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SPECIAL FEATURES OF THE USE OF TELEMEDICINE TECHNOLOGIES IN DERMATOLOGY

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Abstract. *The article focuses on the application of telemedicine technologies in dermatology. The usage of telemedicine approach makes it possible to study certain skin pathologies remotely and monitor the progress of the treatment in the dynamics. The use of equipment and telemedicine services for the study of skin diseases is explained. The dermatoscopic telemedicine system is described. The possibilities of using mobile telemedicine in dermatology are analyzed.*

Keywords: *telemedicine, image processing, dermatology, mobile dermatology, dermatoscopy*

Introduction

Due to the Covid-19 epidemic, telemedicine technology is gaining widespread acceptance. In fact, the relevance of screening and teleconsultation in isolation is unusually high. Such technologies can be applied in various fields of medicine, for example, when testing fine motor skills [1, 2], in otorhinolaryngology [3-5], in the analysis of data of radiation research methods [6-10]. With the advent of this approach and appropriate technologies, dermatologists can expand access to health care by reducing the time spent on traditional outpatient care. Dermatological telemedicine services offer reduced waiting time, increased flexibility of the schedule and sufficient patient satisfaction.

It is known that at the moment telemedicine is suitable for realization of remote consultations and monitoring the dynamics of dermatological diseases such as acne, pigment lesions, atopic dermatitis, skin tumours [11, 12]. Of course, the effectiveness of the traditional interaction with the doctor remains effective, but in the context of self-isolation, technology helps to ensure that diagnostic information is recorded and analyzed at a distance and that quality counselling is provided [13, 14].

It is therefore advisable to develop a telemedicine system for video dermatoscopy and to analyze its components.

Materials and Methods

Such a system should contain a digital video dermatoscope, which allows you to record diagnostic images with adjustable optical magnification from 10 to 200 times and a resolution of at least 5 Megapixels with a matrix size of at least 1 / 2.5 inches to provide an acceptable dynamic range, as well as an integrated lighting unit. The device shall be capable of recording digital images on a memory card



and transmitting them by means telemedicine services for analysis. The inventive method consists in producing images in formats (for example, TIFF), which are devoid of specific artifacts from compression of images resulting in distortion of diagnostic information. The specialist should have specialized software for storing and processing the obtained diagnostic images, taking into account the analysis of the color components of the areas of interest specific to specific pathologies [15, 16]. At the same time, the processing of recorded dermatoscopic images and the application of already existing approaches to their analysis are of primary importance [17, 18]. For example, in the case of atopic dermatitis, it is relevant in dynamics to observe changes in skin color during treatment [17]. Given that dermatoscopic images are recorded by the patient at home, remote monitoring of the conditions for obtaining diagnostic images and the validity of the method and the repeatability of the measurement results shall be mandatory [19, 20]. The received data should be transmitted through the channels of communication between the patient and the specialist to ensure qualified teleconsultations.

It is also advisable to develop specialized certified equipment and dedicated communication channels for the rapid and safe transmission of not only diagnostic images, but also essential medical information (data of anamnesis, sanitary and hygienic characteristics of workplaces, etc.), which allows a highly qualified specialist to monitor the treatment of patient with dermatological diseases with the help of telemedical consultations. These systems have become particularly relevant in the context of the COVID-19 pandemic, forced quarantine and self-isolation, when it is not recommended to visit diagnostic centers for routine treatment. The possibilities of mobile teledermatology may reduce time and financial costs in the process of monitoring a number of chronic skin diseases.

Conclusions

In the present circumstances, the benefits of using telemedicine services for primary diagnosis and control of treatment of certain dermatological diseases are obvious. The development of the approach is the development of intelligent methods of analysis of dermatoscopic images, which, with additional a priori information, can improve the effectiveness of detection of certain skin pathologies and control the treatment process remotely. The possibilities of mobile teledermatology make it possible to reduce time and financial costs in the process of monitoring the treatment of certain chronic skin diseases.

References

1. Селиванова К.Г. Возможности исследования тонкой моторики рук в динамике с помощью графического планшета / К.Г. Селиванова // Сборник материалов докладов «Биотехнические, медицинские и экологические системы и комплексы», Биомедсистемы, 2012. – С. 164-166.
2. Селиванова К. Г. Разработка интерактивных тестов для оценки уровня развития мелкой моторики / К. Г. Селиванова, О. Г. Аврунин, В. В. Семенец // Вісник Харківського національного університету ім. В. Н. Каразіна: Х. 2014. – № 1143, Вип.6. – С. 72-75.
3. Аврунін О.Г., Бодяньський Є.В., Калашник М.В., Семенець В.В., Філа-



- тов В.О. Сучасні інтелектуальні технології функціональної медичної діагностики – Харків : ХНУРЕ, 2018. – 248 с. doi: 10.30837/978-966-659-234-0.
4. Аврунін О.Г., Бодяньський Є.В., Семенець В.В., Філатов В.О., Шушляпіна Н.О. Інформаційні технології підтримки прийняття рішень при визначенні порушень носового дихання: монографія. – Харків: ХНУРЕ, 2018. – 125 с.
 5. Аврунін О.Г. Опыт разработки программного обеспечения для визуализации томографических данных / О. Г. Аврунін // Вісник НТУ «ХПІ». – 2006. – № 23. – С. 3-8.
 6. Аврунін О.Г., Аверьянова Л.А., Бых А.И., Головенко В.М., Скляр О.И. Методика создания виртуальных средств имитации работы рентгеновского компьютерного томографа // Техническая электродинамика. Тем. Вып. – Киев, 2007. – Т. 5, С.105-110.
 7. Tymkovych, M. Y., Avrunin, O. G. Farouk, H. I. Reconstruction method of the intact surface of surgical accesses. *Eastern-European Journal of Enterprise Technologies*, 2014, 9(70), 37-41.
 8. Бажан О. В. Використання технологій віртуальної реальності в пластичній хірургії / О. В. Бажан, О. Г. Аврунін, М. Ю. Тимкович // I Всеукраїнська науково-практична конференція молодих вчених, курсантів та студентів «Авіація, промисловість, суспільство», Кременчук. - 2018. - С. 184.
 9. Guitera P, Menzies SW. State of the art of diagnostic technology for early stage melanoma. *Expert Rev Anticancer Ther*. 2011 May;11(5):715-23.
 10. Soloshenko E.N., Chikina N.A. Automated Information System (AIS) for the diagnosis and prevention of professionally caused allergic dermatoses / E.N. Soloshenko., N.A. Chikina // *Dermatovenereology. Cosmetology. Sexopathology* - 2006.- № 1-2 (9) '- p. 46-53.
 11. Avrunin O. Development of Automated System for Video Interdermatoscopy / O. G. Avrunin, V. Klymenko, A. Trubitsin, O. Isaeva // *Proceedings of the IX International Scientific and Practical Conference International Trends in Science and Technology Vol.2, January 31, 2019, Warsaw, Poland.* – P. 6-9.
 12. Исаева О. А. Разработка автоматизированной системы для видеодерматоскопии / О. А. Исаева, О. Г. Аврунін // *Матеріали 23 Міжнародного молодіжного форуму. Т. 1.* – Харків: ХНУРЕ. 2019. – С. 165 -166.
 13. Nosova, Ya. V. Development of the method of express diagnostics of bacterial microflora of the nasal cavity / Ya. V. Nosova, H. Farouk, O.G. Avrunin // *Problems of information technologies.* - Kherson, 2013. -No 13. -P. 99-104.
 14. Инструментальные методы оценки состояния кожи при атопическом дерматите / А. А. Трубицын, О. А. Исаева, В. А. Клименко, О. Г. Аврунін // *Наука та виробництво.* – 2019. – № 20. – С.180-187.