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Abstract

Healing From a Distance: A Cross-sectional Study on the Diagnostic Reliability of Store-and-Forward Tele dermatology

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Abstract

Background: Telemedicine delivers health care services between two distant locations through the use of information and communication technology. Several medical specializations, such as dermatology, have incorporated telemedicine into their practice. Since dermatologists are trained to diagnose skin, hair, and nail conditions with a clinical eye, tele dermatology may be an alternative when a traditional face-to-face clinic visit is not feasible.

Objective: The purpose of this study was to evaluate the diagnostic reliability of tele dermatology.

Methods: A cross-sectional study was conducted among patients from 2 government hospitals. A total of 39 patients were seen in a face-to-face setting and diagnosed by a consultant dermatologist. A written history of their present illness and accompanying photographs were taken and were shown to 3 consultant tele dermatologists, who then diagnosed their condition. Two senior dermatology residents then rated the face-to-face and tele dermatology diagnoses as either complete agreement, partial agreement, or no agreement. Descriptive statistics was used to summarize the general and clinical characteristics of the participants. The Cohen kappa was used to assess agreement in the evaluations between the tele dermatology and face-to-face diagnoses by senior resident raters #1 and #2.

Results: Over 70% of the diagnoses were deemed as either partial or in complete agreement with the face-to-face diagnosis for senior resident rater #1. Similarly, over 80% of the diagnoses were deemed as either partial or in complete agreement with the face-to-face diagnosis for senior resident rater #2. The agreement between the ratings of senior residents #1 and #2 ranged from fair to substantial.

Conclusions: The findings of the study showed that the diagnostic concordance of in-person clinicians and tele dermatologists ranges from fair to substantial, with over 70% of the diagnoses in partial or complete agreement. Although face-to-face consultations remain the gold standard, tele dermatology is an important alternative where dermatologic care is not accessible.

Conflicts of Interest: None declared.

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tele dermatology; concordance; reliability

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Abstract

Inpatient Teledermatology Referrals During the COVID-19 Pandemic in a UK Trust: A Comparative Review and Doctor Survey

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Abstract

Background: The COVID-19 pandemic has broadened the scope of teledermatology services in the United Kingdom from a primarily outpatient-based triage tool to the management of inpatient referrals. In order to reduce the risk of transmission in hospital, a number of changes were implemented within our department. As part of this, our on-call referrals were transferred to a telemedicine app, which incorporates the secure transfer of user-generated patient images onto a web-based image management system providing remote access for the dermatology team.

Objective: This study aimed to compare how the introduction of this referral method impacted the nature and number of referrals received, the efficiency of the on-call service, and user preferences.

Methods: A retrospective cohort study was conducted to compare the number of referrals, time taken to review, and referral diagnoses between previous referral methods to the dermatology department (bleep, fax, email) (July and September 2019) and the new teledermatology app (July and September 2020). We also performed a survey of junior doctors, seeking their feedback and preferences pertaining to the new referral system.

Results: The number of referrals increased by 80%, with a 6-fold increase in lesion referrals. There is a possibility that not all referrals from 2019 were accounted for as paper documents are easily lost or discarded, highlighting another advantage of teledermatology in providing a reliable record of referrals. Dermatology referrals may have increased as the telemedicine app is more accessible to staff across sites. The telemedicine app also led to a reduction in time to review by 0.53 days, resulting in a significantly higher number of patients being given dermatology input on the day of the referral (78% vs 58%). This will have led to earlier treatment, improved patient outcomes, and shorter inpatient stays, resulting in potential cost reductions for the hospital. The survey of junior doctors showed that 81% preferred teledermatology to the previous referral methods.

Conclusions: The introduction of teledermatology has provided an effective and acceptable method of managing on-call dermatology referrals. Easier access to dermatology advice via teledermatology may result in higher numbers of referrals, which may warrant strict referral criteria to prevent oversubscription of the on-call service. Teledermatology ensures an accurate log of referrals, including the nature of referrals, allowing for better auditing and service improvement. Teledermatology referrals allow for advice to be provided within shorter time frames compared to previous methods. This should improve patient outcomes and reduce hospital admission stays, potentially resulting in cost savings for the hospital.

Conflict of Interest: None declared.

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teledermatology; acute dermatology; COVID-19; referrals

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Abstract

Assessing Generalizability of Deep Learning Models Trained on Standardized and Nonstandardized Images and Their Performance Against Teledermatologists

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Abstract

Background: Convolutional neural networks (CNNs) are a type of artificial intelligence that show promise as a diagnostic aid for skin cancer. However, the majority are trained using retrospective image data sets of varying quality and image capture standardization.

Objective: The aim of our study is to use CNN models with the same architecture, but different training image sets, and test variability in performance when classifying skin cancer images in different populations, acquired with different devices. Additionally, we wanted to assess the performance of the models against Danish teledermatologists when tested on images acquired from Denmark.

Methods: Three CNNs with the same architecture were trained. CNN-NS was trained on 25,331 nonstandardized images taken from the International Skin Imaging Collaboration using different image capture devices. CNN-S was trained on 235,268 standardized images, and CNN-S2 was trained on 25,331 standardized images (matched for number and classes of training images to CNN-NS). Both standardized data sets (CNN-S and CNN-S2) were provided by Molemap using the same image capture device. A total of 495 Danish patients with 569 images of skin lesions predominantly involving Fitzpatrick skin types II and III were used to test the performance of the models. Four teledermatologists independently diagnosed and assessed the images taken of the lesions. Primary outcome measures were sensitivity, specificity, and area under the curve of the receiver operating characteristic (AUROC).

Results: A total of 569 images were taken from 495 patients (n=280, 57% women, n=215, 43% men; mean age 55, SD 17 years) for this study. On these images, CNN-S achieved an AUROC of 0.861 (95% CI 0.830-0.889; $P < .001$), and CNN-S2 achieved an AUROC of 0.831 (95% CI 0.798-0.861; $P = .009$), with both outperforming CNN-NS, which achieved an AUROC of 0.759 (95% CI 0.722-0.794; $P < .001$; $P = .009$). When the CNNs were matched to the mean sensitivity and specificity of the teledermatologists, the model's resultant sensitivities and specificities were surpassed by the teledermatologists. However, when compared to CNN-S, the differences were not statistically significant ($P = .10$; $P = .05$). Performance across all CNN models and teledermatologists was influenced by the image quality.

Conclusions: CNNs trained on standardized images had improved performance and therefore greater generalizability in skin cancer classification when applied to an unseen data set. This is an important consideration for future algorithm development,

regulation, and approval. Further, when tested on these unseen test images, the teledermatologists *clinically* outperformed all the CNN models; however, the difference was deemed to be statistically insignificant when compared to CNN-S.

Conflicts of Interest: VM received speakers fees from Merck, Eli Lilly, Novartis and Bristol Myers Squibb. VM is the principal investigator for a clinical trial funded by the Victorian Department of Health and Human Services with 1:1 contribution from MoleMap.

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KEYWORDS

teledermatology; CNN; artificial intelligence; skin cancer; Denmark; Australia; New Zealand; image standardization; generalizability; classification

Multimedia Appendix 1

Receiver operating characteristic (ROC) curves for the three convolutional neural network (CNN) models and the performances of the teledermatologists on the Danish test set. The ROC and the area under the curve of the ROC of the CNN models in relation to the sensitivity and 1-specificity of the teledermatologists when tested on the 569 Danish test images. The teledermatologist's performance was greater than all of the CNN models.

[[PNG File , 341 KB - iproc_v7i1e35391_app1.png](#)]

Multimedia Appendix 2

Table 1: Sensitivity and specificity of the convolutional neural network models when matched to the average performance of the teledermatologists.

[[PNG File , 398 KB - iproc_v7i1e35391_app2.png](#)]

Abbreviations

AUROC: area under the curve of the receiver operating characteristic

CNN: convolutional neural network

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Abstract

Are We Missing Something? The Skin Lesions Not Seen in Teledermatology

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Abstract

Background: The suspected skin cancer electronic referral pathway was introduced in 2017. It requires general practitioners to add regional, close-up, and dermoscopic images to a lesion-specific referral template for a teledermatologist to review and advise on management. The virtual lesion clinic is a nurse-led clinic used since 2010 to obtain high-quality images for teledermoscopy assessment. A limitation of both services is the absence of a full-body examination.

Objective: This study aims to evaluate the number of skin cancers missed during teledermatology assessment.

Methods: This is a retrospective review of skin lesion referrals to dermatology. Suspected skin cancer referrals made in the latter half of 2020 were compared with referrals to the virtual lesion clinic during a similar time period in 2016.

Results: The study included 481 patients with 548 lesions in the 2020 suspected skin cancer cohort that were matched for age, sex, and ethnicity to 400 patients with 682 lesions in the 2016 virtual lesion clinic cohort. A total of 41 patients underwent subsequent specialist review in the suspected skin cancer cohort compared to 91 in the virtual lesion clinic cohort. A total of 20% of the suspected skin cancer cohort and 24% of the virtual lesion clinic cohort were found to have at least one additional lesion of concern. The majority of these were keratinocytic skin cancers; there were 2 and 0 additional melanomas or melanoma-in-situ, respectively. The virtual lesion clinic nurses identified additional lesions for imaging in 78 of 400 (20%) patients assessed in the virtual lesion clinic. The teledermatologist determined (author AO) that 73% of these additional lesions were malignant. Of the 548 lesions, 10 (2%) in the suspected skin cancer group were rereferred, none of which had a change in diagnosis. Out of 682 lesions, 16 (2%) in the virtual lesion clinic cohort were rereferred, 6 (1%) of which had a change in diagnosis.

Conclusions: Patients diagnosed with skin cancer often have multiple lesions of concern. Single-lesion teledermoscopy diagnoses have high concordance with in-person evaluation and histology; however, we have shown that in-person examination may reveal other suspicious lesions. The importance of a full-body skin examination should be emphasized to the referrer.

Acknowledgments: The Waikato Medical Research Foundation provided financial support for the study.

Conflicts of Interest: None declared.

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skin diseases; skin neoplasms; dermatology; telemedicine; teledermatology

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Abstract

Artificial Intelligence Support for Skin Lesion Triage in Primary Care and Dermatology

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Abstract

Background: Primary care providers, dermatology specialists, and health care access are key components of primary prevention, early diagnosis, and treatment of skin cancer. Artificial intelligence (AI) offers the promise of diagnostic support for nonspecialists, but real-world clinical validation of AI in primary care is lacking.

Objective: We aimed to (1) assess the reliability of an AI-based clinical triage algorithm in classifying benign and malignant skin lesions and (2) evaluate the quality of images obtained in primary care using the study camera (3Gen DermLite Cam v4 or similar).

Methods: This was a single-center, prospective, double-blinded observational study with a predetermined study design. We recruited participants with suspected skin cancer in 20 primary care practices who were referred for assessment via teledermatology. A second set of photographs taken using a standardized camera was processed by the AI algorithm. We evaluated the image quality and compared two teledermatologists' diagnoses by consensus (the "gold standard") with AI and histology where applicable.

Results: Our primary outcome assessment stratified 391 skin lesions by management as benign, uncertain, or malignant. Uncertain lesions were not included in the sensitivity and specificity analyses. Uncertain lesions included lesions that had either diagnostic or management uncertainties. For the remaining 242 lesions, the sensitivity was 97.26% (95% CI 93.13%-99.25%) and the specificity was 97.92% (95% CI 92.68%-99.75%). The AI algorithm was compared with the histological diagnoses for 123 lesions. The sensitivity was 100% (95% CI 95.85%-100%) and the specificity was 72.22% (95% CI 54.81%-85.80%).

Conclusions: The AI algorithm demonstrates encouraging results, with high sensitivity and specificity, concordant with previous AI studies. It shows potential as a triage tool in conjunction with teledermatology to augment health care and improve access to dermatology. Further real-life studies need to be conducted on a larger scale to assess the reliability, usability, and cost-effectiveness of the algorithm in primary care.

Acknowledgments: MoleMap NZ, who developed the AI algorithm, provided some funding for this study. HT's salary was partially sponsored by MoleMap NZ, who developed the AI algorithm. AB is a shareholder and consultant to Molemap Ltd provider of the AI algorithm.

Conflicts of Interest: None declared.

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KEYWORDS

artificial intelligence; triage; dermatology; skin neoplasms; skin diseases; sensitivity and specificity; delivery of health care; primary health care; primary prevention

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Abstract

Evaluation of Patient-Initiated Direct Care Mobile Phone–Based Teledermatology During The COVID-19 Pandemic

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Abstract

Background: With advances in telecommunication, especially smartphones, teledermatology services offered by specialists are now being directly requested by the patients themselves. This model is known as patient-initiated, direct care teledermatology. It has been pushed to the forefront due to the COVID-19 pandemic.

Objective: The objectives of this study were to determine patients' satisfaction and dermatologists' confidence when a diagnosis was made via direct care mobile phone–based teledermatology.

Methods: Patients availing direct care teledermatology services during the COVID-19 pandemic at a tertiary care center were subjected to a questionnaire within 5 days of the teleconsultation to assess patient satisfaction and opinions regarding using this model during and beyond the current COVID-19 pandemic. The dermatologists rated their confidence in making the clinical diagnosis on a scale from 1-10 for every case.

Results: Of 437 participants, 419 (95.9%) were satisfied with this mode of teledermatology. An overwhelming majority (n=428, 97.9%) felt safe consulting the dermatologist via teleconsultation and not having to visit the hospital during the COVID-19 pandemic. In addition, 269 (61.6%) patients agreed that they would be happy to use a teledermatology service beyond the COVID-19 pandemic. The dermatologists' confidence score in making an accurate diagnosis ranged from 3 to 10, with a mean of 9.20 (SD 1.12).

Conclusions: The high levels of patient satisfaction and dermatologists' confidence scores indicate that direct care mobile phone–based teledermatology may be a useful tool in providing dermatological services in appropriate settings and its use should continue to be explored beyond the COVID-19 pandemic.

Conflicts of Interest: None declared.

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direct care teledermatology; teledermatology; hybrid teledermatology; patient satisfaction; physician confidence; COVID-19

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Abstract

Cultural and Linguistic Adaptation for the Romanian Language Version of the Cardiff Acne Disability Index: A Pilot Study on the Web-Based Experience of Cognitive Debriefing

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Abstract

Background: The Cardiff Acne Disability Index (CADI) is a validated measurement instrument for quality of life evaluation in young patients with acne. The original version was designed in English, and it has been translated to other languages. An adaptation for the Romanian language was lacking.

Objective: The main objective of this study was to evaluate the comprehensibility of the Romanian language adaptation of the CADI in a small sample of patients with acne.

Methods: Guided by the team at Cardiff University, we conducted the stages of the standardized translation process—forward translation, the reconciliation of translated versions, back translation, and cognitive debriefing. The cognitive debriefing stage involved applying the CADI to a small sample of patients. This was followed by individual interviews in which each question was discussed. Ethical approval was obtained for the cognitive debriefing stage. We administered this measure as a web-based form. The completion times for each individual question and for the entire survey were automatically recorded. The interviews for assessing comprehensibility and suitability for the Romanian language and culture were also held as live, web-based meetings.

Results: A total of 7 patients with acne—4 females and 3 males—aged between 19 and 34 years were included. All subjects were native speakers of the Romanian language. They had mild or moderate acne. The mean completion time for the survey was 3.28 minutes. The mean score for the CADI was 5.4286. All participants agreed that the language used in this quality of life measurement instrument was simple, clear, and adequate for their native language.

Conclusions: Despite the epidemiologic restrictions against COVID-19, through teledermatology, we achieved cultural adaptation for the CADI in a language that previously lacked a specific tool for assessing quality of life impairment in patients with acne.

Conflicts of Interest: CMS receives royalties from Springer Nature, consulting fees from Vichy International, and support for attending meetings from Leo Pharma. SC has no conflicts of interest.

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KEYWORDS

acne; quality of life; teledermatology; Cardiff Acne Disability Index

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Abstract

Crusted Scabies as a Suitable Disease for Teledermatology: A Study of 2 Cases

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Abstract

Background: Teledermatology has been available for several years now, but the COVID-19 pandemic has highlighted its importance, especially in remote communities. Crusted scabies (CS) presents a unique clinical picture that favors telediagnosis. Patients with neurological diseases, as well as homeless, HIV-infected patients and people with impaired immunological function, are at risk. Clusters of CS have been reported in French Guyana, and these were associated with human T-lymphotropic virus infections. CS has also been reported in Aboriginal Australian communities.

Objective: Teledermatology is especially useful in cases of CS, as it is a disease that affects areas that are in need of medical services. At the same time, CS presents a unique clinical picture. The objective of this presentation is to fuel the clinical suspicion and detection of patients with this debilitating condition.

Methods: Relatives of patient 1 contacted our clinic for teledermatology appointments. General practitioners from health services sent images of the second patient.

Results: Case 1 involved an older woman living in a nursing home with Alzheimer disease, which was severe enough to constrain her to bed. We recommended that her relatives (who had sent images) collect skin scrapings in a container. These scrapings were sent to a clinical analysis laboratory where microscopic potassium hydroxide preparation revealed the presence of *Sarcoptes* mites. Treatment with oral ivermectin and topical permethrin resulted in the complete resolution of the lesions. Case 2 involved a homeless, HIV-positive, 42-year-old male. The images were sent by clinicians from local health services. This patient was also treated with oral ivermectin and permethrin lotion. We recognize that this case would need further diagnostic workup, but it is highly indicative of CS.

Conclusions: CS is one of the most suited diseases for the practice of teledermatology for widespread, large, hyperkeratotic fissured plaques covered with abundant, silvery scales for which the expression “once seen, never forgotten” is highly applicable. These cases are gratifyingly simple to treat, and patients benefit from rapid clinical improvement. Prompt diagnoses prevent outbreaks of scabies for relatives and medical personnel, since these skin crusts contain large numbers of scabies mites. CS has been increasingly reported but poorly recognized, and it has often been misdiagnosed as psoriasis. Images, such as those shown in this presentation, are unique and are enough to raise strong clinical suspicion.

Conflicts of Interest: None declared.

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KEYWORDS

crusted scabies; teledermatology

Multimedia Appendix 1

1a and 1b: White-silvery scales over the hands and arms; 1c: Mites and its black round fecal matter (scybala) through microscopic examination; 1d: Significant clinical improvement after treatment.

[[PNG File , 2440 KB - iproc_v7i1e35429_app1.png](#)]

Multimedia Appendix 2

2a: Disseminated hyperkeratotic lesions covered with thick, silvery-white scales over the legs and feet; 2b: Extensive erythema and crusted edema over arms.

[[PNG File , 1112 KB - iproc_v7i1e35429_app2.png](#)]

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Abstract

Use of Artificial Intelligence as a Predictor of the Response to Treatment in Alopecia Areata

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Abstract

Background: Artificial intelligence (AI) has emerged in dermatology with some studies focusing on skin disorders such as skin cancer, atopic dermatitis, psoriasis, and onychomycosis. Alopecia areata (AA) is a dermatological disease whose prevalence is 0.7%-3% in the United States, and is characterized by oval areas of nonscarring hair loss of the scalp or body without evident clinical variables to predict its response to the treatment. Nonetheless, some studies suggest a predictive value of trichoscopic features in the evaluation of treatment responses. Assuming that black dots, broken hairs, exclamation marks, and tapered hairs are markers of negative predictive value of the treatment response, while yellow dots are markers of no response to treatment according to recent studies, the absence of these trichoscopic features could indicate favorable disease evolution without treatment or even predict its response. Nonetheless, no studies have reportedly evaluated the role of AI in AA on the basis of trichoscopic features.

Objective: This study aimed to develop an AI algorithm to predict, using trichoscopic images, those patients diagnosed with AA with a better disease evolution.

Methods: In total, 80 trichoscopic images were included and classified in those with or without features of negative prognosis. Using a data augmentation technique, they were multiplied to 179 images to train an AI algorithm, as previously carried out with dermoscopic images of skin tumors with a favorable response. Subsequently, 82 new images of AA were presented to the algorithm, and the algorithm classified these patients as responders and non-responders; this process was reviewed by an expert trichologist observer and presented a concordance higher than 90% with the algorithm identifying structures described previously. Evolution of the cases was followed up to truly determine their response to treatment and, therefore, to assess the predictive value of the algorithm.

Results: In total, 32 of 40 (80%) images of patients predicted as nonresponders scarcely showed response to the treatment, while 34 of 42 (81%) images of those predicted as responders showed a favorable response to the treatment.

Conclusions: The development of an AI algorithm or tool could be useful to predict AA evolution and its response to treatment. However, further research is needed, including larger sample images or trained algorithms, by using images previously classified in accordance with the disease evolution and not with trichoscopic features.

Conflicts of Interest: None declared.

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KEYWORDS

artificial intelligence; alopecia areata; predictor; treatment

Multimedia Appendix 1

Null.

[[PNG File , 780 KB - iproc_v7i1e35433_app1.png](#)]

Multimedia Appendix 2

Null.

[[PNG File , 682 KB - iproc_v7i1e35433_app2.png](#)]

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Abstract

Explainability of Convolutional Neural Networks for Dermatological Diagnosis

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Abstract

Background: Convolutional neural networks (CNNs) are regarded as state-of-the-art artificial intelligence (AI) tools for dermatological diagnosis, and they have been shown to achieve expert-level performance when trained on a representative dataset. CNN explainability is a key factor to adopting such techniques in practice and can be achieved using attention maps of the network. However, evaluation of CNN explainability has been limited to visual assessment and remains qualitative, subjective, and time consuming.

Objective: This study aimed to provide a framework for an objective quantitative assessment of the explainability of CNNs for dermatological diagnosis benchmarks.

Methods: We sourced 566 images available under the Creative Commons license from two public datasets—DermNet NZ and SD-260, with reference diagnoses of acne, actinic keratosis, psoriasis, seborrheic dermatitis, viral warts, and vitiligo. Eight dermatologists with teledermatology expertise annotated each clinical image with a diagnosis, as well as diagnosis-supporting characteristics and their localization. A total of 16 supporting visual characteristics were selected, including basic terms such as *macule*, *nodule*, *papule*, *patch*, *plaque*, *pustule*, and *scale*, and additional terms such as *closed comedo*, *cyst*, *dermatoglyphic disruption*, *leukotrichia*, *open comedo*, *scar*, *sun damage*, *telangiectasia*, and *thrombosed capillary*. The resulting dataset consisted of 525 images with three rater annotations for each. Explainability of two fine-tuned CNN models, ResNet-50 and EfficientNet-B4, was analyzed with respect to the reference explanations provided by the dermatologists. Both models were pretrained on the ImageNet natural image recognition dataset and fine-tuned using 3214 images of the six target skin conditions obtained from an internal clinical dataset. CNN explanations were obtained as activation maps of the models through gradient-weighted class-activation maps. We computed the fuzzy sensitivity and specificity of each characteristic attention map with regard to both the fuzzy gold standard characteristic attention fusion masks and the fuzzy union of all characteristics.

Results: On average, explainability of EfficientNet-B4 was higher than that of ResNet-50 in terms of sensitivity for 13 of 16 supporting characteristics, with mean values of 0.24 (SD 0.07) and 0.16 (SD 0.05), respectively. However, explainability was lower in terms of specificity, with mean values of 0.82 (SD 0.03) and 0.90 (SD 0.00) for EfficientNet-B4 and ResNet-50, respectively. All measures were within the range of corresponding interrater metrics.

Conclusions: We objectively benchmarked the explainability power of dermatological diagnosis models through the use of expert-defined supporting characteristics for diagnosis.

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Conflict of Interest: None declared.

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KEYWORDS

dermatology; explainability; convolutional neural networks

Multimedia Appendix 1

Explainability of ResNet-50 and EfficientNet-B4 models in terms of sensitivity between dermatologists-provided segmented supporting characteristics and model activation maps. All activation maps were computed based on the gold standard diagnosis using gradient-weighted class-activation maps. Interrater sensitivity is computed as the pairwise average for dermatologist-provided supporting characteristic segmentations.

[PNG File , 415 KB - [iproc_v7i1e35437_app1.png](#)]

Multimedia Appendix 2

Examples of explanations for images where both models correctly predicted the gold standard diagnosis. From left to right: the original image, the union of all characteristics selected by all dermatologists annotating the image, an EfficientNet-B4 gradient-weighted class-activation map (Grad-CAM) visualization, and a ResNet-50 Grad-CAM visualization. In all cases, the EfficientNet-B4 visualization was closer to the dermatologist map than the ResNet-50 visualization. ResNet-50 appears to be more specific, focusing on smaller, more noticeable lesions.

[PNG File , 1059 KB - [iproc_v7i1e35437_app2.png](#)]

References

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Abstract

The Safety and Effectiveness of Elastic Scattering Spectroscopy and Machine Learning in the Evaluation of Skin Lesions for Cancer

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Abstract

Background: Elastic scattering spectroscopy (ESS) is an optical biopsy technique that can distinguish between a normal and abnormal tissue in vivo without the need to remove it. The handheld device measures ESS spectra of skin lesions and classifies lesions as either malignant or benign with an output of “Investigate Further” or “Monitor,” respectively, with positive results accompanied by a spectral score output from 1 to 10, indicating how similar the lesion is to the malignant lesions the device was trained on. The algorithm was trained and validated with over 11,000 spectral scans from over 3500 skin lesions.

Objective: The purpose of this study was to evaluate the safety and effectiveness of the handheld ESS device in detecting the most common types of skin cancer.

Methods: A prospective, single-arm, investigator-blinded, multicenter study conducted at 4 investigational sites in the United States was performed. Patients who presented with skin lesions suggestive of melanoma, basal cell carcinoma, squamous cell carcinoma, and other highly atypical lesions were evaluated with the handheld ESS device. A validation performance analysis was performed with 553 lesions from 350 subjects with algorithm version 2.0. An independent test set of 281 lesions was selected and used to evaluate device performance in the detection of melanoma, basal cell carcinoma (BCC), and squamous cell carcinoma (SCC). Statistical analyses included overall effectiveness analyses for sensitivity and specificity as well as subgroup analyses for lesion diagnoses.

Results: The overall sensitivity of the device was 92.3% (95% CI: 87.1 to 95.5%). The sensitivity for subgroups of lesions was 95% (95% CI 75.1% to 99.9%) for melanomas, 94.4% (95% CI 86.3% to 98.4%) for BCCs, and 92.5% (95% CI 83.4% to 97.5%) for SCCs. The overall device specificity was 36.6% (95% CI 29.3% to 44.6%). There was no statistically significant difference between the dermatologist performance and the ESS device ($P=0.2520$). The specificity of the device was highest for benign melanocytic nevi (62.5%) and seborrheic keratoses (78.2%). The overall positive predictive value (PPV) was 59.8%, and the negative predictive value (NPV) was 81.9% with the study’s malignancy prevalence rate of 51%. For a prevalence rate of 5%, the PPV was estimated to be 7.1%, and the NPV was estimated to be 98.9%. For a prevalence rate of 7%, the PPV was estimated to be 9.8%, and the NPV was estimated to be 98.4%. For a prevalence rate of 15%, the PPV was estimated to be 20.3%, and the NPV was 96.4%.

Conclusions: The handheld ESS device has a high sensitivity for the detection of melanoma, BCC, and SCC. Coupled with clinical exam findings, this device can aid physicians in detecting a variety of skin malignancies. The device output can aid teledermatology evaluations by helping frontline providers determine which lesions to share for teledermatologist evaluation as well as potentially benefitting teledermatologists’ virtual evaluation, especially in instances of suboptimal photo quality.

Acknowledgments: This study was sponsored by DermaSensor Inc.

Conflicts of Interest: None declared.

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KEYWORDS

melanoma sensitivity; elastic scattering spectroscopy (ESS) device; malignancy detection; machine learning; skin lesions; cancer

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Abstract

The Clinical Utility of a Handheld Elastic Scattering Spectroscopy Tool and Machine Learning in the Diagnosis and Referral Management of Skin Cancer by Primary Care Physicians

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Abstract

Background: Elastic scattering spectroscopy (ESS) is a noninvasive optical biopsy technique that can distinguish between normal and abnormal tissue in vivo. The handheld device measures ESS spectra of skin lesions and classifies lesions with an output of “Investigate Further” or “Monitor.” The algorithm was trained and validated with over 11,000 spectral scans from over 3500 skin lesions. The device performance was also evaluated in an associated clinical study.

Objective: The aim of this paper was to establish whether the use of a handheld ESS tool can improve the detection of skin malignancies by evaluating clinical performance while emulating a real-world telemedicine clinical care setting.

Methods: The associated clinical study examined an independent test set of 332 lesions in a prospective multicenter study that compared algorithm performance to biopsy results for diagnosing malignant lesions. A total of 50 cases were randomly selected from the study data base (25 malignant and 25 benign lesions). Device performance on these lesions had a 96% sensitivity. High-resolution digital images and the patient’s clinical information including prior skin cancer history, risk factors, and physical examination results were available for evaluation. A total of 57 primary care physicians participated in this study in 2 phases, the first phase with their standard-of-care diagnostic and the second phase regarding their evaluation with the device output. The physicians were educated on the ESS device before evaluating the cases in a random order. Case evaluation included the physician reporting their diagnosis, management decision, and confidence level without the device output in the first phase and with the device output in the second phase. The results were evaluated for sensitivity and specificity with confidence intervals.

Results: The diagnostic sensitivity of the readers without and with the use of the handheld ESS device increased significantly from 67% to 88% ($P<.001$). There was no significant difference in specificity at 40% and 53% ($P=.05$). The management sensitivity of the readers increased significantly with and without the use of the device, which, respectively, was 94% (91%-96%) and 81% (77%-85%) ($P<.001$), suggesting that the use of the device may reduce false negatives by 68%. Specificity was comparable for management decisions ($P=.36$) at 31% compared to 36% without the device.

Conclusions: The use of the handheld ESS device significantly improved diagnostic and management sensitivity over standard-of-care, with comparable specificity. While telemedicine has shown promise in many fields, studies have shown that in-person skin evaluation is superior to telemedicine evaluations; however, integration with this type of tool has the potential to improve early detection.

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KEYWORDS

artificial intelligence; melanoma detection; skin cancer; spectroscopy

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Abstract

Trends in Teledermatology Utilization in the United States

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Abstract

Background: Teledermatology is an effective health care delivery model that has seen tremendous growth over the last decade. This growth can be attributed to a variety of factors, including but not limited to an increased access to dermatologic care for those with socioeconomic or geographic barriers, a reduction in health care costs for both the patient and the physician, and the delivery of high-quality dermatologic care. However, the associated barriers include practice reimbursements, interstate licensing, and liability. Despite these apparent barriers, the emergence of COVID-19 afforded teledermatology a surge of demand and loosened regulations, allowing dermatologists to see higher volumes of teledermatology patients. In this paper, we analyzed the American Academy of Dermatology's DataDerm registry teledermatology utilization and patient demographic trends throughout the COVID-19 pandemic.

Objective: The aim of this paper was to characterize national-level teledermatology demographic data in the setting of the COVID-19 pandemic.

Methods: National-level data were curated for all practices enrolled in the American Academy of Dermatology's DataDerm registry from April 1, 2020, through June 30, 2021. Encounter utilization rates were collected for visit type (ie, teledermatology versus in person), sex, race, age, insurance provider, and location (ie, in state versus out of state). The aggregate total data, as opposed to individual encounter data, were collected.

Results: The proportion of women who utilized services via teledermatology (65,023/98,642, 65.9%) was greater than that of those who utilized in-person services (29,40,122/50,48,450, 58.2%). Non-White patients made up a higher percentage of teledermatology utilizers (8920/62,324, 15%) when compared with in-person utilizers (3,94,580/35,08,150, 11.7%). Younger patients (aged <40) contributed more to teledermatology service utilization (62,695/75,319, 83.2%) when compared with in-person services (13,29,218/33,01,175, 40.3%). Medicare was a larger payor contributor for in-person services (8232/1,53,279, 25.2%) than for teledermatology services (10,89,777/43,30,882, 5.4%). Utilization by out-of-state patients was proportionally higher for teledermatology services (19,422/1,33,416, 14.6%) compared with in-person services (5,80,358/1,38,31,400, 4.2%).

Conclusions: Teledermatology services may reach and benefit certain populations (female, younger patients, those with non-White racial backgrounds, and out-of-state patients) more so than others. These baseline demographics may also serve to highlight populations for potential future teledermatology outreach efforts.

Conflict of Interest: None declared.

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KEYWORDS

teledermatology; telehealth; DataDerm; COVID-19

Multimedia Appendix 1

Teledermatology utilization data by demographic.

[[PNG File , 433 KB - iproc_v7i1e35439_app1.png](#)]

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Abstract

Attitudes Toward Artificial Intelligence Among Dermatologists in Morocco: A National Survey

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Abstract

Background: Artificial intelligence (AI) is a hot topic, and the use of AI in our day-to-day lives has increased exponentially. AI is becoming increasingly important in dermatology, with studies reporting accuracy matching or exceeding that of dermatologists in the diagnosis of skin lesions from clinical and dermoscopic images. However, little is known about the attitudes of dermatologists in Morocco toward AI.

Objective: The purpose of this cross-sectional study was to evaluate the attitudes of dermatologists in Morocco toward AI.

Methods: An online survey was distributed through Google Forms (Google LLC) to dermatologists in Morocco and was open from January to June 2021. Statistical analysis of the data collected was performed using Jamovi software. Any association for which the *P* value was <.05 was considered statistically significant.

Results: In total, 183 surveys were completed and analyzed. Overall, 79.8% of respondents were female, and the median age was 35 years (IQR 25-74 years). A total of 30.6% stated that they were not aware of AI, and 34.4% had a basic knowledge of AI technologies. Only 7.7% of the respondents strongly agreed that the human dermatologist will be replaced by AI in the foreseeable future. Of the entire group, 61.8% agreed or strongly agreed that AI will improve dermatology, and 70% thought that AI should be part of medical training. In addition, only 32.2% reported having read publications about AI. Female dermatologists showed more fear pertaining to the use of AI within dermatology (*P*=.01); this group also suggested that AI has a very strong potential in the detection of skin diseases using dermoscopic images (*P*=.03).

Conclusions: Our results demonstrate an overall optimistic attitude toward AI among dermatologists in Morocco. The majority of respondents believed that it will improve diagnostic capabilities.

Conflict of Interest: None declared.

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artificial intelligence; skin; dermatology; dermatologist; Morocco

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Abstract

A 9-Year Teledermoscopy Service: Retrospective Service Review

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Abstract

Background: A teledermoscopy service was established in January 2010, where patients attended nurse-led clinics for imaging of lesions of concern and remote diagnosis by a dermatologist.

Objective: The study aimed to review the number of visits, patient characteristics, the efficiency of the service, and the diagnoses made.

Methods: We evaluated the waiting time and diagnosis of skin lesions for all patient visits from January 1, 2010, to May 31, 2019. The relationships between patient characteristics and the diagnosis of melanoma were specifically analyzed.

Results: The teledermoscopy clinic was attended by 6479 patients for 11,005 skin lesions on 8805 occasions. Statistically significant risk factors for the diagnosis of melanoma/melanoma in situ were male sex, European ethnicity, and Fitzpatrick skin type 2. Attendance was maximal during 2015 and 2016. The seasonal variation in visits 2011-2018 revealed a consistent peak at the end of summer and a dip at the end of winter. In the year 2010, 306 patients attended; 76% (233/306) of these were discharged to primary care and 24% (73/306) were referred to hospital for specialist assessment. For patients diagnosed by the dermatologist with suspected melanoma from January 1, 2010, to May 31, 2019, the median waiting time for an imaging appointment was 44.5 days (average 57.9 days, range 8-218 days). The most common lesions diagnosed were benign naevus (2933/11,005, 27%), benign keratosis (2576/11,005, 23%), and keratinocytic cancer (1707/11,005, 15%); melanoma was suspected in 5% (507/11,005) of referred lesions ([Multimedia Appendix 1](#)). The positive predictive value of melanoma/melanoma in situ was 61.1% (320 true positives and 203 false positives). The number needed to treat (ie, the ratio of the total number of excisions to the number with a histological diagnosis of melanoma/melanoma in situ) was 2.02.

Conclusions: Diagnoses were comparable to the experience of other teledermoscopy services. Teledermoscopy using a nurse-led imaging clinic can provide efficient and convenient access to dermatology by streamlining referrals to secondary care and prioritizing patients with skin cancer for treatment.

Conflicts of Interest: None declared.

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KEYWORDS

dermatology; dermoscopy; telemedicine; skin neoplasm; melanoma

Multimedia Appendix 1

Diagnosis in patients who attended the teledermoscopy clinic from January 2010-May 2019 (n=11,005).

[\[PDF File \(Adobe PDF File\), 75 KB - iproc_v7i1e35401_app1.pdf\]](#)

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Abstract

Privacy Protection With Facial Deidentification Machine Learning Methods: Can Current Methods Be Applied to Dermatology?

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Abstract

Background: In the era of increasing tools for automatic image analysis in dermatology, new machine learning models require high-quality image data sets. Facial image data are needed for developing models to evaluate attributes such as redness (acne and rosacea models), texture (wrinkles and aging models), pigmentation (melasma, seborrheic keratoses, aging, and postinflammatory hyperpigmentation), and skin lesions. Deidentifying facial images is critical for protecting patient anonymity. Traditionally, journals have required facial feature concealment typically covering the eyes, but these guidelines are largely insufficient to meet ethical and legal guidelines of the Health Insurance Portability and Accountability Act for patient privacy. Currently, facial feature deidentification is a challenging task given lack of expert consensus and lack of testing infrastructure for adequate automatic and manual facial image detection.

Objective: This study aimed to review the current literature on automatic facial deidentification algorithms and to assess their utility in dermatology use cases, defined by preservation of skin attributes (redness, texture, pigmentation, and lesions) and data utility.

Methods: We conducted a systematic search using a combination of headings and keywords to encompass the concepts of facial deidentification and privacy preservation. The MEDLINE (via PubMed), Embase (via Elsevier), and Web of Science (via Clarivate) databases were queried from inception to May 1, 2021. Studies with the incorrect design and outcomes were excluded during the screening and review process.

Results: A total of 18 studies, largely focusing on general adversarial network (GANs), were included in the final review reporting various methodologies of facial deidentification algorithms for still and video images. GAN-based studies were included owing to the algorithm's capacity to generate high-quality, realistic images. Study methods were rated individually for their utility for use cases in dermatology, pertaining to skin color or pigmentation and texture preservation, data utility, and human detection, by 3 human reviewers. We found that most studies notable in the literature address facial feature and expression preservation while sacrificing skin color, texture, pigmentation, which are critical features in dermatology-related data utility.

Conclusions: Overall, facial deidentification algorithms have made notable advances such as disentanglement and face swapping techniques, while producing realistic faces for protecting privacy. However, they are sparse and currently not suitable for complete preservation of skin texture, color, and pigmentation quality in facial photographs. Using the current advances in artificial intelligence for facial deidentification summarized herein, a novel approach is needed to ensure greater patient anonymity, while increasing data access for automated image analysis in dermatology.

Conflicts of Interest: None declared.

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KEYWORDS

artificial intelligence; privacy; facial deidentification; machine learning

Multimedia Appendix 1

Overview of included studies.

[[PNG File , 311 KB - iproc_v7ile35431_app1.png](#)]

Multimedia Appendix 2

Part 2 of Multimedia Appendix 1.

[[PNG File , 238 KB - iproc_v7ile35431_app2.png](#)]

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Abstract

A Validated Questionnaire to Evaluate Primary Care Pediatrician Satisfaction With the Use of Tele dermatology

Juan Carlos Palazón Cabanes¹, MD; G Juan Carpena¹, MD; L Berbegal García¹, MD, PhD; T Martínez Miravete², MD; B Palazón Cabanes³, MD, PhD; I Betlloch Mas^{1,4}, MD, PhD

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Abstract

Background: Tele dermatology (TD) is a branch of telemedicine focused on the evaluation of cutaneous lesions by dermatologists remotely, in order to avoid unnecessary in-person consults that could be otherwise resolved by this method, and to shorten the time required for prompt evaluation of cutaneous diseases.

Objective: This study aimed to create and validate a questionnaire to evaluate satisfaction with the use of TD among primary care pediatricians (PCPs) and to test the questionnaire in our health area before performing an intervention for the optimization of TD.

Methods: We first created a questionnaire based on previous publications. Then, an expert consultation was made before drafting the final version of the questionnaire. We tested it twice among pediatricians of different health areas, with a 1-month gap between both evaluations. Internal consistency, reproducibility, and validity of the questionnaire were evaluated. Finally, the validated questionnaire was tested among the PCPs of our health area, to analyze their responses.

Results: We registered 38 questionnaire responses. In all, 30 (78.9%) PCPs actively used TD several times within a month or a year; none of them used TD daily. Technical and health care quality of TD was mostly considered as good or very good. TD was regarded as similar or even better than face-to-face evaluation for most PCPs, whereas 7.9% (3/38) of PCPs thought TD was worse than conventional consults. Most PCPs considered TD as an effective, self-learning, and trustable tool, and 10.5% (4/38) of them identified that pictures captured by mobile phones were a barrier for its use, as it affects patient privacy. Technical problems, absence of exclusive devices for image taking, and delayed answers are some other barriers for TD that need to be overcome. Nonetheless, all PCPs were satisfied with TD, and all of them reported they would continue or start to use this tool.

Conclusions: TD has demonstrated to be an efficient tool, as it reduces waiting time and costs for dermatology evaluation, and it increases satisfaction among professionals. With our proposed questionnaire, we validated that quality, usability, efficacy, and satisfaction related to TD in our health area had a positive consideration among PCPs in general, but there still are barriers to overcome.

Conflict of Interest: None declared.

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KEYWORDS

tele dermatology; pediatric dermatology; satisfaction questionnaire

Multimedia Appendix 1

Questionnaire responses to evaluate quality, usefulness, limitations, and satisfaction with the use of teledermatology among primary care pediatricians.

[PNG File , 134 KB - [iproce_v7ile35438_app1.png](#)]

Multimedia Appendix 2

Frequency of use of teledermatology by primary care pediatricians.

[PNG File , 62 KB - [iproce_v7ile35438_app2.png](#)]

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Abstract

Early Implementation and Evaluation of a Teledermatology Virtual Clinic Within an Academic Medical Center

Ethan D Borre¹, BA; Suephy C Chen¹, MD, MS; Matilda W Nicholas¹, MD, PhD; Edward W Cooner¹, MD, MBOE; Donna Phinney¹, RN, MSN; Amanda Morrison¹, RN-BC, MSN; Natalie Combs¹, BS; Meenal Kheterpal¹, MD, MMCi

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Abstract

Background: Teledermatology can increase patient access; however, its optimal implementation remains unknown.

Objective: This study aimed to describe and evaluate the implementation of a pilot virtual clinic teledermatology service at Duke University.

Methods: Leaders at Duke Dermatology and Duke Primary Care identified a teledermatology virtual clinic to meet patients' access needs. Implementation was planned over the exploration, preparation, implementation, and sustainment phases. We evaluated the implementation success of teledermatology using the Reach, Effectiveness, Adoption, Implementation, and Maintenance framework and prioritized outcome collection through a stakeholder survey. We used the electronic health record and patient surveys to capture implementation outcomes.

Results: Our process consisted of primary care providers (PCPs) who sent clinical and dermatoscopic images of patient lesions or rashes via e-communication to a teledermatology virtual clinic, with a subsequent virtual clinic scheduling of a video visit with the virtual clinic providers (residents or advanced practice providers, supervised by Duke Dermatology attending physicians) within 2-5 days. The teledermatology team reviews the patient images on the day of the video visit and gives their diagnosis and management plan with either no follow-up, teledermatology nurse follow-up, or in-person follow-up evaluation. Implementation at 4 pilot clinics, involving 19 referring PCPs and 5 attending dermatologists, began on September 9, 2021. As of October 31, 2021, a total of 68 e-communications were placed (50 lesions and 18 rashes) and 64 virtual clinic video visits were completed. There were 3 patient refusals and 1 conversion to a telephonic visit. Participating primary care clinics differed in the number of patients referred with completed visits (range 2-32) and the percentage of providers using e-communications (range 13%-53%). Patients were seen soon after e-communication placement; compared to in-person wait times of >3 months, the teledermatology virtual clinic video visits occurred on average 2.75 days after e-communication. In total, 20% of virtual clinic video visits were seen as in-person visit follow-up, which suggests that the majority of patients were deemed treatable at the virtual clinic. All patients who returned the patient survey (N=10, 100%) agreed that their clinical goals were met during the virtual clinic video visits.

Conclusions: Our virtual clinic model for teledermatology implementation resulted in timely access for patients, while minimizing loss to follow-up, and has promising patient satisfaction outcomes. However, participating primary care clinics differ in their volume of referrals to the virtual clinic. As the teledermatology virtual clinics scale to other clinic sites, a systematic assessment of barriers and facilitators to its implementation may explain these interclinic differences.

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KEYWORDS

teledermatology; implementation science

Multimedia Appendix 1

Teledermatology Process Depiction.

[\[PNG File , 420 KB - iproc_v7ile35432_app1.png \]](#)

Multimedia Appendix 2

Implementation Outcomes of a Teledermatology Service.

[\[PNG File , 334 KB - iproc_v7ile35432_app2.png \]](#)

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Abstract

Accuracy of Store-and-Forward Teledermatology for the Diagnosis of Skin Cancer: The Nouvelle-Aquitaine Experience

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Abstract

Background: In Nouvelle-Aquitaine (a French region with a population of almost 6 million), the density of dermatologists is less than 3.8/100,000 inhabitants. This lack of dermatological care is delaying diagnosis and management, especially for skin cancer. The SmartDerm Project is a store-and-forward (SAF) teledermatology platform for primary care in Nouvelle-Aquitaine providing dermatological counselling to general practitioners (GPs).

Objective: The main objective was to determine the concordance between the diagnosis of skin cancer made by dermatologists and the pathologists' diagnosis.

Methods: GPs in 3 pilot departments of Nouvelle-Aquitaine (Lot-Et-Garonne, Deux-Sèvres, Creuse) sent their dermatology requests using their smartphone, via an app called PAACO/Globule; dermatologists at the University Hospital of Bordeaux answered within 48-72 hours. Consecutive cases of skin cancer suspected by the referent dermatologists during the intervention were included, if the result of biopsy interpreted by a certified pathologist was available at the time of the study.

Results: Among the 1727 requests, 163 (9%) concerned a possible diagnosis of skin cancer and were eligible. For 61 cases, the histopathological findings were not available. Eventually, 93 patients with a total of 102 skin lesions were included. Median age was 75 years (range 26-97 years), with 53% women. The skin lesions had progressed for 8 months on average (range 0.5-36 months). The median response time was 1 day (range 0-61 days); 65 days (range 1-667 days) elapsed on average between the SAF opinion and the histological sample. Histopathology diagnosed 83 malignant lesions (57 basal cell carcinomas, 69%; 18 squamous cell carcinomas, 22%; 6 melanomas, 7%; 1 cutaneous lymphoma, 1%; 1 secondary location of a primary cancer, 1%), 1 precancerous lesion, and 18 benign lesions. The concordance between the opinion of the referent dermatologist and the final pathological finding was 83% for nonmelanocytic lesions and 67% for melanocytic lesions.

Conclusions: This study showed the reliability of SAF teledermatology in the diagnosis of skin cancer, comparable to literature data in the absence of dermatoscopy. The median delay of about two months between request and histology was an improvement compared to the delay of usual appointments in the intervention area. The lack of data for 61 patients showed that SAF telemedicine requires better coordination and follow-up, especially for the management of skin cancer. With this reservation in mind, teledermatology offers an alternative answer for the triage of patients with skin cancer residing in areas with low medical density.

Conflicts of Interest: None declared.

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