

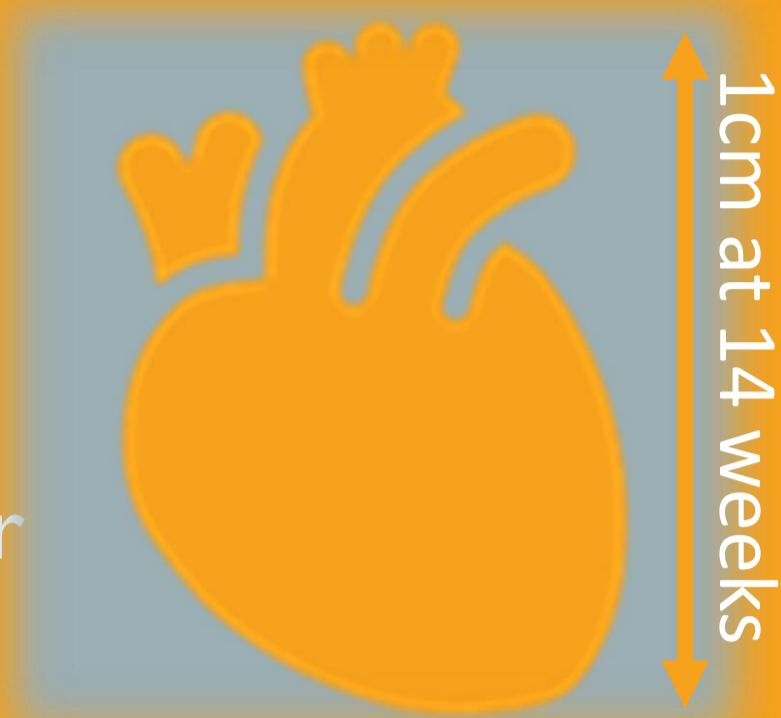
# Detection of fetal congenital heart defects during first trimester screening in a low-risk population

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## First trimester heart

- Congenital Heart Defects (CHD): 5-9/1000 incidence
- The heart position/anatomical appearance is as in the second and third trimesters- only smaller
- Opportunity to assess the heart with 1<sup>st</sup> trimester screening for Preeclampsia and aneuploidies performed at 11-14 weeks gestation
- Accuracy of 1st trimester screening reported in the literature: sensitivity of 78.9 -85% and specificity of 90.6 -99%.<sup>1,2,3</sup>
- First trimester screening unit was initiated within the Feto-Maternal Unit at Liverpool Hospital in June 2022 to screen for preeclampsia and aneuploidy in the diverse, low risk population in South Western Sydney LHD.
- Guidelines from an international association in 2023<sup>4</sup> for 1st trimester early morphology ultrasounds suggests additional views of the fetal heart be included at 12-14 weeks
- Additional views are of the great vessels of the fetal heart.



**AIM:** Audit the number of cardiac defects detected in the first trimester through the First Trimester Screening Unit at Liverpool Hospital on a low risk and diverse population

FIRST TRIMESTER STRUCTURAL SCAN CHECKLIST	
<b>UTERUS/PLACENTA</b> <input type="checkbox"/> CERVIX LENGTH <input type="checkbox"/> UTERUS (including fundus) <input type="checkbox"/> PLACENTA <input type="checkbox"/> PLACENTAL CORD INSERTION <input type="checkbox"/> ANOMALY/VARIABLE (measure if)	<b>ABDOMEN</b> <input type="checkbox"/> AC measurement <input type="checkbox"/> SITUS HEART/STOMACH <input type="checkbox"/> DIAPHRAGM (cont) <input type="checkbox"/> CORD INSERTION <input type="checkbox"/> BLADDER / SVC (cont) <input type="checkbox"/> KIDNEYS in coronal <input type="checkbox"/> RENAL ARTERIES (cont)
<b>FACE</b> <input type="checkbox"/> SPHINX (NB with three lines) <input type="checkbox"/> FACE/ORBITS in coronal <input type="checkbox"/> LENSES <input type="checkbox"/> RETRONASAL TRIANGLE <input type="checkbox"/> NOSE/LIPS	<b>HEAD</b> <input type="checkbox"/> CRANIAL ASSYMETRY <input type="checkbox"/> CHOROID / Falx <input type="checkbox"/> BPD/HC <input type="checkbox"/> AQUEDUCT OF SILVER
<b>HEART (B-mode/colour)</b> <input type="checkbox"/> 4CH B-mode + Colour (equal cardiac filling) <input type="checkbox"/> 3VTV with colour (PA and Ao forming a "V" shape) <input type="checkbox"/> 3VV with colour (forms a "Y" shape) <b>IF POSSIBLE</b> <input type="checkbox"/> LVOT (with/out colour) <input type="checkbox"/> Sagittal great arches (IVC/SVC)	<b>LIMBS</b> <input type="checkbox"/> FL + BOTH FEMURUS <input type="checkbox"/> TIB/FIB <input type="checkbox"/> FEET (presentation) <input type="checkbox"/> HUMERUS <input type="checkbox"/> HANDBUS/FOURMA <input type="checkbox"/> HANDS
<input type="checkbox"/> CRL <input type="checkbox"/> NT measurement (as per RANZCOG) <input type="checkbox"/> POSTERIOR FOSSA/NT measured <input type="checkbox"/> SPINE Coronal / Sagittal <input type="checkbox"/> SKIN LINE in SAGITTAL	<b>DOPPLER BRACHIOCEPHALIC</b> <input type="checkbox"/> IMA (PM on tricuspid) <input type="checkbox"/> DUCTUS VENOSUS <input type="checkbox"/> UTERINE ARTERY PI (RIGHT & LEFT) (As per RANZCOG)

**HEART (B-mode/colour)**

4CH B-mode + Colour (equal cardiac filling)

3VTV with colour (PA and Ao forming a "V" shape)

OR

3VV with colour (forms a "Y" shape)

**IF POSSIBLE**

LVOT (with/out colour)

Sagittal great arches (IVC/SVC)



## Essential views of the fetal heart 12-14 weeks<sup>5</sup>

References

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6. Karim JN, Bradburn E, Roberts N, Papageorgiou AT, ACCEPTS study, Papageorgiou AT, Alfirevic Z, Chudleigh T, Goodman H, Ioannou C, Longworth H. First-trimester ultrasound detection of fetal heart anomalies: systematic review and meta-analysis. *Ultrasound in Obstetrics & Gynecology*. 2022 Jan;59(1):11-25. DOI: 10.1002/uog.23740.
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## Methods

Search: first trimester screening reports on the image reporting system for word "cardiac" and "heart" between 1/6/2022 and 30/06/2024 – found all CHD detected in the first trimester scan

The Local Health District fetal heart anomalies are referred to the Feto Maternal Unit, Liverpool Hospital for review

## Results

June 2022 – July 2024 -2088 first trimester scans were performed in a low-risk population.

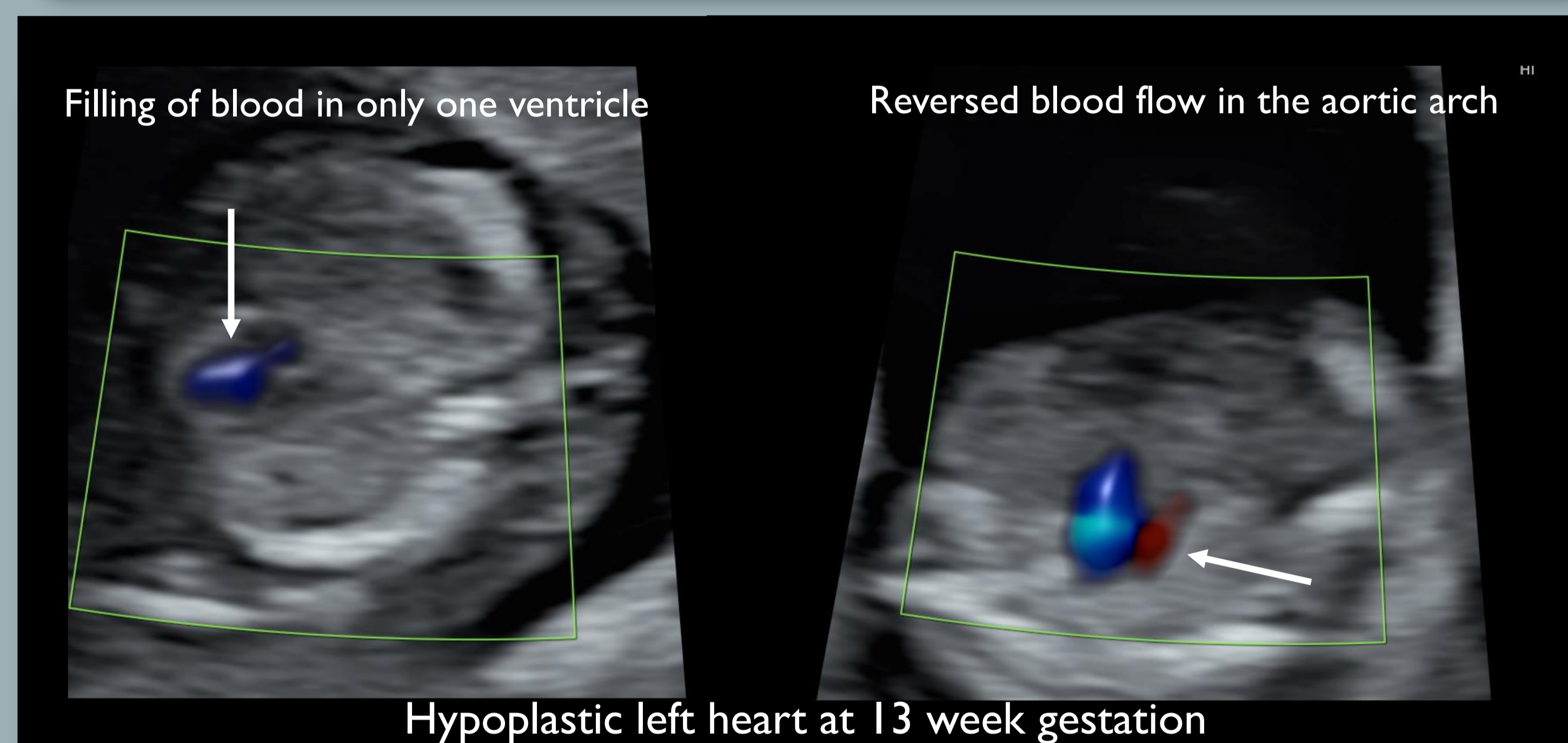
There were 13 fetal CHD in this cohort

A limitation of the audit is: if the CHD was not detected antenatally or fails to be reviewed at Liverpool FMU, we may not be informed of the finding.

2 CHD missed at 11-14 weeks - 11/13 (84.6%) were detected.

Detected: transposition of the great arteries (TGA), hypoplastic left heart, muscular VSD, Ebstein's anomaly, critical tricuspid regurgitation, aberrant right subclavian artery.

Missed CHD: TGA suboptimal /challenging maternal habitus detected at 19 weeks and a dysplastic tricuspid valve with aortic stenosis discovered as a neonate.



## Conclusion

- Rate of CHD (0.6%) was within the reported incidence 0.5-0.9% at birth
- 84.6 % CHD detection rate in a diverse and low risk population.
- Early screening provides reassurance/counselling/referrals and delivery planning



This audit supports that additional views of the heart increases CHD detection.<sup>6,7</sup>



Difficulty obtaining heart views transabdominally should prompt transvaginal imaging or early follow-up.<sup>8</sup>