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Research Article

Easy Eco: Mobile Application in Basic Ultrasound Training for Surgeons and Emergency Doctors

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Abstract

Ultrasound is an imaging study that has become very useful within clinical practice, being adopted by various medical specialties, in order to improve the quality of care of patients. Within the framework of the research scholarship on innovation in surgical technology, an application for mobile devices of an academic, accessible and free nature was developed in order to encourage physicians residents and surgeons to acquire knowledge, basic skills and basic interventionism maneuvers under ultrasound, with the use of ultrasound in medical evaluation. It seeks to promote continuous medical training at any time and anywhere. For its development, there was audiovisual material, generated by expert healthcare professionals where basic theoretical-practical knowledge is applied.

Keywords: *Ultrasound; Application; Doctor; Training*

Introduction

These days, information and communication technology is not only involved on the daily basis of people but it is used directly in the assistance of patients, by making online consults, assessing and sharing laboratory results. This has changed how people communicate to each other, learn, work and even the way they take care of their health [1-3].

Ultrasound has become a very useful tool, being a complementary diagnostic imaging study to be carried out after a good anamnesis and physical examination that allows, under clinical suspicion to solve a specific problem immediately, to diagnose a pathology, to guide invasive procedures or follow-up. It allows the physician to obtain a real-time image of visceral structures, in a non-invasive, non-irradiating and low-cost way [4].

It has been adopted by several medical and surgical specialties (GYN/OB, Surgery, Emergency Medicine, Intensive Medicine, among others) at the time of the initial assessment of the patient, as well as the possibility of performing therapeutic procedures under direct vision, reducing complications by performing them blindly [5].

However, the use of ultrasound requires training and basic knowledge for its interpretation. That is why within the framework of the research scholarship on innovation in surgical technology, an application available for mobile devices is being developed in order to bring the knowledge of ultrasound to advanced medical students, physicians, residents and already trained specialists. It offers quick access to a diagnostic and teaching tool in prevalent pathologies and to facilitate certain invasive procedures, not supplanting the experience of radiologists [6].

The invention of smartphones, the progress of software and mobile applications within the medical field allow faster and unlimited access to more medical resources. This technological revolution has contributed to the optimization of the quality of learning for doctors, as well as the quality of care for patients [7].

Medicine and in particular Surgery has benefited from technological advances from the organization and management of patients, even in the operating room, through mobile and technological applications that allow surgeries in which the patient and the specialist are found in different geographical places, also going through a number of tools that facilitate teaching and research assistance [3,8-10].

For this reason the Innovation and simulation team of the Medical Union of Maldonado with the support of the Favaloro University, regional East of the Medical College of Uruguay, local doctors from Maldonado Department, both from the Elbio Rivero Hospital of Maldonado and the Medical Care of Maldonado, have proposed to develop the first mobile app for teaching in surgery in our district and region, which generates an original work not only for our country but also internationally since academic apps for teaching in ultrasound are not available in the most popular stores on the web.

General Objective

To develop an application for mobile devices of academic content, accessible and free that allows general practitioners and specialists to acquire or refresh knowledge and skills regarding the use of ultrasound in clinical practice.

Specific Objectives

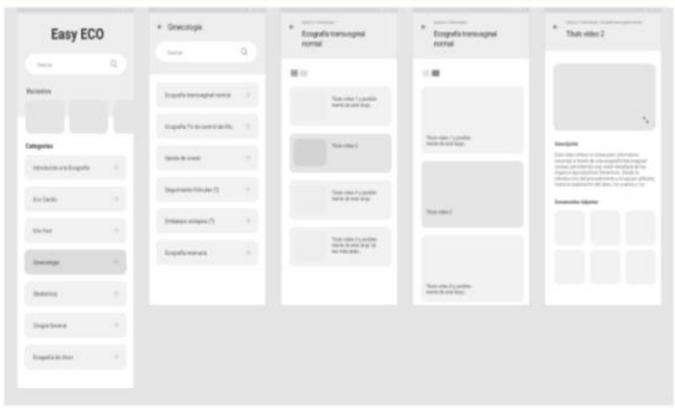
- To promote continuous medical training.
- To generate innovation in the field of medical apps.
- To highlight the importance of using ultrasound as part of the physical examination during the patient's assessment.
- To provide basic knowledge in the use of ultrasound to advanced medical students, physicians, residents and surgeons.
- To provide good quality information by competent healthcare professionals in the field.

Methodology and Results

Materials and Methods

This application consists of several videos made as lectures. The procedures will be explained and both patient-point-of-view and ultrasound-screen-point-of-view will be displayed simultaneously, allowing a general understanding of both the procedure and the correct use of the probes.

Along with these dynamic lectures in the format of short clips there will also be written material, as manuals, to accompany each of the procedures that will be available in the application.



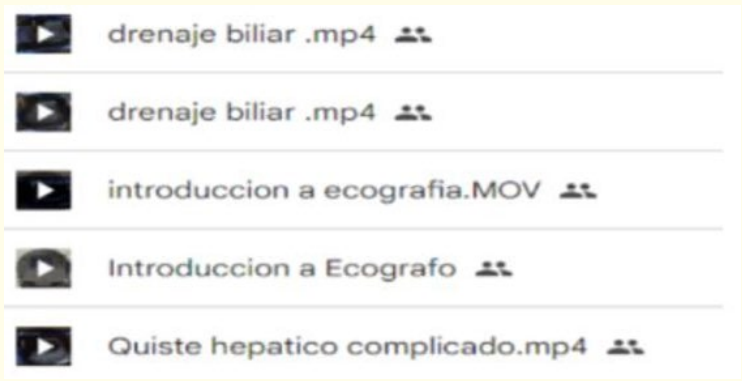


Figure 1 and 2: *App main menu Prototype*

After analyzing and studying the development of mobile apps for medical teaching and with the experience of having developed EasyLap [11], "Mobile application and low-cost simulators to train in laparoscopic surgery; Is it possible to do it?", an app for teaching in laparoscopic surgery presented at the Uruguayan Congress of Surgery in 2016, which won the Forum award, we were able to decide with our web developer, to generate along with FEMI (Medical Federation of Uruguay) who financed this project, a web app format to lower development costs and be able to create a free teaching app. This means that it will not be in traditional stores, but in FEMI's domain where doctors will be able to download it for free. This is a local advance in logistics for doctors since we will not depend on traditional stores and their formats and will allow progress in development and modification for app improvements.

These materials were generated by the work in conjunction with the Favaloro Foundation of Argentina, the Medical Union of Maldonado and other healthcare professionals of our country, within the framework of the Scholarship in simulation and innovation in surgery, supported by FEMI, the Regional East of the Medical College of Uruguay and SAIP Insurance cooperative.

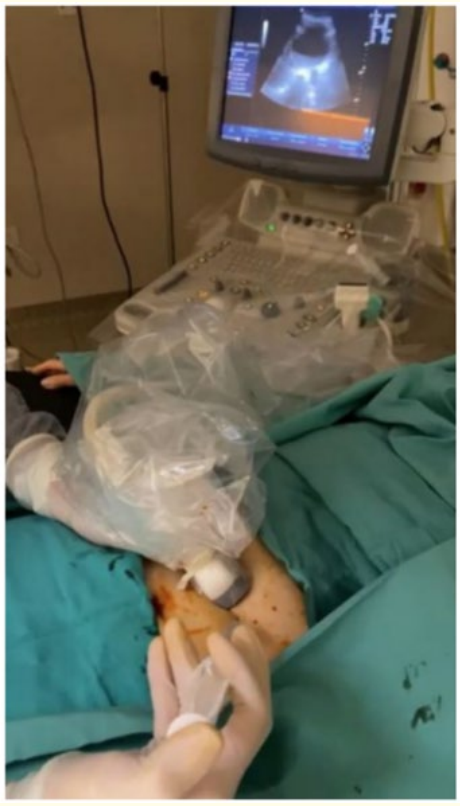


Figure 3: *Drainage of hepatic cyst*

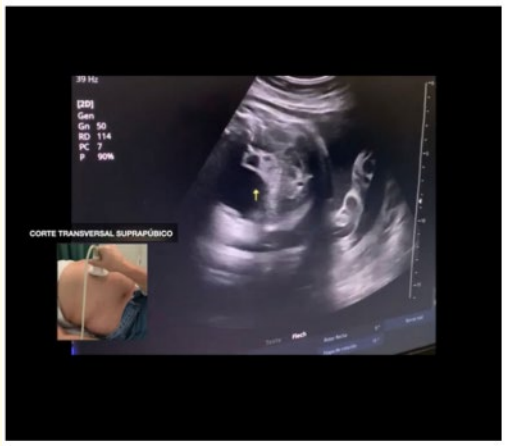


Figure 4: *GYN/OB- third trimester ultrasound*

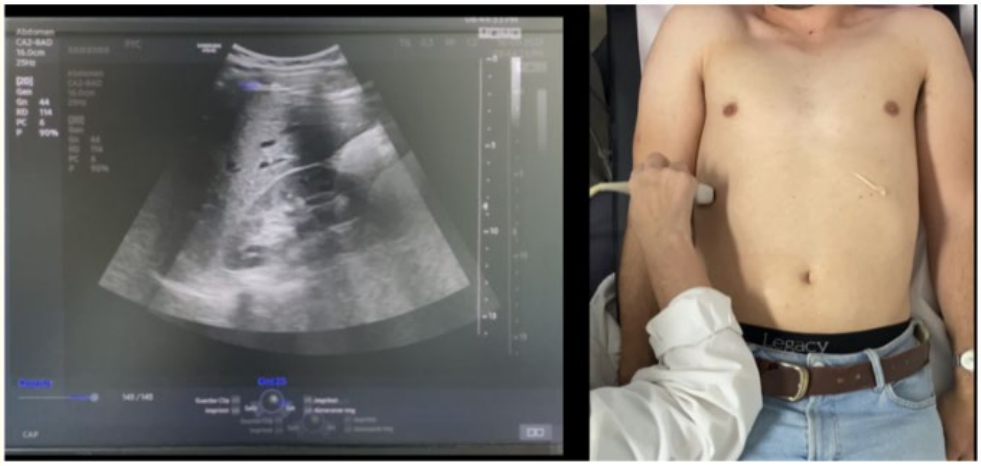


Figure 5: *FAST protocol*

Discussion

We developed the first teaching app in our district and region, and surely the first of its kind internationally for teaching in basic ultrasound and basic invasive procedures under ultrasound. Having reviewed the stores, we did not find a similar app with the same teaching characteristics that EasyEco offers, although there is already an app for teaching in ultrasound available on international app stores. EasyEco is the first of its kind with a realistic no-cost teaching system with real imaging.

It was produced as a web app to facilitate access and be able to be updated continuously, being also free of charge.

This development of an application for basic knowledge in ultrasound aimed at medical students, physicians, residents and surgeons has an immense potential to revolutionize education and clinical practice. In a way that it offers a dynamic and accessible platform to learn and practice ultrasound techniques and that will be at hand of all doctors immediately.

This application will probably reduce the gap between theoretical knowledge and practical skills, being a real link between these two aspects of learning. In addition to decentralizing continuous medical training, for doctors who reside in the interior of the country and/or in districts far from the training centers being the main beneficiaries.

Conclusion

Technology will continue to advance in the future and contribute to medical knowledge, so we conclude that adopting this type of innovative tools such as this application will allow healthcare professionals to provide better care in patients, make relevant diagnoses, improve their clinical skills and perform therapeutic invasive procedures under ultrasound.

In the future we will have to study the impact of it on healthcare professionals, a project to be developed.

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