Amir A Sepehri, Pediat Therapeut 2015, 5:3
http://dx.doi.org/10.4172/2161-0665.S1.008

OMICS International
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International Conference and Exhibition on
Pediatric Cardiology
August 25-27, 2015 Valencia, Spain

New advances in digital cardiography for screening and detecting heart diseases in children

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Statistical analysis shows that around 1% of children are born with congenital heart diseases that count for about 10% of all congenital anomalies. While as many as 70% have asymptomatic extra sounds which are sometimes confused with pathological heart sounds during auscultation. It is sometimes vital that the conditions of these children be screened as early as possible and before 12 years of age. Studies show that the screening errors (positive or negative), are still substantial in primary health care centers, a large number of pediatric referrals for cardiac evaluation have normal hearts. Based on our unique and internationally patented processing method on murmur characterization, the Arash-Band method and its derivatives, an original digital phonocardiograph is developed. The new digital phonocardiograph has been tested on more than 1000 cases. The device has proven to have a >90% sensitivity, specificity and efficiency with correct diagnosis in children with heart diseases and 100% diagnostic accuracy with normal hearts with or without innocent murmurs The development of the new digital cardiograph also required automated end-pointing and segmentation of children´s heart sounds. For that purpose, we developed a novel method by paying special attention to physiological effects of respiration on pediatric heart sounds and using neural network classifiers. The new digital cardiograph exhibits superior performance than a pediatric cardiologist who relies on conventional or computer-assisted auscultation and drastically reduces unnecessary use of echocardiography. The new digital cardiograph is a children lives saver in developing countries and also it opens a new era for children heart states verification through telemedicine.

Biography

Amir A Sepehri has received his PhD from 'Faculté Polytechnique de Mons' (Mons University, Belgium), in Digital Audio Signal Processing. He has worked on a special research program on 'Computerized Screening of Congenital Heart Disease'. The program was aimed toward obtaining a special diploma known as 'l'Agrégation de l'Enseignement Supérieur' in the same university. The result of his research work is formulated as Arash-Band and it is internationally patented. He has several publications on the CHD screening and detection. He is currently Director of CAPIS Biomedical R&D department.

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