Objective
To assess the potential clinical applicability of cardiac axis and V sign angle measurements for detection of congenital heart defects in the first trimester.

Methods
A prospective cohort study was conducted at a Chinese tertiary hospital from December 2015 to June 2016. Patients with singleton pregnancies and a crown rump length between 45 and 84 mm were recruited to undergo nuchal translucency scan. The cardiac axis on the four chamber view and the V sign angle on the three vessels and trachea view with Doppler mapping were also examined during the scan. The prevalence of cardiac defects was confirmed by the second trimester anomaly scan, postnatal examination or autopsy if the pregnancy was terminated.

Results
The study population included 54 fetuses with cardiac defects and 1538 fetuses without cardiac defects or other structural anomalies. The normal ranges of cardiac axis and V sign angle were 30° to 60° and 30° to 40° respectively defined by the 2.5th and 97.5th percentiles in fetuses without congenital heart defects or other structural anomalies. After excluding isolated septal defects, a nuchal translucency above 95th percentile, abnormal cardiac axis or abnormal V sign angle were observed in 19 (59.4%), 20 (62.5%), and 22 (68.8%) fetuses with cardiac defects respectively, and in 71 (4.6%), 30 (2.0%), and 86 (5.6%) fetuses without cardiac defects. Either abnormal cardiac axis or V sign angle was found in 30 of the fetuses with cardiac defects (93.8%, 95% confidence interval, 93.0%-94.6%) and in 113 of those without cardiac defects (7.3%, 95% confidence interval, 6.0%-8.6%).

Conclusion
Abnormal angles of cardiac axis and V sign are potential markers of congenital heart defects in the first trimester.