

Diagnostic imaging in Equalis' external quality assessment schemes of echocardiography and vascular ultrasound – introduction of a novel web-based imaging tool



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CONCLUSIONS

The improved diagnostic imaging tool enables rapid review of images and sequences, and a comprehensive range of measurements, very similar to the clinical real-life setting. The use of a web-browser provides an easier access to study cases than previously. Since the cases now can include a complete range of measurements, this will enable a development of the external quality assessment schemes. The use of DICOM material, displaying the same properties as clinical samples, leads to a more commutable digital material than before.

INTRODUCTION

The quick technological development with small and inexpensive scanners, as well as automatization of measurements, have led to increased availability of ultrasound examinations. Meanwhile, both echocardiographic and vascular examinations are very dependent on the knowledge and education of the users, and because of this external quality assessment plays an important role.

Equalis' EQA schemes of vascular ultrasound and echocardiography have participants from ~90% of the clinical physiology departments in Sweden.

The case studies in the EQA schemes were previously distributed as a PowerPoint-presentation, with varying results concerning functionality and user-satisfaction. Measurements were performed with an in-house built system with limited functions.

AIM

The aim of this study was to introduce a new digital imaging system, accessible through a web-browser of choice and with a comprehensive range of measurements, and to evaluate user-satisfaction.

METHOD

A web-based imaging system (Tomtec Arena) with a high-performance viewer and full measurement package was introduced in 2018. The medical images used were *Digital Imaging and Communications in Medicine* (DICOM) files.

The imaging tool was evaluated in two rounds of the echocardiography scheme and participants were asked to perform measurements and/or case evaluation by multiple choice questions (Fig. 1). One round of vascular ultrasound was evaluated with the new system. Participants reported both on multiple choice questions as well as writing a clinical opinion. A survey regarding the functionality of the imaging system was also distributed.

RESULTS

For echocardiography, ~200 users representing 49 clinics participated in each EQA round. In the EQA round of vascular ultrasound, ~150 users from 29 clinics participated.

In total, 82% considered the web-based imaging system to be better than previous systems, 10% answered "no difference" and the remaining 8% found functionality to be better in the previous system (Fig. 2).

Most participants evaluated the cases in 1-2 hours (52%) or <1 hour (37%), whereas the remaining 10% spent >2 hours.

Five web-browsers were used with the majority using Internet Explorer (57%) or Google Chrome (37%).

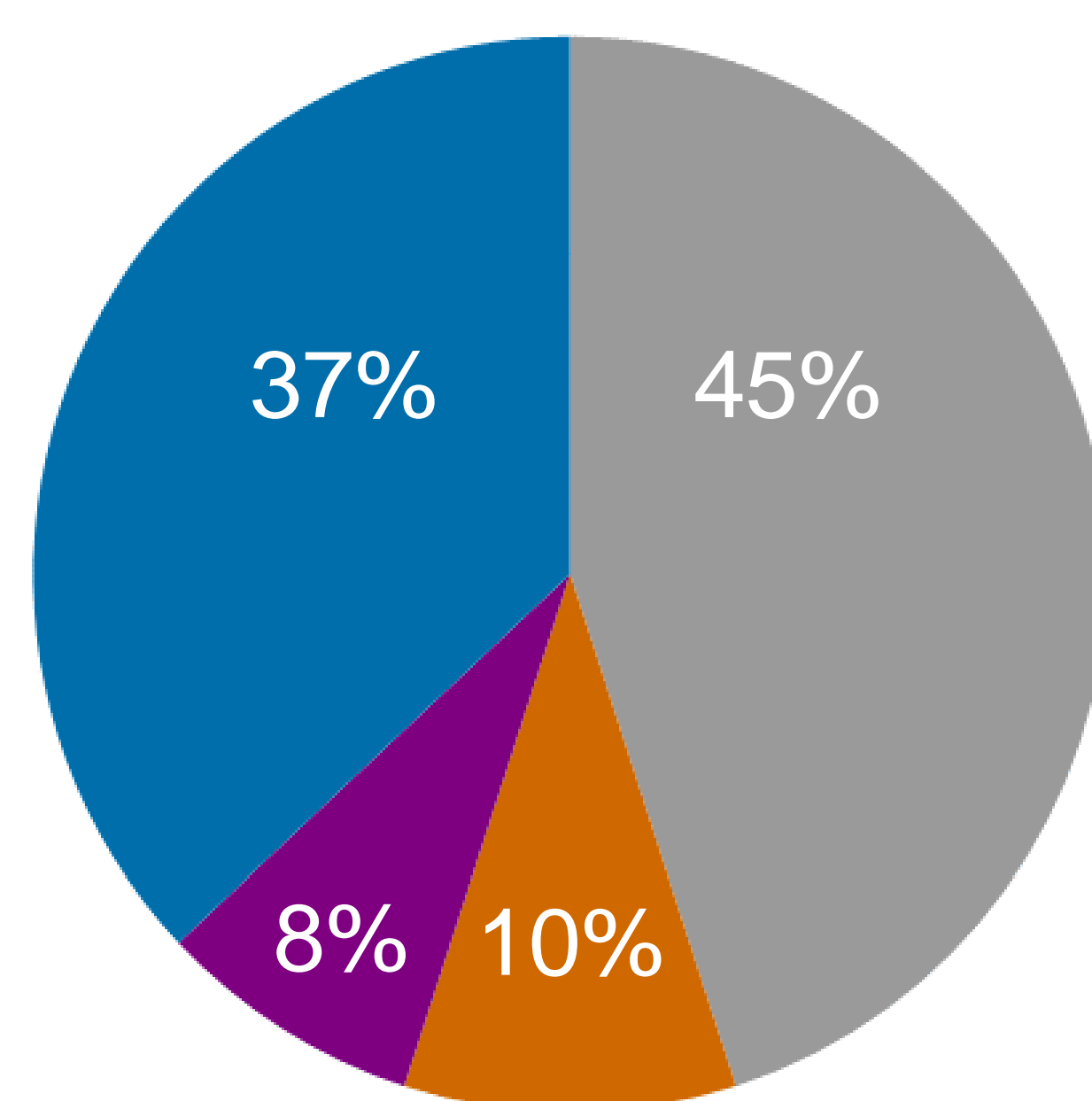


Figure 2. Answers (%) of survey question: "How did you experience the functionality of the system compared to previous systems (PowerPoint/individual files/in-house measuring program)?"

- Very improved functionality
- Improved functionality
- No difference between systems
- Reduced functionality in new system

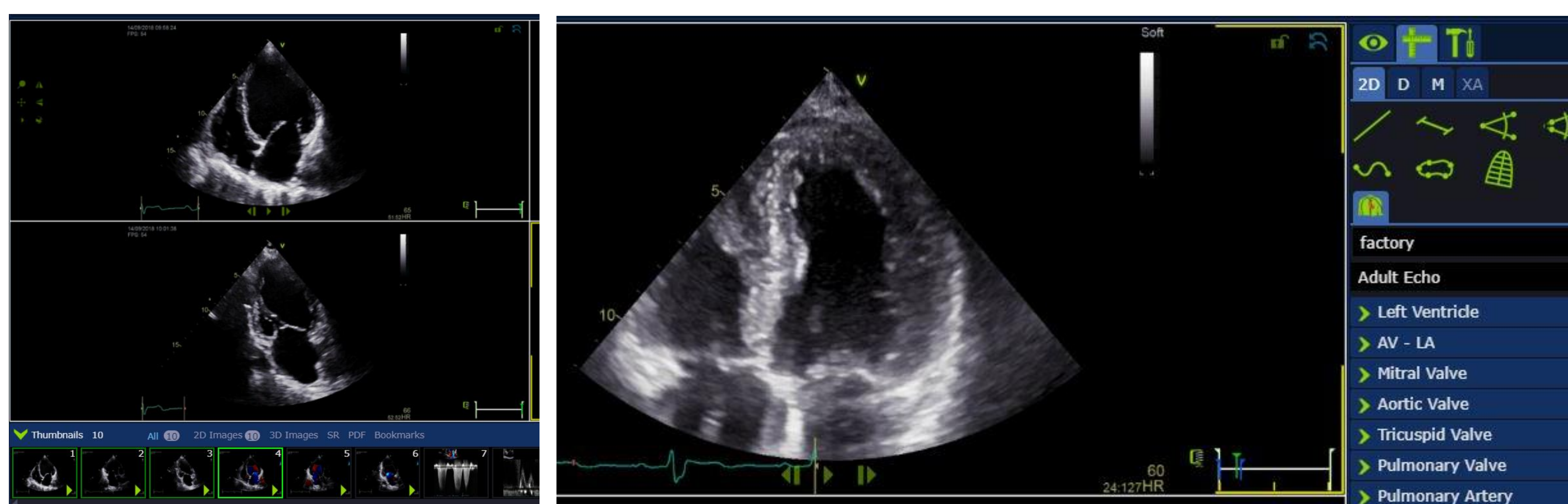


Figure 1. Participants in the EQA scheme of echocardiography evaluated study cases in a web-based diagnostic imaging system (Tomtec Arena). The system resembles the clinical setting with a high-performance viewer with a cardiac measure package including standard echo 2D, M-mode and Doppler measurements. Each case consisted of several anonymized original DICOM images.