BMUS

Antenatal Detection Of CHD

Challenges, Collaboration and Change

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tiny tickers
a better start for tiny hearts

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Disclaimer

This presentation is based on research conducted to the best of the presenter's abilities, acknowledging inherent uncertainties and limitations. The findings may be influenced by factors such as data quality, methodology, and interpretation, and do not guarantee real-world accuracy.

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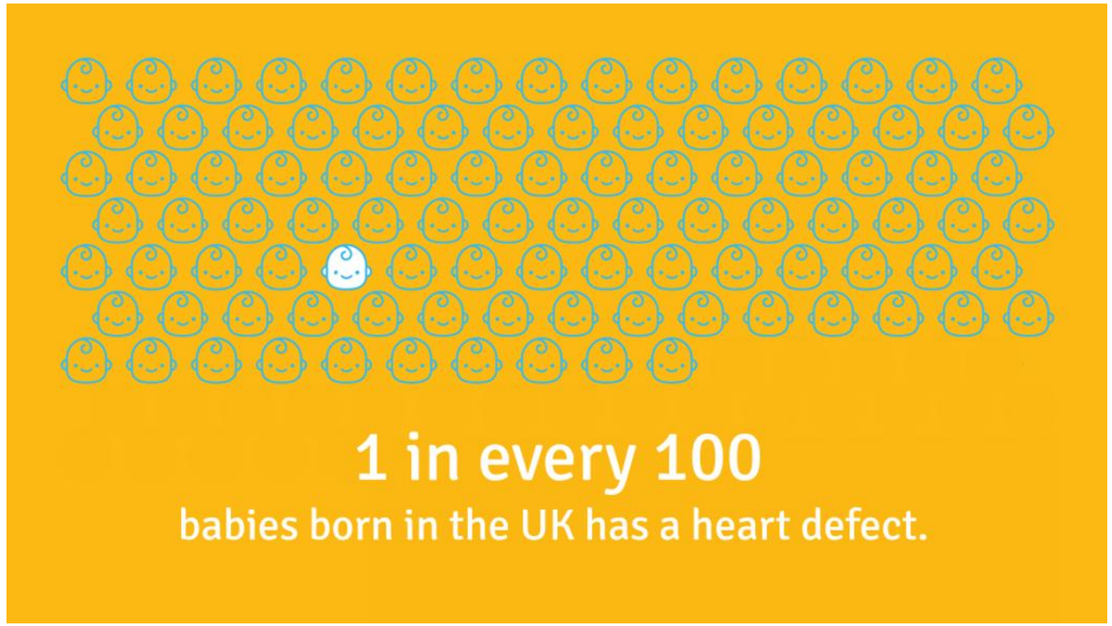
Overview

- Antenatal detection rate
- Challenges
- Collaboration
- Change

Congenital Heart Disease

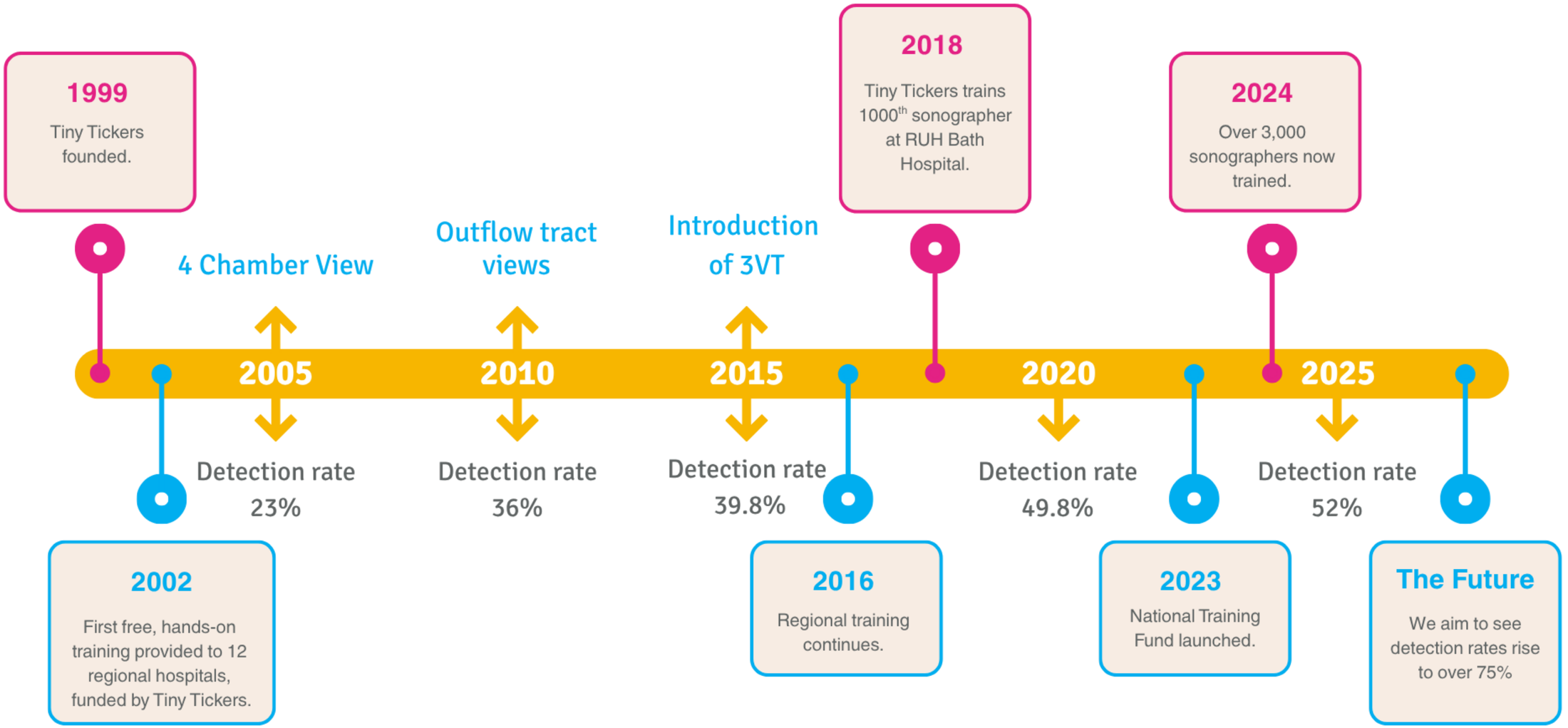
- The most common congenital anomaly
- Antenatal diagnosis significantly improves outcomes for babies with CHD



Source: Binocor, Congenital Anomaly Statistics 2012, published December 2014.

Why?

- Technology has vastly improved
- New views were introduced
- Education and training


1999
Tiny Tickers founded.
2002
First free, hands-on training provided to 12 regional hospitals, funded by Tiny Tickers.
4 Chamber View
2005
Detection rate 23%
Outflow tract views
2010
Detection rate 36%
Introduction of 3VT
2015
Detection rate 39.8%
2016
Regional training continues.
2018
Tiny Tickers trains 1000th sonographer at RUH Bath Hospital.
2020
Detection rate 49.8%
2023
National Training Fund launched.
2024
Over 3,000 sonographers now trained.
2025
Detection rate 52%
The Future
We aim to see detection rates rise to over 75%

Over half of all procedures in infancy have a successful prenatal diagnosis

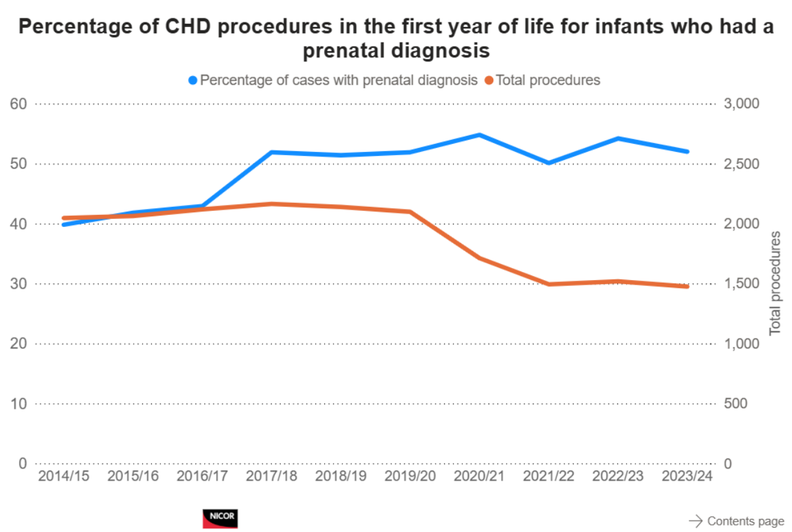
The audit collects data for babies diagnosed antenatally with a cardiac defect who then undergo an intervention in the first year of life.

In 2023/24, the detection rate was 52% for all infants requiring a procedure in the first year of life.

Over the last 7 years, the rate of antenatal diagnosis has plateaued at just over 50%.

Note: The data exclude spontaneous intrauterine deaths, termination of pregnancy, non-intervention after birth and unrecognised death in community or non-tertiary centre. For additional information, see here.

This link will be added at the publication stage



NICOR

→ Contents page

Antenatal diagnosis of four reported lesions remains good with anticipated cyclical variations in rates of prenatal detection

The figure shows the prenatal detection rate of four individual cardiac lesions where a procedure is performed in the first year of life:

- Hypoplastic Left Heart Syndrome (HLHS)
- Tetralogy of Fallot
- Transposition of the Great Arteries with intact ventricular septum (TGA-IVS)
- Atrio-ventricular septal defect (AVSD)

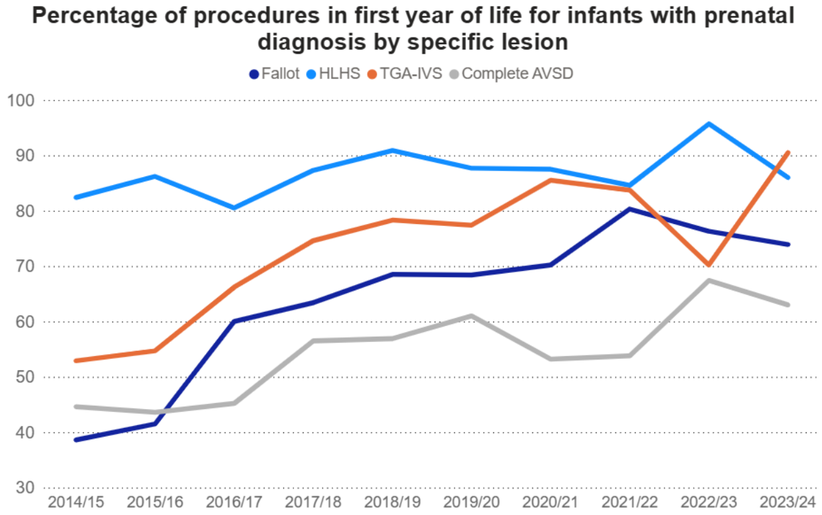
For those requiring a procedure in the first year of life, the prenatal detection of TGA-IVS was highest in 2023/24 at 91%, improved from the previous year.

Detection rates for all the remaining lesions were lower than the previous year. While this could be due to cyclical variation, the data could reflect:

- a genuine fall in detection
- an increase in the termination of pregnancy for these diagnoses
- differences in screening timing and methods used by sonographers.

Note: A full table of results is available here (Link will be functional when publication goes live).

This link will be added at the publication stage.



3VT

https://www.nicor.org.uk/~documents/route%3A/download/3668

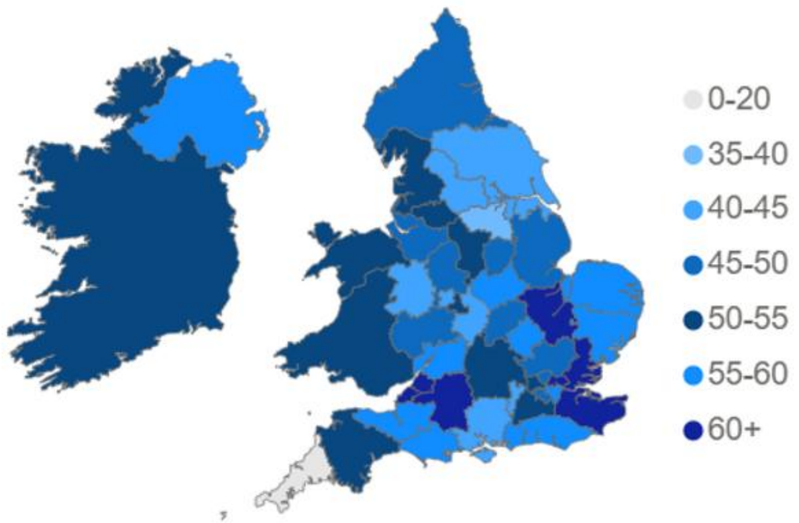
Considerable variation is seen in the rate of prenatal diagnosis across Integrated Care Boards and University Health Boards

The maps show the variation between ICBs/HBs in prenatal diagnosis rates for infants who underwent a procedure in the first year of life.

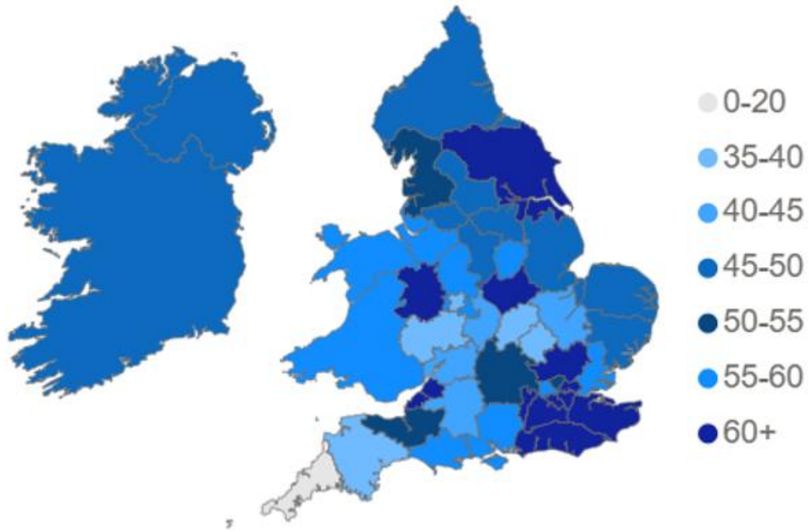
In 2023/24, the highest rate of antenatal diagnosis was 67% in East London Health and Care Partnership.

There is also a noticeable change in intra-regional rates of prenatal diagnosis between the two financial years 2022/23 and 2023/24 (e.g. in Devon where the figure rose to 53% in 2023/24 from 37% the year before).

Percentage of CHD procedures in the first year of life for infants who had a prenatal diagnosis in 2023/24

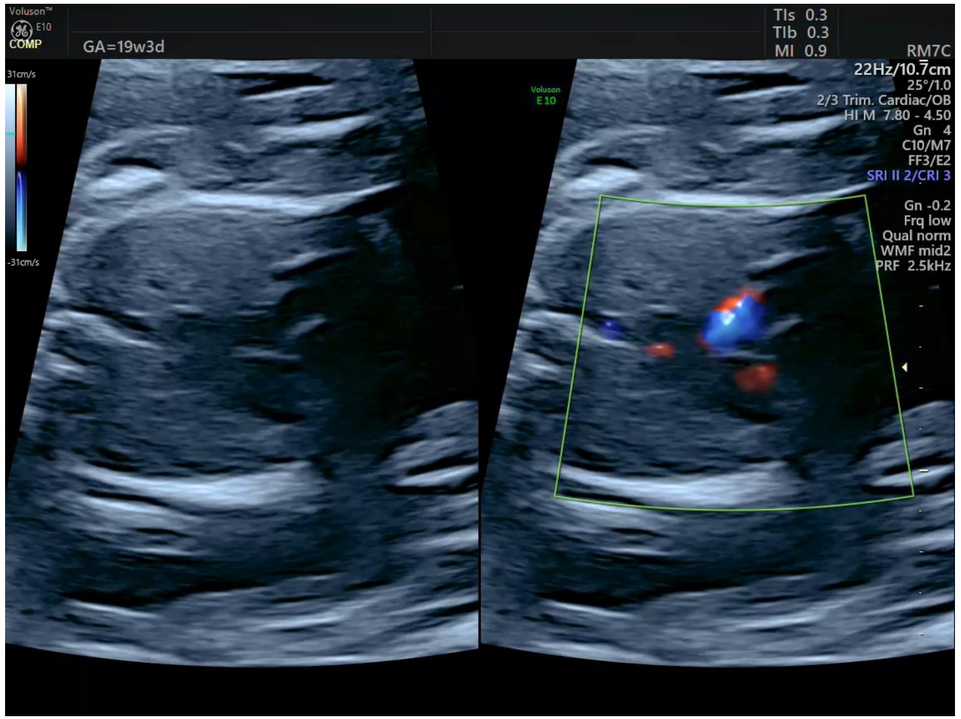


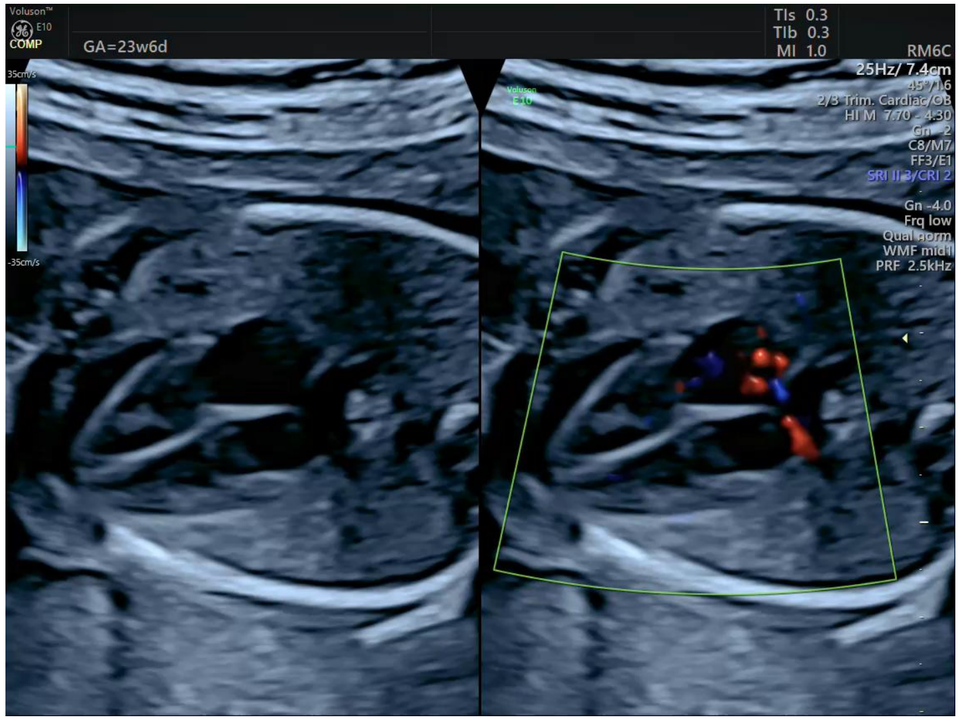
Percentage of CHD procedures in the first year of life for infants who had a prenatal diagnosis in 2022/23



Technical limitations

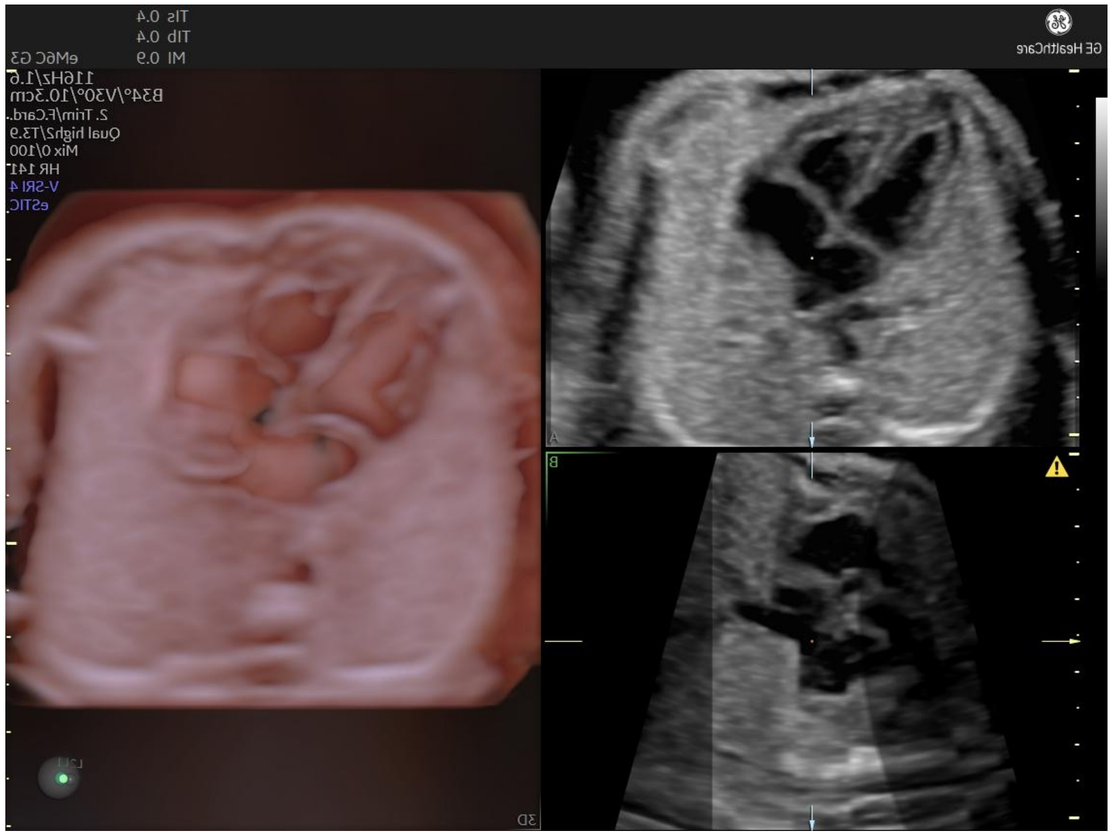
- Small cardiac structures
- Sub-optimal imaging – maternal tissue type, fetal position
- Variability in ultrasound equipment quality





Technical Improvements

- Invest in high quality ultrasound equipment
- Advanced imaging – 3D/4D
- AI



EClinicalMedicine. 2025 May 30:84:103250. doi: 10.1016/j.eclinm.2025.103250. eCollection 2025 Jun.

Artificial intelligence-enabled prenatal ultrasound for the detection of fetal cardiac abnormalities: a systematic review and meta-analysis

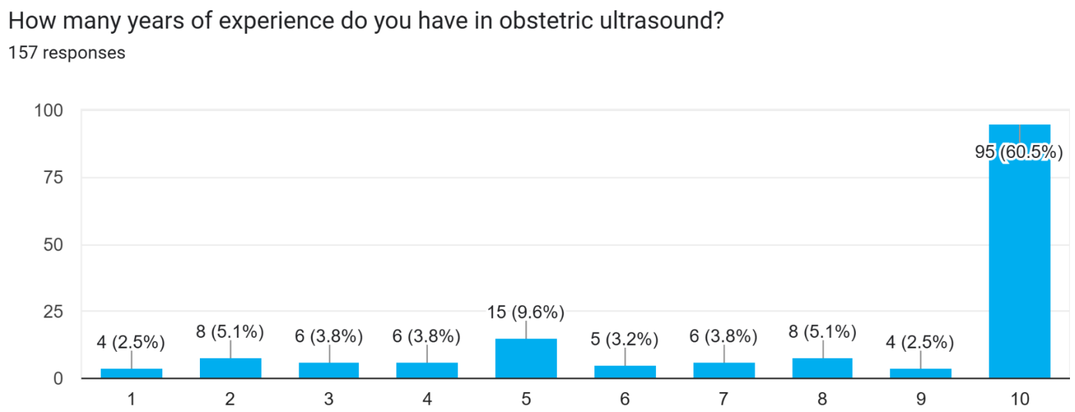
Elena D'Alberti [1 2], Olga Patey [1 3 4], Carolyn Smith [5], Bojana Šalović [4], Netzahualcoyotl Hernandez-Cruz [6], J Alison Noble [6], Aris T Papageorghiou [1 4]

Affiliations + expand

PMID: 40687738 PMCID: PMC12273734 DOI: 10.1016/j.eclinm.2025.103250

Sonographer skill and Training

- Variability in sonographer expertise
- Inconsistent adherence to cardiac screening protocols
- No hands-on mandatory training



44% **NOT** storing fetal cardiac views at the anatomy scan

56% Storing fetal cardiac views at the anatomy scan

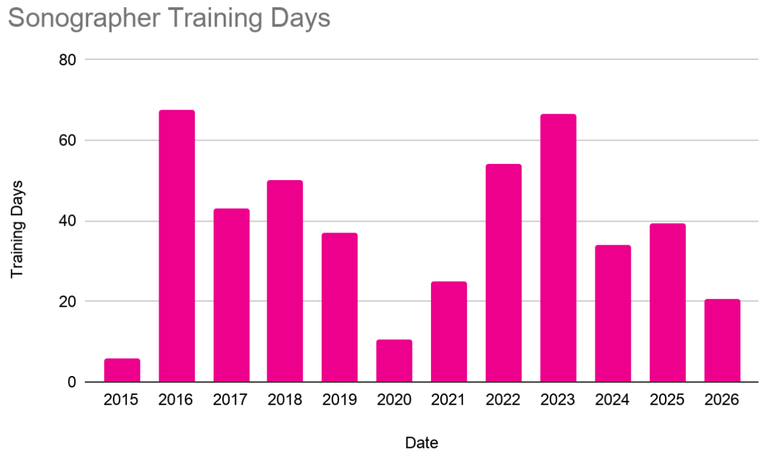
Freedom of Information Request 240285 to University Hospitals Sussex Released 19 July 2024 www.uhsussex.nhs.uk accessed 7/1/25.

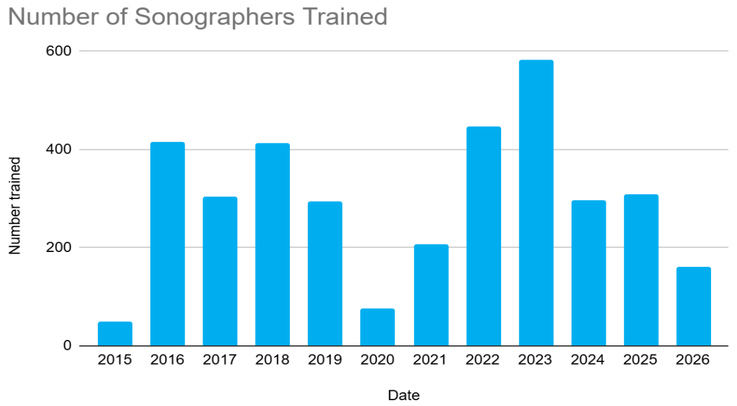
Improving Training

- Enhanced sonographer education in fetal cardiac views
- Regular skill refreshers
- Hands- on sessions

Since 2016 we have provided:

- Over 400 training days to hospitals across the UK
- Training to more than 3,200 sonographers.

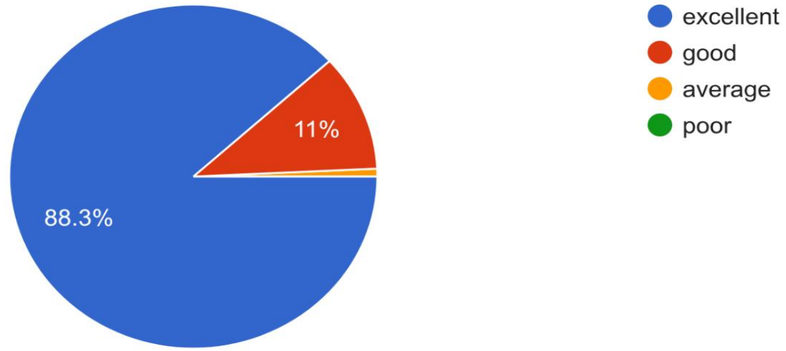




sonographers may have taken part in more than one training day over time and may be counted more than once

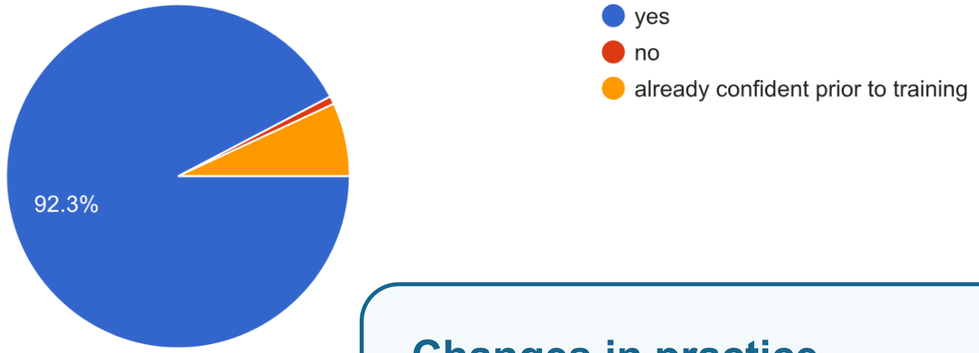
How would you rate the practical hands-on training provided by Tiny Tickers?

409 responses



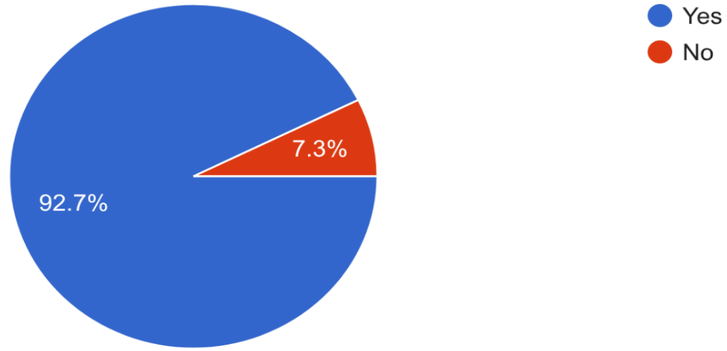
Has the training increased your confidence for referring potential abnormalities of the heart?

404 responses



Do you think you will change your practice as a result of this training day?

410 responses



Changes in practice

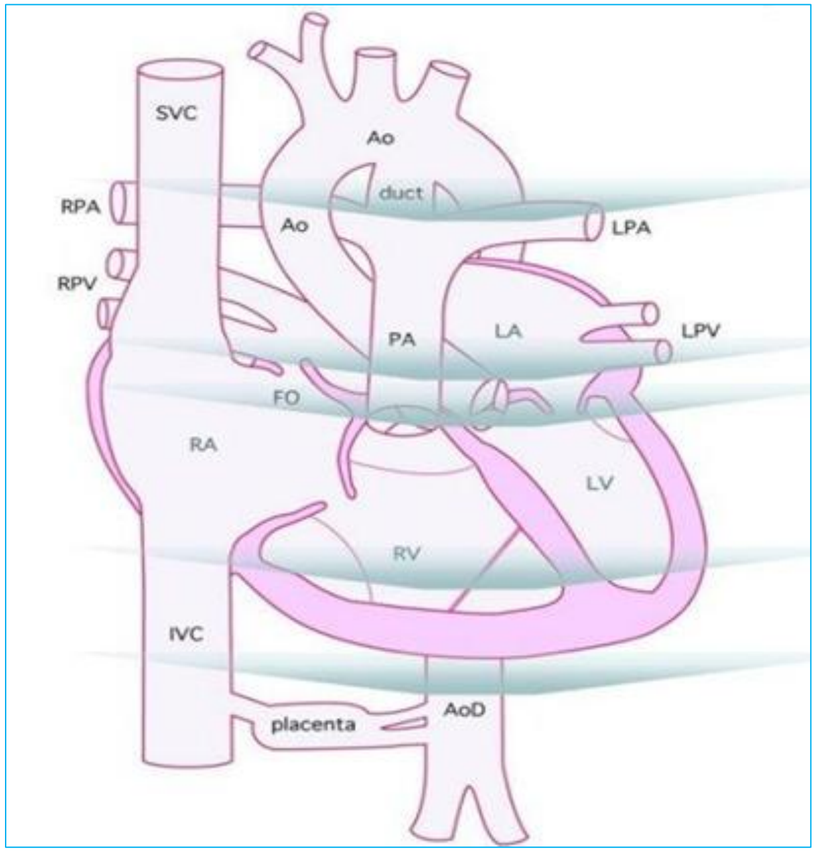
- Using a more systematic approach to scanning the heart
- Routine use of colour flow Doppler
- Utilising techniques for patients with a high BMI or difficult fetal lie

Screening Pathways

- Inconsistent implementation
- Limited time allocated for detailed anatomy scans

- FASP in England
- 18+0 - 20+6 weeks gestation
- Standard views
- Different guidelines
- ISUOG

- 3VT
- RVOT
- LVOT
- 4CH
- Situs



Screening Pathways

- Standardisation throughout the UK
- Detailed mandatory protocols
- Communication
- Optimise timings for anomaly scans
- Referral pathways for suspected CHD

Appendix 1 Checklist for cardiac screening

Upper abdomen			
	Stomach on left	☐ Yes	☐ No
Four-chamber view			
General	Heart on left, axis ~45°	☐ Yes	☐ No
	Heart area ≤ ⅓ chest area	☐ Yes	☐ No
	Regular rhythm, rate 120–160 bpm	☐ Yes	☐ No
Atria	Approximately equal in size	☐ Yes	☐ No
	Patent foramen ovale; foramen ovale flap valve in left atrium	☐ Yes	☐ No
	At least one pulmonary vein entering left atrium	☐ Yes	☐ No
Atrioventricular junction	Two separate valves that open and close freely	☐ Yes	☐ No
	Tricuspid valve more apical than mitral valve (normal valve offset)	☐ Yes	☐ No
Ventricles	Approximately equal in size	☐ Yes	☐ No
	Moderator band at apex of right ventricle	☐ Yes	☐ No
	Septum appears intact	☐ Yes	☐ No
Left ventricular outflow-tract view			
	Vessel in continuity with ventricular septum and does not bifurcate	☐ Yes	☐ No
	Aortic valve leaflets not thickened, open and close freely	☐ Yes	☐ No
Right ventricular outflow-tract view/three-vessel view			
	Vessel arising from right ventricle is anterior to aorta and bifurcates	☐ Yes	☐ No
	Great arteries crossover	☐ Yes	☐ No
	Pulmonary valve leaflets are not thickened, open and close freely	☐ Yes	☐ No
Three-vessel-and-trachea view			
	V-sign (ductal and aortic arches to left of trachea)	☐ Yes	☐ No
	Ductal and aortic arches similar in size	☐ Yes	☐ No

https://www.isuog.org/static/a529f402-06f9-42b6-ae9abdc736c43bf2/UOG-2023-Carvalho-ISUOG-Practice-Guidelines-updated-fetal-cardiac-screening.pdf

Sector Barriers

- Resource limitations
- Lack of equitable access to fetal cardiology specialists

Sector Interventions

- Tele- medicine
- Regional fetal cardiology networks

Sonographers Voice

- 158 responses
- Obstetric Ultrasound Experience – 60.5% > 10 years
- 24.2% had from 5 - 10 years experience
- 96.8% of respondents provide anatomy scans for the N
- 85.4 % have received Tiny Tickers training

https://www.isuog.org/static/a529f402-06f9-42b6-ae9abdc736c43bf2/UOG-2023-Carvalho-ISUOG-Practice-Guidelines-updated-fetal-cardiac-screening.pdf

Sonographers Voice

Recommendations

I think there should be more hands-on training for all professionals that undertake 20 week anomaly scans maybe every two or so years as a refresher

Not enough time to achieve diagnostic cardiac images within 30 minute appointment time

Heart scan would be better separate to 20 week scan to focus purely on heart not everything else.

Have a set policy nationally with listed view

Longer appointments

It would be good to have a fetal heart lead in departments, available for queries and training, similarly to the screening support sonographer.

Collaboration

Detection is a shared responsibility across the whole pathway

Sonographers

First line of detection

- Perform and store the standard cardiac views at the anomaly scan
- Flag suboptimal or incomplete views early, not just suspected abnormality
- Receive outcome feedback on every referral made

Fetal medicine team

Assessment and referral

- Provide timely second-look scanning and local expertise
- A bridge between screening and fetal cardiology
- Apply agreed referral pathway

Fetal cardiologists

Diagnosis and counselling

- Deliver fetal echo within agreed timescales
- Confirm diagnosis, counsel parents and plan delivery
- Lead joint image review and hands-on teaching

CHD networks

Standards and pathways

- Set shared protocols, referral criteria and audit
- Enable equitable access
- Feed regional outcome data back into training

A shared pathway — shared goals, joint training, agreed referral pathway and feedback

Change

Practical changes to systems and processes that would improve services and outcomes

Standardise the pathway

Consistency across every unit

- One agreed national view set, with mandatory storage of cardiac images
- Detailed written protocols covering colour Doppler and documentation
- Clear referral criteria - who, how and when to refer
- Realistic appointment times

Education and training

A confident, competent workforce

- Mandatory hands-on fetal cardiac training with regular refreshers
- A named fetal heart lead in every imaging department
- Joint case review with obstetric and cardiology colleagues
- Learning from missed diagnoses as well as successes

Strengthen the system

Equitable access and investment

- Funded, equitable access to training regardless of trust budget
- Telemedicine for remote review and rapid specialist advice
- Investment in ultrasound equipment and advanced imaging
- AI as a supportive second check at the point of screening

Together these changes move us beyond the 50% plateau - towards a detection rate above 75% and better outcomes for every baby with CHD

Take-Home Message

Collaboration drives early detection

Standardisation → Train together → Feedback

Tiny Tickers Learning Hub

Online training courses

- Courses covering different topics from a variety of speakers
- Can be completed at your own pace and in your own time
- Certificates of completion for each course

Sign up here