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Computerized interpretation of electrocardiograms poses a risk of false-negative diagnosis of long QT syndrome or WPW syndrome.

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Introduction: Computerized interpretation of electrocardiograms (ECGs) is widely used in clinical setting, especially when manual reading by cardiologists is not available. However, little is known whether computerized interpretation makes a correct diagnosis of pediatric life-threatening arrhythmias like long QT syndrome or WPW syndrome.
Objectives: To clarify the rate of false negative diagnoses in a large number of ECGs using the school-based ECG screening program.
Patients and Methods: Patients were the first and seventh graders in Kagoshima City from 2005 to 2014. ECGs were interpreted using an ECG analysis program (Ver. S1 or S2, Fukuda Denshi, Inc.). Normal ECGs evaluated by computerized interpretation are re-evaluated by pediatric cardiologists, and abnormal ECGs are picked up and referred to the 2nd examination.
Results: Computerized interpretations were performed on ECGs from 52,831 first graders and 57,246 seventh graders. The ECGs of 43,279 first graders (82%) and 46,926 seventh graders (82%) were evaluated as normal. Pediatric cardiologists re-evaluated as abnormal in 24 ECGs of first graders (9 IRBBB and others) and 68 ECGs of seventh graders (21 suspected long QT syndrome, 21 abnormal ST-T findings, 6 arrhythmias, 4 WPW syndrome, and others). One first grader (1/24; 4%) and 18 seventh graders (18/64; 26%) were eventually diagnosed as having cardiac diseases after the 2nd and 3rd examinations (first graders, ASD; seventh graders, 8 with long QT syndrome, 4 with WPW syndrome, 3 with PVC, 1 with second-degree atrio-ventricular block, and 2 with others).
Discussion: Computerized interpretation was found to have inadequacies in analyzing the small or gently-sloping waves on ECGs. The false negative rate of computerized interpretation was low (0.04% in the first graders and 0.1% in the seventh graders). Nevertheless, re-evaluation is important, especially in the seventh graders, because it can identify patients who have a high risk of cardiac events.
Conclusions: Computerized interpretation of ECG poses a risk of false-negative diagnosis of long QT syndrome or WPW syndrome. In normal ECGs evaluated by computerized interpretation, it is important to re-evaluate ECGs carefully for the findings of long QT syndrome or WPW syndrome.