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LETTER TO THE EDITOR **Open Access**

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Developing an emergency ultrasound app – a collaborative project between clinicians from different universities

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Abstract

Focused emergency ultrasound is rapidly evolving as a clinical skill for bedside examination by physicians at all levels of education. Ultrasound is highly operator-dependent and relevant training is essential to ensure appropriate use. When supplementing hands-on focused ultrasound courses, e-learning can increase the learning effect. We developed an emergency ultrasound app to enable onsite e-learning for trainees. In this paper, we share our experiences in the development of this app and present the final product.

Keywords: Focused ultrasound, Medical education, Medical mobile applications, mHealth, e-learning, Video-assisted learning

Letter to the Editor

Focused ultrasound is rapidly expanding in emergency care in both prehospital and hospital settings, but ultrasound is operator-dependent and requires adequate training [1–3]. Ultrasound courses provide the trainees with confidence in clinical use [4] and e-learning is excellent course-preparation [5]. Clinicians frequently use smartphones for educational purposes and an app could potentially provide e-learning support for hands-on training in focused ultrasound [6]. We sought to develop a non-commercial smartphone app for focused ultrasound in emergency settings independent of financial interests. The purpose of this letter is to report on the process developing a clinical teaching app, and to present the final product.

We formed a group of Danish physicians engaged in ultrasound teaching and research. Our goal was to produce a smartphone app with standardized national instructions on how to conduct focused ultrasound in an emergency setting. Engaging physicians from different

hospitals, universities, and specialities enabled us to elevate instructions beyond local practice to be nationally applicable. Skype (Skype Technologies, Luxembourg) was used for meetings to discuss the content of the app and gain consensus about nomenclature and probe orientation. We agreed that an introduction to focused ultrasound and five specific focused ultrasound protocols (focused lung ultrasound, focus assessed transthoracic echocardiography, ultrasound guided vascular access, extended focused assessment with sonography for trauma, and limited compression ultrasonography for deep venous thrombosis) would be appropriate. Main authors were selected for each protocol-section and a manuscript was drafted and shared with the other authors using Dropbox (Dropbox Inc., USA) for review. After review by the other authors, the main authors finalized each section. Video-demonstrations were recorded in Clinical Skills Laboratories at Centre for Clinical Education (Copenhagen, Denmark). Videos were recorded with three-point lighting setup and three video cameras installed on tripods with a portable microphone for audio. Ultrasound cine-loops were recorded directly from the ultrasound machines (from GE Healthcare, UK and BK Medical, Denmark) using MediCapture (MediCapture, USA). Videos and cine-loops were edited using Final Cut X (Apple Inc., USA)

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and uploaded in QuickTime Movie format (.mov) to an online video-hosting service (Vimeo.com, USA) for easy embedding into the app.

The app was developed using a previously described simple web-app method [7, 8] and the format enabled easy and multi-platform access. Screenshots of the final app are provided in Fig. 1 and the app is accessible from: http://akutul.cekuapp.dk

In conclusion, developing an educational smartphone app on focused ultrasound through nationwide collaboration across university hospitals was feasible.

This app cannot stand alone, nor replace supervision or courses in focused ultrasound, but it is a useful onsite e-learning supplement that may enhance learning outcomes.
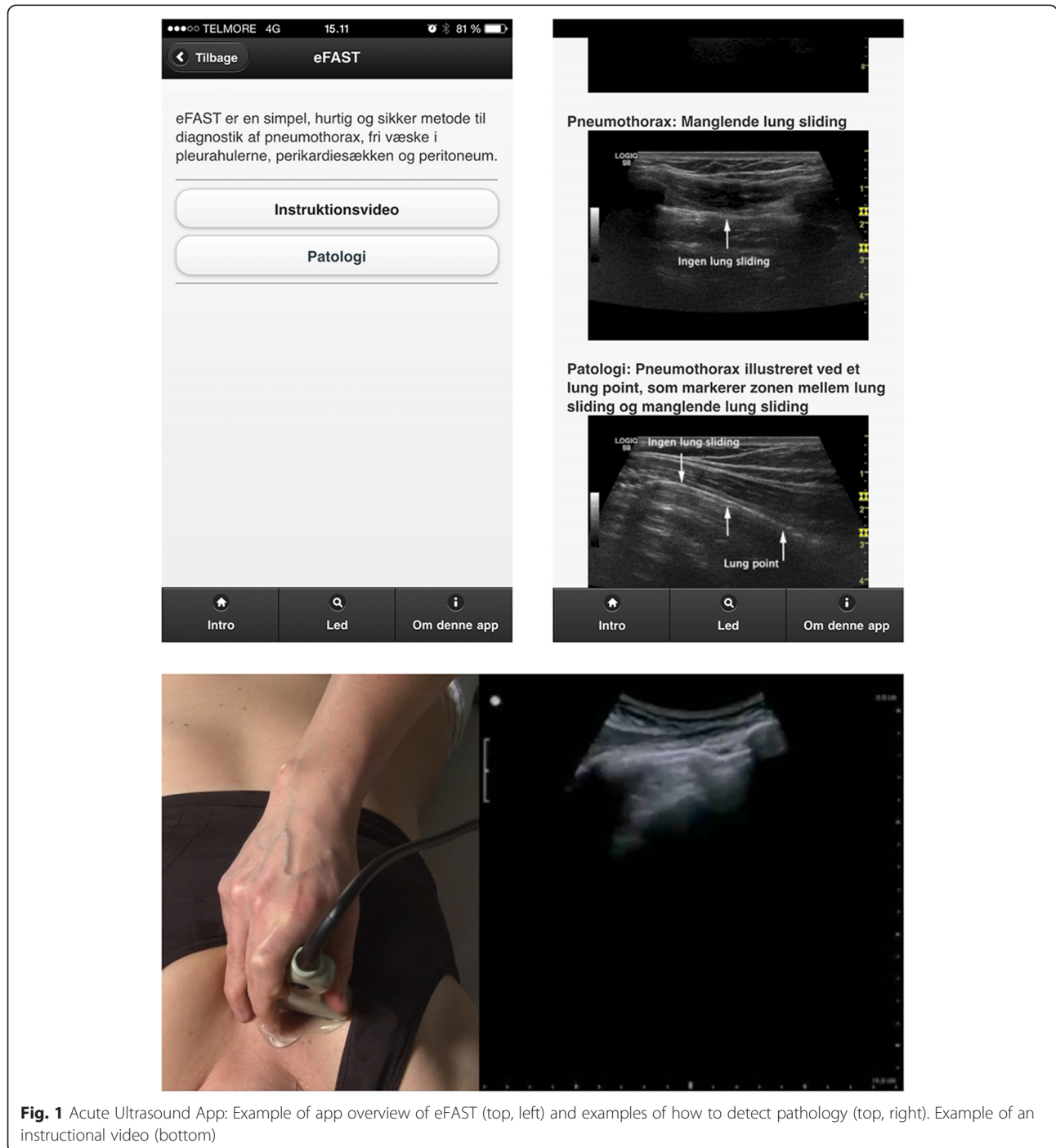

Fig. 1 Acute Ultrasound App: Example of app overview of eFAST (top, left) and examples of how to detect pathology (top, right). Example of an instructional video (bottom)

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Authors' contributions
KTF, YS, and TT contributed with the original idea. KTF, RA, ELB, MTB, OG, CBL, JW, and TT authored all instructional material. YS developed the smartphone app. KTF, YS, and TT drafted the manuscript. All authors helped draft the final manuscript. All authors read and approved the final manuscript.

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