

# Teledermatology and the COVID-19 pandemic: experience from a Portuguese center

## *Teledermatologia e a pandemia covid-19: experiência de um centro português*

Miguel Santos-Coelho<sup>a</sup>, Joana A. Barbosa<sup>b</sup>, Mafalda Pestana<sup>c</sup>, Margarida B. Caldeira<sup>d</sup>,  
Maria J. Paiva-Lopes<sup>e</sup>, and Joana Cabete<sup>f</sup>

Department of Dermatology and Venereology, Centro Hospitalar Universitário de Lisboa Central, E.P.E., Alameda Santo António dos Capuchos, Lisboa, Portugal

ORCID: <sup>a</sup>0000-0002-2288-7306; <sup>b</sup>0000-0001-7351-5302; <sup>c</sup>0000-0003-1361-4995; <sup>d</sup>0000-0002-2538-4739; <sup>e</sup>0000-0001-9189-2734; <sup>f</sup>0000-0003-2259-5634

### Abstract

**Introduction:** In order to maintain assistential activity while ensuring social distancing and mobility restrictions imposed during the COVID-19 pandemic, the Dermatovenereology Department of Hospital de Santo António dos Capuchos implemented an asynchronous teledermatology platform based on e-mail and smartphones. This study aims to evaluate its application to urgent outpatient and inpatient consultations while considering its benefits and limitations. **Methods:** All written communications received via e-mail or smartphone between April 1, 2020 and April 31, 2021 were reviewed. Data was evaluated and statistical analysis was made using SPSS Statistics 25<sup>®</sup> software. **Results:** We reviewed 471 referrals (329 for outpatient and 142 for inpatient urgent consultations). E-mail was the most used platform (68.8%) and most referrals were composed of clinical information and clinical images (70.3%). Only 29% of these contained adequate clinical information and clinical images simultaneously. The majority of referrals received a response by a dermatologist in less than 24 hours (89%) and conversion to in-person evaluation was made in 58% of cases. The average time for in-person evaluation after triage was 0.25 days for inpatients and 4 days for outpatients. **Conclusion:** The COVID-19 pandemic hastened teledermatology implementation in order to maintain good healthcare. This study demonstrates that these platforms were widely accepted by healthcare professionals and patients and remote consultations were possible in a significant percentage of cases. Teledermatology struggles with its own limitations and can never fully replace in-person evaluation, but can present itself as a useful tool in daily practice.

**Keywords:** Teledermatology, COVID-19, Pandemic.

### Resumo

**Introdução:** Com o objectivo de manter a actividade assistencial numa altura em que o distanciamento social e as restrições de mobilidade entre hospitais consequentes à pandemia COVID-19 se apresentavam como fundamentais, o departamento de Dermatovenereologia do Hospital de Santo António dos Capuchos implementou uma plataforma assíncrona de teledermatologia baseada em e-mail e smartphones. Este estudo pretende avaliar a sua aplicação a consultas de urgência de

#### Corresponding author:

\*Miguel Santos-Coelho

E-mail: mscoelho.derma@gmail.com

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ambulatório e internamento, dando destaque aos seus benefícios e limitações. **Métodos:** Todas as comunicações escritas recebidas por e-mail ou smartphone entre 1 de Abril de 2020 e 31 de Abril de 2021 foram analisadas. Os dados foram avaliados e foi realizada análise estatística com recurso ao software SPSS Statistics 25<sup>®</sup>. **Resultados:** Foram analisadas 471 referências (329 consultas urgentes de ambulatório e 142 consultas urgentes em internamento). O e-mail foi a plataforma mais usada (68.8%) e a maioria das referências eram compostas por informação clínica escrita e imagens clínicas (70.3%). Apenas 29% destas continham, em simultâneo, informação clínica e imagens clínicas adequadas. A maior parte dos pedidos recebeu uma resposta por um dermatologista em menos de 24 horas (89%) e, em 58% dos casos, foi efectuada uma conversão a consulta presencial. O tempo médio para uma consulta presencial após triagem foi de 0.25 dias para consultas em internamento e 4 dias para consultas de ambulatório. **Conclusão:** A pandemia COVID-19 acelerou a implementação da tele dermatologia de modo a assegurar a manutenção de bons cuidados de saúde. Este estudo demonstrou que estas plataformas foram amplamente adoptadas por profissionais de saúde e doentes e a realização de consultas remotas foi possível numa percentagem significativa de casos. A tele dermatologia apresenta várias limitações e nunca poderá substituir integralmente uma avaliação presencial, podendo ser, no entanto, uma ferramenta útil no dia-a-dia.

**Palavras-chave:** Teledermatologia. COVID-19. Pandemia.

## Introduction

In March 2020, the World Health Organization classified the SARS-COV2 virus outbreak as a pandemic event. During the following weeks and months, hospitals and health services were overwhelmed with COVID-19 patients, and society itself went through major changes in order to (try to) contain the virus.

Months before the arrival of the first vaccines, personal protective equipment, frequent hand disinfection, social distancing, and mobility restrictions were the only available means to limit viral spreading. The Dermatovenereology Department of Hospital de Santo António dos Capuchos (HSAC) in Lisbon is in a unique situation in Portugal as it is responsible for all inpatient consultations and urgent outpatient evaluations in Centro Hospitalar Universitário de Lisboa Central (CHULC). Besides HSAC, the Center also encompasses Hospital de São José (HSJ), Hospital Curry Cabral, Hospital Santa Marta, Hospital Dona Estefânia, and Maternidade Alfredo da Costa.

In order to maintain assistential activity while ensuring social distancing and mobility restrictions imposed between hospitals, tele dermatology platforms were employed. These can be defined as the use of electronic communications applied to dermatology to exchange medical information between remotely located health care professionals<sup>1</sup>.

In order to accomplish this, an e-mail address hosted by CHULC's private network was created and a smartphone was made available to all department

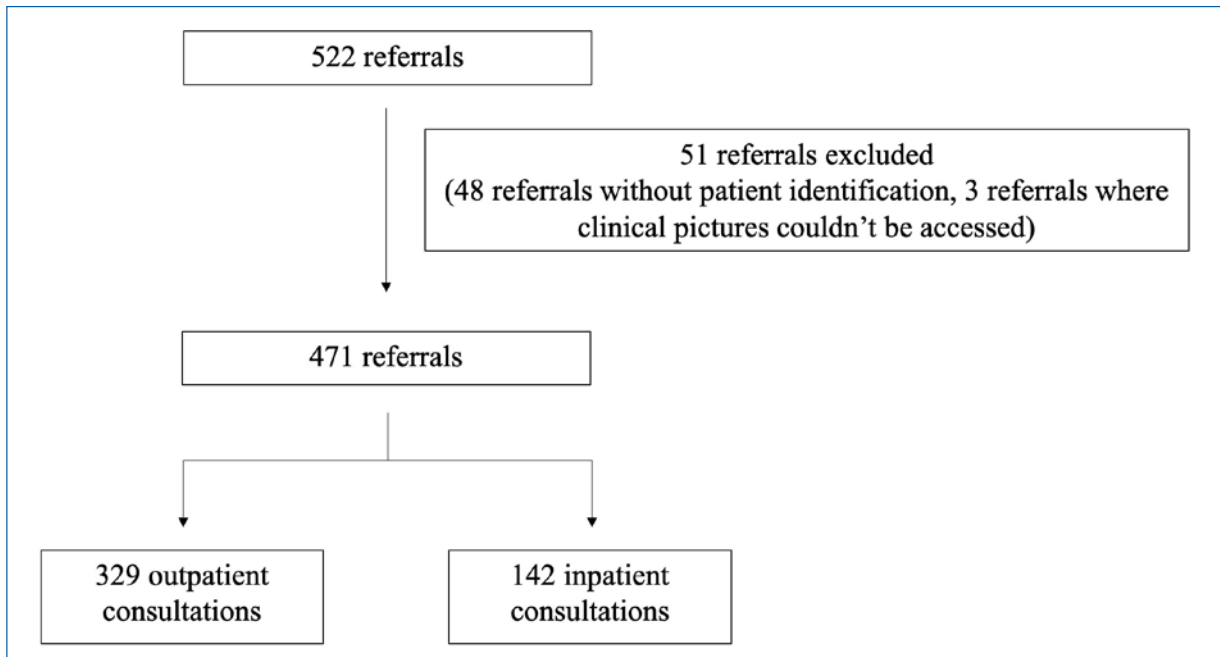
physicians. The latter was used both for accessing the previously mentioned e-mail account and also to receive short message services (SMS) and messages through encrypted communication services (such as Whatsapp<sup>®</sup>). Communication through both of these methods was made available to all physicians in CHULC.

The General Data Protection Regulation was followed in all processes, as patients gave consent to clinical image taking and sharing between medical professionals and patient's identification relied only on the hospital's patient ID number (which can only be accessed by medical professionals). Regarding the use of third-party software, consent from patients was also obtained previously; the use of encrypted end-to-end solutions meant that internet service providers, application service providers or any other entity were unable to access information that was only available to the sender and receiver (both medical professionals).

This study aims to evaluate the use of tele dermatology methods in CHULC during the COVID-19 pandemic, with emphasis on type and quality of received information, response timing by physicians, and conversion to in-person evaluation.

## Methods

A retrospective study of all inpatient and urgent outpatient consultations using tele dermatology platforms during a 13-month period was conducted.



**Figure 1.** Referrals received.

All written communications received via e-mail or smartphone between April 1, 2020 and April 31, 2021 were reviewed. Those containing inpatient and urgent outpatient consultations were included. Exclusion criteria were lack of patient identification and the inability to access sent clinical images.

Clinical information was evaluated regarding essential anamnesis and other relevant data. Clinical images were analyzed based on framing, contrast, lighting, color, and sharpness. Data that enabled medical interpretation and decision-making (as defined by a panel of four physicians) was classified as “adequat”, and the remaining as “inadequat”.

Results were analyzed by SPSS Statistics 25® software.

## Results

The inclusion criteria were met in 522 referrals and 51 cases were then excluded. Of the remaining 471 referrals, 329 (69.9%) were urgent outpatient consultations and the remaining 142 (30.1%) urgent inpatient consultations (Fig. 1). The distribution of referrals during the 13-month period is shown in Figure 2.

Referred patients had an average age of 53.7 years (1 month–96 years) and 237 (50.3%) were male. Subgroup analysis revealed an average age of 48 years (2 months–96 years) and of 67 years (1 month–94 years) for outpatients and inpatients, respectively.

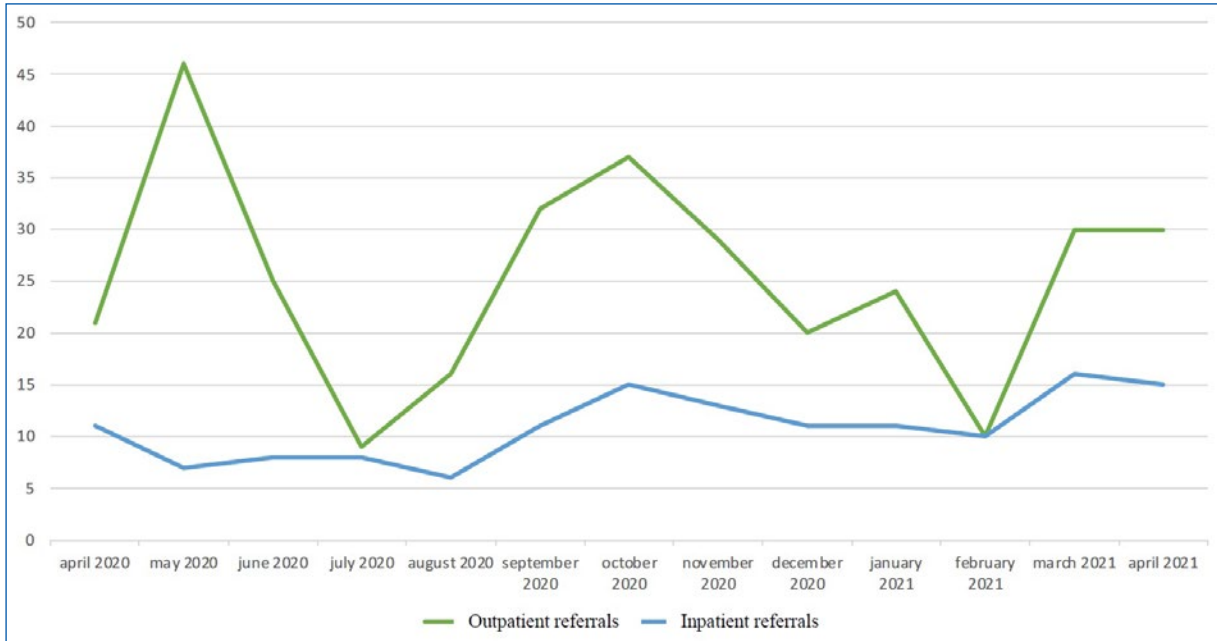
Most referrals were received through e-mail (324 [68.8%]) and the remaining through encrypted smartphone apps (147 [31.2%]).

The majority of inpatient referrals originated from the Internal Medicine Wards (Fig. 3); the Emergency Department in HSJ was the most common source for urgent outpatient consultation referrals (Fig. 4).

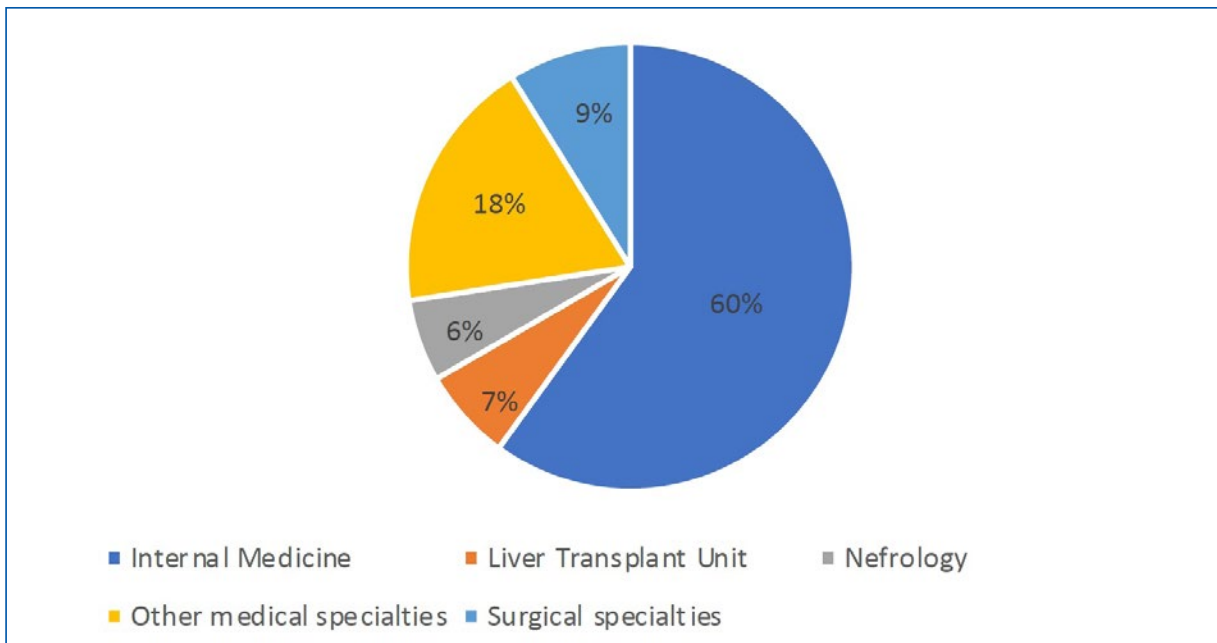
Regarding content, the majority of inpatient and outpatient referrals (331 [70.3%]) were composed of written clinical information accompanied by clinical pictures (Fig. 5); “adequat”. clinical information and clinical images were only present simultaneously in 96 cases (29%) (Table 1).

All other cases, composed only of written clinical information or clinical pictures, were further supplemented with additional data received by e-mail/message and/or phone calls through the Centro Hospitalar’s private network. In this subgroup, 30% and 73.64% of first received referrals were classified as containing “good qualit”. data, respectively (Table 2). Given that subsequent written information and clinical pictures were obtained after feedback from a dermatologist, this data was not evaluated in this study.

The majority of all referrals (419 [88.9%]) received a response by a dermatologist in less than 24 hours and this was also the case for subgroup analysis (Table 3). Conversion to in-person evaluation was made in 273 cases (58%), encompassing most outpatient referrals (230 [69.9%]) but less than a third of inpatient



**Figure 2.** Distribution of referrals during a 13-month period.



**Figure 3.** Origin of inpatient referrals.

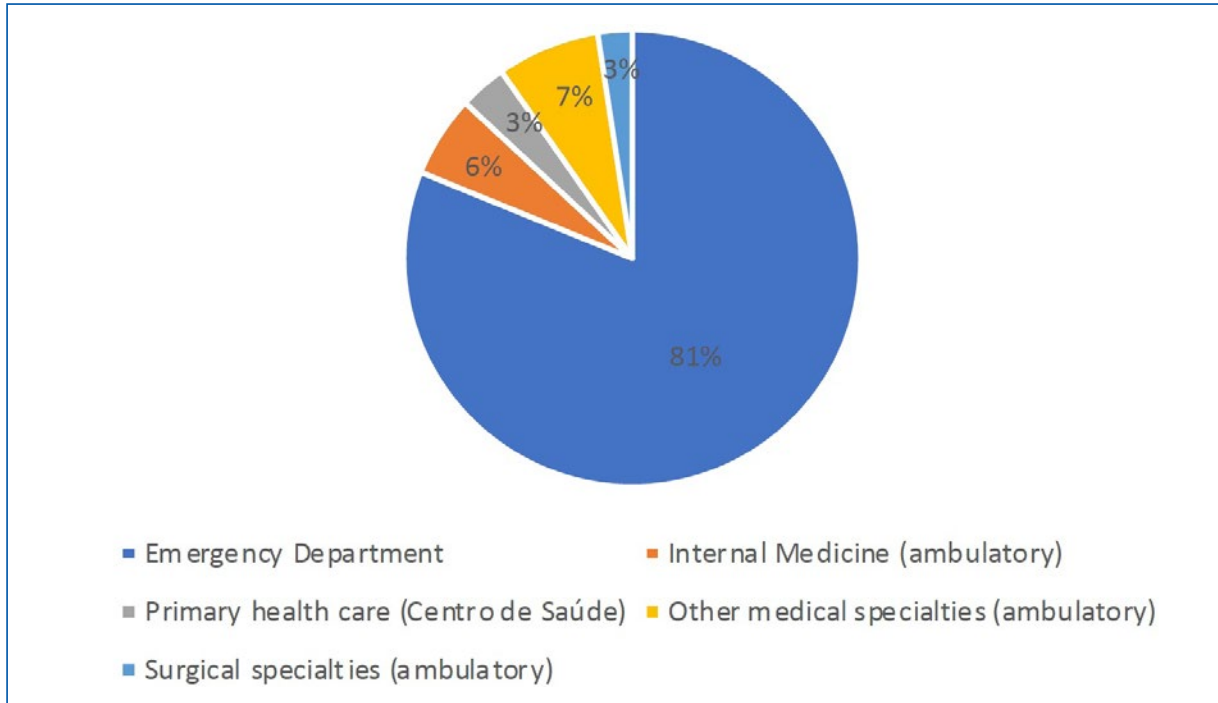
referrals. The average time for in-person evaluation after triage was 0.25 days for inpatients and 4 days for outpatients (Table 4).

### Discussion

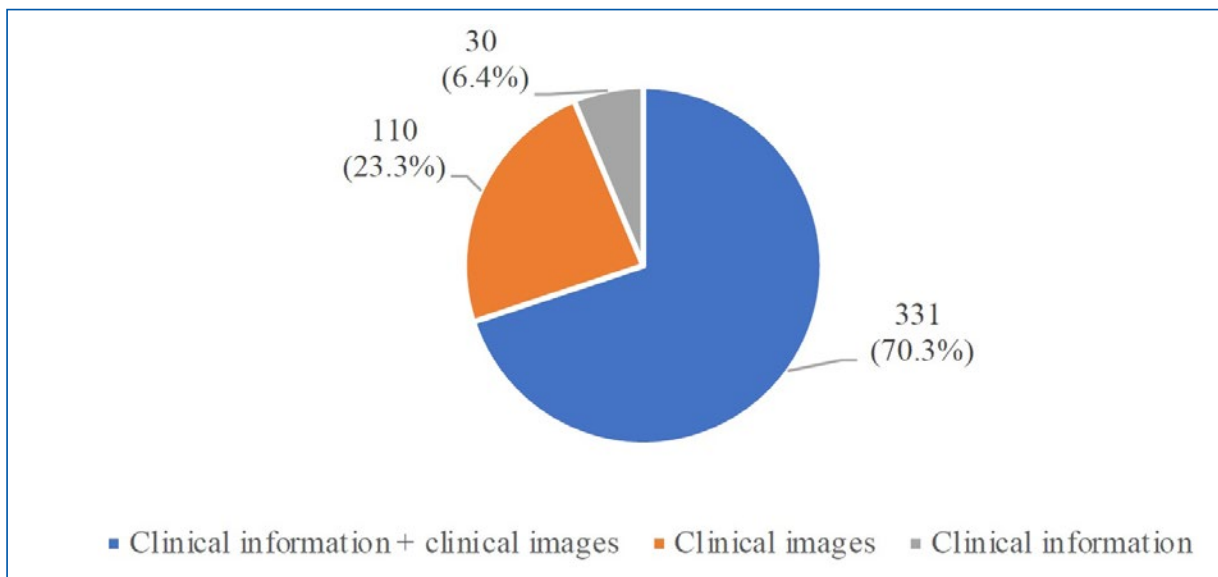
Tele dermatology care can be divided into three main platforms: synchronous (real-time), asynchronous

(store and forward), and mixed (a fusion of the previous two)<sup>2</sup>. The Dermatovenereology Department of HSAC implemented an asynchronous platform based on e-mail and smartphones.

These methods of communication were rapidly made available and implemented in Centro Hospitalar Lisboa Central. The e-mail was the preferred method of referral for urgent consultations; we believe that widespread



**Figure 4.** Origin of outpatient referrals.



**Figure 5.** Type of data received in referrals.

availability, lack of need for specific equipment (i.e., smartphone, apps), secure integration in the hospital's network, and the use of work credentials instead of personal ones (i.e., private phone number) contributed to this fact.

Even though these were effective means of data transfer, lack of integration with the software used

throughout CHULC were a difficult challenge to overcome. The constant need of switching between software (and operative systems when it came to smartphone usage) revealed itself as time-consuming and followed a learning curve. We also believe that the ability to store clinical images into patients' medical records (with patient consent) would be beneficial; by

**Table 1.** Type of data in referrals composed of clinical information and clinical images

Type of data	Adequate clinical Images	Inadequate clinical images
Adequate clinical information	96 (29%)	32 (9.7%)
Inadequate clinical information	119 (35.9%)	84 (25.4%)

**Table 2.** Type of data in referrals composed of clinical information or clinical images

Type of data	Adequate	Inadequate
Clinical information	9 (30%)	21 (70%)
Clinical images	81 (73.64%)	29 (26.36%)

**Table 3.** Time of response by a dermatologist after referral

Time of response	All referrals	Inpatient referrals	Outpatient referrals
Less than 24 h	419 (88.9%)	138 (97.2%)	281 (85.4%)
24-48 h	7 (1.5%)	0	7 (2.1%)
48-72 h	30 (6.4%)	0	30 (9.1%)
More than 72 h	15 (3.2%)	4 (2.8%)	11 (3.3%)

**Table 4.** Conversion to in-person evaluation and average time for consultation

Conversion to in-person evaluation	Conversion to in-person evaluation	Average time to in-personal evaluation
All referrals	273 (58%)	–
Inpatient referrals	43 (30.3%)	0.25 days
Outpatient referrals	230 (69.9%)	4 days

doing this, important clinical data would be made available to all physicians involved in a given patient’s care, regardless of medical specialty. Current storage options available at CHULC don’t grant access to this data to non-dermatologists and make future erasing of said data (due to low storage capacity, change of e-mail domains, among others) an inevitability.

Nevertheless, the successful implementation of teledermatology methods is directly impacted by the quality of the sent data. In an ideal world, only adequate clinical information and clinical pictures would be

received. In this study, this was true in less than a third of referrals containing both types of data.

Without clear and detailed clinical information, the interpretation of the patient’s condition becomes difficult, making diagnosis and treatment a challenge; frequently, past medical history of patients was omitted in referrals and the evolution of the dermatosis through time was not always described. Likewise, description of past medical treatments was missing most of the time.

The absence of a clear description of dermatologic lesions was frequently found in referrals. Incorrect use of medical terms regarding primary and secondary skin lesions (especially when clinical images are lacking or inadequate), can misguide diagnosis. This problem can be addressed with adequate education of non-dermatologists regarding standard definitions of dermatological terms.

On the other hand, clinical pictures without good quality also undermine these clinical processes. Lack of focus and insufficient lighting were the most common problems identified and can be, at least partially, justified by lack of specific formation in clinical image of adequate cameras owned by the hospitals and the need to use personal cameras or taking, lack of ideal physical conditions (natural lighting for example) and time to produce adequate clinical images. Absence of adequate cameras owned by the hospitals and the need to use personal cameras or smartphones can also impact image quality.

Other difficulties arise when considering the almost 30% of cases in which referrals were only composed of clinical information or clinical pictures. This is unsatisfactory for all the previously mentioned reasons, adding up to the need of subsequent follow-ups on referrals (which increases workload not only for the dermatologist but also for the physician responsible for the referral). If this process, albeit cumbersome, can be made in inpatients referrals, its application to outpatient referrals was sometimes impossible (i.e., obtaining clinical pictures of a patient that had already left the emergency room). Evidently, one must also consider that all of this is directly reflected in delaying patient care.

It is also noteworthy the acceptance of teledermatology by patients. All patients in which the use of these methods was suggested by their physician gave their informed consent. High acceptance of COVID-19 control measures (including mobility restrictions) among Portuguese population, desire to avoid more in-person consultations and the prospect of a faster clinical response were probable drivers for this fact.

Accordingly, clinical response by a dermatologist was produced in less than 24 hours in almost 90% of all

referrals, approaching almost 100% in inpatient referrals. Longer response times were associated with referrals made during the weekend or holidays (as the dermatology department only functions during working days).

Conversion to in-person evaluation was made when the clinical information and/or images were insufficient to arrive at a diagnosis, when medical or surgical procedures were necessary (as in malignant tumors) and when the complexity of the medical condition demanded it (erythrodermic patients, among others). We also consider that the average time for in-person evaluation was satisfactory.

The striking difference in conversion to in-person evaluation between inpatient and outpatient referrals can be justified, in part, by the nature of the referrals themselves. In the first case, most patients didn't present with dermatological urgencies and were referred mostly for benign, long-term and easy to treat conditions, thus taking advantage of a hospitalization for other medical reasons for this dermatological evaluation. In contrast, a significant portion of outpatient referrals consisted of urgent or complex conditions that demanded in-person evolution, and that, in most situations, had driven the patient to an emergency room consultation in the first place.

Our study has several limitations: deleted or lost data at the time of the study couldn't be included in this analysis and, even with pre-established criteria, the classification of "adequat". and "inadequat". clinical images is always observant-dependent at some level.

Arguably, the pandemic accelerated the process of implementation of new technologies to deliver better healthcare and so, even after the restrictions imposed by COVID-19 were lifted, the Dermatovenereology Department of HSAC maintained its teledermatology platforms. By allowing clinical triage and remote consultations for clinical situations where in-person evaluation is not mandatory, teledermatology made possible a faster delivery of care, while lowering work absenteeism and costs for patients and health providers.

## Conclusion

The COVID-19 pandemic gave rise to a number of difficult to overcome challenges. In this particular case, the need to balance assistential activity and COVID imposed restrictions was met with the implementation and use of teledermatology methods. These were widely and rapidly accepted by physicians and patients.

During a 13-month period, the Dermatology and Venerology Department of HSAC received more than 500 referrals for inpatient and outpatient consultations, composed of clinical information and/or clinical images. A significant proportion of these was resolved remotely without the need for in-person consultation.

Insufficient clinical information in referrals, inadequate clinical images and lack of integration with clinical software were the main problems identified by this study. Its resolutions aren't straightforward and would involve education of professionals and financial support in order to acquire new equipment and software.

Telemedicine cannot, by any means, fully replace in-person evaluation of patients and presents itself with a particular array of problems. Nevertheless, it can be a valuable work tool for professionals, especially in atypical times when all available resources must be used to assure good healthcare.

## Ethical disclosures

**Protection of human and animal subjects.** The authors declare that no experiments were performed on humans or animals for this study.

**Confidentiality of data.** The authors declare that no patient data appear in this article.

**Right to privacy and informed consent.** The authors declare that no patient data appear in this article.

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