HEALTH TECHSESSION TITLE: BEST ABSTRACTS: APPLYING NEW TECHNOLOGY TO CARDIOVASCULAR CARE

Abstract 17004: Performance Evaluation of Two Heart Murmur Detection Applications by Prospective Clinical Trial

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Abstract

Introduction: Automated software applications that analyze digital heart sound recordings, phonocardiograms (PCGs) could be used to improve the screening accuracy for valvular and congenital heart disease.

Hypothesis: The new software detection program, eMurmur, can diagnose a murmur as innocent or pathologic with similar sensitivity and specificity as an existing FDA approved device, Sensi Cardiac, verified by echo as a gold standard.

Methods: This blinded, prospective clinical trial, recruited 95 patients from the pediatric cardiology clinics at the Children's Hospital of Eastern Ontario, Ottawa, Canada. Patients with no murmur or an innocent murmur (AHA Class III, n=50), and patients with pathologic murmurs (AHA Class I, n=45) were recruited consecutively (January-March 2017). All patients were auscultated by the attending specialist and assessed by eMurmur and Sensi Cardiac using an electronic stethoscope to record the PCGs. The eMurmur application ran on a mobile device, requiring acquisition of one to two, 20 second PCGs, acquired from the loudest location as heard by the pediatric cardiologist. The Sensi Cardiac application ran on a Laptop, requiring acquisition of four to eight, 25 second PCGs from the 4 traditional cardiac auscultation locations. All patients had an echocardiogram interpreted by their pediatric cardiologist and by a second pediatric cardiologist, both blinded to the software results. Sensitivities, specificities and associated two-sided 95%-confidence intervals (CI) were calculated.

Results: Compared to echo, eMurmur's sensitivity and specificity for automated detection of pathologic murmurs were 84% (C.I. 70-93%) and 84% (C.I. 70-92%), respectively, with accuracy 84% (C.I. 75-91%); versus sensitivity and specificity of 69% (C.I. 53-81%) and 54% (C.I. 40-68%), respectively, with accuracy 61% (C.I. 51-71%) for the Sensi Cardiac device.

Conclusions: This is the first blinded, prospective clinical trial evaluating the performance of two software applications for automated heart murmur detection. eMurmur demonstrates high sensitivity and specificity, similar to reported levels for specialist auscultation.