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Title : Stress Echocardiography with Smartphone: Real-time Remote Reading for Regional Wall Motion

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On Behalf : Stress Echo 2020 study group

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Background: The diffusion of smart-phones offers access to the best remote expertise in Stress Echo (SE).

Purpose: To evaluate the reliability of SE based on smart-phone filming and reading.

Methods: A set of 20 SE video-clips were read in random sequence with a multiple choice six-answer test by 10 readers from 5 different countries (Italy, Brazil, Serbia, Bulgaria, Russia) of the "SE2020" study network. The gold standard to assess accuracy was a core-lab expert reader in agreement with angiographic verification (0 = wrong, 1 = right). The same set of 20 SE studies were read, in random order and > 2 months apart, on desktop Workstation and via smartphones (WhatsApp application) by 10 remote readers. Image quality was graded from 1 = poor, to 3 = excellent. Kappa (k) statistics was used to assess intra- and inter-observer agreement.

Results: The image quality was comparable in desktop workstation vs. smartphone (2.0± 0.5 vs 2.4± 0.7, p = NS): see figure (left panel). The average reading time per case was similar for desktop vs. smartphone (90± 39 vs. 82± 54 s, p = NS). The overall diagnostic accuracy of the 10 readers was similar for desktop workstation vs smartphone (84 vs. 91 %, p = NS): see figure, right panel. Intra-observer agreement (desktop vs. smartphone) was good (k = 0.81±0.14). Inter-observer agreement was good and similar via desktop or smartphone (k = 0.69 vs. k = 0.72, p= NS).

Conclusions: The diagnostic accuracy and consistency of SE reading among certified readers was high and similar via desktop workstation or via smartphone. Smartphone-SE is feasible, simple, fast and effective in providing semi-real-time access to remote consulting for regional wall motion in SE reading. Since state-of-the-art regional wall motion analysis remains qualitative and subjective, this may increase the clinical robustness of SE and reshape the current way we practice SE.

Figure
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