Learning curve for ultrasound assessment of the fetal heart in nuchal scan
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Objective
The aim of our study is to evaluate the characteristics of the learning curve for the first trimester (FT) fetal heart scan and to determine the required number of ultrasound examinations for training sonographers to accurately assess the normal fetal heart from 11 to 13 weeks and 6 days of gestation, by means of 2D ultrasound.

Methods
We selected four trainees (resident doctors) with theoretical knowledge and limited experience in FT/ST scan but without prior experience in performing first trimester fetal heart assessment. Each of them performed fetal heart ultrasound scanning in a cohort of 100 consecutive fetuses with normal heart during the routine nuchal translucency (NT scan), upon a pre-established protocol. The supervising doctor recorded if the sonographer succeeded in obtaining an informative 2D/2DC duplex sweep of the fetal heart. The time limit for scanning was 10 minutes. The data were analysed in three groups of examinations. Individual learning curves were delineated using moving average method.

Results
For all the trainees, there was a positive relationship between the number of FT scans and the number of good quality acquired clips. Assessment of fetal structures in first trimester can be accurately achieved by an inexperienced trainee after scanning 50 cases on average. The operating time was stabilized after 80 cases in moving average analysis. We used a two-way ANOVA test to compare the first third (first 33 trials) of the training process with the last third (last 33 trials), to highlight if there is an inter-trainee influence on the learning process or not. The results showed that the trainee (p=0.686) and the trainee dependence on number of repetitions (p=0.311) do not have a significant statistical influence on the final result, and that only by repeating the maneuver the outcome of the training is influenced (=1.82 x10-90).

Conclusion
Repeated scans increase the ability to acquire good quality fetal heart sweep digital clips at the end of the first trimester of pregnancy. First trimester fetal heart ultrasound assessment is a relatively simple procedure to learn and, once a moderate degree of experience is gained, should be routinely incorporated into NT scan. Policymakers should decide safety studies in respect to the FT Doppler use. After adequate training, the heart assessment does not prolong the nuchal scan.