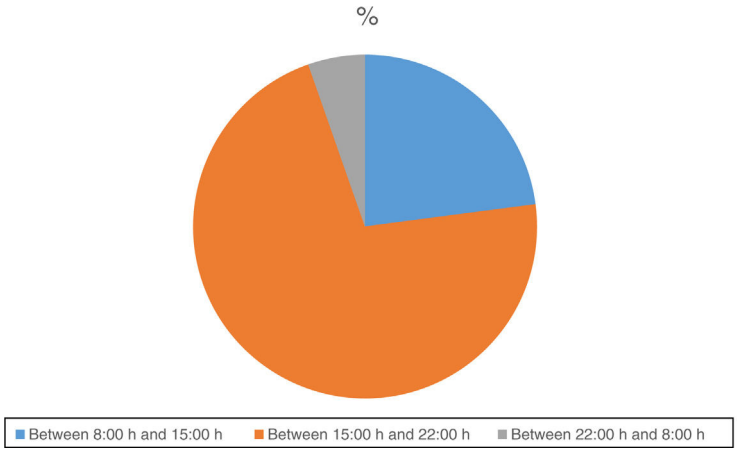


**Fig. 1** Time slot in which the message was received.

| | % | n |
|---|---|---|
| Under 1 hour | 35.9 | 42 |
| 1 to 12 hours | 56.41 | 66 |
| 12 to 24 hours | 1.71 | 2 |
| Over 24 hours | 5.98 | 7 |
| | | 117 |

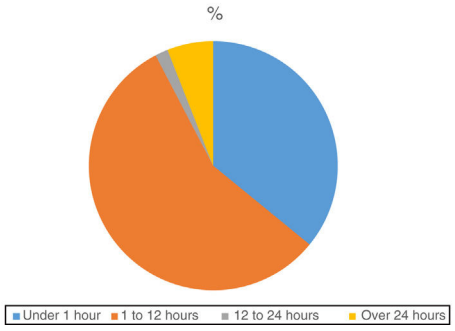


**Fig. 2** Average time between message reception and response.

the specialist via instant messaging only occasionally rather than on a regular basis: 71 (59.7%) said that the consultation was not a regular occurrence, while 48 (40.3%) said that the sender consulted them via WhatsApp or Telegram once or twice a month.

The survey specified 3 reasons that motivated the sender to use instant messaging for the consultation: trust and familiarity with the dermatologist, ease of use, and the speed of the response. Of the 118 members who answered this question, 74 (62.7%) attributed the patient's use of instant messaging to all 3 reasons, while 26 (22%) believed that the decision was motivated by the patient's trust in the particular specialist, 15 (12.7%) considered that the patients' only motivation was the convenience of digital communication, and 3 (2.5%) attributed the choice to the rapidity of the response.

## Formal Characteristics of the Consultation

Sixty-two of the 114 respondents (54.4%) stated that the patients did not usually send the message themselves, compared to 52 (45.6%) who stated that they did. Almost all of the 115 respondents who answered the question on the images received (113 [98.3%]) reported that the consultation was accompanied by a picture of the lesion. However, according to 55 (47.8%) of the respondents this image was generally inadequate and the clinician had to request a second photograph. In fact, 43 (37.4%) respondents said that more than 2 photographs are usually required in this type of consultation. Only 13 members (11.3%) said that these consultations are resolved with a single image (the one usually sent with the initial message).

Of the 116 respondents who provided information on the quality of the images received, 63 (54.3%) said that the quality of the images provided was mediocre but sufficient to resolve the consultation and 41 (34.4%) said that the quality was not good enough to establish a diagnosis and that they had to request further images. Only 8 members (6.9%) reported that the quality of the image initially received was good and allowed them to respond without requesting further images.

The question on the number of messages in the conversation was answered by 114 respondents: 57 (50%) reported that the prototypical consultation usually involved between 1 and 5 messages (including text and images); 41 (36%) stated that the conversation usually comprised between 6 and 10 messages; and only 16 (14%) reported that it involved more than 10 messages. Of the 115 respondents who answered the following question, 91 (79.13%) said that no voice call was required and only 24 (20.9%) ultimately had

to contact the patient in this way. The voice call was made by the patients in 57.9% of these cases and by the specialist in 42.1%.

However, almost one-third of these consultations initiated using TD were resolved with a face-to-face visit: 37 (32.5%) of the 114 respondents who answered this question stated that an in-person visit was required to complete the consultation, a slightly higher proportion than those resolved by way of a voice call.

Of the 76 clinicians who specified where a face-to-face visit would take place, 25 (32.9%) said a hospital or specialized clinic, 17 (22.4%) specified a private consultation at the dermatology office, only 1 (1.3%) said that the visit would take place in his or her home, and 2 (2.6%) said that it would take place at another (unspecified) location.

## Type of Disease

Of the 113 respondents who answered the question on the age of the person consulting, 94 (83.2%) said that patients most often attended to via instant messaging were aged between 18 and 67 years of age, while only 2 (1.8%) reported attending to patients over 67 years of age. In 17 cases (15%), the patient was under 18 years of age.

Question 32 on the nature of the disease was answered by 112 members: 83 (74.1%) specified inflammatory conditions, 14 (12.5%) infectious diseases, and 15 (13.4%) said the patients consulted for benign tumors. None of the consultations related to malignant tumors.

Acute conditions clearly predominated over chronic disease: 91 (80.5%) of the 113 responses indicated an acute condition, compared to 22 (19.5%) cases of chronic disease.

Only 6 (5.3%) of the 113 specialists who responded to this question reported that they had to consult another dermatologist to resolve the digital consultation.

The specialists recommended or prescribed pharmacological treatment after studying the case, even without a face-to-face consultation, in 95 (84.1%) of the 113 consultations and did not in the other 18 (15.9%). Just over half (64 [56.6%]) of the 113 dermatologists did not consider further follow-up necessary, compared to 49 (43.4%) who considered recommending further visits.

## Consequences for the Dermatologist

In total, 113 respondents answered the block of questions on the impact on the dermatologist arising from this type of consultation. Of these, 48 (42.5%) reported spending less than 5 minutes on the response and another 48 (42.5%) reported spending between 6 and 10 m inutes while 15 (13.3%) members spent between 11 and 15 minutes and only 2 (1.8%) reported spend more than 15 minutes (Fig. 3).

When asked about the repercussions of consultation N, 66 (58.4%) respondents said that it interrupted the activity they were involved in when the message was received, 48 (42.5%) cited loss of concentration, 35 (31%) said that the effect on their state of mind was negative, and only 1 (0.9%) reported a positive effect on mood; only 25 (22.1%) specialists reported no repercussions (Fig. 4).

When asked whether they considered that the patient valued this type of consultation as much as they did an in-person visit, 69.9% thought that the patients did not and 30.1% thought that they did. The findings with respect to the dermatologist's own engagement were somewhat similar: 65 (57.5%) clinicians recognized that they were less engaged in consultations on instant messaging than in face-to-face visits, 46 (40.7%) considered that they were equally engaged in both settings, while only 2 (1.8%) reported greater engagement in the WhatsApp consultations.

In response to question 41, 53 (46.9%) members admitted that they took greater risks in making a diagnosis when the consultation was dealt with via WhatsApp or Telegram than in face-to-face consultations, and 60 (53.1%) considered that they did not.

The same is not true of the decisions taken related to treatment, in which fewer clinicians said that they took a greater risk: 77 (68.1%) stated that they did not take a greater risk and 36 (31.9%) admitted that they did.

| | % | n |
|---|---|---|
| Less than 5 mins | 42.48 | 48 |
| Between 6 and 10 mins | 42.48 | 48 |
| Between 11 and 15 mins | 13.27 | 15 |
| More than 15 mins | 1.77 | 2 |
| | | 113 |

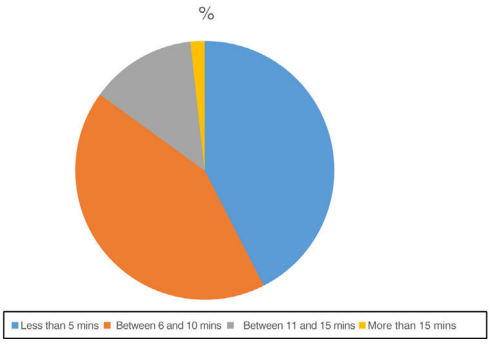


Fig. 3 Time spent dealing with the consultation.

| | % | n |
|---|---|---|
| Loss of concentration interfering with current activity | 42.48 | 48 |
| Interruption of current activity | 58.41 | 66 |
| Negative repercussion on mood | 30.97 | 35 |
| Positive repercussion on mood | 0.88 | 1 |
| No repercussion | 22.12 | 25 |
| | | 175 |

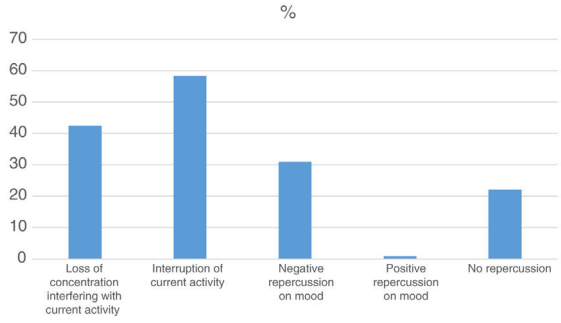


Fig. 4 Personal repercussions of the consultation on the physician.

Finally, and by way of a summary question, the specialists were asked whether they would like to stop attending to this type of consultation; 93 (82.3%) of the 113 specialists—almost all of them—said that they would prefer not to deal with these consultations. Only 20 (17.7%) did not share this view.

It should be noted that some questions were posed only when the response to the previous question made this necessary, which explains the high number of respondents who did not respond to questions 17, 18, 20, 28, and 30 (Table 1).

A significant association was found in 5 of the possible relationships studied:

1 *Relationship between the time the consultation is received and the repercussion on the dermatologist of the consultation (questions 10 and 38) (*Table 3*)*

Analysis showed an association between consultations received between 15:00 and 22:00 h and an interruption of the dermatologist's activity in 50% of cases, compared to interruption reported by 72.41% when the message was received between 8:00 and 15:00 h, and 33.33% when it was received at night (between 22:00 and 8:00 h) ($P = .06$).

2 *Relationship between time spent on the consultation and the repercussions on the dermatologist (questions 37 and 38) (*Table 4*)*

Consultations that took under 5 minutes to resolve were characterized as an interruption by 45.83% of respondents; this percentage rises to 68.75% when resolution required between 6 and 10 minutes. All the respondents who reported that the consultation took over 15 minutes to resolve said that it interrupted their activities.

On comparison of the 2 variables, an association was found between time spent and interruption of activity ($P = .0829$).

3 *Relationship between years in practice and consultation with another dermatologist (questions 5 and 34) (*Table 5*)*

The statistical analysis demonstrated an association between years in practice and consultation with a colleague to help resolve a WhatsApp consultation ($P = .0125$). Only 3.13% of clinicians with less than 10 years of experience consulted a colleague, while those in practice as dermatologists for 10 to 20 years did so in 14.71% of cases. None of the specialists who had been practicing for more than 20 years reported consulting a colleague (0.00%).

4 *Relationship between the age of the physician and the tendency to respond or not to consultations received* via *WhatsApp (questions 2 and 8) (*Table 6*)*

The rate of response to the consultations received was very high, over 80% in all cases.

Analysis revealed a significant correlation between willingness to respond to a WhatsApp consultation and the physician's age ($P = .0581$). All of the clinicians under 30 years of age old responded to such consultations, compared to 93.44% of those between 30 and 50 years old, and 82% of those over 50.

5 *Relationship between age and the average time between receiving the consultation and responding to it (questions 2 and 13) (*Table 7 *)*

Age was also a determining factor in the average time between receiving a message and responding ($P = .0921$): none of those under 30 years of age took more than 12 hours to respond; the percentage was 1.72% in the group aged between 30 and 50 years, rising to 13.65% in the cohort aged over 50 years.

## Discussion

WhatsApp is considered to be a simple, inexpensive, and effective means of communication within the clinical health sector and its use is expected to increase in the future.[8] Since only 128 of the 275 dermatologists who received the invitation completed the survey, our sample may not representative and could be subject to bias, since it is likely that only those dermatologists most interested in the topic chose to participate. It may also be that more insistent email reminders about the survey were needed.

While 92.97% of the respondents reported receiving medical consultations via instant messaging applications, they did not appear to pay a great deal of attention to the issues involved, including confidentiality,[10,11] data protection,[12] and lack of informed consent,[9] all of which will undoubtedly require adapting this type of consultation to the legal framework of each country.[8,11]

Most of the consultations were sent by a very close or quite close friend. The motives the specialists cited for the patient's use of this method included the speed of response (an advantage cited in other similar studies[12,13]) and the convenience offered by this form of communication.[14]

In line with other authors,[15] we found that most instant messaging consultations were accompanied by an image of the lesion in question; however, the image received initially was, in many cases, of too low a quality to permit a diagnosis.

Despite the fact that they were initiated remotely, almost one-third of these consultations were ultimately resolved in a face-to-face visit. However, in 84.07% of these cases, the clinician recommended a pharmacological treatment after studying the information provided, a practice that could entail unnecessary risks, as highlighted in other studies.[9]

In the present study, most of the consultations related to inflammatory diseases, with a clear predominance of acute over chronic conditions. This differs from the findings of Mars and Scott,[8] who in their review of the literature on the use of WhatsApp in clinical practice reported that most of the consultations related to surgery.

To investigate the impact of instant messaging consultations in the daily routine of dermatologists, given that these can often be intrusive,[9] we posed many questions and investigated many possible relationships. However, given the fact that our study is based on a series of cases, the scant information on the topic in the literature, and the limitations of the survey used, we found statistically significant associations in only a small number of the relationships studied.

**Table 3** Relationship Between Timing of Consultation and Interruption of Activity.

| Time Slot | No interruption | Activity Interrupted | Total |
|---|---|---|---|
| Between 22:00 h and 8:00 h | 40 | 40 | 80 |
| | 50% | 50% | 100% |
| | 76.92% | 63.49% | 69.57% |
| Between 8:00 h and 15:00 h | 8 | 21 | 29 |
| | 27.59% | 72.41% | 100% |
| | 15.38% | 33.33% | 25.22% |
| Between 15:00 h and 8:00 h | 4 | 2 | 6 |
| | 66.67% | 33.33% | 100% |
| | 7.69% | 3.17% | 5.22% |
| Total | 52 | 63 | 115 |
| | 45.22% | 54.78% | 100% |
| | 100% | 100% | 100% |

Association between question 38 (second response item) and question 10.
$X^2 = 5.4923$. Df = 2. P = 0.0642.

**Table 4** Relationship Between Time Spent on Consultation and Interruption of Activity.

| Time Spent | No interruption | Activity Interrupted | Total |
|---|---|---|---|
| < 5 min | 26 | 22 | 48 |
| | 54.17% | 45.83% | 100% |
| | 55.32% | 33.33% | 42.48% |
| 6-10 m in | 15 | 33 | 48 |
| | 31.25% | 68.75% | 100% |
| | 31.91% | 50.00% | 42.48% |
| 11-15 min | 6 | 9 | 15 |
| | 40.00% | 60.00% | 100% |
| | 12.77% | 13.64% | 13.27% |
| > 15 min | 0 | 2 | 2 |
| | 0 | 100% | 100% |
| | 0 | 3.03% | 1.77% |
| Total | 47 | 66 | 113 |
| | 41.59% | 58.41% | 100% |
| | 100% | 100% | 100% |

Association between question 37 and question 38 (response item 2).
$X^2 = 6.6774$. Df = 3. Probability = 0.0829.

**Table 5** Relationship Between Years in Practice and Consultation of a Colleague.

| Time in Practice, y | No Colleague Consulted | Consulted Colleague | Total |
|---|---|---|---|
| < 0 | 31 | 1 | 32 |
| | 96.88% | 3.13% | 100% |
| | 29.25% | 16.67% | 28.57% |
| 10-20 | 29 | 5 | 34 |
| | 85.29% | 14.71% | 100% |
| | 27.36% | 83.33% | 30.36% |
| > 20 y | 46 | 0 | 46 |
| | 100% | 0% | 100% |
| | 43.40% | 0% | 41.07% |
| Total | 106 | 6 | 112 |
| | 94.64% | 5.36% | 100% |
| | 100% | 100% | 100% |

Association between question 34 and question 5.
$X^2 = 8.7649$. Df = 2. Probability = 0.0125.

**Table 6** Relationship Between Age of Dermatologist and Willingness to Respond to a Consultation.

| Age, y | Did not respond | Responded | Total |
|---|---|---|---|
| < 30 | 0 | 14 | 14 |
| | 0% | 100% | 100% |
| | 0% | 12.50% | 11.20% |
| 30-50 | 4 | 57 | 61 |
| | 6.56% | 93.44% | 100% |
| | 30.77% | 50.89% | 48.80% |
| > 50 | 9 | 41 | 50 |
| | 18.00% | 82.00% | 100% |
| | 69.23% | 36.61% | 40.00% |
| Total | 13 | 112 | 125 |
| | 10.40% | 89.60% | 100% |
| | 100% | 100% | 100% |

Association between questions 2 and 8.
$X^2$ = 5.6908. Df = 2. Probability = 0.0581.

**Table 7** Relationship Between Dermatologist's Age and Average Interval Between Receiving Message and Responding to the Consultation.

| Age, y | Less than 1 h | From 1 to 12 h | From 12 to 24 h | From 24 to 36 h | > 36 h | Total |
|---|---|---|---|---|---|---|
| < 30 | 4 | 10 | 0 | 0 | 0 | 14 |
| | 28.57% | 71.43% | 0% | 0% | 0% | 100% |
| | 9.52% | 15.38% | 0% | 0% | 0% | 12.07% |
| 30-50 | 18 | 37 | 1 | 1 | 1 | 58 |
| | 31.03% | 63.79% | 1.72% | 1.72% | 1.72% | 100% |
| | 42.86% | 56.92% | 100% | 100% | 14.29% | 50.00% |
| > 50 | 20 | 18 | 0 | 0 | 6 | 44 |
| | 45.45% | 40.91% | 0% | 0% | 13.64% | 100% |
| | 47.62% | 27.69% | 0% | 0% | 85.71% | 37.93% |
| Total | 42 | 65 | 1 | 1 | 7 | 116 |
| | 36.21% | 56.03% | 0.86% | 0.86% | 6.03% | 100% |
| | 100% | 100% | 100% | 100% | 100% | 100% |

Association between question 2 and question 13.
$X^2$ = 13.6238. Df = 8. Probability = 0.0921.

The time the message was received does not appear to influence the overall impact on the physician's mood, except in the case of the interruption of their current activity. Most of the respondents received the consultations in the afternoon during working hours and the senders respected their privacy at night and at the weekend; however, they did receive these messages during periods normally considered to be vacations.

A relationship was observed between the time spent on the consultation and the interruption it causes.

The more time the physician spent resolving the consultation, the greater the likelihood they would report interruption of current activity.

There is a clear relationship between number of years in practice and the tendency to consult a colleague: specialists who have been practicing for between 10 and 20 years tend to consult their colleagues more often than those who have little experience or have been practicing for more than 20 years. We were struck by the fact that none of the specialists with over 20 years of practice consulted a colleague, a finding in line with the results of other studies, in which younger doctors were the group that most often consult with colleagues.[16]

While most of those surveyed do respond to consultation received on WhatsApp and do so quickly, there is a clear correlation with age: as the age of the physicians increases, the response rate decreases and the average response time increases. On the other hand, most of the respondents said that they would prefer not to receive these consultations, even though almost all of them (88.28%) said that they do respond to these message.

Owing to the exponential growth of WhatsApp consultations and the lack of studies with which to compare the results obtained, the need arises, in addition to drawing up guidelines for the use of WhatsApp in telemedicine,[8] to investigate some of aspects of this practice in greater depth, since the present study leaves many questions unresolved. These present opportunities to continue working on new lines of research, given the lack of a reliable explanation for the statistically proven associations and for the absence of an association between other behaviors generally considered interdependent.

## Conflicts of Interest

The authors declare that they have no conflicts of interest.

## Acknowledgements

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## References

1. Gimeno Carpio E. ¿Es la Teledermatología una herramienta útil para médicos, pacientes y administración? Actas Dermosifiliograf. 2018;109:557–8.
2. Diaz, Carlos Alberto (2011). Enter.co. Bogota. Retrieved from http://www.enter.co/cultura-digital/negocios/casi-el-75-de-la-poblacion-mundial-tiene-un-telefono-movil/.
3. Rivero F. Amic.media. Spain.; 2016. Retrieved from http://www.amic.media/media/files/file_352_1050.pdf.
4. Valero D, Spain. Retrieved from https://www.adslzone.net/2014/08/18/se-cumplen-20-anos-del-lanzamiento-del-primer-telefono-movil-inteligente/, 2014.
5. Anonymous, Ireland. Retrieved from https://www.whatsapp.com/about/, 2018.
6. Hagelstrom J, Argentina. Retrieved from http://www.perfil.com/sociedad/el-abuso-de-las-consultas-por-whatsapp-enloquece-a-los-medicos.phtml, 2017.
7. Jamal A, Temsah MH, Khan SA, Al-Eyadhy A, Koppel C, Chiang MF. Mobile Phone Use Among Medical Residents: A Cross-Sectional Multicenter Survey in Saudi Arabia. JMIR Mhealth Uhealth. 2016;19:e61, http://dx.doi.org/10.2196/mhealth.4904.
8. Mars M, Scott RE. WhatsApp in Clinical Practice: A Literature Review. Stud Health Technol Inform. 2016;231:82–90.
9. Khanna V, Sambandam SN, Gul A, et al. ẄhatsAppëning in orthopedic care: a concise report from a 300-bedded tertiary care teaching center. Eur J Orthop Surg Traumatol. 2015;25:821–6.
10. Dhuvad JM, Dhuvad JM, Kshirsagar RA. Have Smartphones contributed in the clinical progress of oral and maxilofacial surgery? J Clin Diagn Res. 2015;9:ZC22–4.
11. Sanchez-Machin I, Guedes PP, Perez RG, Matheu V. Experience in the use of social media (WhatsApp, e-Mail, Facebook, website) by patients. J Allergy Clin Immunol. 2015;135:AB135.
12. Migliori M. The use of smartphones or tablets in surgery. What are the limits? Ann Ital Chir. 2015;86:186.
13. Suliman MT. Sending photos through Whatsapp: A faster method for teleconsultation. Journal of Local and Global Health Science. 2014;2.
14. Senera TE, Butticèb S, Sahina B, Netschc C, Dragosd L, Pappalardob R, et al. WhatsApp Use In The Evaluation of Hematuria. Int J Med Inform. 2018;111:17–23.
15. Corazza M, Toni G, Virgili A, Borghi A. When traditional Chinese medicine runs on WhatsApp®. G Ital Dermatol Venereol. 2018;153(1):123–4.
16. Martyn-Hemphill C, Sarkar S, Withington J, Ashoke Roy A, Rosaline Chisholm R, Toby Newton T, et al. Whatsapp doc? Evaluating a novel modality of communication amogst urology team members to promote patient safety. J Urol. 2015;193:e169–70.