PAS 2020 Meeting

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TITLE: Feasibility of using an artificial intelligence-enabled stethoscope and telemedicine to improve referrals and reduce inappropriate use of echocardiography in children with heart murmurs

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TITLE: Feasibility of using an artificial intelligence-enabled stethoscope and telemedicine to improve referrals and reduce inappropriate use of echocardiography in children with heart murmurs

Background: A pathologic murmur may be the first sign of heart disease in children and is an appropriate indication for echocardiography, while an innocent murmur is not. However, stethoscope skills are in decline among primary providers making distinction of innocent from pathologic murmurs increasingly difficult. This leads to over-referral to the cardiologist and overuse of echocardiography, resulting in unnecessary emotional and financial burdens on families. The use of an artificial intelligence (AI)-enabled electronic stethoscope and telemedicine may aid decision-making regarding referral of children with a murmur.

Objective: Assess the feasibility of using an electronic stethoscope with AI and remote cardiologist interpretation of recorded heart sounds to screen for pathologic murmurs.

Design/Methods: In this observational pilot study, we recruited children with heart murmurs and no prior cardiac evaluation from a community practice, hospital-affiliated resident clinic, newborn nursery, and pediatric cardiology clinic. A single study team member performed all heart sound recordings with an electronic stethoscope. Using the eMurmur smartphone app, recordings were uploaded to a cloud server for quality check and storage. AI and remote cardiologist interpretation of heart sound recordings were compared to gold standard, which was determined by echocardiography, clinical cardiologist auscultation, or follow-up chart review. Feasibility and accuracy of AI and remote cardiologist interpretations were determined.

Results: Among 137 subjects, 96% were successfully recorded (80 male, average age 6.1 years, SD 6.1, 5 not recorded due to network connectivity or failed quality check). Of the 132 obtained, 5 recordings were uninterpretable (1 by AI and 4 by remote cardiologist due to noise). Overall, net feasibility was 93%. 53 subjects were referred to the cardiology clinic by primary providers because of a murmur, of which 10 had pathology. For these, accuracy of the AI algorithm was similar to that of the remote cardiologist.

Conclusion(s): In this pilot study, the paradigm of screening heart murmurs with an AI-enabled electronic stethoscope and remote listening by a cardiologist was feasible and accurate. Future studies are needed to assess this approach in decision-making and its potential to improve referrals and reduce inappropriate use of echocardiography.

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PRESENTER: Christine Lucille Kuryla

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