British Society of Echocardiography

Accreditation in Congenital Heart Disease (CHD) Echocardiography Information Pack

This pack is for the use of all candidates undergoing the accreditation process and becomes effective as of

25 April 2023

This document supersedes all previous versions

This document is a guide to completing BSE CHD accreditation

Submission and assessment criteria are included

Contents

Welcome message from Chair of Accreditation

Dear Candidate,

Welcome to the British Society of Echocardiography (BSE). The process underlying accreditation is set up to assist the echocardiographer in training.

We would encourage BSE members to undertake the relevant accreditation process, with the ultimate aim of achieving and maintaining a high standard of clinical echocardiography for the benefit of our patients.

The accreditation process is regulated to ensure a high level of proficiency and professional standard. We aim to make it possible for as many members to achieve accreditation. A list of accredited members is maintained on the BSE website.

Please let us know if we can assist you in this process or if you have constructive feedback to offer the accreditation committee; please just get in touch.

Good luck with your accreditation

process.

Best wishes,

Sadie Bennett

Chair, BSE Accreditation Committee

Introduction & aims

The BSE's congenital heart disease (CHD) accreditation is designed to maintain high standards of clinical echocardiography for the benefit of patients with CHD whilst providing Healthcare Professionals undertaking echocardiographic studies with additional training to support their practice.

Whilst the focus of this accreditation is designed for echocardiographers practicing within an adult CHD setting, a proficient level of knowledge in the echocardiographic assessment of CHD in children and adults will be required.

- Accreditation is run as a service for members of the BSE and is not a compulsory or regulatory certificate of competence or excellence.
- Accredited members are expected to be able to perform and report echocardiographic studies unsupervised.
- The Accreditation process comprises two parts: a written theory examination and a practical assessment. Further information for both is available within this pack.
- Accreditation is a minimum requirement and cannot be regarded as a guarantee of competence.
- Echocardiography skills can only be maintained by continued education and practical involvement in echocardiography. The importance of this is underlined by limiting accreditation to five years, after which reaccreditation must be sought. Further details surrounding reaccreditation can be found on the BSE website.

Summary of process requirements

- The candidate must be a member of the BSE and hold via BSE transthoracic echocardiography (TTE) or EACVI TTE accreditation prior to undertaking this accreditation process.
- A candidate must have a designated mentor to assist them through the accreditation process.
- The accreditation process has two compulsory elements: A written theory examination and a practical assessment. Both elements need to be passed in order to become an accredited member.
- The written theory exam compromises two parts: A multiple choice question (MCQ) theory section and a "best answer" image reporting section.
- The practical assessment compromises three parts: A logbook, a practical scanning assessment and a viva assessment of five patient case studies.
- The candidate must pass the written assessment before registering to attend the practical assessment.
- The logbook should be collected over a period of no more than 24 months from the written examination.
- Any queries regarding the accreditation process should be addressed to: BSE Accreditation Department, contact details and registrations are available on www.bsecho.org. **Tel:** 0208 065 5794 (operating hours **09:00 -17:00 Monday-Friday**, excluding UK public holidays), **email:** accreditation@bsecho.org.

Exam fees

- A fee of £275 is charged for the complete accreditation process. This fee is payable in advance upon registration for the written section of the examination and covers the practical assessment. There is a non-refundable booking fee of £25 to pay upon registering for a secured placement at the practical assessment.

- Candidates who are unsuccessful in the written section of the examination will be charged a reduced fee of £137.50 to re-sit this section. This reduced fee only applies to candidates who re-sit the examination within two sittings of the unsuccessful attempt (i.e. within 12 months of an unsuccessful attempt).
- Candidates are entitled to one re-attempt at the practical assessment. A re-attempt at the practical assessment is subject to an additional fee of £137.50.

Extensions and appeals

- Extensions to the 24-month deadline may be granted per the extensions policy. Extension requests forms must be submitted **before the submission deadline.** Extension request information and forms (along with all other BSE application forms) can be found at www.bsecho.org. Requests received after the case deadline may not be granted.
- Candidates can appeal the decision on a practical assessment. There is no appeals process for the written section of the examination. Further information can be accessed via www.bsecho.org.

Mentor

- A mentor is an experienced echocardiographer who can successfully guide a candidate through the BSE accreditation process. If the echocardiographer is BSE accredited, this is an advantage but not essential.
- The mentor should have a clear understanding of the accreditation process including the training syllabus (see Appendix 1)and all relevant assessment criteria (see remainder of this accreditation pack for more details).
- The mentor must assess the candidate's ability to undertake a CHD echocardiogram to a proficient level. Once a proficient level of ability is achieved the mentor must complete the curriculum-based competency tool and the mentor statements. These can be accessed and completed via the online logbook portal. The curriculum-based competency tool can also be found in Appendix 2.
- Candidates who cannot find a mentor should contact us; we will try our best to help source a suitable mentor. Alternatively, candidates can reach out to local BSE representatives, please visit the Governance, committees section of www.bsecho.org.

Details of the written theory examination

- The full training syllabus for this accreditation process is available in Appendix 1. A recommended reading list is available in Appendix 3.
- This is held twice a year, usually in the Spring and Autumn. The examinations are held at various Pearson VUE centres across the UK, Republic of Ireland, and some overseas locations. Dates and online registration are announced on the written assessment section of BSE website. Further information on registrations for the written examination can be found in Appendix 4.
- The written examination has two parts, an MCQ and an image reporting section. In order to pass the written examination overall, it is necessary to pass both parts at the same exam sitting.
- The pass mark for the MCQ section is 70%, the image reporting section is 60%. These may vary slightly at the discretion of the Accreditation Chair following moderation.
- There is no bar to re-sitting the written examination any number of times.
- Accreditation is awarded once a candidate has also successfully completed the practical assessment. Satisfactory performance at the written assessment alone does not allow 'partial accreditation.'

Multiple-choice section

- Consists of 25 questions that must be answered within 60 minutes.
- Questions are designed to test the knowledge of CHD echocardiographic findings. There are no questions relating to the physics of ultrasound as this has already been demonstrated in BSE or EAVCI TTE accreditation.
- The subject matter reflects the scope of clinical practice according to both frequency and technical complexity. Candidates should understand the whole spectrum of disease from foetus to adult.
- Each question comprises a brief statement followed by five questions. Candidates are required to answer 'true' or 'false' to each question. Example questions are provided in Appendix 5.
- This part of the examination will be marked +1 for correct answers, 0 for incorrect, or unanswered questions (no negative marking).
- There are no 'trick' questions.
- There are no fixed number of correct answers, i.e. for each question, it is possible for every answer to be false or every answer to be true or any combination of true or false.
- The maximum possible mark is 125.

Image reporting section

- Consists of 50 questions centred around 10 patient case studies that must be answered within 90 minutes.
- The candidate will be presented with 10 patient case studies. Each case study will compromise of relevant patient details and a variety of echocardiographic images.
- For each case study, the candidate will be required to answer five questions. Each question will have four possible answers, the candidate must select the best single answer. An example case study and questions are provided in Appendix 6
- The maximum possible mark is 50.

Details of the practical assessment

- The practical assessment is held two times per year. Dates, locations and online registration instructions are announced on the practical assessment section of BSE website.
- The practical assessment has three parts, a 200 case logbook, a practical scanning assessment and a viva assessment of five patient case studies.
- All candidates will be required to attend a within 26 months of starting the accreditation process (i.e. within two months of their case collection deadline). A two months of grace period has is designed to give the candidate time to review, prepare and submit the logbook and 5 viva cases.
- Registration should ONLY be sought after collecting the logbook and patient case studies.
- It is the Candidates responsibility to ensure they enter correct information on registration forms. Incorrect information will lead to a rejected registration.
- Logbooks are to be submitted in advance, a logbook submission deadline is displayed on the online booking page, please read carefully before booking a space. If there are any concerns, please email accreditation@bsecho.org.

Logbook submission

- The logbook should demonstrate the candidate's ability in meeting the competencies as shown Appendix 2. The specific case mix of the logbook is shown below.
- It should consist of 200 reports personally **performed and reported** by the candidate during the specified period of 24 months.
- The logbook format is copies of the actual clinical report. The reports are to be uploaded and submitted via the BSE logbook portal. Please see the portal user guide in Appendix 7 . **Non-portal logbooks will not be accepted.**
- For full details of what is expected in reports and how the logbook is marked, please see Appendix 8.
- Duplicate reports are not acceptable.
- If a candidate has problems finding enough specific cases, this should be discussed with their mentor who may consider arranging for the candidate to attend a nearby centre.
- The logbook should reflect the candidate's best clinical practice, and as such targeted scans, unless showing a significant and rare pathology, should not be included.
- Competencies and mentor statements are to be completed via the BSE logbook portal.
- Fully subscribed BSE members can request access to the portal before sitting the written examination by emailing accreditation@bsecho.org.

The logbook case mix should include:

- A maximum of 5 cases to demonstrate sequential segmental analysis where there is no significant cardiac abnormality (PFO/PDA acceptable in a new born case).
- At least 25 cases should be for unrepaired shunt lesions.
- At least 25 cases should be for repaired shunt lesions.
- At least 5 cases should be for unrepaired cyanotic or complex congenital disease.
- At least 25 cases should be for repaired cyanotic or complex congenital disease.
- At least 25 cases should be for valve disease / outflow obstruction.
- At least 5 cases should be for suspected coronary artery anomalies.

Additional information for logbook case mix:

- Sequential segmental analysis may include normally connected hearts.
- Unrepaired shunt lesions may include ASD, VSD, AVSD, PDA.
- Repaired shunt lesions may include ASD, VSD, AVSD, PDA.
- Unrepaired cyanotic or complex congenital disease may include TGA, tetralogy of Fallot, pulmonary atresia with VSD, pulmonary atresia with intact septum, DORV, truncus arteriosus, anomalous pulmonary venous drainage, univentricular heart or ccTGA.
- Repaired cyanotic or complex congenital disease may include TGA, tetralogy of Fallot, pulmonary atresia with VSD, pulmonary atresia with intact septum, DORV, truncus arteriosus, anomalous pulmonary venous drainage, univentricular heart or ccTGA.
- Valve disease / outflow obstruction may include subvalvular membrane, bicuspid aortic valve, coarctation, Ebstein's anomaly or pulmonary stenosis.
- Replacement / repaired valves in the setting of CHD may include any replaced/repaired valve.
- Suspected coronary artery anomalies may include normal ostia findings.

Other information regarding the logbook:

- **All** patient identifiable data needs to be removed. This may require the manual removal of identifiable data. See Appendix 9.
- **At least the final 150** cases should be reported primarily by the candidate, although they may be checked by another operator.
- We expect reports to reflect departmental practice at your centre but may question candidates on up-to-date normal ranges as they are published.
- The candidate's name must appear on the report as the performing and reporting echocardiographer / sonographer. Where local policy deviates from this, a supporting letter and current standard operating procedure from the departments echo lead stating local policy should be included. This should be submitted under the "optional supporting information" section on the BSE logbook portal.
- Final sign off / validation of the logbook is undertaken by the departments echo lead. Please see the portal user guide in Appendix 7.
- **Logbooks must be submitted in advance**, usually up to eight weeks before a practical assessment date. Please check the online registration information before booking a space. Candidates may request an extension by contacting accreditation@bsecho.org.

Practical scanning assessment

Consists of a candidate acquiring up to 10 different echocardiographic imaging views within 20 minutes. A real-life model or simulator may be used.

This part of the assessment is designed to assess a candidates practical scanning ability along with their ability to perform basic image optimisation.

All imaging views used in this assessment are taken from the from the recommended minimum CHD imaging list as shown on the BSE website.

A pass mark / trigger score of 66% is used. Once obtained, the candidate will be deemed successful at this part of the assessment process.

The candidate is not expected to be familiar with the equipment. The Assessor will alter equipment setting as directed by the candidate.

For full details of the practical scanning marking criteria please see Appendix 10.

Patient case study viva assessment

- Consists of a viva assessment of five separate patient case studies. See below for the required cases.
- The candidate will be expected to discuss their patient cases **with** the Assessor. All five cases may be reviewed.
- For full details of the viva case marking criteria please see Appendix 11.
- The cases must represent a complete study that is of good quality. Cases should be accompanied with a printed report. This should be complete, comprehensive and reflect the patient case study being presented.
- The candidate must ensure that at least one full cardiac cycle is recorded. The cases must play automatically / continuously within a PowerPoint presentation (or equivalent). Cases that do not play appropriately may be classified as an unsuccessful attempt.
- Candidates must bring and present their patient case studies on their **own laptop. It is the candidate's**

responsibility to ensure these are anonymised and can be viewed in a manner to allow an assessment of the cases being presented.

The viva case studies should include one of each of the following:

1. A study showing no significant abnormality
2. A study showing echocardiographic assessment of a simple unrepaired lesion.
3. A study showing echocardiographic assessment of uncorrected complex or cyanotic heart disease.
4. A study showing echocardiographic assessment of a repaired case of complex CHD.
5. A study showing left or right heart obstruction.

Patient case studies may be used in subsequent BSE written exams, educational and training sessions

Practical assessment- Outcomes and process for re-attempts

In total a candidate will have two attempts at passing the practical assessment part of the accreditation process. A second attempt at the practical assessment is subject to a fee of £137.50.

If a candidate is successful in all three parts of the practical assessment, the candidate will be awarded BSE CHD accreditation and will join the accredited member list.

If a candidate is unsuccessful in any of the three parts of the practical assessment, the candidate will be deemed to have been unsuccessful at this first attempt. The candidate will be provided with constructive feedback to facilitate a re-attempt. See below for more details.

In the event of an unsuccessful first attempt, the candidate may be requested to resubmit logbook reports / patient case studies. These must be new reports / patient case studies. A candidate is not permitted to resubmit previously assessed work under any circumstance.

If a candidate is unsuccessful at the second attempt of the practical assessment. The accreditation process must be started over with the candidate undertaking the written examination again.

In the event of an unsuccessful attempt, the candidate is required to:

- Attend another practical assessment and re-attempt ONLY the parts of the practical assessment that the candidate was unsuccessful at in the first attempt. The pass marks from the remaining practical assessment elements will be upheld.
- The timescale allowed for re-attempts will depend on which elements were unsuccessful and the candidates current and future work commitments. This will be discussed with the candidate during the first attempt. Typical timeframes may include: 3-9months.

Our feedback consistently demonstrates that non-face to face feedback does not adequately equip a candidate to pass at the next sitting. Therefore, all re-attempts at the practical assessment, require the candidate's attendance in-person to facilitate adequate and helpful face-to-face feedback*

**Subject to government guidance we may authorise virtual submissions.*

Appendix 1: Training syllabus

The following sections form the minimum suggested training syllabus for this accreditation process.

Candidates should use as a guide to prepare for the written and practical assessments of this accreditation process.

1. General Concepts

1.1 Image optimisation

- Factors affecting choice of imaging frequency: typical practical values for adults & children
- Use of distraction techniques to assist in obtaining images
- Use of non-standard views

1.2 Relationship with patients

- Explaining the procedure in terms relevant to the particular patient
- Respect for patients' dignity and cultural backgrounds
- Relationships with patient, parents, carers and colleagues
- Handling requests for information about the study findings

1.3. Conscious sedation in children

- Explaining the procedure in terms relevant to the patient/parents
- Specific environment for performing studies in children/adults with CHD
- Indications for conscious sedation
- Precautions, dosage, follow-up

1.4 Reporting and Documentation

- Standard methods & terminology used for describing congenital heart disease (segmental sequential analysis)

2. Cardiac Anatomy and Physiology

2.1 Anatomy of the thorax

- Thorax contained by rib cage & diaphragm
- Lungs & pleura; heart & pericardium; mediastinum
- Blood vessels within the thorax

2.2 Cardiac morphology and echo identification for the congenital sonographer

- Cardiac position, levocardia, dextrocardia, mesocardia
- Atrial situs - definition, abdominal aorta and great vein relationship
- Systemic venous return: morphology
- Pulmonary venous return: morphology
- Atrial anatomy
    - difference between right and left atrium, atrial appendages
- Ventricular anatomy
    - Morphology of right and left ventricle
    - Atrioventricular valve arrangement
    - Trabecular pattern
    - Ventricular shape.
    - Inlet and outlet valve relationships
    - Chordal attachments
- Atrioventricular valves:
    - anatomy of mitral and tricuspid valve
- Semilunar valves: anatomy of pulmonary and aortic valve
- Intra-atrial septum

    - Morphology
    - Primum and secundum septum
    - Foramen ovale
    - Sinus venosus
- Interventricular septum
    - Morphology
    - Inlet
    - Outlet
    - Membranous
    - muscular septum
- Pulmonary artery anatomy
- Aortic anatomy
- Coronary artery anatomy: normal anatomy and variants
- The arterial duct: normal anatomy and normal variants
- The pericardium: anatomy
- Visualisation of normal cardiac anatomy and normal variants in standard echocardiography planes
- Normal valve function, normal Doppler parameters and normal variants

2.3 Terminology of congenital heart disease

- Atrial situs and situs abnormalities
    - Situs inversus
    - Right and left isomerism
    - Cortriatriatum
- Atrioventricular connections
    - Concordant
    - Discordant
    - Double inlet
    - Absent connection
    - Straddling valves
    - Criss-cross connections
- 'Univentricular' heart: description of different variants
- Ventriculoarterial connections
    - Concordant
    - Discordant
    - Single outlet
    - Double inlet
- Great artery relationships

2.4 The physiology of congenital heart disease

- The fetal circulation: how it differs from the postnatal circulation
- Circulatory changes at birth: the neonatal circulation
- Adaptations in circulatory physiology during the first weeks of life
- Causes of chamber dilation and hypertrophy
- Ventricular pressure and volume overload
- Physiological effect of shunts at atrial, ventricular and great artery level
- Physiological effect of regurgitation through all four valves
- Physiological effect of stenosis on all four valves

2.5 Cardiac anatomy and physiology as demonstrated by echocardiography

- Detailed structural anatomy of the heart, great vessels and pericardium
- Visualisation of normal cardiac anatomy and normal variants in standard echocardiographic planes
- Normal valve function, normal Doppler parameters and normal variants

- The phases of atrial function: reservoir, conduit and contractile phases
- The LV remodelling process in response to disease: eccentric (chronically elevated preload) vs. concentric hypertrophy (chronically elevated afterload)

2.6 The Cardiac Cycle

- Temporal relationships of the ECG, chamber pressures and valve movements
- Typical values for intracardiac pressures
- Relationship of valve movements to heart sounds
- Identification of valve opening and closure signals on Doppler recordings
- The timing of aortic valve closure as a marker of end-ejection, as derived from M-mode, blood flow Doppler or tissue Doppler

3. Cardiac functional parameters

3.1 Measurements and calculations

- On-screen measurement of length, slope, area, volume and time interval, and their significance for 2-D, 3D images, M-mode and spectral Doppler displays
- Standard M-mode measurements (including MAPSE and TAPSE) and calculations, both using machine software and manual methods
- Derivation of Stroke Volume, Ejection Fraction and LV Mass
- Methods of measuring LV volume, including biplane area, area-length, Simpson's rule methods and 3D.
- Limitations of single plane estimations of LV ejection fraction e.g. Teicholtz formula method
- Limitations of single plane measurements of LA size
- Geometric assumptions used in estimation of cardiac chamber volumes with M mode and 2D imaging
- The advantages of deriving volumes and ejection fraction by 3D echocardiography
- Limitations of measurement and/or calculation validity in the presence of poor quality and/or off-axis images
- Assessment of cardiac structures in paediatrics referenced to Z scores

3.2 Doppler determination of cardiac output, ejection time and velocity acceleration

- On-screen measurement of length, slope, area, volume and time interval, and their significance for 2-D, 3D images, M-mode and spectral Doppler displays
- Standard M-mode measurements (including MAPSE and TAPSE) and calculations, both using machine software and manual methods
- Derivation of Stroke Volume, Ejection Fraction and LV Mass
- Methods of measuring LV volume, including biplane area, area-length, Simpson's rule methods and 3D.
- Methods of measuring diastolic dysfunction: E/A ratio, deceleration time, pulmonary venous flow patterns, the ratio of the peak early diastolic transmitral velocity and the peak early diastolic tissue velocity of the mitral valve annulus (the E/E' or E/Ea) ratio for estimating LV filling pressures, the mitral valve propagation velocity.
- Peak and Mean pressure gradient measurements by Doppler and their relationship to catheterisation data
- Measurement of pulmonary pressures from tricuspid and pulmonary regurgitant flow velocities and assessment of inferior vena cava contraction during inspiration

4. Contrast studies

- Significance of spontaneous echo contrast
- Optimisation of machine control settings for detecting contrast
- Main indications for a bubble contrast study: diagnosis of intracardiac shunts and PFO, diagnosis of left sided SVC
- Manoeuvres to provoke right to left passage of bubbles during assessment for PFO

- Relevance of injecting bubble contrast through upper arm vein vs. femoral vein for detecting PFO
- Technique for performing a hand-agitated contrast study
- Clinical precautions

5. Pathology and echocardiographic assessment for the congenital sonographer

5.1 Septation defects

- Atrial communications
  - Anatomical variations :Sinus venosus, secundum, primum defects, unroofed coronary sinus and associated lesions
  - Echo features of atrial communications
  - Assessment of shunt
  - Evaluation of right heart pressures
  - Evaluation of pulmonary veins
  - Surgical and percutaneous closure of defect and echo assessment following closure

- Ventricular septal defects
  - Anatomical variations : perimembranous, muscular, apical, doubly committed
  - Echo features of VSD
  - Assessment of haemodynamic effect of the shunt, restrictive / non restrictive
  - Evaluation of right heart pressures
  - Aortic valve cusp prolapse
  - Subvalvar aortic stenosis
  - Double chambered RV
  - Malalignment of the ventricular septum, anterior / posterior deviation
  - Percutaneous and surgical closure of VSD's and echo assessment following closure

- Atrio-ventrcular septal defect (AVSD)
  - Anatomical variations
  - Echo features of AVSD
  - AV valve function in AVSD
  - Assessment of LVOT obstruction
  - Evaluation of pulmonary hypertension
  - Echo assessment following surgical correction

5.2 Shunt lesions (not caused by septation defects)

- Arterial duct
  - Anatomical variations
  - Echo views to assess arterial ducts
  - Haemodynamic effects of an arterial duct
  - Ductal flow patterns
  - Surgical and percutaneous closure of defect and echo assessment following closure

- Basic anatomy and echo features of other acyanotic lesions
  - AP window
  - Unroofed CS
  - PA from aorta
  - Coronary artery fistula
  - Sinus of Valslva fistula

5.3 Cyanotic Shunts

- Transposition of the Great Arteries (TGA)
  - Anatomy and variations
  - Echo features of TGA in the newborn
  - Associated lesions (VSD, PS)
  - Coronary artery anatomy and variations
  - Surgical treatment in TGA
  - Echo evaluation and assessment following atrial switch
  - Echo evaluation and assessment in arterial switch
  - Echo evaluation and assessment following Rastelli procedure

- Tetralogy of Fallot / Pulmonary atresia with VSD
  - Anatomy and variations
  - Assessment of pulmonary blood flow
  - Echo assessment in uncorrected TOF
  - Assessment of coronary arteries
  - Surgical treatment for TOF
  - Echo assessment and evaluation of the post operative TOF and associated complications.

- Pulmonary atresia intact septum
  - Anatomy and variants
  - Echo assessment of pre operative patient
  - Percutaneous and surgical assessment and the echo evaluation of the treatments

- Double Outlet Right Ventricle (DORV)
  - Anatomy and variations
  - Echo evaluation and assessment of uncorrected DORV
  - Surgical treatments
  - Echo evaluation and assessment of the post operative patient

- Truncus arteriosus
  - Anatomy and variations
  - Echo evaluation and assessment of the pre op patient
  - Surgical treatment

- Anomalous pulmonary venous drainage
  - Anatomy and variations, partial and total, supracardiac and infracardiac
  - Assessment of pulmonary veins in partial and total anomalous pulmonary venous drainage.
  - Echo features pre and post surgical correction

5.4 Other complex lesions

- Univentricular heart
  - Anatomy and variations
  - Echo assessment and evaluation
  - Staged surgical and interventional procedures
  - Evaluation of Fontan circulation by echocardiography

- ccTGA, Double discordance
  - Anatomy and variations
  - Echo assessment of evaluation of unrepaired ccTGA
  - Surgical treatment options and post-operative assessment, including double switch.

5.5 Congenital valvular disease/Outflow tract obstruction

Mitral valve anomalies

- Echo assessment of the congenitally abnormal mitral valve
  - Anatomy and different variants of mitral valve anomalies
  - Description of the valve and subvalvar apparatus
  - Measurement of orifice area by planimetry

- Doppler assessment of severity of stenosis/regurgitation
  - Mean and end-diastolic gradient
  - Valve area by pressure half-time: technique and limitations

- Mitral valve prolapse: definition and echocardiographic assessment
- Echocardiographic assessment of surgical mitral valve repair

Aortic valve anomalies

- Echo assessment of the congenitally abnormal aortic valve
  - Anatomy and different variants of aortic valve
  - Assessment of the left ventricle: size, hypertrophy, systolic and diastolic function
  - Associated left ventricular outflow tract abnormalities
  - Effect on the aortic root
  - Associated lesions

- Doppler assessment of the aortic stenosis and regurgitation
  - Assessment by CW Doppler, including stand-alone CW probe
  - Peak and mean gradients
  - Apical, right parasternal and suprasternal positions
  - Continuity equation

- Echocardiographic assessment of surgical and percutaneous treatments for congenital aortic valve disease including balloon valvuloplasty, repair, Ross procedure
- Echocardiographic assessment of the aorta in Marfans syndrome, Sinus of Valsalva aneurysm, aortic dissection.

Tricuspid anomalies

- Echo assessment of the tricuspid valve
  - Anatomy and congenital variations of the tricuspid valve including dysplastic TV, Ebsteins anomaly
  - Assessment of the right heart, size and function
  - Doppler assessment of stenosis and regurgitation
  - Echocardiographic assessment of surgical and percutaneous treatment for the tricuspid valve

Pulmonary anomalies

- Echo assessment of the tricuspid valve
  - Anatomy and congenital variations of the pulmonary valve, sub valvar, valvar, supravalvar lesions
  - Imaging and Doppler assessment of the outflow tract, infundibular obstruction
  - Assessment of the right heart, size and function

- Doppler assessment of obstruction / regurgitation
- Associated abnormalities
- Echo assessment of surgical and percutaneous treatment for the pulmonary valve

LV outflow tract obstruction

- Echo assessment of subvalvar aortic stenois
  - Anatomy and congenital variations
  - Imaging and Doppler assessment
  - Surgical procedures and complications
  - Associated lesions

- Echo assessment of supravalvar aortc stenosis
  - Anatomy and congenital variations
  - Imaging and Doppler assessment
  - Surgical procedures
  - Associated lesions

- Coarctation of the aorta
  - Anatomy and variations of the aortic arch
  - Site and type of narrowing
  - Imaging and Doppler assessment including full Bernoulli equation
  - Effect of a patent arterial duct on the assessment of the arch
  - Percutaneous and surgical procedures and the post op echo assessment
  - Associated lesions
  - Complications and re-coarctation

- Interrupted aortic arch
  - Site and type of interruption of the aorta
  - Imaging and Doppler assessment
  - Associated lesions
  - Surgical procedures and post op echo assessment

RV Outflow tract obstruction

- Echo assessment of subvalvar pulmonary stenosis
  - Anatomy and congenital variations
  - Imaging and Doppler assessment
  - Surgical procedures
  - Associated lesions

- Supravalvar stenosis and peripheral branch PS
  - Anatomy and congenital variations
  - Imaging and Doppler assessment
  - Surgical procedures
  - Associated lesions

5.6 Prosthetic Valves

2D, M-Mode and Doppler features of the main types of replacement valves

- Tilting Disc
- Bi-leaflet
- Bioprostheses (stented and stentless)

- Age-related deterioration of bioprostheses
- Role of TOE in examining normal and malfunctioning prosthetic valves

Prosthetic valve stenosis

- Assessment by 2D, M-mode and Doppler
- Normal ranges
- Use of Continuity Equation for aortic prostheses
- The phenomenon of pressure recovery
- The diagnosis of patient-prosthesis mismatch

Prosthetic valve regurgitation

- Trans-versus para-valvar regurgitation
- Normal versus abnormal regurgitation
- Assessment by CW, PW and Colour
- Doppler Colour artefacts from mechanical prostheses

5.7 Congenital coronary anomalies

- Anatomy & nomenclature of the major branches of the coronary arteries
- Imaging of the coronary artery origins
- Relationship of coronary anatomy to standard echocardiographic imaging planes
- Echo identification and assessment of congenital coronary artery anomalies including anomalous origins and transmural coronary course
- Physiological effect of coronary artery abnormalities
- Echo assessment of surgical treatment for coronary artery anomalies
- Echo features and assessment of coronary artery fistulae
- Echo assessment for surgical and percutaneous treatment of coronary artery fistulae
- Use of Z scores in congenital coronary anomalies

5.8 Intracardiac Masses

- Typical locations for formation of intracardiac thrombus
- Intracardiac masses that may present in childhood and their echo features, e.g. rhabdomyoma, fibroma, teratoma, myxcoma
- Features suggestive of malignancy
- Role of TOE in assessment of intracardiac masses
- Role of contrast in the assessment of intracardiac masses

6. Acquired heart disease

6.1 Infective endocarditis

- Use of Z Typical echocardiographic appearance of vegetations in bacterial and fungal endocarditis
- Preferred locations for vegetations
- 'Jet', 'kissing' lesions
- Endocarditis associated with congenital disease and HCM
- Complications: abscess, fistula, perforation, valve regurgitation
- Role of TOE in suspected

6.2 Pericardial disease

- Echocardiographic features of pericardial fluid
    - Location of fluid in relation to patient position and fluid volume
    - Differentiation from pleural effusion

- Assessment of volume of pericardial fluid
- Role of echocardiography in pericardiocentesis

- Features of tamponade
  - Collapse of RA and/or RV walls
  - Effect on IVC and hepatic vein flow pattern
  - Effect on A-V valve flow velocities during respiratory cycle

6.3 Kawasaki disease

- Echo assessment and follow up of Kawasaki disease
- Assessment of coronary artery ostia
- Use of Z scores to assess coronary artery dimensions

6.4 Duchene Muscular Dystrophy

- Echo assessment and follow up of Duchene muscular dystrophy

6.5 Rheumatic fever

- Echo assessment and follow up of rheumatic fever

6.6 Pulmonary Hypertension and functional assessment of RV

- 2-D, M-mode and Doppler features of pulmonary hypertension
- Aetiologies: primary; post pulmonary embolism; secondary to left-sided lesions; lung disease
- Assessment of global systolic function of the RV: Tricuspid annular peak systolic
- Excursion by M-mode (TAPSE), fractional area change of the RV, tissue Doppler of the RV
- Right ventricular dysfunction in pulmonary embolism, chronic pulmonary diseases, cardiomyopathy, Eisenmenger's syndrome, and systemic right ventricle

7. Inherited cardiac conditions

- Echocardiographic assessment and features of:
  - Arrhythmogenic right ventricle
  - Hypertrophic cardiomyopathy
  - Dilated cardiomyopathy
  - Marfans syndrome
  - Loeys Dietz syndrome

8. Additional topics

- The level of knowledge expected is that of a competent echocardiographer performing CHD-A studies and sustaining knowledge through the BSE and other educational resources, including issues relevant to clinical scanning and practice raised in the BSE Newsletter.

Appendix 2: Curriculum based competency tool

The following competency assessment tool should be used to ensure all knowledge and practical experience is covered during the candidates training period.

The competency tool is now required to be completed by the candidates mentor via the BSE online logbook portal.

Competency	Date achieved
1. BASIC ECHOCARDIOGRAPHY **Knowledge** Basic principles of ultrasound Basic principles of spectral Doppler Basic principles of colour flow Doppler Basic instrumentation Ethics and sensitivities of patient care Basic anatomy of the heart Basic echocardiographic scan planes Parasternal long axis standard, RV inflow, RV outflow Parasternal short axis including aortic valve, mitral valve and papillary muscles Apical views, 4- and 5-chamber, 2-chamber and long-axis. Subcostal and suprasternal views Indications for transthoracic and transoesophageal echocardiography Normal variants and artefacts **Practical competencies** Interacts appropriately with patients Understands basic instrumentation Cares for machine appropriately Can obtain standard views Can optimise gain setting, sector width, depth, harmonics, focus, sweep speed, Doppler baseline and scale, colour gain Can obtain standard measurements using 2D or M-mode Can recognise normal variants; Eustachian valve; Chiari work; LV tendon Can use colour Doppler examination in at least two planes for all valves optimising gain and box-size Can obtain pulsed Doppler and continuous wave Doppler adequately	
2. **LEFT VENTRICLE** **Knowledge** Coronary anatomy and correlation with 2D views of left ventricle. Segmentation of the left ventricle wall motion Measurements of global systolic function. (LVOT VTI, stroke volume, fractional shortening, ejection fraction using Simpson's biplane method) Doppler mitral valve filling patterns & normal range Appearance and complications post-surgery Appearance of complications after myocardial infarction Aneurysm, pseudoaneurysm, Ventricular septal and papillary muscle rupture Ischaemic mitral regurgitation Features of dilated, and hypertrophic cardiomyopathy and common differential diagnosis; Athletic heart; hypertensive disease **Practical competencies** Can differentiate normal from abnormal LV systolic function Can recognise large wall motion abnormalities Can describe wall motion abnormalities and myocardial segments	

Can obtain basic measures of systolic function VTI, FS, LVEF Understands & can differentiate diastolic filling patterns Can detect and recognise complications after myocardial infarction Can detect and recognise complications post-surgery Understands causes of a hypokinetic left ventricle Can recognise features associated with cardiomyopathies Can recognise hypertensive heart disease	
3. MITRAL VALVE DISEASE **Knowledge** Normal anatomy of the mitral valve, and the subvalvular apparatus and their relationship with LV function Causes of mitral stenosis and regurgitation- Ischaemic, functional, prolapse, rheumatic, endocarditis, cleft, double orifice **Practical competencies** Can recognise rheumatic mitral valve disease Can recognise mitral valve prolapse Can recognise functional mitral regurgitation Can assess mitral stenosis; 2D planimetry, pressure half-time, mean pressure gradient Can assess severity of mitral regurgitation, chamber size, signal density, PISA & vena contracta Can recognise surgical repair of mitral valve Can recognise and interrogate mitral valve replacement	
4. AORTIC VALVE DISEASE and AORTA **Knowledge** Causes of aortic valve disease Causes of disease of the aorta Methods of assessment of aortic stenosis and regurgitation Basic criteria for surgery to understand reasons for making measurements **Practical competencies** Can recognise bicuspid, unicuspid, quadracuspid, rheumatic, and degenerative disease Can recognise a significantly stenotic aortic valve Can recognise sub and supra valvular stenosis Can recognise LVOT obstructions; aortic subvalvular membrane Can derive peak & mean gradients using continuous wave Doppler Can measure valve area using the continuity equation Can recognise severe aortic regurgitation Can recognise dilatation of the ascending aorta Can recognise variations of the aortic arch Can recognise coarctation of the aorta and aortic arch interruptions Can recognise post-operative appearance Can recognise aortic dissection	
5. Right heart **Knowledge** Causes of tricuspid and pulmonary valve disease Causes of right ventricular dysfunction Causes of pulmonary hypertension The imaging features of pulmonary hypertension The estimation of pulmonary pressures **Practical competencies** Recognises right ventricular dilatation Can estimate PA systolic pressure Can estimate right atrial pressure from the appearance of the IVC Can recognise congenital variations of tricuspid valve disease; Ebsteins anomaly, dysplastic pulmonary and tricuspid valves Can recognise pulmonary valve, sub and supra valvular stenosis Can recognise RVOT and infundibular obstruction Can recognise tricuspid valve stenosis including rheumatic involvement Can recognise pulmonary branch stenosis	

Can recognise aberrant left pulmonary artery (sling)	
6. REPLACEMENT / REPAIRED HEART VALVES **Knowledge** Types of valve replacement / repair criteria of normality Signs of failure **Practical competencies** Can recognise broad types of replacement / repair valve Can recognise para-prosthetic regurgitation Can recognise prosthetic obstruction	
7. INFECTIVE ENDOCARDITIS **Knowledge** Echocardiographic features of endocarditis Criteria for TOE **Practical competencies** Can recognise typical vegetations Can recognise an abscess Can recognise complications just on valve regurgitation	
8. INTRACARDIAC MASSES **Knowledge** Types of mass found in the heart Features of a myxoma Differentiation of atrial mass Normal variants and artifacts **Practical competencies** Can recognise a LA myxoma Can differentiate LV thrombus and trabeculation	
9. PERICARDIAL DISEASE **Knowledge** Features of tamponade RV collapse, effect on IVC, AV valve flow velocities and respiratory variation. Features of pericardial constriction Differentiation of pericardial constriction from restrictive cardiomyopathy **Practical competencies** Can differentiate a pleural and pericardial effusion Can recognise the features of tamponade Can recognise restrictive physiology	
10. **SEPTATION DEFECTS** **Knowledge** Atrial communications and anatomical variations; Sinus venosus; secundum; primum defects; unroofed coronary sinus and associated lesions Echo features of atrial communications Ventricular septal defects and anatomical variations; perimembranous; muscular; apical; doubly committed Echo features of ventricular septal defect Surgical and percutaneous closure of defect and echo assessment following closure Atrio-ventricular septal defect (AVSD) and anatomical variations Echo features of AVSD **Practical competencies** Can recognise an atrial communication and direction of shunt Assessment of haemodynamic effect of the shunt, restrictive / non restrictive Evaluation of right heart pressures Can recognise malalignment of the ventricular septum, anterior / posterior deviation Percutaneous and surgical closure of VSD's and echo assessment following closure Can identify AV valve function in AVSD and name the leaflets	

Can assess LVOT obstruction Echo assessment following surgical correction	
11. **PATENT DUCTUS ARTERIOSUS (PDA)** **Knowledge** Anatomical variations and location Haemodynamic effects of PDA; left heart dilatation **Practical competencies** Can recognise ductal Doppler flow patterns Surgical and percutaneous close of defect and echo assessment Can recognise the difference between a PDA and aorto-pulmonary collateral	
12. TRANSPOSITION OF THE GREAT ARTERIES (TGA) **Knowledge** Transposition of the Great Arteries (TGA) anatomy and variations Echo features of TGA and associated lesions (VSD, PS) Coronary artery anatomy and variations Surgical repair of TGA (atrial/arterial switch) **Practical competencies** Echo evaluation and assessment following atrial switch Echo evaluation and assessment in arterial switch Echo evaluation and assessment following Rastelli procedure Echo evaluation and assessment following Le Compte manoeuvre	
13. **TETRALOGY OF FALLOT (TOF)** **Knowledge** Anatomy and variations of TOF Assessment of pulmonary blood flow Surgical repair for TOF **Practical competencies** Assessment of coronary arteries Echo assessment in uncorrected TOF Echo assessment and evaluation of the post-operative TOF and associated complications.	
14. **DOUBLE OUTLET RIGHT VENTRICLE (DORV)** **Knowledge** Anatomy and variations of DORV **Practical competencies** Echo evaluation and assessment of uncorrected DORV Surgical repairs with echo evaluation and assessment of the post-operative patient	
15. **TRUNCUS ARTERIOSUS** **Knowledge** Anatomy and variations of truncus Surgical treatment with post-op appearance **Practical competencies** Echo evaluation and assessment of the unoperated lesion Echo evaluation of the truncal valve; regurgitation, number or leaflets	
16. **ANOMLAOUS PULMONARY VENOUS DRAINAGE** **Knowledge** Anatomy and variations; partial and total, supracardiac and infracardiac Haemodynamic effect on heart **Practical competencies** Assessment of pulmonary veins in partial and total anomalous pulmonary venous drainage. Echo features pre and post-surgical correction	
17. **UNIVENTRICULAR HEART** **Knowledge** Anatomy and variations of a univentricular heart	

Staged surgical and interventional procedures **Practical competencies** Echo assessment and evaluation Evaluation of Fontan circulation by echo	
18. CONGENITALLY CORRECTED **TRANSPOSITION OF THE GREAT ARTERIES (ccTGA OR DOUBLE DISCORDANCE; AV/VA DISCORDANCE)** **Knowledge** Anatomy and variations of ccTGA Surgical treatment options and post-operative assessment, including double switch. **Practical competencies** Echo assessment of evaluation of unrepaired ccTGA Echo assessment of evaluation of repaired ccTGA	
19. **CORONARY ANOMALIES** **Knowledge** Anatomy of the major branches of the coronary arteries Physiological effect of coronary artery abnormalities Echo features and assessment of coronary artery fistulae Use of Z scores in congenital coronary anomalies; Kawasaki **Practical competencies** Can image the coronary artery origins Relationship of coronary anatomy to standard echocardiographic imaging planes Echo identification and assessment of congenital coronary artery anomalies including anomalous origins and transmural coronary course Echo assessment of surgical treatment for coronary artery anomalies Echo assessment for surgical and percutaneous treatment of coronary artery fistulae	

Appendix 3: Reading list

The reading list is provided by the Accreditation Committee of the British Society of Echocardiography and represent only a handful text that are available for candidate to learn from

1. Echocardiography in Adult Congenital Heart Disease; Wei Li, Michael Henein, Michael Gatzoulis (2007)
2. Echocardiography in Paediatric and Adult Congenital Heart Disease by Benjamin W. Eidem, Frank Cetta, and Patrick W. O'Leary (2009)
3. Echo in Paediatric & Congenital Disease from Foetus to Adult; Wyman Lai, Luc Mertens, Meryl Cohen & Tal Geva (2009)
4. The Paediatric Cardiology Handbook; Myung K. Park (2015)
5. Adult Congenital Heart Disease; Sara Thorne & Paul Clift (2017)
6. 2020 ESC Guidelines for the Management of Adult Congenital Heart Disease; Baumgartner, Helmut, De Backer Julie, Babu-Narayan, Sonya V, et al; European Heart Journal (2020) https://academic.oup.com/eurheartj/advance-article/doi/10.1093/eurheartj/ehaa554/5898606?searchresult=1
7. EDUCATIONAL SERIES IN CONGENITAL HEART DISEASE: Echocardiographic assessment of left to right shunts: atrial septal defect, ventricular septal defect, atrioventricular septal defect, patent arterial duct Antigoni Deri and Kate English (2018)
8. EDUCATIONAL SERIES IN CONGENITAL HEART DISEASE: Congenital left-sided heart obstruction Michelle Carr, Stephanie Curtis, and Jan Marek (2018)
9. EDUCATIONAL SERIES IN CONGENITAL HEART DISEASE: Tetralogy of Fallot: diagnosis to long-term follow-up R Bedair and X Iriart (2019)
10. EDUCATIONAL SERIES IN CONGENITAL HEART DISEASE: Echocardiographic assessment of transposition of the great arteries and congenitally corrected transposition of the great arteries Meryl S Cohen and Luc L Mertens (2019)
11. Lai W et al. Guidelines and standards for performance of a paediatric echocardiogram: A report from the task force of the paediatric council of the American Society of Echocardiography. J Am Society Echocardiography 2006;19:1413-1430
12. Robinson S et al. A practical guideline for perfomring a comprehensive transthoracic echocardiogram in adults: The British Society of Echocardiography minimum dataset. Echo Research and Practice 2020;7(4):G59-G93.

Appendix 4: Written examination registration guidance

BSE written exams are delivered in partnership with Pearson VUE. Candidates will be able to sit the exam at local centres throughout the UK, Republic of Ireland, and some overseas areas.

Pre-Registration (through BSE website)

- Candidates must register their interest to sit the written exam by completing an **online pre-registration form via the accreditation section of www.bsecho.org**. The pre-registration window is open for up to four weeks.
- Candidates registered names should appear the same as per their photo identification. Pearson Vue follows a strict admission policy.
- BSE will transfer data and requirements to Pearson VUE, who will contact all pre-registered candidates with further information on booking an paying for the exam.
- **Delivery methods:** there are two ways candidates can take the exam- **Test Centre (recommended)** or Online proctored exam (OnVUE), which allows candidates to sit the exam from home (subject to system requirement).

Special accommodations

- Pearson Vue can provide special accommodations to candidates who have official requirements, such as extra time, a reader, or the need for medication during the examination.
- Further information on accommodations is available on www.bsecho.org.
- All requests must be put in writing with supporting documents to support claims for special accommodations. Requests will be approved at the discretion of the BSE. Forward such requests to accreditation@bsecho.org.

Registration (through Pearson VUE)

- All registration and payments will be managed by Pearson VUE after the stage of pre- registration.
- Candidates with special requirements or conditions should notify the BSE during the pre-registration stage.
- Cancellations made in less than 7 days do not qualify for a refund. All cancellations must be processed through Pearson VUE.

On the day of the exam

- Instructions will be given on the day of the exam via a video tutorial at the test centre. Candidates will complete the exam on a computer at the test centre.
- A basic calculator is already built into the online exam. An erasable sheet will be given to candidates by the examining centre. If sitting the exam from home using online proctoring- a calculator and whiteboard are built into the exam.
- Candidates are not required to bring any stationery to the exam.
- **Candidates are required to bring a photo ID.** Please ensure that the registration details match your photo ID exactly as otherwise you will be refused entry. If denied entry, candidates should contact BSE immediately.
- **Any last-minute requests for special accommodations will not be facilitated by the test centre**.

Results

- Results are released 5-6 weeks after sitting the exam. Scores will be uploaded to BSE personal profiles. Both sections must be passed to achieve an overall pass grade.
- **Pass:** candidates will be issued with login details to the portal to begin uploading cases. The submission deadline will appear at the 'Practical submission deadline' in the member profile.
- **Fail:** candidates can register interest to sit the next sitting of the exam.
- The reduced fee only applies to candidates who physically sat the exam and were unsuccessful; the

next attempt must be taken at the next sitting (within 12 months).

- Results cannot be appealed or 'remarked' as the tests are computer-based.

Please watch the demo available via Pearson VUE; http://www.pearsonvue.com/demo/

Additional Information

Candidates are advised to check the security procedures in the "What to expect section" of the Pearson VUE/BSE guide page; https://home.pearsonvue.com/test-taker/security.aspx

Pearson Vue operates a strict admissions policy. Candidates registered names should be exactly as they appear on their government photographic ID.

Appendix 5: Examples of written exam multiple choice questions

Answer 'True' (T) or 'False' (F) to each of the following.

There is no negative marking - one mark added for a correct answer, no mark deducted for an incorrect answer.

Q1	With regard to ventricular septal defects:	
a)	Doubly committed defects are the most common	F
b)	The Bernoulli equation can be used to assess the pressure difference between the left ventricle and the right ventricle	T
c)	VSDs always communicate between the right and left ventricles	F
d)	A peri-membranous ventricular septal defect rarely causes pulmonary hypertension	F
e)	The parasternal short axis view is ideal for diagnosing the type and location of a ventricular septal defect	T

Q2	The following statements regarding congenital heart disease are true:	
a)	Coronary aorto-ventricular fistula may be associated with a dilated coronary sinus and proximal coronary artery	T
b)	A highly pulsatile aortic root and akinetic abdominal aorta are associated with aortic coarctation	T
c)	An ostium primum ASD may be associated with a common AV valve	T
d)	Large, overriding aorta, ASD and tricuspid stenosis are all associated with tetralogy of Fallot	F
e)	Eisenmenger reaction describes a combination of left-to-right shunt with secondary pulmonary hypertension	T

Q3	The following are echo features of arrhythmogenic right ventricular dysplasia:	
a)	Global RV dilatation and hypokinesis	T
b)	Localised aneurysms of the right ventricle	T
c)	Severe left ventricular systolic impairment	F
d)	Regional right ventricular hypokinesis	T
e)	Pulmonary stenosis	F

Appendix 6: Examples of the written exam image reporting questions

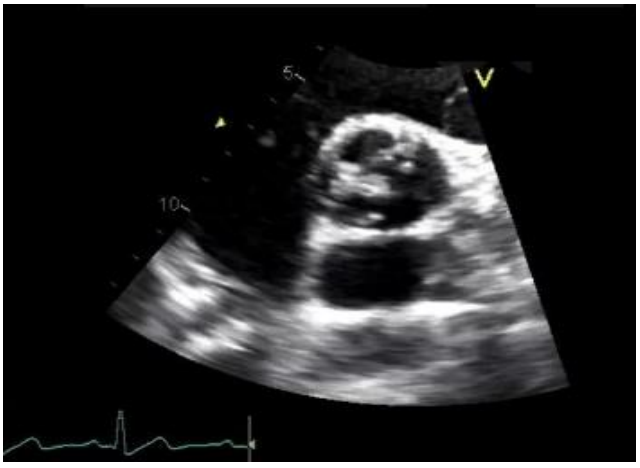
A number of moving clips and stills will be included in each question. Although these can be viewed and replayed as many times as the candidate wishes, the candidate should be mindful of the time spend on each question.

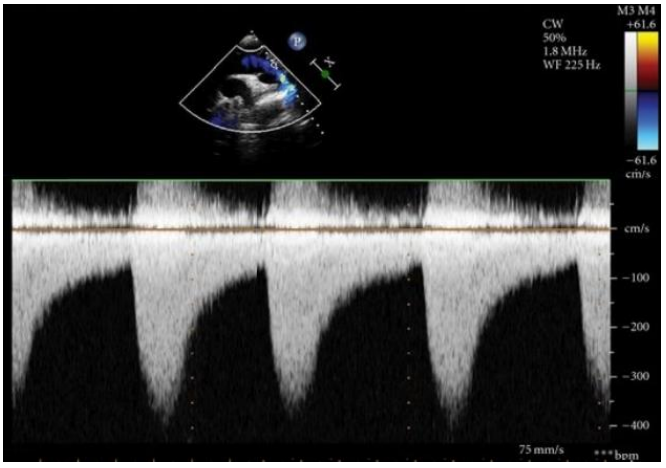
The **SINGLE BEST ANSWER** should be selected.

There is no negative marking - one mark added for a correct answer, no mark deducted for an incorrect answer.

Case 1
Request: 43 year old man presented with a systolic murmur, no previous cardiac history.

Data: LVIDd: 5.0cm, proximal ascending aorta: 3.4cm, AV Vmax: 3.8m/s, max PG: 57mmHg, AVA: 1.1cmsq, TAPSE: 2.1cm, descending aorta Vmax: 3.5m/s, AR pressure half time: 560msec.





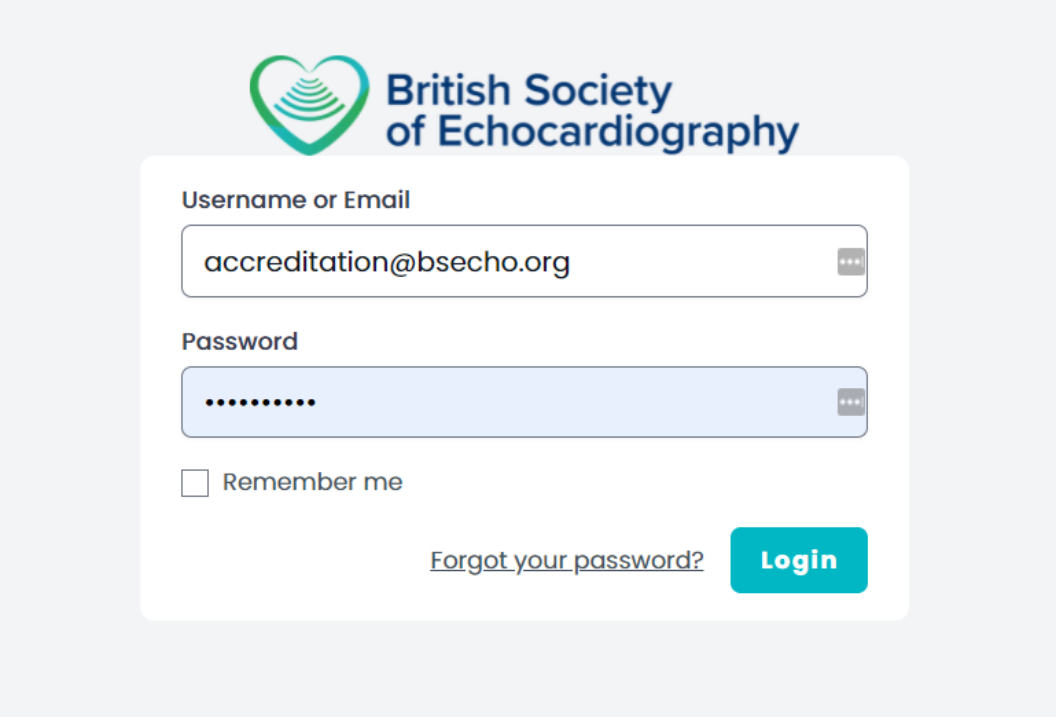
1.1	The aortic valve is:	Answer
a	Not a native valve	
b	Highly likely bicuspid	T
c	Highly likely unicuspid	
d	Highly likely tricuspid	

1.2	The images and data demonstrate:	
a	Normal aortic arch	
b	Aortic coarctation with patent ductus arteriosus	
c	Aortic ridge at the level of the isthmus	
d	Significant aortic coarctation	T

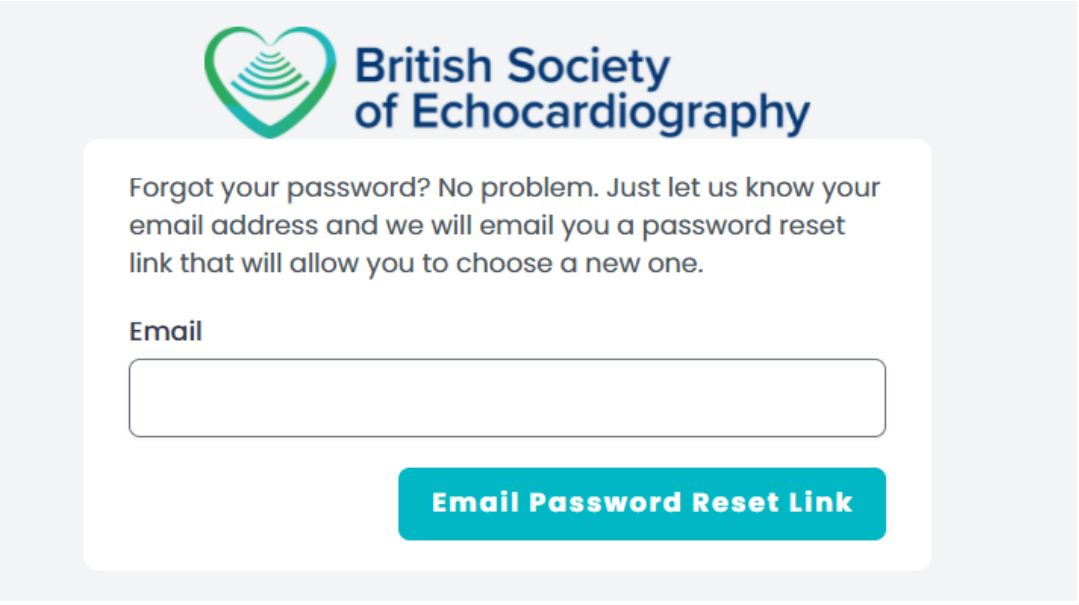
Appendix 7: BSE logbook portal user guidance

1. User Login Details:

- Request login details by emailing the accreditation team- accreditation@bsecho.org.
  Provide your **BSE ID number**, the type of *accreditation you are pursuing.
  Also, inform us of your mentor's name and email address- we will assign them to your logbook.
- An automated message from the portal will be emailed to you with your login details.
- Link to the portal: https://logbook.bsecho.org/

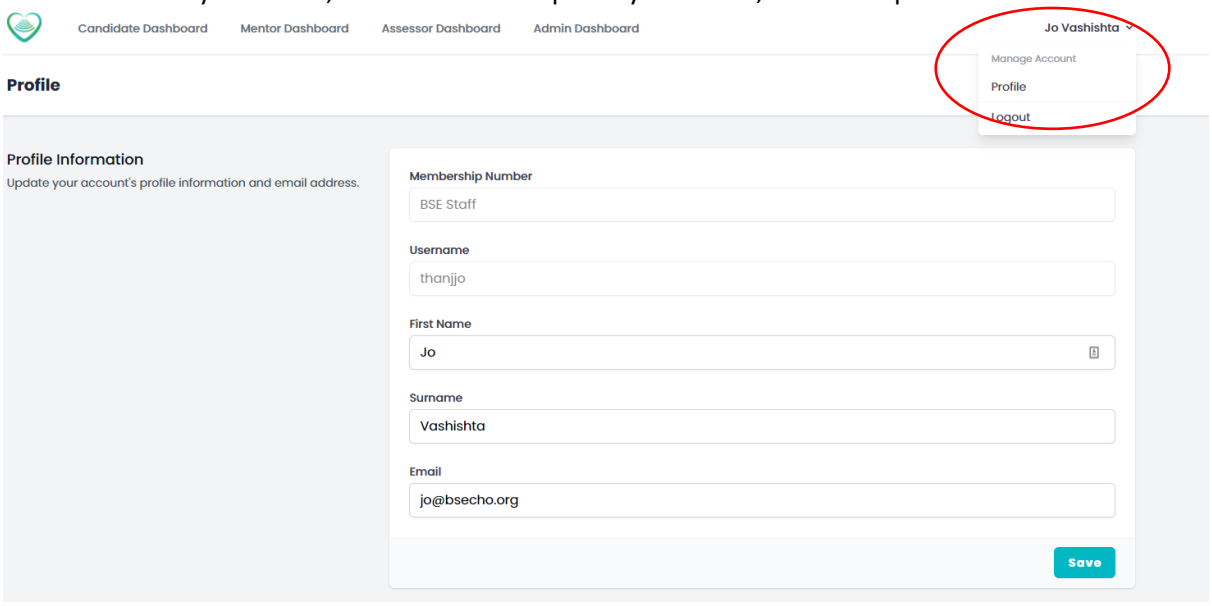


a. If you have forgotten your password, please click the link titled Forgot your password?

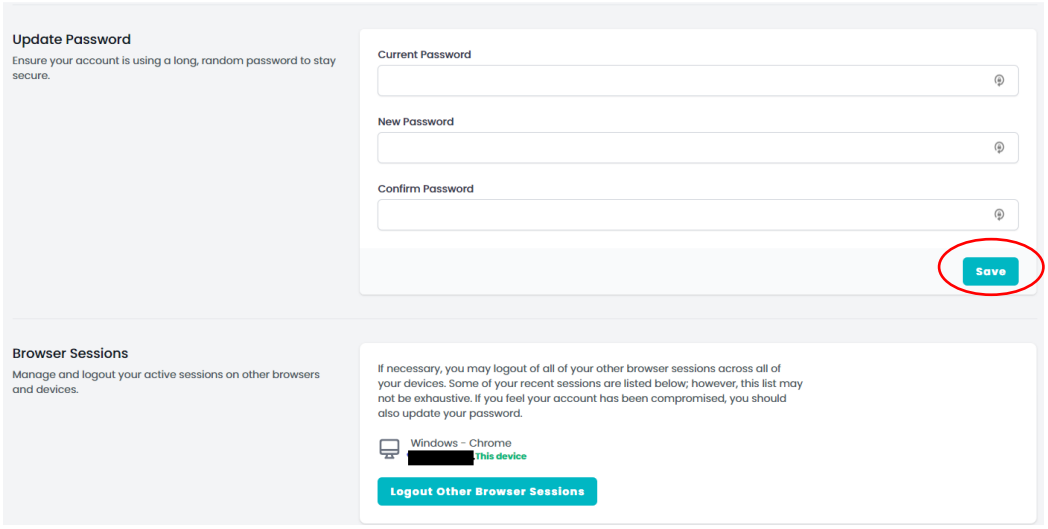


2. Update your profile

- Click on your name, then **‘Profile’** to update your name, email and password.

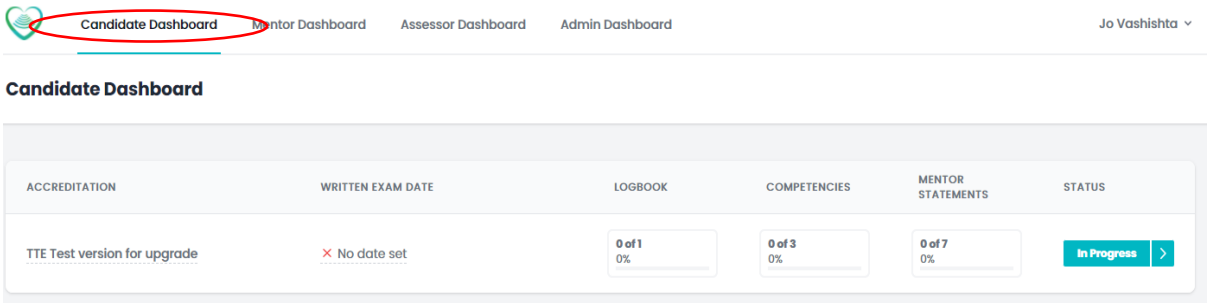


Enter new password and click ‘save.’



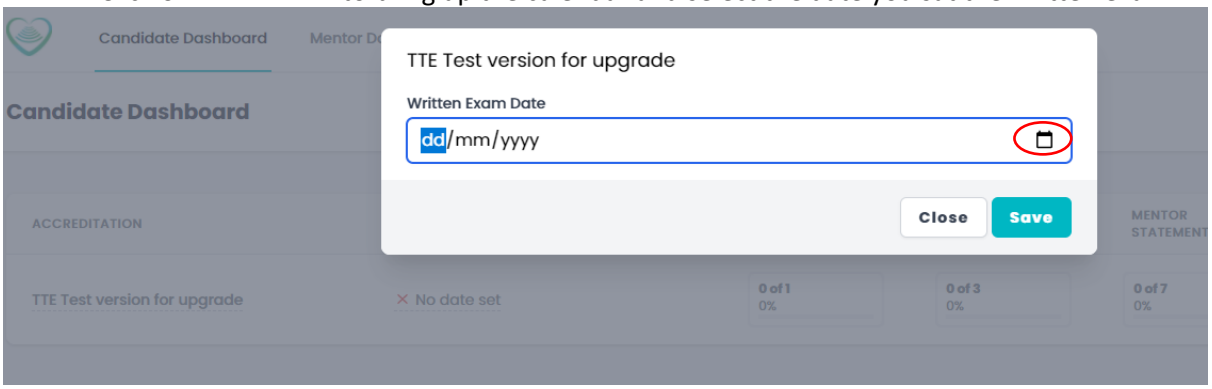
3. User dashboard (e.g. Candidate, Mentor or Assessor)

- Click on the visible heading to access your dashboard

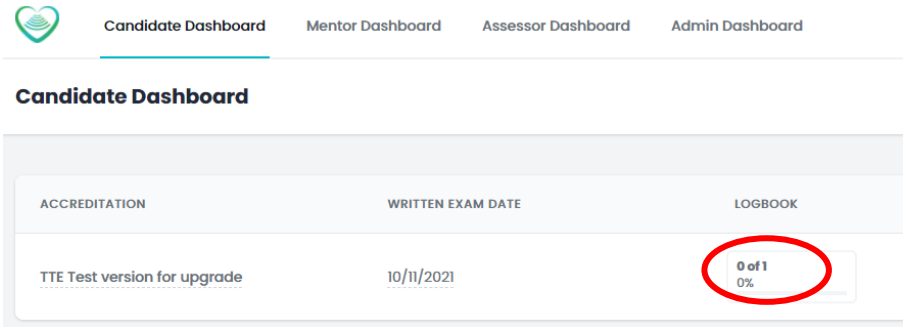


a. Enter Written Exam Date

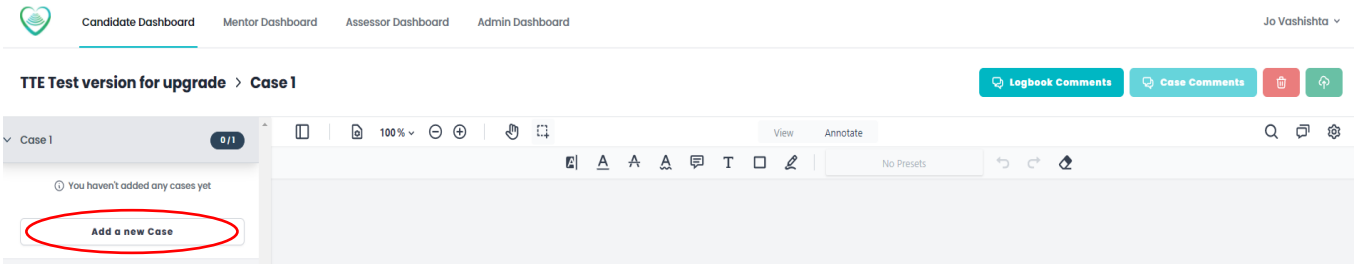
- Click on ✕ No date set to bring up the calendar and select the date you sat the written exam.

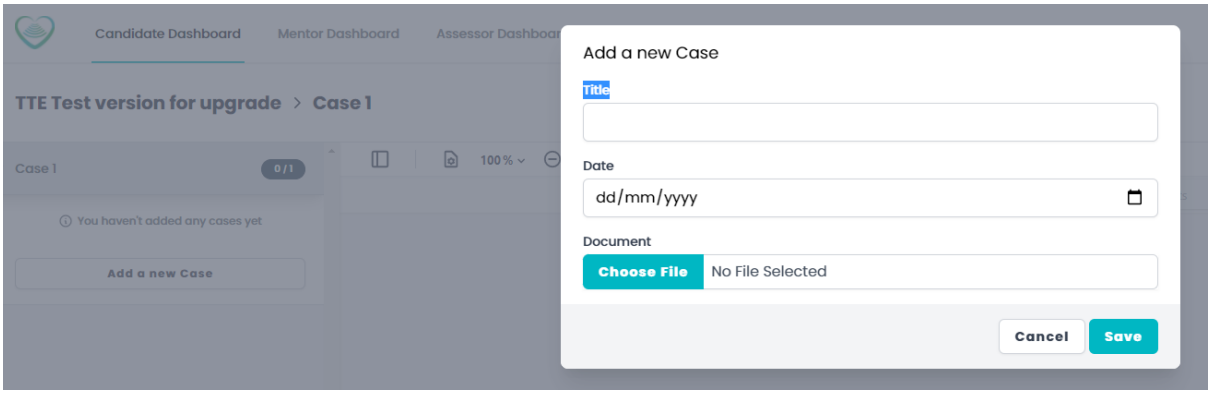


b. Click the box under the Logbook title to begin uploading PDF reports. The portal will take only PDF uploads.



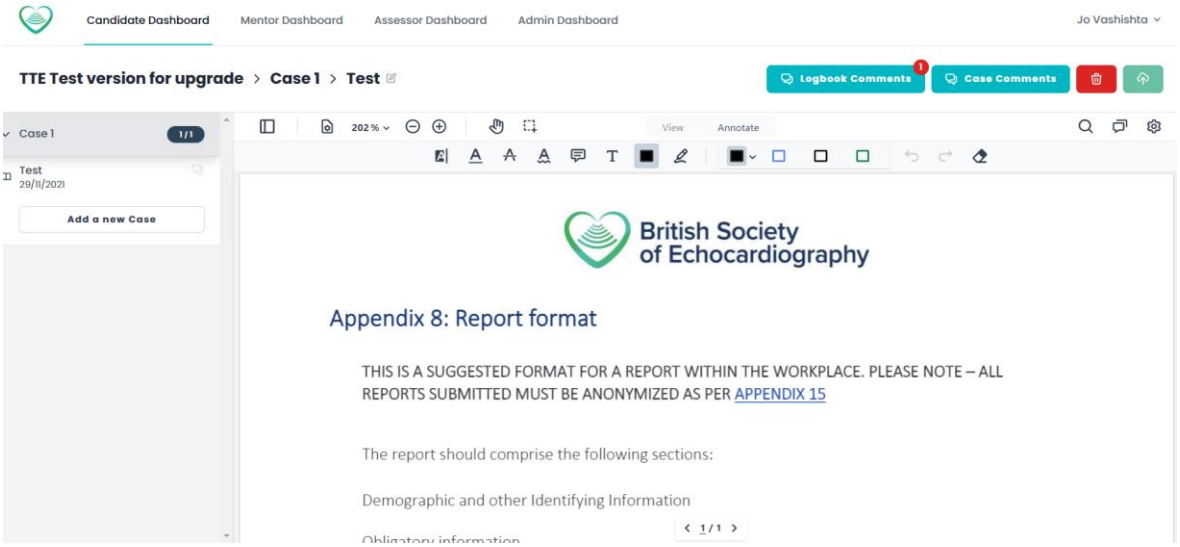
To add a new case, click on '**Add a new Case**', give it a Title, enter the date of the case and Choose File.



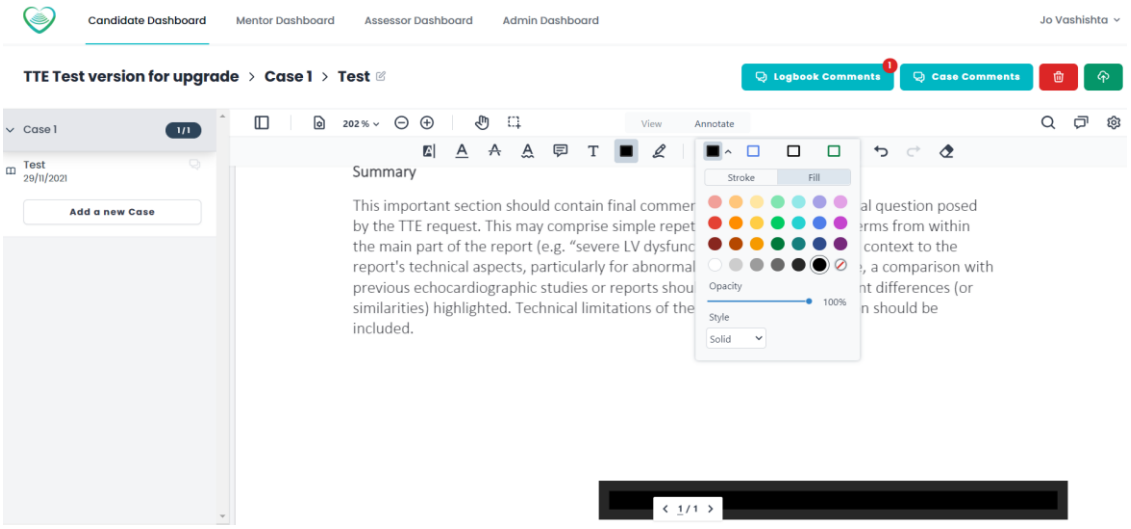


- Explore the features and tools by hovering over the icons to find what they can do.

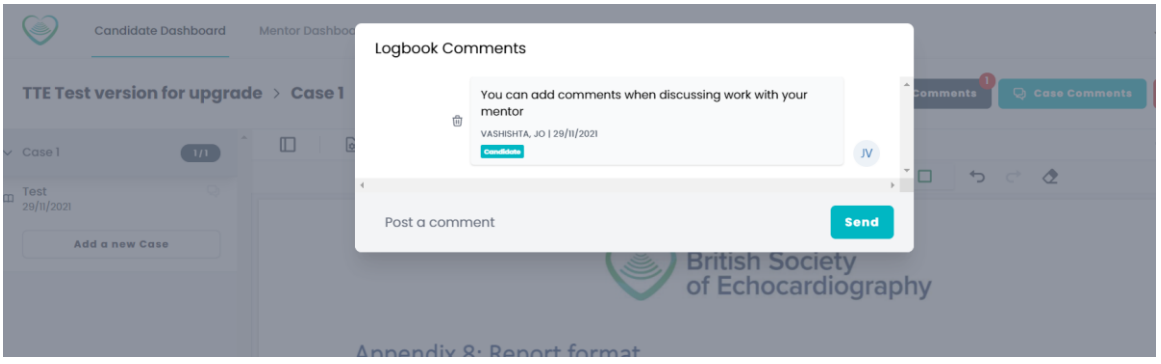
- To **save** your work, click , to **delete** click



The 'Rectangle' tool allows masking over unwanted data. Click the Save button to keep the anonymise changes.



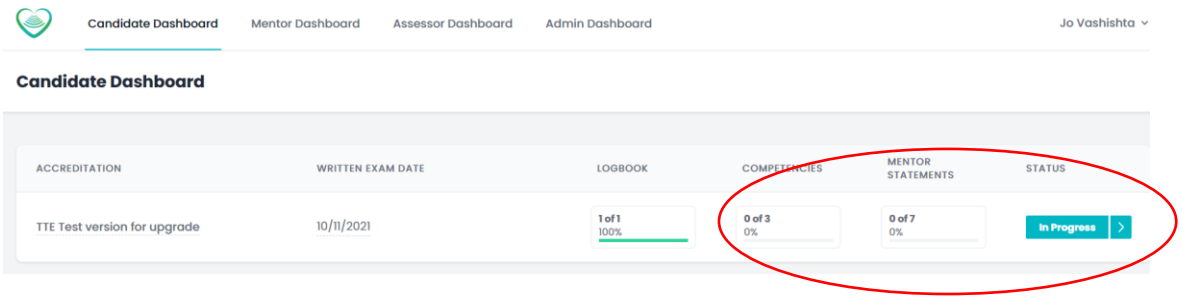
You can add logbook or case comments to share with your mentor only.



4. Competencies

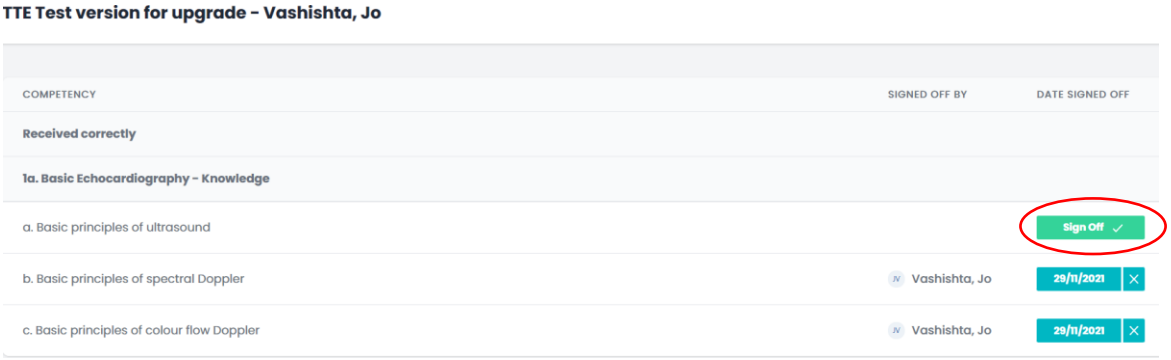
Your mentor will access your portal via their login and sign off each of the competencies.

Candidate can view the progress in the dashboard.

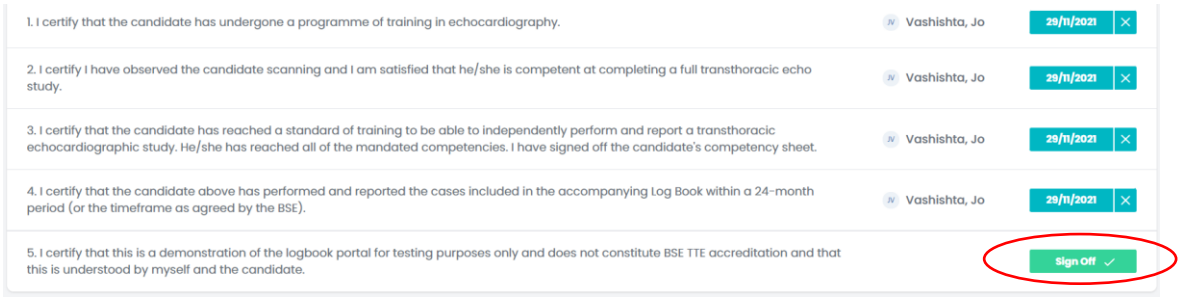


a. Mentor view:

The mentor clicks the sections below the 'DATE SIGNED OFF' header to sign off competencies by clicking on 'Sign off.'

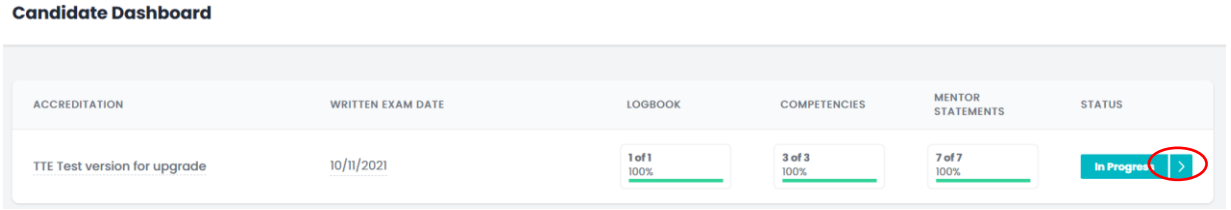


When mentor has completed competency sign off, they must do the same for the 'Mentor statement.'



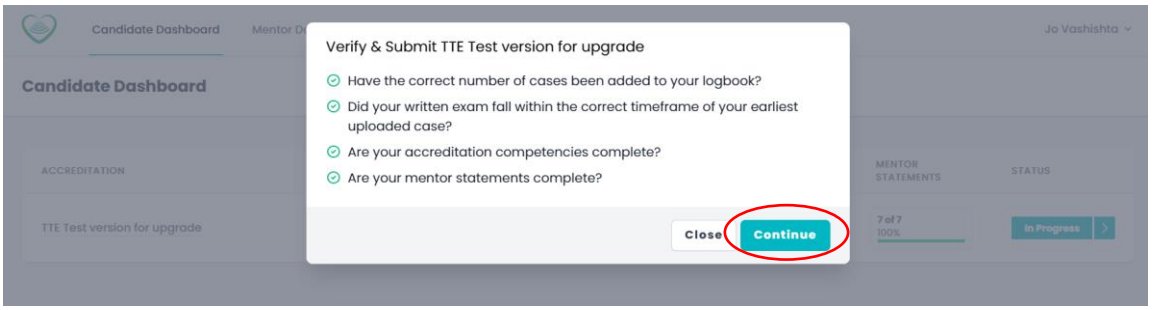
5. Candidate logbook submission

Candidate can check the progress of their logbook in the dashboard and click the arrow after 'In Progress'.

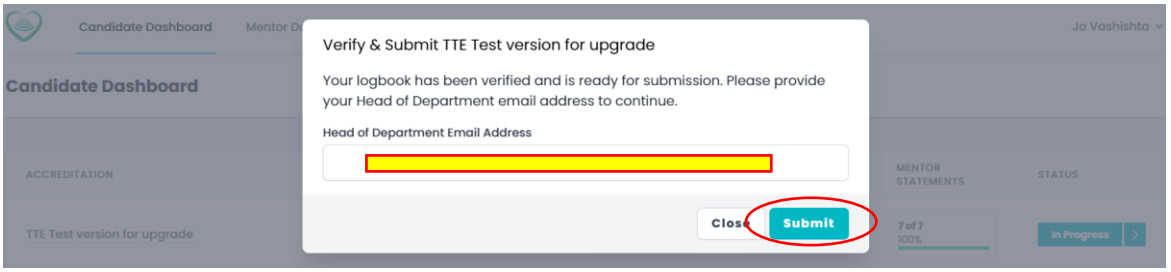


a. Verify and submit

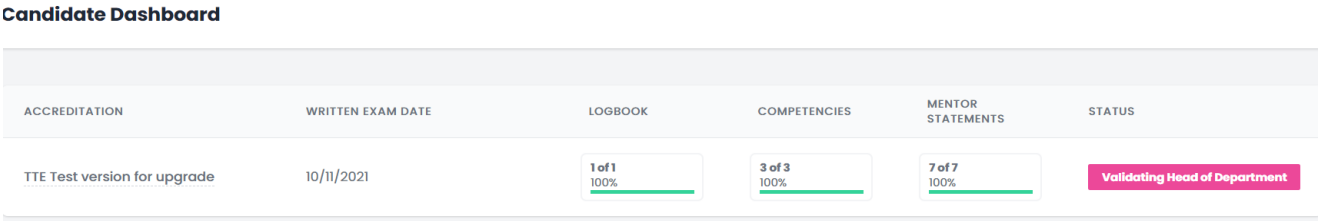
Check you have completed the requirement before clicking **'Continue.'**



b. Enter Head of Department Email Address and click submit:

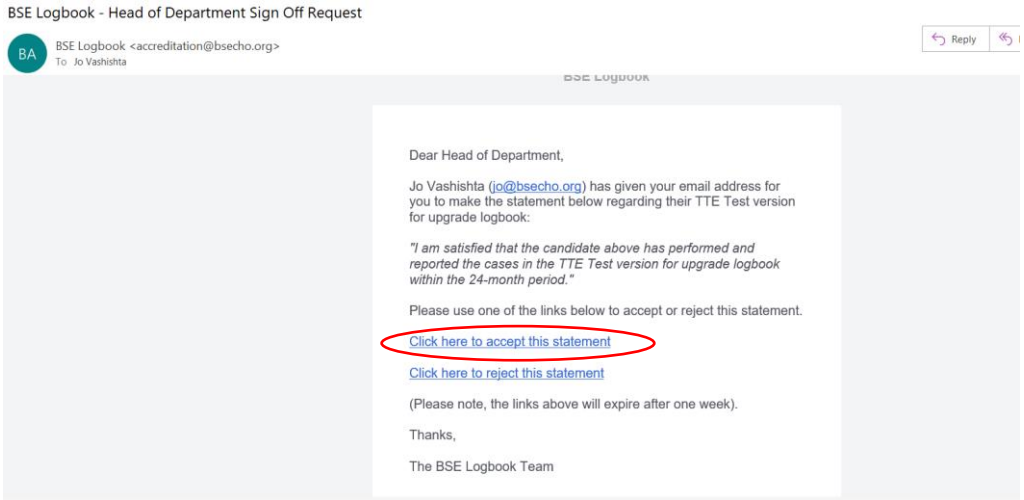


c. Contact accreditation@bsecho.org to inform you have entered your HOD's email address and clicked submit.



6. Validate logbook

Your Head of Department must click the link to accept the statement.



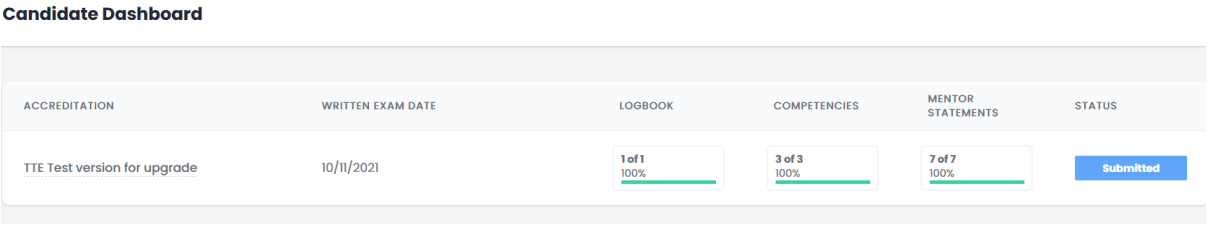
a. Head of Department varified

After clicking the statement, the Head of Department receives the message below.

Please note that some NHS emails may block messages from the logbook portal- accreditation@bsecho.org. In this case, candidates should consider providing an alternative email address, e.g. non-NHS email addresses.

7. Logbook submitted

Once the logbook has been validated, it is ready for an assessor to mark.



- No further action is required from this point.
- Candidates will be notified when marking is complete.

Updated: JV- 29/11/2021

End of guide.

Appendix 8: Logbook guidance and marking criteria

In order to meet all competencies of this accreditation process the logbook should represent good/excellent examples of a candidate's daily workload.

Whilst we encourage the use of good / excellent work to be included in the logbook, it is acknowledged that not every report in the logbook will meet this standard. Therefore, when considering whether to include a report, please refer to the following as an absolute minimum.

*****If a report does not meet the below, it should not be included as a logbook report*****

Clinical question: Must be stated.
Age: Must ne stated.
BSA: Height and weight to determine BSA should be quoted where possible. For infants, if only weight is available this should be quoted.
BP: Measurement only where appropriate e.g. aortic stenosis.

Paediatric studies

Height and weight, or weight only in infants
Rate and rhythm
Image quality / cooperation of patient

Position , Situs and connections : Describe the position of the heart in the chest and the atrial situs. Describe the atria ventricular and ventriculo arterial connections.
For example, Levocardia, Situs solitus, AV-VA concordance

Systemic venous return: Describe the drainage of the SVC and IVC to the right atrium.

Pulmonary venous return: Describe the drainage of the pulmonary veins

Atrial septum: The septum appears intact with no shunts seen or describe any abnormalities

Right atrium: Normal / abnormal in size

Left atrium: Normal / abnormal in size. Biplane volume measurement where possible.

Tricuspid valve: Describe the observed structure and comment on TR. TR Vmax should be given to assess RV systolic pressure where present.

Mitral valve: Describe the observed structure and comment on MR. Mitral valve Doppler assessment and TDI measurement ideally.

Pulmonary valve: Describe the appearance of the valve, comment on stenosis / regurgitation. Comment on left and right pulmonary arteries, comment of patent ductus arteriosis present.

Aortic valve: Describe the appearance of the valve, comment on stenosis / regurgitation. Comment on coronary artery origins.

Right ventricle: Right ventricular assessment of size and function, TAPSE and RV S'

Left ventricle: LVIDd and LV wall thickness, visual assessment and description of function. Where possible, biplane Simpson's assessment for ventricular function.

Ventricular septum: The septum appears intact with no shunts seen or describe any abnormalities
RVOT / LVOT: Assess for right and left ventricular outflow tract obstruction using colour and PW Doppler modalities.

Aorta: Comment on ascending aorta size, aortic arch, proximal descending aorta and abdominal aorta where possible. Assess Doppler velocities in ascending and descending aorta.

Pericardium: Comment on absence / presence of pericardial fluid

Conclusion / Summary:
Must relate to the clinical question.
Z scores may be used to assess structure size in children in relation to their BSA or weight.

Adult Studies
The report format for an adult CHD study may be presented in the style suggested in the BSE adult TTE accreditation pack, all parts and connections of the heart must be determined.

Logbook marking criteria

When marking a candidate's logbook, the Assessor will review a selection of reports in the candidate's logbook.

The following marking criteria is used when assessing each logbook report

Does the report meet the following criteria?	Yes / No (if no, state reasons why)
Fully Anonymised	
Indication for echo present	
Appropriate 2D measurements present	
Appropriate Doppler calculations present	
Do measurements / Doppler calculations match descriptions	
All parts of heart described	
Descriptions complete	
Appropriate to request	
Conclusion present	

Logbook outcomes include:

Satisfactory log-book for BSE accreditation OR Unsatisfactory at present and a resubmission is required.

If a logbook is unsatisfactory, the candidate will be asked for one of the following resubmissions.

- 25-75 further specified reports: To address repeated inaccuracies, lack of correct conclusion or lack of sequential systematic comments on all parts of the heart. (e.g. lack of RWMA description + lack of quantitative valve pathology measurements).

- 250 reports: To address significant errors, inaccurate or lack of systematic comments. The presence of Patient ID on any report will require a complete resubmission of the logbook.

To ensure consistency across logbook marking, all logbooks are discussed with the national logbook leads and chief assessor prior to a resubmission being requested.

Appendix 9: Guidance for the removal of patient identifiable data

The duty of confidentiality arises out of the common law of confidentiality, professional obligations and also staff employment contracts. Breach of confidence may lead to disciplinary measures, bring into question professional reputation and possibly result in legal proceedings.

Guidance is provided to Healthcare Professionals in the 'NHS Code of Practice on Confidentiality' (November 2003): http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4069254.pdf

Patient information that can identify individual patients is confidential and must not be used or disclosed in any part of the submission required for this accreditation process. In contrast, anonymised information is not confidential and may be used.

Key identifiable information includes:

- Patient's name
- Address
- Full post code
- Date of birth
- NHS number and local identifiable codes

Key identifiable information may also include information that may be used to identify a patient directly or indirectly. For example, rare diseases, drug treatment or statistical analyses which have very small numbers within a small population may allow individuals to be identified.

Guidance to candidates submitting Logbooks and Cases for Accreditation

The NHS Code of Practice on confidentiality means that evidence submitted for this accreditation process must have removed **ALL** patient identifiable information beyond that of gender and age/year of birth.

Reports – Please use the BSE online portal and electronically delete all patient information except age and gender.

We would advocate against the use of other electronical anonymisation as sometimes data is still present. If in doubt, manually remove patient identification information prior to use.

Video cases - We appreciate that the removal of patient ID may be difficult. Therefore advise that the video cases are specifically collected, and the data inputs are made relevant to your cases (E.g. Patient Name could be 'BSE Case 1', Patient Number could be your membership number followed by case number, '1111-1').

The final decision remains at the discretion of the Chair of the Accreditation Committee.

Appendix 10: Practical scanning assessment marking criteria

The marking criteria used for the practical scanning assessment can be seen below.

2 minutes:	• Familiarisation of echo machine / equipment. • Assessor will be on hand if assistance is required.
20 minutes:	• Candidate to have 2 minutes to obtain and acquire each image. • The Assessor will instruct the candidate on the images to acquire. • The Assessor can alter echo machine / equipment setting to optimise images at the direction of the candidate.

The pass mark is set at 102 points. Once this mark is achieved the candidate will be deemed as being successful at this station.

Each image the candidate acquires is scored as per the marking scheme below.

Appendix Four - Practical Scanning Mark Scheme

F = Fail = 0 points:	unable to demonstrate appropriate skill set
BF = Borderline Fail = 1 point:	unable to demonstrate appropriate skill set, is able to describe reasons how improvement could be achieved
BP = Borderline Pass = 2 points: quality	able to acquire/demonstrate skill set although fails to optimize image acquisition
P = Pass = 3 points: optimization of images	able to fully demonstrate high quality image acquisition with appropriate

An example of the imaging list used in this assessment can be seen below.

	Image (Score Weighting)
1	Demonstrate & identify situs (5)
2	2D subcostal view demonstrating the abdominal aorta (3)
3	2D bicaval view with colour flow mapping (5)
4	2D parasternal long axis (3)
5	2D modified parasternal short axis demonstrating main pulmonary artery & branches (5)
6	Pulsed wave Doppler trace of right ventricular outflow tract (3)
7	2D proximal right coronary artery with colour flow mapping (5)
8	2D apical 4 chamber (3)
9	2D apical 4 chamber modified to demonstrate the coronary sinus (3)

Appendix 11: Patient case studies viva marking criteria

The next few pages show the individual marking criteria for each of the patient video case studies.

All criteria must be met to a satisfactory standard in order for the patient case study to be passed. A minimum of two patient case studies will be assessed. The British Society of Echocardiography reserves the right to assess all five patient viva cases.

Congenital heart disease accreditation. **Case 1 – Normal study**. Practice must be satisfactory in all areas to pass			
Evidence of satisfactory practice	Tick	Evidence of unsatisfactory practice	Tick
ECG Largely present throughout without 2D image interference		**ECG** Unstable or frequently absent making timings inaccurate	
Optimisation Infrequent, non-repetitive optimisation errors which do not detract from the case conclusion		**Optimisation** Frequent, repetitive optimization errors which detract from the case conclusion	
Complete study Images are complete enough to allow full sequential, segmental assessment of the heart, including Doppler study and measurements.		**Incomplete study** Images are missing which are relevant to the accurate segmental, sequential assessment of the heart, including inadequate Doppler study or relevant measurements quoted in report but not demonstrated.	
2D measurements/M-mode (if appropriate) Accurate throughout with minor errors only		**2D measurements/M-mode (if appropriate)** Frequent inaccuracies or isolated inaccuracies that change the categorisation of the chosen pathology	
Colour Doppler Accurate box size, gain, scale and baseline settings demonstrating anatomy clearly		**Colour Doppler** Frequent inaccuracies of box size, gain, scale and baseline settings which prevent clear demonstration of the anatomy	
Spectral Doppler Accurate use with good cursor alignment and optimised waveforms		**Spectral Doppler** Inaccurate use with poor cursor alignment or waveform optimisation altering pathology assessment	
Pathology assessment No images missing which are key to pathology assessment No measurements significantly inaccurate that are key to pathology assessment		**Pathology assessment** Images missing which are key to pathology assessment Measurements key to pathology assessment significantly inaccurate and change the categorisation of the pathology	
Report is complete and accurate Comprehensive/accurate description of all parts of the heart and connections Correct categorisation of chosen pathology (NB trivial abnormalities may be included in this case) Correct interpretation of findings in the clinical context		**Report is incomplete or inaccurate** Partial/inaccurate description of parts of the heart and connections Incorrect categorisation of chosen pathology Incorrect interpretation of findings in the clinical context	

Congenital heart disease accreditation. **Case 2 – Simple unrepaired lesion** Practice must be satisfactory in all areas to pass			
Evidence of satisfactory practice	Tick	Evidence of unsatisfactory practice	Tick
ECG Largely present throughout without 2D image interference		**ECG** Unstable or frequently absent making timings inaccurate	
Optimisation Infrequent, non-repetitive optimisation errors which do not detract from the case conclusion		**Optimisation** Frequent, repetitive optimisation errors which detract from the case conclusion	
Complete study Images are complete enough to allow full assessment of the selected pathology, including Doppler study and measurements.		**Incomplete study** Images are missing which are relevant to the accurate assessment of the selected pathology, including inadequate Doppler study or relevant measurements quoted in report but not demonstrated.	
2D measurements/M-mode (if appropriate) Accurate throughout with minor errors only		**2D measurements/M-mode (if appropriate)** Frequent inaccuracies or isolated inaccuracies that change the categorisation of the chosen pathology	
Colour Doppler Accurate box size, gain, scale and baseline settings demonstrating anatomy clearly		**Colour Doppler** Frequent inaccuracies of box size, gain, scale and baseline settings which prevent clear demonstration of the anatomy	
Spectral Doppler Accurate use with good cursor alignment and optimised waveforms		**Spectral Doppler** Inaccurate use with poor cursor alignment or waveform optimisation altering pathology assessment	
Pathology assessment Full assessment of the unrepaired lesion with necessary measurements No images missing which are key to pathology assessment No measurements significantly inaccurate that are key to pathology assessment		**Pathology assessment** Missing or poor quality images with do not demonstrate the lesion Images missing which are key to pathology assessment Measurements key to pathology assessment significantly inaccurate and change the categorisation of the pathology	
Report is complete and accurate Comprehensive and accurate description of all parts of the heart Correct categorisation of chosen pathology Correct interpretation of findings in the clinical context		**Report is incomplete or inaccurate** Partial and inaccurate description of parts of the heart Incorrect categorisation of chosen pathology Incorrect interpretation of findings in the clinical context	

Congenital heart disease accreditation. **Case 3 – Uncorrected complex or cyanotic heart disease** Practice must be satisfactory in all areas to pass			
Evidence of satisfactory practice	Tick	Evidence of unsatisfactory practice	Tick
ECG Largely present throughout without 2D image interference		**ECG** Unstable or frequently absent making timings inaccurate	
Optimisation Infrequent, non-repetitive optimisation errors which do not detract from the case conclusion		**Optimisation** Frequent, repetitive optimisation errors which detract from the case conclusion	
Complete study Images are complete enough to allow full assessment of the selected pathology, including Doppler study and measurements		**Incomplete study** Images are missing which are relevant to the accurate assessment of the selected pathology, including inadequate Doppler study or relevant measurements quoted in report but not demonstrated	
2D measurements/M-mode (if appropriate) Accurate throughout with minor errors only		**2D measurements/M-mode (if appropriate)** Frequent inaccuracies or isolated inaccuracies that change the categorisation of the chosen pathology	
Colour Doppler Accurate box size, gain, scale and baseline settings demonstrating anatomy clearly		**Colour Doppler** Frequent inaccuracies of box size, gain, scale and baseline settings which prevent clear demonstration of the anatomy	
Spectral Doppler Accurate use with good cursor alignment and optimised waveforms		**Spectral Doppler** Inaccurate use with poor cursor alignment or waveform optimisation altering pathology assessment	
Pathology assessment Full assessment of the uncorrected complex lesion No images missing which are key to pathology assessment No measurements significantly inaccurate that are key to pathology assessment		**Pathology assessment** Poor or inadequate assessment of the uncorrected complex lesion Images missing which are key to pathology assessment Measurements key to pathology assessment significantly inaccurate and change the categorisation of the pathology	
Report is complete and accurate Comprehensive and accurate description of all parts of the heart Correct categorisation of chosen pathology Correct interpretation of findings in the clinical context		**Report is incomplete or inaccurate** Partial and inaccurate description of parts of the heart Incorrect categorisation of chosen pathology Incorrect interpretation of findings in the clinical context	

Congenital heart disease accreditation. **Case 4 – Repaired case of complex congenital heart disease** Practice must be satisfactory in all areas to pass			
Evidence of satisfactory practice	Tick	Evidence of unsatisfactory practice	Tick
ECG Largely present throughout without 2D image interference		**ECG** Unstable or frequently absent making timings inaccurate	
Optimisation Infrequent, non-repetitive optimisation errors which do not detract from the case conclusion		**Optimisation** Frequent, repetitive optimisation errors which detract from the case conclusion	
Complete study Images are complete enough to allow full assessment of the selected pathology, including Doppler study and measurements		**Incomplete study** Images are missing which are relevant to the accurate assessment of the selected pathology, including inadequate Doppler study or relevant measurements quoted in report but not demonstrated	
2D measurements/M-mode (if appropriate) Accurate throughout with minor errors only		**2D measurements/M-mode (if appropriate)** Frequent inaccuracies or isolated inaccuracies that change the categorisation of the chosen pathology	
Colour Doppler Accurate box size, gain, scale and baseline settings demonstrating anatomy clearly		**Colour Doppler** Frequent inaccuracies of box size, gain, scale and baseline settings which prevent clear demonstration of the anatomy	
Spectral Doppler Accurate use with good cursor alignment and optimised waveforms		**Spectral Doppler** Inaccurate use with poor cursor alignment or waveform optimisation altering pathology assessment	
Pathology assessment Full assessment of the repaired pathology with note to assess post-operative complications (leaks, re-stenosis) No images missing which are key to pathology assessment No measurements significantly inaccurate that are key to pathology assessment.		**Pathology assessment** Incomplete assessment of the repaired pathology Images missing which are key to pathology assessment Measurements key to pathology assessment significantly inaccurate and change the categorisation of the pathology.	
Report is complete and accurate Comprehensive and accurate description of all parts of the heart Correct categorisation of chosen pathology Correct interpretation of findings in the clinical context		**Report is incomplete or inaccurate** Partial and inaccurate description of parts of the heart Incorrect categorisation of chosen pathology Incorrect interpretation of findings in the clinical context	

Congenital heart disease accreditation. **Case 5 – Left or right heart obstruction** Practice must be satisfactory in all areas to pass			
Evidence of satisfactory practice	Tick	Evidence of unsatisfactory practice	Tick
ECG Largely present throughout without 2D image interference		**ECG** Unstable or frequently absent making timings inaccurate	
Optimisation Infrequent, non-repetitive optimisation errors which do not detract from the case conclusion		**Optimisation** Frequent, repetitive optimisation errors which detract from the case conclusion	
Complete study Images are complete enough to allow full assessment of the selected pathology, including Doppler study and measurements		**Incomplete study** Images are missing which are relevant to the accurate assessment of the selected pathology, including inadequate Doppler study or relevant measurements quoted in report but not demonstrated	
2D measurements/M-mode Accurate throughout with minor errors only		**2D measurements/M-mode** Frequent inaccuracies or isolated inaccuracies that change the categorisation of the chosen pathology	
Colour Doppler Accurate box size, gain, scale and baseline settings demonstrating anatomy clearly		**Colour Doppler** Frequent inaccuracies of box size, gain, scale and baseline settings which prevent clear demonstration of the anatomy	
Spectral Doppler Accurate use with good cursor alignment and optimised waveforms		**Spectral Doppler** Inaccurate use with poor cursor alignment or waveform optimisation altering pathology assessment	
Pathology assessment No images missing which are key to pathology assessment (e.g. suprasternal view, bifurcation) No measurements significantly inaccurate that are key to pathology assessment.		**Pathology assessment** Images missing which are key to pathology assessment Measurements key to pathology assessment significantly inaccurate and change the categorisation of the pathology	
Report is complete and accurate Comprehensive and accurate description of all parts of the heart Correct categorisation of chosen pathology Correct interpretation of findings in the clinical context		**Report is incomplete or inaccurate** Partial and inaccurate description of parts of the heart Incorrect categorisation of chosen pathology Incorrect interpretation of findings in the clinical context	