



Use of mobile applications in plastic surgery

Uso de aplicativos móveis em cirurgia plástica

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■ ABSTRACT

Introduction: The modernization of medicine allowed a greater interaction between medical teams and patients. Technological development, especially in the field of communication, has led to the creation of new devices such as smartphones and tablets. The widespread popularity of these devices and the development of applications have allowed their use in medicine, being quick means of accessing information, diagnosis, patient follow-up, surgical simulations, guidelines, electronic books and information on pathological conditions, and therapeutic and surgical procedures. This study is a review of the applications of smartphones and tablets in plastic surgery. **Methods:** The application stores Google Play[®] and Apple Store[®] in English were assessed until June 2014. Initially, 588 applications related to plastic surgery were found. Based on their descriptions, the applications were classified according to cost, area of operation, store in which the application is made available, and use. **Results:** After applying the exclusion criteria, 19 applications were selected, of which 11 were related to surgical simulations; five, to clinical evaluations; and three, to microsurgery and flaps. With regard to access, 12 were free and seven were paid. Of these applications, 11 were exclusive to the Apple Store[®], two were exclusive to Android[®], and six were available in both. **Conclusion:** Approximately 600 applications related to plastic surgery have been developed, but only about 20 of these have clinical applicability. The development of these applications in other languages is needed, facilitating their use in other countries.

Keywords: Mobile applications; Plastic surgery; Mobile phone.

■ RESUMO

Introdução: A modernização da Medicina permitiu uma maior interação entre a equipe médica e o paciente. O desenvolvimento tecnológico, principalmente na comunicação, permitiu a criação de novos aparelhos, como *smartphones* e *tablets*. A disseminação destes aparelhos e o desenvolvimento de aplicativos permitiram o uso destes na Medicina, sendo um meio rápido de acesso a informação, diagnóstico, acompanhamento de pacientes, simulações cirúrgicas, orientações, livros eletrônicos e informações sobre a patologia, e na conduta terapêutica e cirúrgica. Este estudo é uma revisão para identificação dos aplicativos sobre cirurgia plástica nestes aparelhos: *smartphones* e *tablets*. **Métodos:** Foram pesquisadas, na língua inglesa, as bases de aplicativos google play[®] e apple store[®], encontradas disponíveis até junho de 2014. Foram encontrados, inicialmente, 588 aplicativos relacionados à cirurgia plástica.

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Com base na descrição dos aplicativos, estes foram classificados quanto a gratuidade, área de atuação, base em que o aplicativo foi encontrado e utilização. **Resultados:** Após utilização de critérios, foram encontrados 19 aplicativos, dos quais 11 relacionados à simulação cirúrgica, cinco à avaliação clínica e três sobre microcirurgia e retalhos. Quanto ao acesso, 12 eram gratuitos e sete pagos. Quanto à base de aplicativos, 11 eram exclusivos da apple store®, dois exclusivos da android® e seis encontrados em ambas. **Conclusão:** Existem atualmente cerca de 600 aplicativos relacionados à cirurgia plástica, porém apenas cerca de 20 destes apresentam aplicabilidade clínica. É necessário o desenvolvimento da acessibilidade através desses aplicativos em outras línguas, facilitando o uso destes em outros países.

Palavras-chave: Aplicativos móveis; Cirurgia plástica; Telefone celular.

INTRODUCTION

The modernization of medicine has allowed better interaction between medical teams and patients. Currently, a wide range of technological products are available that are intended to facilitate the relationship between medicine, patients, and physicians. As a source of medical information and immediate access to this information, this technology can help in the improvement of medical management, improve communication between the hospital medical staff, and enhance the scope of telemedicine^{1,2}.

Technological development, especially in communication, has led to the creation of new devices that, through the Internet, can provide new means of obtaining information, diagnosis, patient follow-up, surgical simulations, guidelines, electronic books, and specific information about pathological conditions, and assist in therapeutic conduct and surgical planning¹⁻³. This represents a significant enabling of information dissemination at an exceptional speed, to a specific population.

Smartphones and tablets can be considered new means of communication and accessibility to information, with which new tools can be developed to help physicians in their practice and education. With the use of these devices, we can cite the promising development of applications that allow the use of information in medicine, including plastic surgery, either in reconstruction or in an aesthetic approach⁴. The use of these applications creates new opportunities to integrate mobile technology and daily clinical practice.

OBJECTIVE

The objective of this present work was to review the applications of smartphones and tablets in plastic surgery.

METHODS

The most widely used application stores, namely Google Play® for the Android® system and Apple Store® for Apple®, were searched in English for applications until the month of June 2014. A literature review of publications on plastic surgery and applications was also conducted. In these application stores, 588 applications related to plastic surgery were found. Each store provides a brief summary of the application and its applicability. Data were collected regarding the application, such as cost, application site in plastic surgery (reconstructive and/or aesthetic), operation site, clinical evaluation data, surgical simulation, use of flaps, and information regarding the application store.

The applications that could be used to assist the plastic surgeon in the clinic or at the surgical center, and that were related to diagnostic aid, surgical simulation, preoperative care, and surgical applicability were included. Applications related to books, magazines, accessibility to clinics or hospitals, and *marketing* personnel were excluded. Repeated applications were excluded.

RESULTS

Nineteen applications met the above-mentioned criteria. Of these, 11 were related to surgical simulation; five, to clinical evaluation; and three, to microsurgery and flaps. Among the simulators, six were of the face, four were of the face and body, and one of the nose. Of the applications related to clinical evaluation, two were on burns and the rest were on information about surgical safety, drug interaction, and surgical planning. With regard to access, 12 were free and seven were paid. Eleven were exclusive to the Apple Store®, two were exclusive to the Android® system, and six were available in both application stores (Table 1).

Table 1. The most commonly used applications.

| Application | Operating System | Field | Cost | Usefulness |
|--------------------------------------|------------------|---------------------|------|---|
| <i>Uburn</i> | Apple | Clinical evaluation | Free | Calculation of the burned area |
| <i>Merseyburns</i> | Apple | Clinical evaluation | Free | Calculation of the burned area |
| <i>SilpaRamanitor</i> | Android | Flaps | Free | Monitor flaps in the postoperative period |
| <i>Iflaps</i> | Apple/Android | Flaps | Paid | Application of surgical flaps |
| <i>Surgical Flaps</i> | Apple | Flaps | Paid | Application of surgical flaps |
| <i>Kaeria Lite</i> | Apple/Android | Simulator | Free | Simulation of facial alterations |
| <i>Virtual Plastic Surgery</i> | Apple/Android | Simulator | Free | Simulation of facial alterations |
| <i>Facial Plastic Surgery</i> | Apple/Android | Simulator | Free | Simulation of facial alterations |
| <i>Iplasticme PRO</i> | Apple | Simulator | Free | Simulation of facial and body alterations |
| <i>Plastic Surgery PRO simulator</i> | Apple | Simulator | Free | Simulation of facial and body alterations |
| <i>FaceLlift Premium simulator</i> | Apple | Simulator | Paid | Simulation of facial alterations |
| <i>Crisalix</i> | Apple | Simulator | Paid | Simulation of facial and body alterations |
| <i>Plastic Surg Nose-Job</i> | Apple/Android | Simulator | Free | Simulation of nose surgery |
| <i>Photo Plastic Surgery Pro</i> | Apple | Simulator | Free | Simulation of facial alterations |
| <i>Botox Cosmetic</i> | Apple | Simulator | Paid | Simulation of facial alterations |
| <i>I-Surgeon</i> | Apple | Simulator | Free | Simulation of face and body |
| <i>Breast-V calculator</i> | Apple | Clinical Evaluation | Free | Calculation of breast volume |
| <i>Surgaware</i> | Apple/Android | Clinical Evaluation | Paid | Patient Safety |
| <i>Surgplanning</i> | Android | Clinical Evaluation | Paid | Patient Safety and surgical planning |

DISCUSSION

The initial clinical evaluation and preoperative planning are key steps in the patient-surgery process. Establishment of more precise criteria that assist in the surgical approach contributes to the development and redevelopment of the patient in relation to surgery. Thus, the presence of technology is a key factor in the development of communication with the patient, in addition to having a major importance in the education and decision of the patient.

The use of applications has revolutionized access to information, and applications related to clinical assessment contribute to the reduction of the time needed for a therapeutic approach. This can be observed in applications for burns; through the use of

the *Uburn* application⁵, one can quickly establish the patient's hydration values. This application has been properly validated through comparison with manual calculations. It is worth stressing the importance of some applications related to assessment in the preoperative period that have algorithms to search for drug interactions with anesthetics, allergies, and special care, which can increase the safety of the patient⁶⁻⁹.

Simulators are older programs with higher quality, which can convey to the surgeon the expectation of the patient. However, they are limited because they are used only as a guide or reference, and cannot provide a guaranteed result given the numerous factors that influence the evolution of the postsurgical process, which can change the course of the result. Therefore, their application is limited to an initial

approach to educate the patient regarding the goals proposed surgically, seeking to understand patients' perception of themselves and how they would like their anatomy to be modified. However, they cannot be used to guarantee the result. These applications may improve the communication between patients and surgeons.

In the field of reconstruction, some applications revisit surgical tactics and techniques. This is an area in which related applications are few. *SilpaRamanitor*, an application created recently, allows – with the aid of a handmade paper box – the detection of patent vessels in the preoperative period and postoperative monitoring of free flaps¹⁰.

Unfortunately, as a limiting factor, we should mention that many of these applications exist only in the English language, which may limit their use, as not all dominate this language. In addition, this study focuses only on the two most common application stores, excluding other possible applications in other databases, including those in other languages. Moreover, as a further limitation, the applications were described without reporting the frequency of their use.

CONCLUSION

Applications developed for smartphones and tablets can assist and facilitate clinical assessment, patient education, and postoperative monitoring. Approximately 600 applications related to plastic surgery are currently available, but only about 20 have clinical applicability. Accessibility in other languages is needed in order to facilitate their use in countries that do not use English as the main language.

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