

THE USE OF MOBILE PHONES FOR SKIN TUMOR SCREENING

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Abstract

A lot of importance is attributed to mobile telemedicine these days, a topic that encompasses a wide and ever growing range of applications. Small, handheld devices such as camera mobile phones have come into every day use providing technically sophisticated tasks on a user-friendly level and can therefore be easily used in various fields of telemedicine. Dermatology is a perfect candidate for the use of telemedicine tools in general, as well as mobile devices in particular. The unique aspect of mobile teledermatology is that this system represents a filtering, or triage system, allowing a sensitive approach for the management of patients with emergent skin diseases. In order to investigate the feasibility of teleconsultation using a new generation of cellular phones, a clinical study to evaluate the accuracy of online diagnosis of skin tumours was conducted. Teledermoscopy represents a recent development of teledermatology that might add up additional information in the diagnosis of pigmented skin lesions. Teledermatology, mobile as well as stationary, can advance the reliability of diagnosis by expert consultations without expensive and time-consuming relocations. Consequently, the quality of patient's care can be raised and the costs of the health care system can be reduced.

1. Introduction

The term mobile telemedicine is widely used and encompasses a wide range of telemedicine applications. Mobile telemedicine is a newly emerging area, integrating wireless communications for different telemedical applications. Stationary devices are therefore replaced by small portable devices, such as mobile phones and personal digital assistants (PDAs). As a visual profession dermatology is a promising candidate for various aspects of telemedicine in general, as well as *mobile* telemedicine in particular. The power of these devices allows their use in more demanding tasks such as processing medical images; their use in telemedicine, particularly in teleradiology and teledermatology has recently been proven and the name “mobile teledermatology” has been coined [1,2]. Despite limitations in image definition and restricted camera options of the first generation camera mobile phones, preliminary studies already pointed out the usability and feasibility of such-like devices in teledermatology. Modern PDA's and mobile phones of the second (2G) and third

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generation (3G) revolutionised the dimensions of data transmission, network coverage and number of pixels [3]. As a result, technical limitations can be reduced to a minimum.

The incidence of skin cancers has reached epidemic proportions among whites and the trend is still going upwards [4]. Mobile teledermatology might be implemented as a filtering or triage system allowing a more sensible approach for the management of patients with emergent skin diseases. Furthermore, it may become a screening tool for malignant cutaneous tumors. Early detection is crucial, especially concerning melanoma, as surgical excision today is the only life-saving approach for this type of skin cancer [5].

2. Results

In 2007, the first study performing mobile teledermoscopy using cellular phones with an in-built camera was conducted. Within the framework of a pilot study, colleagues from the Department of Dermatology, Medical University of Graz, Graz (Austria), investigated the feasibility to perform melanoma screening with both clinical and dermoscopic images acquired using a new generation of cellular phones [6].

This new study emphasized on a wide range of tumours skin lesions (benign and malignant) and was conducted with a modern cellular phone with a built-in 3,2 megapixel camera with autofocus, macro mode and zoom. One-hundred patients presenting with one or more particular skin tumours were selected consecutively at the outpatient clinic of the Department of Dermatology, Medical University of Graz, Graz (Austria). In each case a close up clinical image and a dermoscopic image applying the cellular phone on a pocket dermoscopy device has been taken.

The clinical and dermoscopic pictures have been uploaded separately along with specific information concerning the patient (age, sex, localisation). An experienced teleconsultant reviewed the images on a specific web application, a virtual private network based on a store and forward system, where images had been uploaded in JPEG format [www.dermahandy.net/default.asp]. The telediagnoses were then compared to the face-to-face diagnoses made by the dermatologists at the outpatient department as well as the histological findings.

We calculated a crosstabulation which displays the number of cases in each category defined by the variables `cellular_phone_image` and `dermoscopic_image`. The total number of cases was 107. According to our data the clinical diagnosis was detected with cellular phone imaging correctly in 86,9% of all cases and with dermoscopic imaging in 76,6%. In 72,9% both imaging techniques detected the clinical diagnosis correctly. The three most frequent diagnosed skin lesions in our 107 cases were basal cell carcinoma (BCC, 33 cases), melanocytic nevus (MN, 18 cases) and actinin cheratosi (AC, 15 cases). In BCC cellular phone imaging detected the clinical diagnosis in 84,8% correctly, dermoscopic imaging detected the clinical diagnosis in 75,8% correctly. In MN both cellular phone imaging and dermoscopic imaging detected the clinical diagnosis in 87,5%. In AC cellular phone imaging detected the clinical diagnosis in 86,7% correctly, dermoscopic imaging detected the clinical diagnosis in 100% correctly.

3. Discussion

Currently, research in telemedicine is focusing on developing and testing new ways to utilize mobile phones for home-based health data acquisition or health data acquisition from rural areas where there is no specialist available. As presently the majority of people possess a mobile phone, most of

which have a built-in camera, this could be a cheap approach to the concept of a “person-centred health system”. The hallmark of this concept is to empower citizens to adopt an active role in managing their own health status and, in addition, facilitating early diagnoses of diseases [7]. A person concerned about an emergent skin lesion, e.g. a tumour of any sort, can take a picture with and send it to a specialised telemedicine centre for triage.

Teledermoscopy represents a recent development of teledermatology. Dermoscopic images alone or in combination with clinical images could aid diagnosis of skin lesions not only for clinicians as a second-level procedure for the evaluation of selected lesions. Dermoscopy in the framework of mobile teledermatology could also improve the accuracy of primary care physicians to triage lesions suggestive of skin cancer without increasing the number of unnecessary expert consultations [8]. Moreover, prospective, randomized clinical studies are needed to test and standardize the proposed mobile approach.

4. Conclusion

We foresee that in the near future mobile telemedicine will exceed its current limits and will be implemented in various fields of Medicine. Mobile phones may have a special function for online consultation including advice and follow up for dermatological conditions and a triage system for new and suspicious moles. Thus, teledermatology is paving the way for enhanced self examination in the spirit of the eHealth program of the European Commission for Information Society and Media.

5. References

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