




The Role of Teledermatology During the COVID-19 Pandemic: A Narrative Review

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Abstract: Teledermatology represented one of the most important and useful tools during the COVID-19 pandemic era. Indeed, due to the severe restriction, and to reduce the spread of the infection, different measures were applied among different countries and hospitals to ensure a continuity of care for patients. In this scenario, teledermatology played a central role, especially in the management of patients suffering from chronic inflammatory skin diseases. The aim of this narrative review is to describe the role of teledermatology during the COVID-19 pandemic to analyze main strengths and limitations of this tool, as well as to provide future perspectives in clinical applications.

Keywords: teledermatology, telemedicine, COVID-19, psoriasis, atopic dermatitis, hidradenitis suppurativa

Introduction

The Coronavirus disease 2019 (COVID-19) outbreak represented a worldwide challenge, strongly impacting on overall health, lifestyle and global economy.¹ In order to reduce as much as possible the spread of the infection, several measures have been adopted among different countries to ensure a continuity of care for patients, deeply changing the daily clinical practice approach.^{2,3} Among these, the transition from face-to-face visits to teleconsultations was one of the main strategy adopted to reduce the risk of infection, limiting the access to hospital only for severe diseases.⁴ With regard to daily dermatological practice, teledermatology represented a useful tool to ensure a continuity of care for patients.⁵ Furthermore, several new cutaneous manifestations have been linked to the COVID-19 infections, including COVID-19 related skin diseases, and a worsening of preexisting dermatological conditions, such as of the inflammatory skin diseases.⁵ Moreover, dermatologists had to manage patients' hesitancy and doubts about the safety and effectiveness of conventional treatments and biologics in case of infection, the development or worsening of several dermatoses such as acne, rosacea, related to the use of personal protection equipment and the new lifestyle, and the management of inflammatory skin conditions [eg atopic dermatitis (AD), psoriasis, hidradenitis suppurativa (HS)] since their relapsing chronic clinical course strongly affecting patients' quality of life, and requiring a long term follow-up.⁶⁻¹⁶

Telemedicine has been defined by the World Health Organization (WHO) as the

Delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment, and prevention of disease and injuries, research, and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities.¹⁷

Even if the use of telemedicine has been proposed several years ago, the spreading of COVID-19 allowed a massive and rapid diffusion, and implementation of this service, becoming a valuable weapon during the pandemic era.^{17,18} As note, two different types of telemedicine should be distinguished: synchronous (in which patient and clinicians are able to

interact in real-time) and asynchronous (based on a store-and-forward system).¹⁹ The aim of this narrative review is to describe the role of teledermatology during the COVID-19 pandemic in order to analyze main strengths and limitations of this tool, as well as to provide future perspectives in clinical applications.

Materials and Methods

For the current review, literature research was performed on the PubMed, EBSCO, Embase, Google Scholar, Cochrane Skin, and MEDLINE databases (until October 20, 2022). Research was performed by using and matching the following terms: “COVID-19”, “telemedicine”, “teledermatology”, “skin manifestations”, “cutaneous disease”, “acne”, “psoriasis”, “atopic dermatitis”, “hidradenitis suppurativa”, “urticaria”, “alopecia”, “rosacea”, “eczema”. Investigated manuscripts included meta-analyses, reviews, letter to editor, real-life studies, case series and reports. The most relevant articles were considered in this narrative review. Studies were selected if they provided useful information on the use of teledermatology during COVID-19 pandemic. Manuscripts reporting data on the use of teledermatology before COVID-19 pandemic were excluded. Thus, the research was refined by reviewing the texts and the abstracts of considered articles. The bibliography was also analyzed to include articles that could have been missed. Only English language manuscripts were included. This article is based on previously conducted studies and does not contain any studies with human participants or animals performed by any of the authors.

Results

A total of 132 reports were initially found searching literature. Subsequently, 42 and 11 manuscripts were excluded since they were duplicates and in non-English languages, respectively. Then, literature review was refined following inclusion and exclusion criteria. Finally, a total of 39 articles were selected in the current review.

Teledermatology, Acne and Hidradenitis Suppurativa

The use of teledermatology for the management of acne and HS has shown to be crucial for the management of these conditions during the COVID-19 pandemic era. Indeed, patients affected by both diseases require personalized therapies and continuous follow-up.^{20–24}

As regards acne, several studies have been reported. Indeed, acne was the main field of application of telemedicine during the pandemic and the use of this tool for acne management has been investigated also before COVID-19 period.^{25–27}

In a retrospective analysis by Kazi et al, investigating 951 synchronous and 1672 asynchronous acne visits, the authors reported that synchronous teledermatology was statistically significant ($p < 0.05$) preferred to asynchronous one for complex medical dermatology.²⁸ Similarly, Gu et al¹⁹ investigated the characteristics of 480 acne visits conducted by telemedicine during COVID-19 pandemic showing that topical medications were more commonly prescribed compared with systemics ($p < 0.05$) as well as the authors advised to be careful in using isotretinoin in female subjects because there are not studies assessing the efficacy and safety on the use of this drug using teledermatology.²⁹ However, recently Moreno-Ramírez et al²⁰ reported that store-and-forward telemedicine is feasible for the management of acne subjects requiring oral isotretinoin in a longitudinal, prospective, feasibility study.³⁰ The effectiveness of teledermatological consultations was also analyzed by Lee et al who analyzed 1233 virtual visits showing that non-English speaking subjects were 2.86 times ($p < 0.001$) and elderly patients (>60 years) were 2 times ($p = 0.020$) more likely to have an audio-only than video visit, suggesting the importance of non-video visits as a valuable alternative in these populations.³¹ Other strategies of teledermatology for acne patients were reported in literature. Marasca et al²² showed the effectiveness of Whatsapp supporting group reporting an increased therapeutic adherence and better outcomes in 80 patients receiving reminder for their acne medications compared with patients which did not receive reminders.³²

All these studies reported telemedicine as an effective and safe option in the management of acne disease, increasing treatment adherence and patients' quality of life, suggesting this tool as a valuable option for acne treatment. Moreover, a high grade of patients' satisfaction has been reported.^{20,33–35} Finally, a long-term study on 213 acne patients showed that about 50% of acne patients preferred telemedicine even if in-person visits are allowed.³⁶

The use of teledermatology for the management of HS has not been widely investigated. Indeed, fewer studies are available.³⁷ Patel showed that face-to-face visits are important for the management of HS as compared with tele-visits since HS is an unstable disease and the use of video or photographic assessment should be handled with caution since

intimate body areas are usually involved as well as patients affected by HS have a high prevalence of depression and anxiety.³⁸ In his study, 41 patients undergoing 73 remote consultations were compared with 40 subjects attending 70 face-to-face visits.³⁸ Similarly, a survey conducted on Facebook supporting patients' groups for HS, performed by 335 responders, reported that subjects with a severe form of HS disagreed that tele dermatology provided equally effective care compared with face-to-face visits.³⁹

To sum up, the role of telemedicine in patients affected by HS seems to be limited since several concerns remain such as patient emotional distress, patient comfort and privacy, difficulties to show intimate areas, inability for clinicians to palpate lesions.^{40–44} Thus, new strategies and new studies are required.

Tele dermatology and Psoriasis

Psoriasis is a chronic relapsing skin disorder that needs long-term management and frequent follow-ups.^{45–47} Even if the introduction of biologic and small molecules revolutionized the management of psoriasis, showing a high grade of effectiveness and safety, also in special populations, the long-term follow-ups to monitor the severity of the disease is still required.^{48–53}

Globally, psoriasis represented a burden for patients during COVID-19 pandemic period.⁵⁴

In this scenario, telemedicine showed to be a valuable weapon to ensure therapeutic continuity also during the pandemic.⁵⁵ A survey-based study by Gisondi et al³⁹ including 246 patients affected by chronic plaque psoriasis in stable clinical remission undergoing biologic treatment showed that 118 patients (48%) preferred telemedicine over a face-to-face visit, saving time and reducing the risk of contracting COVID-19 infection.⁵⁶ Moreover, a previously reported experience with telemedicine showed patients' preference for tele visits (odds ratio [OR] 10.75; 95% confidence interval [CI] 3.61–32.03), while older age was negatively associated with the preference for telemedicine (OR 0.30; 95% CI 0.10–0.90).⁵⁶ The importance of telemedicine for psoriasis management has been confirmed by recent guidelines.⁵⁷ The effectiveness of tele dermatology for psoriasis management has also been showed by Tinio et al⁴¹ which analyzed 424 charts of patients affected by psoriasis undergoing tele dermatological consultation for disease's flare-up, and a follow-up at 1 month, reporting a high level of effectiveness of this tool for the management of psoriasis worsening, and confirming patients' appreciation for this service.⁵⁸

Globally, the use of telemedicine for psoriasis has been also investigated before COVID-19 pandemic, confirming its potential role in these chronic diseases, especially during the pandemic period, due to the restrictive measures adopted.^{59–61} Certainly, tele dermatology will be a useful weapon for the transition to a personalized approach and the chronic management of psoriatic patients.^{62,63}

Tele dermatology and Atopic Dermatitis

AD is one of the most common dermatological inflammatory disease.⁶⁴ The early onset in childhood, the chronic-relapsing course, the need for continuous monitoring of the disease severity, and the association with atopic comorbidities make AD an important global public health issue.^{65–69} These concerns raised the need for new treatment strategies during the COVID-19 pandemic period, where face-to-face visits were limited.

A recently published retrospective study showed that the accuracy for the diagnosis of AD using telemedicine was 84.4%. Moreover, 72% of the atopic patients were managed by tele dermatology, while 28% of them were referred to dermatologists.⁷⁰ Other studies reported the effectiveness and safety of telemedicine for AD management, showing this tool as an effective and safe option for atopic patients.^{71–74} Finally, the European Academy of Allergy and Clinical Immunology concerning AD proposed telemedicine as useful for therapeutic education, monitoring AD severity (using validated instruments for scoring AD severity), patient communication, medication reminders, and research.⁷⁵

Tele dermatology and Skin Cancers

Skin cancers are the most common type of cancer. In particular, melanoma and non-melanoma skin cancers can be distinguished.⁷⁶ Even if several studies reported the reduction in the diagnosis of skin tumors during the pandemic,^{77–83} few data are available on their diagnosis and management using telemedicine. Jobbágy et al showed that asynchronous tele dermatology was an accurate skin cancer screening system during the first wave of the COVID-19 pandemic, examining 749 patients with 799 lesions using a mobile phone application.⁸⁴ Similar results were showed by Ziętek et al which analyzed 80 patients using remote dermatological consultation.⁸⁵ Finally, the long-term efficacy of

telemedicine for patients with locally advanced basal cell carcinoma during COVID-19 pandemic has been reported by Villani et al⁶⁷ who analyzed 23 patients undergoing treatment with sonidegib, a hedgehog inhibitors,⁸⁶ performing monthly follow-ups by telemedicine.⁸⁷

Teledermatology, Biological Treatments and COVID-19 Vaccination

Biological treatments revolutionized the management of several dermatological inflammatory skin conditions, particularly psoriasis, atopic dermatitis and hidradenitis suppurativa.^{47,88–90} In particular, real-life evidence confirmed the safety of these drugs also during COVID-19 pandemic period.^{91–93} Unfortunately, even if several articles suggest teledermatology as a valuable option for the long-term management of patients undergoing biological treatment with a stable disease, official guidelines and international recommendations are still lacking. Similarly, few data about the monitoring of cutaneous reactions following COVID-19 vaccination are available.^{94–103}

Limitations of Teledermatology

Although the high value that teledermatology had during the pandemic era, near the several pros highlighted, there are several limitations to this important tool. The results from a survey-based study, involving dermatologists offering teledermatology services, showed both advantages and disadvantages of teledermatology.¹⁰⁴ Particularly, although most of the interviewed dermatologists described teledermatology as an effective tool for patient care, they also described the limitations of teledermatology.¹⁰⁴ Among the described disadvantages, the most frequently reported included the low image quality, the inadequate view of the skin during the video consultations, and several technical issues. Other limitations described were the decreased patient rapport, unrealistic patient expectation to tele-visit, the inability to perform any procedures or through examination, compensation issues.¹⁰⁴ Furthermore, among interviewed dermatologists about 37% reported to believe that teledermatology contributed to their professional burn out during the COVID-19 era.¹⁰⁴ Similar data have been showed by Bhargava et al, who reported teledermatology as one of the most important factor influencing dermatologists burn out during the pandemic.¹⁰⁵ Another important disadvantage of teledermatology is represented by the diseases misdiagnosis. Particularly, although teledermatology gave the opportunity to inspect and diagnose lesions pertinent to the chief complaint, several other lesions that would have been otherwise analyzed and correctly diagnosed, during a complete standard examination may be missed, or otherwise not correctly diagnosed.^{106,107} Several studies showed that this may come from a non-adequate use of video or photo during the visit, due to the poor quality of shared clinical image, and/or to the inability of many patients to correctly share and take photos of their lesions, resulting in a difficult differential diagnosis process (ie, missing small/discrete details like small erythematous areas, scales, Pityriasis Folliculorum of the back thoracic area, discrimination between furunculosis/hidrosadenitis, acne/rosacea, small nail signs), and hence in a higher rate of diagnosis error than in person visits.^{108–110} These limitations may be the cause of low rate of patients satisfaction, and patients' preference for in person visits than teledermatology.¹⁰⁷

Discussion

The WHO definition of telemedicine describes the main aims of this tool.¹¹¹ In particular, evading spatial distance, providing clinical assistance remotely, and using new technologies at the service of patients, are the main objectives of teledermatology, with the avoidance of the reduction of the quality of health care as the main one.¹¹² In our opinion, the aim of telemedicine should also consider other factors related to healthcare system, patients and global situation.

In this scenario, our review highlighted the key role played by teledermatology during the COVID-19 pandemic.¹¹³ Indeed, it allowed the continuity of care in several dermatological conditions, especially chronic skin diseases. Certainly, the need for therapeutic assistance as well as the strategies adopted to prevent the spreading of the infection, led to the need for a personalized telemedical approach. Several strategies were adopted such as boosted online services (eg email, phone calls, video calls) and digital platform support groups, allowing the therapeutic continuity.

As shown in our narrative review, main strengths of telemedicine are the safety, effectiveness, and the high level of satisfaction for both patients and physicians.

Furthermore, some more advantages for using teledermatology in COVID time have been the possibility of diagnosis and treatment of familial clustering of COVID-19 skin manifestations, for isolated families with skin problems, linked to the

rapidity of communication, and direct interaction with physicians.¹¹⁴ Another important role of teledermatology during the COVID-19 era has been represented by the inpatient consultations for patients positive to the SarsCov2 infection. Particularly, these tele-visits resulted important for inpatients experiencing both COVID-19 related and non-related diseases, reducing the risk of infection for physicians, and leading to a correct diagnosis of these novel manifestations.^{114–116} Unfortunately, several limitations remain. Among these, we want to highlight capacity of using devices, the availability of internet access, the need for high-quality camera and for an app for personal computers and smartphones for the inclusion of photographs. Moreover, severity score indexes should be reevaluated to make them pertinent to telemedicine.

Nowadays, with the reduction of COVID-19 restriction measures, the number of face-to-face visits is increasing. In our opinion, telemedicine is still a useful tool, but its use should be revised.¹¹⁷ Indeed, it could play a key role in daily clinical practice for patients who, for any reason (eg logistical barriers, living in underserved areas, few availabilities of dermatologists, quarantine measures, personal problems), require medical advice without the possibility of attending a face to face visit. Certainly, patients affected by chronic inflammatory skin disorders undergoing biological treatments, and presenting a stable disease, may be the main candidates for the use of teledermatology.¹¹⁸

Furthermore, the use of telemedicine should be better regulated by official guidelines, and international shared recommendation, especially for the problems of a medico-legal nature (such as informed consent and privacy disclosure), which may impact on the physicians' use of this service. Moreover, to increase the use and appreciation among patients, a well-structured, simply and widely diffused platform should be implemented, to reduce the barriers for elderly patients, as well as to reassure patients about privacy and safe data storage concerns.

Globally, even if teledermatology is expected to be an integral part of medicine, allowing cost and time-savings both for health system and patients, the physician–patient relationship should not be ignored. This relationship is at the basis of medicine, and it is not present during tele visits. Probably, the association of tele visits with face-to-face consultations may be a valuable option to overcome this limitation.

Strengths and Limitations

Main strengths of our review are the systematic method during the literature research and the high number of investigated articles. Main limitations include the reduced data on the use of teledermatology before and after the COVID-19 pandemic period as well as the absence of large cohort disease investigating the effectiveness, feasibility, and safety of this tool in dermatological conditions.

Conclusion

COVID-19 pandemic period required special measures to avoid the spreading of the infection. Among these, teledermatology played a key role, showing promising results in terms of effectiveness and safety, allowing the therapeutic continuity also in this period. Nowadays, it is a current reality in daily clinical practice, and it will hold a key role also in the future. Certainly, further studies and improvements are needed to overcome the limitations of this tool, offering patients a tailored tail teledermatological management.

Disclosure

G. Fabbrocini acted as a speaker or consultant for AbbVie, Amgen, Eli Lilly, Janssen, Leo-Pharma, Ammirall, Novartis, and UCB. M. Megna acted as a speaker or consultant for AbbVie, Eli Lilly, Janssen, Leo-Pharma, and Novartis. None of the other contributing authors have any conflict of interest, including specific financial interests of relationships and affiliation relevant to the subject matter or discussed materials in the manuscript.

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