State-wide utilization of cell-free DNA screening: results from the Victorian Perinatal Record Linkage (PeRL) study

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Background

Despite the increasing complexity of prenatal screening and diagnostic pathways following the introduction of cell-free DNA (cfDNA) testing, there remains a paucity of population-based data on contemporary prenatal screening practices to inform public policy.

Objectives

We aimed to perform an individual, state-wide record-linkage study of women undergoing screening with cfDNA, combined first trimester screening (CFTS), second trimester serum screening (STSS), and/or prenatal diagnosis (PNDx) in 2015 to obtain estimates on the utilisation of available clinical pathways.

Methods

All women resident in Victoria, undergoing a primary screening or prenatal diagnostic test in 2015 were included.

A collaboration between the major private and not-for-profit pathology and ultrasound services was formed to collect cfDNA results across the state, incorporating data from three different cfDNA platforms.

These data were linked with state-wide results for CFTS, STSS and prenatal diagnostic procedures. Individual record-linkage was performed using LinkageWiz™ and statistical analyses with STATA v14.0.

Results

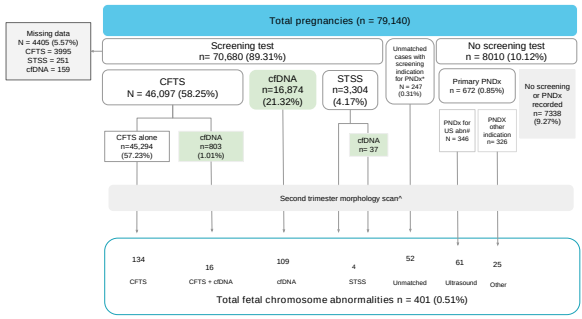
There were 79,140 births during the study period, of which 70,680 (89.31%) underwent prenatal aneuploidy screening.

The percentage of women that had primary screening by CFTS, cfDNA and STSS were 58.25%, 21.32% and 4.17% respectively.

11.5% (174/1,512) of women with CFTS T21 risk greater than 1 in 300 had secondary cfDNA screening; of these, 13 had a high-risk NIPT result and 9 abnormalities were confirmed (including 5 T21 and 1 T18)

5.3% (145/2,761) of women with a CFTS T21 risk between 1 in 300 and 1 in 1000 (intermediate risk) had secondary screening with cfDNA; among these, 1 case each of trisomy 21, trisomy 18 and a sex chromosome abnormality were confirmed (Fig 1).

Fig 1. Prenatal screening and diagnosis pathways VIC 2015



*Indications for PNDx in unmatched cohort: CFTS = 143, STSS = 31, cfDNA = 68, HRS = 5
US abnormality in T1 = 270, T2/3 = 76
^ minimum estimated uptake based on 2015 Medicare government billing statistics was 84%, excludes scans performed on public patients in public hospitals therefore underestimates total numbers

Conclusions

Our population-based linkage study provides the first comprehensive assessment of cfDNA utilization as a primary and secondary screening test in Australia.

1 in 5 women in Victoria choose cfDNA as their primary screening test, while only a minority of those with a high-risk CFTS result use cfDNA as a secondary screen.

In 2015, contingent screening with cfDNA was responsible for detecting one case of T21 that would have been missed by CFTS alone.

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