British Society of Echocardiography

Accreditation in Adult Transoesophageal Echocardiography (TOE) Information Pack

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

30 April 2026

This document supersedes all previous versions.

This document is a guide to completing BSE TOE accreditation

Submission and assessment criteria are included

Top of document

British Society of Echocardiography

Contents

Welcome message from the Accreditation Chair

Dear Candidate,

Welcome to the British Society of Echocardiography (BSE). The Transoesophageal Echocardiography (TOE) accreditation process represents a joint venture between the BSE and the Association of Cardiothoracic Anaesthetists (ACTACC). The ultimate aim is to achieve and maintain a high standard of transoesophageal echocardiography for the benefit of our patients.

The process is primarily offered as a service to the members of both these specialist societies. It is designed to accommodate the requirements of cardiologists, sonographers, anaesthetists, intensivists and cardiac surgeons. It is important that the candidate and their mentors read all the information carefully before commencing the accreditation process.

The accreditation process is regulated to ensure a high level of proficiency and professional standards. 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 in any specific way, or if you have constructive feedback to offer the accreditation committee, then please just get in touch.

Good luck with your accreditation process.

Best wishes,

Michâel Purdon

Chair, BSE Accreditation Committee

Introduction & aims

- Accreditation is run as a service for members of the BSE and is not a compulsory or regulatory certificate of competence or excellence. Accredited echocardiographers are expected to be able to perform and report TOE studies unsupervised.
- The Accreditation process is predominantly based on TOE. However, an understanding of transthoracic echocardiography is also necessary because the two approaches are complementary.
- Accreditation is a minimum requirement and cannot be regarded as a guarantee of competence.
- TOE 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 re-accreditation are available on the re-accreditation section on the BSE website.
- Accredited members are expected to uphold the BSE code of conduct standards. Where concerns about an accredited member's echocardiography practice arise, this should be dealt with locally in the first instance and should only be escalated to the Accreditation Chair if improvement in echocardiography practice has not been demonstrated.
- **Return-to-practice pathways** for reaccreditation are available for previously accredited members.
- **International candidates** working outside the United Kingdom must pass the logbook section of the practical examination before booking a place on a practical assessment day. This will help the Society manage capacity, and candidates manage their travel arrangements (including visas, where necessary) for overseas candidates.

Summary of process requirements

1. The candidate must be a member of the BSE.
2. Candidates must have a designated mentor to assist them through the accreditation process.
3. The accreditation process has two compulsory elements: a written theory examination and a practical assessment. **You must pass both elements to become an accredited member.**
4. The written theory exam comprises a multiple-choice question (MCQ) theory section and a "best answer" image reporting section.
5. The practical assessment consists of a logbook, a practical scanning assessment, and a viva assessment of five patient case studies.
6. The candidate must pass the written assessment before registering to attend the practical assessment.
7. The logbook should be collected within 36 months of the written examination.

Any queries regarding the accreditation process should be addressed to the BSE Accreditation Department; contact details and registrations are available at www.bsecho.org.

Tel: 0208 065 5794 (lines open from 09:00-17:00 Mon-Fri). Email: accreditation@bsecho.org.

Exam fees

A fee of **£375** is charged for the complete accreditation process. This fee is payable upon registration for the written section of the examination and covers the practical assessment. There is a non-refundable booking fee of **£50** 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 **£187.50** to re-sit this section. This reduced fee only applies to the second attempt if taken within 12 months of an unsuccessful first 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 **£187.50**.

Fees for international and return-to-practice candidates may differ; please contact the accreditation team for current rates. Fees may increase annually.

Extensions

Extensions to the **36-month deadline** may be granted. Extension request forms must be submitted **before the submission deadline.** Requests received after the case deadline may not be granted.

Less-than-full-time extensions are available for up to 24 months for candidates working less than full-time as stipulated by their contracted hours. Further information can be found on the BSE website's extension request page.

Appeals

Candidates can appeal the decision on a practical assessment result. **There is no appeals process for the written section of the examination**. Further information on applying for an appeal can be found in Appendix 13.

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 understand the accreditation process, including the training syllabus (see Appendix 1) and all relevant assessment criteria.

The mentor must assess the candidate's ability to perform an echocardiogram proficiently. 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.

The accreditation process cannot be completed without the support of a mentor. Ongoing supervision is essential to the accreditation process. **Candidates should only pursue accreditation when they have a designated mentor.** Candidates may have more than one mentor if working between Hospitals.

Written Theory Examination

Appendix 1 contains the whole training syllabus for this accreditation process, and Appendix 3 includes a recommended reading list.

The written theory examination is held once a year, usually in the autumn. It is held at various Pearson VUE centres across the UK, the Republic of Ireland, and some overseas locations. Registration dates are announced on the written assessment section of the BSE website. See Appendix 4 for registration guidance.

The written examination has two parts: an MCQ theory section and an Image reporting section. To pass the written examination overall, it is necessary to pass both parts at the same exam sitting.

If the first attempt is unsuccessful, candidates may be eligible to retake the exam at a reduced rate.

Reduced rate: This applies only to a second attempt taken within 12 months of the first attempt. If the second attempt is unsuccessful, the next attempt will be charged at the full fee.

There is no bar to re-sitting the written examination any number of times.

The pass mark for the MCQ is 70%, and the pass mark for the image reporting section is 60%. Following moderation, the Accreditation Chair may decide to vary these slightly.

Accreditation is awarded once a candidate has successfully completed the practical assessment. Satisfactory performance at the written assessment alone does not allow 'partial accreditation.'

Theory section

- Consists of 50 questions which must be answered within 60 minutes.
- Theory questions are designed to test the knowledge of TOE echocardiographic findings, with some additional questions on basic cardiology and ultrasound physics.
- Each Theory question comprises a main stem followed by 5 options related to the stem. **The single best answer should be selected**. Example questions are provided in Appendix 5.
- The Theory examination will be marked +1 for correct answers, 0 for incorrect or unanswered questions. There is no negative marking.
- There are no 'trick' questions.
- **The maximum possible mark is 50**.

Image reporting section

- Consists of 50 questions which must be answered within 90 minutes.
- The candidate will be presented with 50 questions based on a range of echocardiographic images and pertinent patient data.
- Each MCQ comprises a main question followed by 5 possible answers. The single best answer should be selected. Example questions are provided in Appendix 6.
- The Reporting section will be marked +1 for correct answers, 0 for incorrect or unanswered questions. There is no negative marking.
- There are no 'trick' questions.
- **The maximum possible mark is 50.**

Practical Assessment

The practical assessment is held up to five times per year. Dates, locations and online registration instructions are announced on the practical assessment section of the BSE website.

The practical assessment has three parts: a 125-case logbook (or 75 cases if TTE- or ACCE-accredited), a practical scanning assessment, and a viva assessment of five patient case studies.

All candidates must attend an assessment within 38 months of starting the accreditation process (i.e., within two months of their case collection deadline). A two-month grace period gives the candidate time to review, prepare, and submit the logbook and five viva cases.

- Registration for the practical assessment should **ONLY** be sought after collecting the logbook and patient case studies.
- It is the candidate's responsibility to complete online registration forms and update personal information correctly.
- If you have any concerns about the information provided, you should contact the accreditation team for guidance and support.

Logbook submission

The logbook should demonstrate the candidate's ability to meet the competencies shown in Appendix 2. The specific case mix for the logbook is shown below.

It should consist of 125 reports personally **performed and reported** by the candidate during the specified period of 36 months. The logbook is reduced to 75 cases over the same time period if the candidate holds **BSE** or **EACVI** TTE/ACCE/TOE Accreditation. Evidence of this should be submitted under the "Supporting information" section on the BSE logbook portal.

It is not acceptable to include cases reported by the candidate that have been performed by someone else.

The logbook format is a copy of the actual clinical report. The reports are to be uploaded and submitted via the BSE logbook portal. Please contact accreditation@bsecho.org for access.

Studies performed before and after bypass, i.e. during the same operation, count as one study. A study performed for the same patient on separate occasions counts as two separate studies.

More than one candidate from the same institution is permitted to study the same patient if the diagnosis is unusual, but each candidate must independently scan and write their own report

If a candidate encounters problems finding enough specific cases, this should be discussed with the mentor, who may consider arranging for you to attend a nearby centre.

- Competencies and mentor statements are to be completed via the BSE logbook portal.
- For details on what is expected in reports and full details of the logbook marking criteria, see Appendix 7.

Fully subscribed BSE members can request access to the portal before sitting the written examination by emailing accreditation@bsecho.org.

The logbook should reflect the normal caseload of a department and should include at least one example of the following case mix:

- Mitral repair
- Severe mitral valve regurgitation
- Infective endocarditis
- Basic adult congenital heart disease (e.g. ASD, VSD or pulmonary stenosis)
- Aortic pathology (e.g. dissection, aneurysm, intramural haematoma)
- Abnormal aortic valve
- Hypovolaemia/septic shock assessment
- Abnormal prosthetic valve
- Intracardiac mass including thrombus
- Pericardial effusion
- Left ventricular wall motion abnormality
- Right ventricular abnormality or pulmonary embolism assessment
- No more than 20 studies should be predominantly normal

Other information regarding the logbook:

- **All** patient identifiable data needs to be removed. This may require the manual removal of identifiable data. See Appendix 10.
- All cases have been collected in accordance with local requirements for data protection, i.e. your trust policy.
- The **signature (or e-signature)** and full name of the candidate are included. At least the final 50 cases should be reported primarily by the candidate alone, although they may be checked by another operator.
- **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 "Supporting information" section on the BSE logbook portal.

- Final sign-off / validation of the logbook is undertaken by the department's echo lead.

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 report summary should be worded so that it can be understood by any non-echocardiographer.

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 patient case studies should include one of each of the following:

1. A study showing no significant abnormality.
2. Moderate or severe aortic stenosis.
3. Moderate or severe mitral or aortic regurgitation.
4. Endocarditis or Intracardiac mass.
5. The fifth case should show an example of one of the following (and which has not previously been shown in the cases above):
    a. Prosthetic valve with size and type noted and reference to normal values for that valve
    b. Mitral repair
    c. Infective endocarditis
    d. Intracardiac mass including thrombus with differential diagnoses
    e. Basic adult congenital heart disease (e.g. ASD, VSD or pulmonary stenosis)
    f. Aortic pathology (e.g. dissection, aneurysm, intramural haematoma)
    g. Hypovolaemia/septic shock assessment
    h. Pericardial effusion
    i. Right ventricular abnormality or pulmonary embolism assessment
    j. Regional wall motion abnormality

Other information regarding the patient case studies:

- The "no significant abnormality study should demonstrate appropriate use of machine settings for optimal imaging and correct use of standard 2-D views as per BSE minimum dataset (mid-oesophageal, transgastric and upper oesophageal), M-mode, CW, PW and Colour Doppler to assess chambers and valves.

- It is essential to demonstrate accurate measurement of the LV dimensions in at least one case. This would normally be in the normal case, but if this is not possible, it is acceptable to provide this in at least one of the other cases.

- Moderate or severe aortic stenosis (please include a good demonstration of the use of the CW Doppler probe in the deep transgastric view/transgastric long axis view). You should also calculate the aortic valve area using the continuity equation and show all measurements used in the calculation.
- Moderate or severe mitral or aortic regurgitation which demonstrates quantification of the degree of regurgitation as per BSE guidelines.
- It is essential to demonstrate accurate measurement of the LV dimensions in at least one case. These measurements must be made in diastole and systole in both mid-oesophageal 4 chamber and 2 chamber views. Ejection fraction and regional wall motion abnormalities (if present) must be described accurately.

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

Image acquisition assessment

Consists of a candidate acquiring 10 different TOE echocardiographic views within 20 minutes. A simulator will be used to present various pathologies and test the candidates' knowledge and skills.

This will test the candidate's haptic knowledge and image acquisition skills. If there are concerns with any of the images, assessors may question the candidate - if they can demonstrate appropriate knowledge/competence when questioned this may be sufficient.

For full details of the image acquisition marking criteria, please see Appendix 12.

Practical assessment - outcomes and process for re-attempts (resubmissions)

A candidate will have two attempts at passing the practical assessment part of the accreditation process. A second attempt (referred to as resubmission) at the practical assessment is subject to a fee of £187.50.

- **If a candidate is successful** in all three parts of the practical assessment, they will be awarded BSE accreditation and join the accredited member list.
- **If a candidate is unsuccessful** in any of the three parts of the practical assessment, they will be deemed unsuccessful on this first attempt. The candidate will receive constructive feedback to facilitate a reattempt. 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 circumstances.

- If a candidate fails the second attempt (resubmission), the accreditation process must start 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 (resubmissions) 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 range from 3-9 months and can extend up to 12 months following the first attempt.

Our feedback consistently demonstrates that non-face-to-face feedback does not adequately equip a candidate to pass on 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*

We may authorise virtual or remote submissions for logbook reports and some viva cases, subject to committee approval.

Appendix 1: Training syllabus for BSE accreditation

Topics that may be included in the multiple-choice examination.

General Concepts

1. The place of echocardiography

- Clinical role of echocardiography and Doppler
- Information that echocardiography can and cannot provide
- 'Ruling out' pathology (sensitivity, specificity & Bayes' theorem)
- Likelihood of findings influencing patient management
- Undesirable outcomes: inaction while waiting for results, clinical 'red herrings'
- Indications for echocardiography
- Competing and complementary technology
- Cardiac catheterisation (ventriculography and coronary angiography)
- CT imaging
- Magnetic resonance imaging
- Nuclear Cardiology

1.1 Service Provision

- Provision and indication for specialised techniques, e.g. TOE, Contrast Echo.
- Availability and access
- Controlling workload
- Training & motivation of staff
- Audit, Quality Control & Clinical Governance
- Infection control

1.2 Relationship with patients

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

1.3 Reporting and Documentation

- Standard methods & terminology
- Distinction between Technical and Clinical reports
- Responsibility for reporting - Medico-legal considerations (Data Protection Act)

2. Imaging Physics & Instrumentation

2.1 Concepts and Terminology

- Concept of compression waves
- Definitions: frequency, wavelength, propagation velocity
- Units of measurement: Hz and MHz
- Decibel Comparison of Ultrasound with audible sound.

2.2 Propagation of ultrasound through tissues

- Speed of sound in different body tissues.
- Frequency range used for diagnostic imaging
- Distinction between specular reflection and backscatter
- Principles of attenuation and scattering

2.3 Ultrasound Transducers

- Piezo-electric effect
- General concepts of 2D and 3D transducer construction
- Characteristics of the ultrasound beam: Far (Fraunhofer) & Near (Fresnel) zones, side lobes
- Beam steering methods: mechanical & electronic
- Focusing methods, including dynamic receive focusing
- Focus position
- The role of intracardiac echocardiography

2.4 Imaging physics

- Factors affecting choice of imaging frequency: typical practical values for adults & children
- Broad-band imaging
- Harmonic imaging
- M Mode imaging.
- Scanning speed limitations, relationships between pulse repetition frequency, frame rate, lines per frame, field of view, depth to be imaged.
- Temporal resolution.

- Grey scale and dynamic range
- Measurement and optimisation of Resolution: axial, lateral, azimuthal and temporal
- Side lobe and grating artefacts
- Reverberation artefacts
- Limiting factors for detecting small targets

2.5 Echo Instrumentation

- Function of machine controls:
- Transmit power, overall gain, time gain compensation, lateral gain compensation, reject, compression, signal processing, dynamic range, pre-processing; post processing.
- Optimisation of imaging parameters, including transducer frequency, scan angle, spatial and temporal smoothing.
- Optimisation of 3D volume acquisitions including cropping and manipulation of viewing plane.
- The advantages of 3D echocardiography over 2D echocardiography e.g. appreciation of mitral valve pathology, elimination of geometric assumptions in cardiac chamber volume estimations

2.6 Optimising Images

- Use of gel (infection risk from transducer, operator)
- Standard views: midoesophageal (4C, 5C, 30°, 60°, 90° & 120° views), bicaval, RV inflow-outflow, upper oesophageal and transgastric views
- Use of non-standard views

2.7 Storage and Display of Images

- Basic concept of digital acquisition and storage systems.
- Scan converters and digital memories.
- Display devices and controls, recording techniques

3. Doppler physics & fluid dynamics

3.1 Basic Fluid Dynamics

- Fluid flow: significance of peak & mean velocities
- Determination of volumetric flow by Continuity equation

- Laminar & turbulent flow: Reynolds‘ equation (qualitative)
- Transition from Laminar to turbulent flow: inlet jet Bernoulli equation

3.2 Principles of Doppler

- Interaction of ultrasound waves with moving blood: the Doppler effect
- The Doppler equation: factors influencing magnitude of Doppler shift
- Spectral analysis: fast Fourier transform (qualitative)
- The spectral Doppler display: determination of mean, modal and peak velocities
- Limitation of CW Doppler caused by lack of depth discrimination
- Audible range of Doppler shift frequencies
- The effect of beam angle errors on Doppler velocities
- Aliasing: how it is caused and how it manifests in practice: the Nyquist limit
- Influence on aliasing of: transducer frequency; sample depth (range x velocity product); and beam angle
- High pulse repetition frequency (extended range) PW Doppler and the phenomenon of range ambiguity
- Relative advantages and disadvantages of CW, PW and HPRF modes
- Concept of colour flow imaging as multi-sampled PW
- Velocity estimation, by moving target indication and autocorrelation (qualitative)
- Limitations of mean velocity: use of velocity variance to show high velocities/turbulence
- Aliasing in colour Doppler
- The principles of pulse wave tissue Doppler
- Packet size, colour mode and sector size and their effect on frame rate and aliasing

4. Deformation Analysis

4.1 Principles of Myocardial Deformation

- The definition of displacement, velocity, strain and strain rate
- The cardiac ultrasound co-ordinate system for describing motion and deformation: longitudinal, radial, circumferential and rotational axes
- Quantifying myocardial deformation as opposed to velocity or displacement
- Concept of shear deformation; rotation of the base and apex of the left ventricle, and the resultant twisting deformation or torsion

4.2 Quantifying myocardial strain and strain rate by tissue Doppler

- The concept of the myocardial velocity gradient

- The concept of strain and strain rate to define deformation
- Tissue Doppler imaging for deriving strain and strain rate: practical parameters in measuring strain and strain rate (e.g. sample size and shape, offset distance, drift compensation, spatial and temporal averaging, tracking of sample volume)
- Reproducibility issues

4.3 Speckle Tracking Echocardiography/2D strain

- Familiarity with the concept of speckles and speckle tracking in greyscale 2D loops
- Speckle tracking for angle-independent derivation of velocities, displacement, strain and strain rate, in 2 dimensions
- The impact of frame rates on the quality of speckle tracking
- Speckle tracking vs. tissue Doppler techniques for assessing myocardial motion and deformation
- Speckle tracking for measuring left ventricular rotation and torsion
- Kindred technologies
- 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 Flow 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

5. Doppler instrumentation

5.1 Spectral Doppler Instrumentation

- Features of the spectral display: positive & negative velocities; scale & baseline controls.
- Effect of high-and low-pass filter and intensity threshold (‘reject‘) settings
- Pulsed Doppler sample volume: influence of gate length and distance (beam width)
- Representation of signal strength by image intensity
- How aliasing manifests on the spectral display

5.2 Colour Flow Instrumentation

- The colour display: BART convention
- Colour maps to show velocity scales
- Image domination and additive colour modes
- Difference between velocity and power (signal amplitude) displays
- Basic principles of Tissue Doppler Imaging (TDI), including optimisation of filters for detecting tissue versus blood velocities, sample volume and size, impact of interrogation angle on measured velocities, minimising aliasing, and maximising frame rates to detect short duration myocardial motion
- Differences between colour Doppler TDI and pulsed wave TDI.
- Minimisation of myocardial translational movements during acquisition.
- The concept of tracking on colour Doppler TDI to ensure that sample volume remains in the region of interest
- Parametric (curved M-mode) display of tissue Doppler images
- The relevance of importing cardiac cycle time points, such as aortic valve closure, into tissue
- Doppler traces

5.3 TOE Instrumentation

- Transducer types: single plane, biplane, omniplane
- Optimising machine settings for TOE Patient monitoring for TOE and general safety considerations
- Control of infection

5.4 Safety of ultrasound

- Potential hazardous biological effects: heating, resonance and cavitation effects
- Measurement of beam intensity (SPTA)
- Practical precautions: power levels, use of colour and CW Doppler
- Thermal Index, Mechanical Index

5.5 Recording methods

- Advantages/disadvantages of recording on videotape and digitally
- Basic understanding of digital image processing and recording methods: pixel density, volume of data, the DICOM standard, concept of data compression (JPEG, AVI, etc.), archiving of echocardiographic studies on magneto-optical discs, CD/DVD, portable

solid-state memories, ECG-gated acquisitions vs. continuous recording, facility to review acquired loop prior to

- storage, facility to choose the number and type of cardiac cycles to be recorded, facility for offline image properties adjustment and further quantitative analysis.

6. Cardiac Anatomy and Physiology

6.1 Anatomy of the thorax

- Anatomy of oesophagus
- Anatomy of the oesophagus with respect to the heart.
- Anatomy of Lungs & pleura
- Anatomy of heart, pericardium and mediastinum

6.2 Gross anatomy of the heart

- Basic cardiac embryology
- Nomenclature of chambers and valves
- Major relationships of chambers, valves and blood vessels
- Distinguishing features of valves and chambers as related to echocardiography
- The pericardial sac

6.3 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)

6.4 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

7. Cardiac functional parameters

7.1 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 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. Teichholtz 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 presence of poor quality and/or off- axis images

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

- 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 Flow 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

8. 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

8.1 Awareness of encapsulated contrast agents and techniques

- Interaction of ultrasound with encapsulated agents
- Generation of harmonic energy by bubble distortion and fracture
- Doppler signals generated by bubbles (Power Mode)
- Main indications for LV and RV opacification: enhancing endocardial definition for assessment of regional contractility and accurate cardiac volume estimations, detection of intracardiac masses, distinguishing thrombus from a vascular tumour, diagnosis of cardiomyopathies e.g. non- compaction, arrhythmogenic right ventricular dysplasia, Doppler enhancement
- Use of contrast in stress echocardiography for improving detection of wall motion abnormalities and for assessment of myocardial perfusion

9. Pathology

9.1 Mitral Valve Disease, 2D, 3D, M-mode and Doppler features of the normal mitral valve

9.2 Mitral Stenosis

- Mitral Stenosis
- Recognition of rheumatic mitral stenosis
- Qualitative description of valve and sub-valve calcification and fibrosis
- Measurement of orifice area by planimetry
- Factors favouring successful balloon valvuloplasty
- Doppler assessment of mean and end-diastolic gradient
- Doppler assessment of area by ‘pressure half-time‘: technique and limitations
- Role of exercise echocardiography in assessing the change in transmitral gradient and pulmonary systolic pressures with exercise, as decision aid in the timing of surgery/balloon valvuloplasty

9.3 Mitral regurgitation

- Aetiologies and typical echocardiographic features of
- Rheumatic
- Mitral annular calcification
- Floppy /myxomatous mitral valve
- Ischaemic
- Functional
- Infective endocarditis
- Assessment of severity by
- Chamber sizes and volume overload
- CW Doppler – shape and density of contour of Doppler signal
- Vena contracta, PISA and effective regurgitant orifice area
- Size of colour jet relative to atrial size by colour flow Doppler, Regurgitant fraction, regurgitant volume
- Pulmonary vein flow patterns
- Indirect effects on LV and LA
- Role of echocardiography in determining timing of surgery for primary mitral valve disease: ejection fraction, end-systolic LV diameter, EROA
- Role of TOE in assessing mitral valve pathology and in determining likelihood of repair as opposed to replacement

10. Aortic Valve Disease

10.1 2D, 3D, M-mode and Doppler features of the normal aortic valve

10.2 Aortic Stenosis

- Aetiologies and echocardiographic features:
- Rheumatic
- Bicuspid
- Senile degenerative
- Sub-and supra-valve obstruction
- Assessment by CW Doppler
- Peak and Mean gradients
- Apical, right parasternal and suprasternal positions
- Continuity equation
- Assessment of left ventricular hypertrophy and use of stress echocardiography for distinguishing fixed anatomical stenosis from pseudostenosis in low flow aortic stenosis and for assessing LV contractile reserve

- Difference between transaortic pressure gradients derived from echocardiography and from cardiac catheterisation

10.3 Aortic Regurgitation

- Aetiologies and typical echocardiographic features of:
- Rheumatic
- Bicuspid valve
- Aortic root disease
- Infective endocarditis (including root abscesses)
- Assessment of severity by:
- Chamber sizes/volume overload (regurgitant volume, regurgitant fraction)
- CW Doppler – shape and density of contour of Doppler signal, pressure half time
- Colour Doppler – size of jet relative to left ventricular outflow tract diameter
- Vena Contracta
- Effective regurgitant orifice area
- Diastolic flow reversal in descending aorta
- Indirect effects on LV
- Role of echo in determining timing of surgery
- Role of TOE in assessing aetiology and severity

11. Tricuspid Valve Disease

11.1 2D, M-mode and Doppler features of the normal tricuspid valve

11.2 Tricuspid valve stenosis

- Echocardiographic features
- Assessment of severity by imaging and Doppler

11.3 Tricuspid Regurgitation

- Aetiologies and echocardiographic features of:
- Rheumatic
- Prolapse
- Congenital
- Endocarditis
- Carcinoid
- Functional
- Assessment of severity by:

- 2D imaging and M-mode
- CW Doppler – shape and density of contour of Doppler signal
- Colour Doppler
- Hepatic vein flow pattern
- Indirect effects on RV and RA

12. Pulmonary Valve Disease

12.1 2D, M-mode and Doppler features of the normal pulmonary valve

12.2 Pulmonary Valve Stenosis

- Echocardiographic feature
- Assessment of severity by:
- Spectral Doppler
- Detection of infundibular obstruction by spectral Doppler

12.3 Pulmonary Regurgitation

- Aetiologies and echocardiographic features
- Assessment of severity by

13. Infective Endocarditis – Risk factors for I.E

- 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 endocarditis
- Monitoring of IE

14. Prosthetic valves

14.1 2D, M-Mode and Doppler features of the main types of replacement valves

- Tilting Disc
- Bi-leaflet
- Ball & cage

- Bioprostheses (stented and stentless)
- Age-related deterioration of bioprostheses
- Role of TOE in examining normal and malfunctioning prosthetic valves

14.2 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

14.3 Prosthetic valve regurgitation

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

15. Cardiomyopathies

15.1 Dilated Cardiomyopathy

2D, M-mode and Doppler features of dilated cardiomyopathy

- Detection and assessment of associated lesions
- Functional valve regurgitation
- Thrombus in cardiac chambers
- Pericardial effusions
- Role of echocardiography in assessment and follow-up

15.2 Hypertrophic Cardiomyopathy

- 2D, M-mode and Doppler features of Hypertrophic Cardiomyopathy
- Differentiation from other causes of hypertrophy, e.g. hypertension, “athletic heart”, amyloidosis, Fabry‘s disease, Friedreich‘s ataxia cardiomyopathy
- Techniques for measurement of left ventricular wall thickness, detection of left ventricular outflow tract obstruction and intracavity gradient

- Assessment of right ventricular involvement
- Associated abnormalities, e.g. systolic anterior motion mitral valve

15.3 Restrictive Cardiomyopathy

- Causes e.g. primary amyloidosis, sarcoidosis, idiopathic, endomyocardial fibrosis
- 2D, Doppler & TDI features of impaired ventricular filling – increased ventricular wall thickness, dilated atria, increased E/A ratio, reduced deceleration time, increased E/E‘ ratio, reduced S‘ wave.

15.4 Main features of LV non-compaction

15.5 Intracardiac Masses

- Typical locations for formation of intracardiac thrombus
- Echocardiographic features of typical LA myxoma
- Differentiation of myxoma from other cardiac tumours
- Features suggestive of malignancy
- Role of TOE in assessment of intracardiac masses
- Role of contrast in the assessment of intracardiac masses

16. Pericardial Disease

16.1 Anatomy of the normal pericardium

- Relationships of serous pericardium to heart and great vessels
- Transverse and oblique sinuses of the pericardium

16.2 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

16.3 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

16.4 Features of pericardial constriction

- Pericardial thickening/appearance
- Effect on A-V valve flow velocities
- Effect of respiration
- SVC/hepatic vein flow
- Differentiation from restrictive cardiomyopathy including use of tissue Doppler

17. Coronary Artery Disease and Systolic LV function

17.1 Anatomy of the normal coronary arteries

- Anatomy & nomenclature of the major branches of the coronary arteries
- Relationship of coronary anatomy to standard echocardiographic imaging planes
- Nomenclature for describing myocardial segments (16 & 17 segment model)

17.2 Analysis of segmental systolic myocardial function

- Use of stress echo to assess for myocardial ischaemia
- Diastolic dysfunction in coronary artery disease

17.3 Global measures of LV function:

- Ejection Fraction
- Stroke Distance
- Stroke Volume and Cardiac output
- Use of tissue Doppler and speckle tracking echocardiography for assessment of regional myocardial velocities and deformation in ischaemic heart disease, at rest and with stress
- Longitudinal function of the left ventricle, as assessed by M-mode (MAPSE) and tissue
- Doppler of the mitral valve annulus
- The concept of post-systolic contraction
- The concept of isovolumic acceleration by tissue Doppler

- Left ventricular torsion and its implications for systolic function of the LV

18. Diastolic function of the LV

18.1 Normal Diastology

- The 4 stages of diastolic dysfunction as assessed by transmitral flow Doppler (including DT);
- impaired filling pattern and restrictive flow pattern
- The limitations of transmitral flow

18.2 Doppler for assessing diastolic dysfunction:

- Effect of LA pressures and pseudonormalisation
- Effect of mitral regurgitation
- The use of Valsalva manoeuvre in reducing LA pressures to differentiate normal from pseudonormalisation
- Flow Doppler patterns
- The use of left atrial size, IVRT, tissue Doppler (diastolic longitudinal velocities of the mitral valve annulus, the E/E‘ ratio), pulmonary vein flow pattern and mitral propagation velocity for assessing diastolic function
- The importance of untwisting in left ventricular filling

19. LV dyssynchrony and assessment by echocardiography

- Techniques for measuring interventricular and intraventricular dyssynchrony for predicting response to cardiac resynchronisation treatment
- Tissue Doppler quantitation of intraventricular dyssynchrony and their limitations
- Techniques for optimising settings of the cardiac resynchronisation device after implantation

20. Stress Echocardiography

- Indications and basic knowledge of techniques for exercise, Dobutamine or vasodilator stress echocardiography

- Exercise or pharmacological stress echocardiography for diagnosis of ischaemic heart disease and myocardial viability
- The concept of viable and hibernating myocardium, and the relevance of the various responses of the myocardium to stress
- The concept of contractile reserve
- The American Society of Echocardiography regional wall motion scoring system
- Dobutamine stress echo in 'low flow' aortic stenosis
- Exercise stress echo in valvular heart disease and pulmonary hypertension

21. Myocardial Infarction and its sequelae

- 2D, 3D, M-mode and Doppler features of:
- post-infarction VSD
- Mitral papillary muscle rupture
- Cardiac tamponade
- Mural thrombus
- Myocardial scarring
- Dressler's syndrome
- Left ventricular aneurysm – true aneurysm vs. pseudoaneurysm
- Main features of stress-induced (Takotsubo) cardiomyopathy as differential diagnosis of acute myocardial infarction

22. Pulmonary Hypertension (PH) and functional assessment of RV

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

23. Diseases of the Aorta

- Technique for examining the ascending and descending thoracic aorta

- Echocardiographic features of the normal aortic root, ascending aorta, aortic arch and upper descending thoracic aorta
- 2-D, M-mode and Doppler features of:
    - Marfan syndrome
    - sinus of Valsalva aneurysm
    - thoracic aortic aneurysm
    - aortic dissection
- additional features related to aortic dissection:
    - aortic cusp prolapse
    - aortic regurgitation
    - fluid in pericardium
- Role of transoesophageal echocardiography in the diagnosis of aortic dissection
- Assessment of aortic root for patients undergoing transcutaneous aortic valve replacement

24. Adult Congenital Heart Disease

- Anatomy, pathophysiology and natural history of common congenital lesions present in adults
- 2-D, M-mode and Doppler features of the following, pre-operatively and post-operatively, as seen in the older child or adult.
- Ostium Secundum Atrial septal defects
- Perimembranous and muscular ventricular septal defects
- Partial and complete atrio-ventricular septal defect
- Persistent ductus arteriosus
- Bicuspid aortic valve and associated aortopathy
- Sub-and supra-valve aortic stenosis
- Aortic coarctation
- Pulmonary stenosis
- Ebstein‘s anomaly
- Tetralogy of Fallot
- D-type transposition of the great arteries and congenitally corrected transposition
- Role of contrast echocardiography in evaluating shunts in adults
- Calculation of shunts
- Role of TOE in adult congenital heart disease intervention

25. Likely echocardiographic findings for common clinical presentations:

- Heart failure or breathlessness
- Arrhythmia
- Ejection systolic murmur

- Hypertension
- Collagen abnormalities (including systemic sclerosis)
- Renal failure
- Stroke

26. Emergency and ICU TOE

26.1 General

- Constrained environment (multiple arterial/venous lines, ventilator, lighting issues etc.)

26.2 The hypotensive/shocked patient and post cardiac arrest

- Role of focused peri-arrest study and appreciation of limited echo windows
- Evaluation of LV (systolic and diastolic) and RV function.
- Exclusion of severe valve disease (e.g. severe AS, endocarditis) and acute aortic dissection
- Assessment for pericardial effusion and cardiac tamponade, hypovolaemia and underfilling, and high output cardiac failure
- Septic shock – assess for LV systolic/diastolic dysfunction
- Value of repeated echo studies to assess any deterioration/improvement in underlying state

26.3 Suspected acute pulmonary embolus

- Echocardiographic evaluation of RV size and function, tricuspid regurgitation and pulmonary artery systolic pressure assessment, IVC size and respiratory variation, thrombus presence in IVC/RA

26.4 Blunt and penetrating cardiac trauma

- Typical echocardiographic features including pericardial effusion, right and left ventricular contusion, acute valve lesions, aortic dilation and dissection/transection, VSD, pleural effusion

26.5 TOE in the ventilated patient

- Awareness of echocardiographic findings in the presence of mechanical ventilation.
- Value of echo in difficult to wean patients
- Role in differentiating hydrostatic and inflammatory causes of pulmonary oedema
- Assessment in persistent hypoxaemia despite pulmonary recruitment strategies (e.g. exclude
- PFO, proximal pulmonary embolus)
- Acute arrhythmias such as fast AF (assessment for chamber abnormalities, valve
- disease, LV impairment, pericardial effusion)
- Cardiac source of embolus – CVA/peripheral embolic event in ventilated patients, thrombus, endocarditis, myxoma)
- Value of TOE in ventilated patients (if poor transthoracic echo window)

26.6 Post surgery patient

- Appreciation of effects of general anaesthesia and cardio-pulmonary bypass on LV function
- Assessment of post-surgical haemodynamic compromise/ acute deterioration e.g. cardiac surgery (tamponade, wall motion abnormalities, valvular dysfunction), general surgery (air/fat embolism, venous thromboembolism, acute MI, volume overload)

26.7 Assessment of filling status

- Awareness of the role of TOE in assessing filling using left and right ventricular systolic and diastolic function, IVC, limitations of SVC and hepatic vein size and reactivity, atrial septal motion, chamber sizes and variation in Doppler velocities.
- Role of repeated echo studies in assessing effects of fluid challenge and inotropes

27. Additional topics

The level of knowledge expected is that of a competent echocardiographer performing transoesophageal echocardiographic 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 Assessment Tool

The following competency assessment tool should be used to ensure all knowledge and practical experience are covered during the candidate's training period.

The competency tool is now required to be completed by the candidate's 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: midoesophageal, upper oesophageal and transgastric 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 network etc Can use Colour Flow Doppler for all valves optimising gain and box-size Can obtain pulsed wave Doppler at; left ventricular inflow (mitral valve) left ventricular outflow tract (LVOT) right ventricular inflow (tricuspid valve) right ventricular outflow tract, pulmonary valve & main pulmonary artery	
2. LEFT VENTRICLE **Knowledge** Coronary anatomy and correlation with 2D views of left ventricle. Segmentation of the left ventricle (16 and 17 segment models) Wall motion Measurements of global systolic function. (LVOT VTI, stroke volume, fractional shortening, ejection fraction using Simpson's rule) Doppler mitral valve filling patterns & normal range Appearance of complications after myocardial infarction Ventricular septal and papillary muscle rupture Ischaemic mitral regurgitation Features of dilated and hypertrophic cardiomyopathy 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 Understands causes of a hypokinetic left ventricle Can recognise features associated with hypertrophic cardiomyopathy Can recognise hypertensive heart disease	
3. MITRAL VALVE DISEASE Knowledge Normal anatomy of the mitral valve, and the subvalvar apparatus and their relationship with LV function Causes of mitral stenosis and regurgitation Ischaemic, functional, prolapse, rheumatic, endocarditis **Practical competencies** Can recognise rheumatic disease Can recognise mitral prolapse Can recognise functional mitral regurgitation Can assess mitral stenosis 2D planimetry, pressure half-time, gradient Can assess severity of regurgitation, chamber size, signal density, proximal flow acceleration & vena contracta	
4. AORTIC VALVE DISEASE and AORTA Knowledge Causes of aortic valve disease Causes of aortic disease Methods of assessment of aortic stenosis and regurgitation	

Basic criteria for surgery to understand reasons for making measurements **Practical competencies** Can recognise bicuspid, rheumatic, and degenerative disease Can recognise a significantly stenotic aortic valve 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 Knows the echocardiographic signs of 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	
6. REPLACEMENT HEART VALVES **Knowledge** Types of valve replacement Criteria of normality Signs of failure	

Practical competencies Can recognise broad types of replacement valve Can recognise para-prosthetic regurgitation Can recognise prosthetic obstruction	
7. INFECTIVE ENDOCARDITIS **Knowledge** Duke criteria for diagnosing endocarditis 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 artefacts **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, A-V valve flow velocities and respiratory variation. Features of pericardial constriction Differentiation of pericardial constriction from restrictive myopathy **Practical competencies**	

Can differentiate a pleural and pericardial effusion Can recognise the features of tamponade Can judge the route for pericardiocentesis Can recognise restrictive physiology	
10. ADULT CONGENITAL HEART DISEASE **Knowledge** Anatomy and echo features of basic congenital disease: ASD, VSD, partial & complete atrio-ventricular defects Patent ductus arteriosus Sub and supravalvar aortic stenosis Sub valvar, valvar and supra-valvar pulmonary stenosis Ebstein's anomaly Fallot's tetralogy Role of contrast Shunt calculation Estimation of pulmonary artery pressure **Practical competencies** Can recognise a secundum ASD and identify pulmonary veins Can calculate a shunt	

Appendix 3: Reading list

The reading list is provided by the Accreditation Committee of the British Society of Echocardiography and represents only a handful of texts that are available for candidates to learn from.

- Practical Perioperative Transoesophageal Echocardiography: With Critical Care Echocardiography by David Sidebotham, Alan Merry, Malcolm E. Legget · Elsevier/Saunders ISBN 0702034274.
- A Practical Approach to Transesophageal Echocardiography by Albert C. Perrino, Scott T. Reeves ISBN 1451175604
- Perioperative Two-Dimensional Transesophageal Echocardiography: A Practical Handbook by Annette Vegas. 1441999523
- Clinical Manual and Review of Transesophageal Echocardiography, Second Edition by Joseph Mathew, Madhav Swaminathan, Chakib Ayoub · Mcgraw-Hill. ISBN 0071638075
- Echocardiography: Guidelines for reporting – a practical handbook Helen Rimington and John Chambers Taylor & Francis 1998 ISBN 1850700117
- Feigenbaum‘s Echocardiography William F. Armstrong, Thomas Ryan, Harvey Feigenbaum –2010. ISBN 0781795575

Useful review articles:

- A minimum dataset for a standard transoesophageal echocardiogram: a guideline protocol from the British Society of Echocardiography. Richard Wheeler, Richard Steeds, Bushra Rana et al. Echo Res Pract. 2015 Dec 1; 2(4): G29–G45.
- ASE/SCA guidelines for performing a comprehensive intraoperative multiplane transesophageal echocardiography examination: recommendations of the ASE Council for Intraoperative Echocardiography and the SCA Task Force for Certification in Perioperative Transesophageal Echocardiography. Shanewise JS, Cheung AT, Aronson S et al. Anesth Analg. 1999 Oct;89(4):870-84.

- Guidelines for performing a comprehensive transesophageal echocardiographic examination: recommendations from the ASE and SCA. Hahn RT, Abraham T, Adams MS et al. Anesth Analg.2014 Jan;118(1):21-68
- Echocardiographic assessment of valve stenosis: EAE/ASE recommendations for clinical practice.
- Baumgartner H, Hung J, Bermejo J et al. Eur J Echocardiogr. 2009 Jan;10(1):1-25.
- Recommendations on the Echocardiographic Assessment of Aortic Valve Stenosis: A Focused Update from the European Association of Cardiovascular Imaging and the American Society of Echocardiography. Baumgartner H, Hung J, Bermejo J et al. J Am Soc Echocardiogr. 2017 Apr;30(4):372-392.
- European Association of Echocardiography recommendations for the assessment of valvular regurgitation. Part 2: mitral and tricuspid regurgitation (native valve disease). Lancellotti P, Moura L, Pierard LA et al. Eur J Echocardiogr. 2010 May;11(4):307-32.
- European Association of Echocardiography recommendations for the assessment of valvular regurgitation. Part 1: aortic and pulmonary regurgitation (native valve disease). Lancellotti P, Tribouilloy C, Hagendorff A et al. Eur J Echocardiogr. 2010 Apr;11(3):223-44.
- Recommendations for Noninvasive Evaluation of Native Valvular Regurgitation: A Report from the American Society of Echocardiography Developed in Collaboration with the Society for Cardiovascular Magnetic Resonance. Zoghbi WA, Adams D, Bonow RO. J Am Soc Echocardiogr. 2017 Apr;30(4):303-371Recommendations for cardiac chamber quantification by echocardiography in adults: an update from the ASE and the EACVI Lang RM, Badano LP, Mor-Avi V et al. J Am Soc Echocardiogr. 2015 Jan;28(1):1-39.
- Recommendations for quantification of Doppler echocardiography: a report from the Doppler Quantification Task Force of the Nomenclature and Standards Committee of the American Society of Echocardiography. Quiñones MA, Otto CM, Stoddard M et al. J Am Soc Echocardiogr.2002 Feb;15(2):167-84.
- Guidelines for the echocardiographic assessment of the right heart in adults: a report from the ASE endorsed by the EAE, a registered branch of the ESC, and the CSE. Rudski LG, Lai WW, Afilalo J et al. J Am Soc Echocardiogr. 2010 Jul;23(7):685-713

- Safe sedation during TOE- https://www.bsecho.org/Public/Public/Education/Guidelines.aspx
- EAE/ASE Recommendations for the evaluation of left ventricular diastolic function by echocardiography. Nagueh SF, Appleton CP, Gillebert TC et al. J Am Soc Echocardiogr. 2009 Feb;22(2):107-33.

Appendix 4: Written Examination Registration Guidance

BSE written exams are administered in collaboration with Pearson VUE testing services. Candidates can take the exam at local testing centres across the UK, the Republic of Ireland, and certain overseas locations.

➢ **Pre-registration (through the BSE website)**

1. Candidates must have an active BSE membership (fully paid and up to date).
2. Candidates must register their interest in taking the written exam by completing an **online pre-registration** form via the accreditation section of www.bsecho.org, during the pre-registration window specified online. **Candidates' registered names should match their photo identification. Pearson VUE follows a strict admission policy.**
3. BSE will transfer your data and requirements to Pearson VUE, who will contact all pre-registered candidates with further information on confirming exam placements.

Delivery methods: Candidates can take the exam in two ways: in a **Test Centre (recommended)** or online proctored exam (OnVUE), which allows them to sit the exam from home (subject to system requirements).

Note: Candidates taking the exam from home accept full responsibility for technical issues like device updates, pop-up blocking, connection errors, and bandwidth. System checks before the exam may not catch all faults, which can still occur during the exam. Understand these risks.

➢ **Special accommodations**

Pearson VUE can provide special accommodations (reasonable adjustments) to candidates with official requirements, such as extra time, a reader, or medication during the examination.

All requests must be in writing and supported by documents from a healthcare professional/provider detailing the requirements and reason for the request. The BSE will approve requests at its discretion and **must be submitted within the pre-registration window**. To submit such requests, forward them to accreditation@bsecho.org.

➢ **Registration (through Pearson VUE)**

Pearson VUE will manage all registration and payments after the pre-registration stage. Some automated emails may end up in spam or junk mail. Pearson VUE may notify candidates of any changes to bookings; candidates must ensure that their contact information is accurate.

Cancellations made less than 7 days in advance 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. The instructions can also be accessed through Pearson VUE's online resources before the exam. Candidates will complete the exam on a computer at the test centre.

The exam already includes a basic calculator and a whiteboard application. The examining test centre will give candidates an erasable sheet.

If the candidate chooses to take the exam from home using online proctoring (OnVUE), a basic calculator and whiteboard are built into the exam as an online application for the candidate to use at their convenience. Therefore, **no form of stationery is permitted when taking the exam.**

Candidates are required to bring a government photo ID and another form of identification. Please ensure that the registration details match your photo ID exactly; otherwise, you will be refused entry. If denied entry, candidates should contact BSE immediately.

The test centre will not facilitate any last-minute requests for special accommodations.

- **Results**

Results are released 5-6 weeks after sitting the exam, and scores will be uploaded to BSE profiles. **Both sections must be passed for a complete pass.**

Pass: Candidates can request portal login details to upload logbook reports. The deadline appears under 'Practical submission deadline' after written exam scores in the 'Participation' tab of the BSE profile. This information is also emailed to the candidate (subject to account status).

Fail: candidates can register interest to sit in the next sitting of the exam.

- The reduced fee applies only to first-time, unsuccessful candidates who sit the exam physically. The second attempt must occur within 12 months. **Results cannot be appealed or remarked since 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-takers/Resources.aspx.

Pearson VUE has a strict admissions policy. Candidates' registered names should be exactly as they appear on their government-issued photographic ID.

Appendix 5: Written exam multiple-choice questions example

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.

1	**When considering possible mitral valve repair there is no need to assess**	A
a.	the mechanism of the mitral regurgitation	
b.	left atrial size	
c.	mitral to tricuspid annular ratio	*
d.	anterior mitral valve leaflet length	
e.	the presence of annular calcification	

2	**Doppler methods to quantify flow in clinical practice assume that**	
a.	cross-sectional flow profiles are parabolic	
b.	turbulent flow profiles are being sampled	
c.	the intercept angle with flow is 15°	
d.	transmit power is kept constant	
e.	flow velocity and cross-sectional area are measured at the same point	*

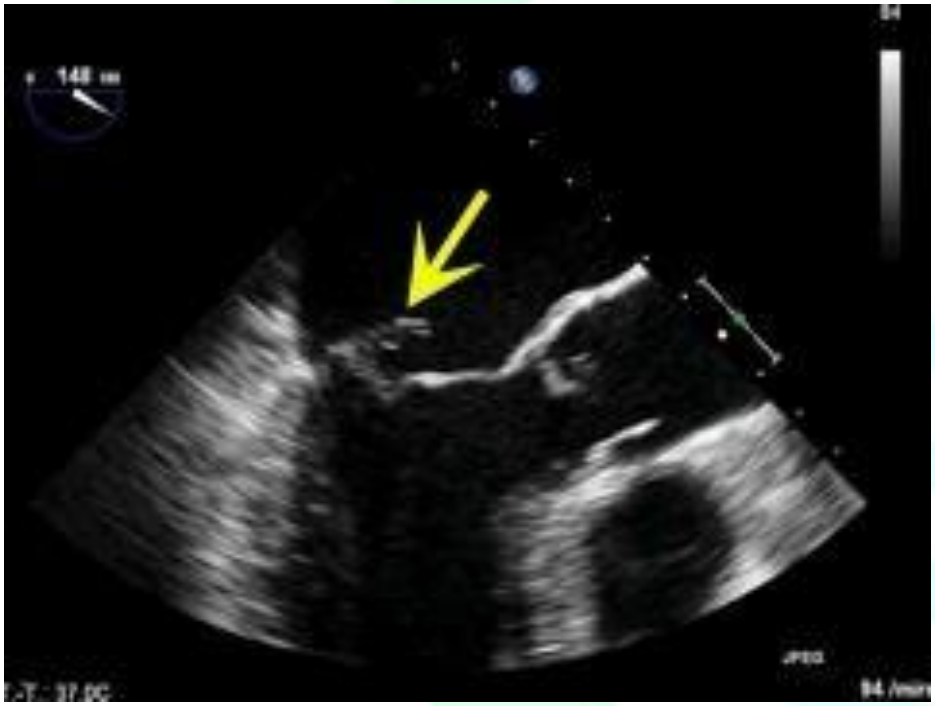
3	**Left ventricular regional wall motion abnormalities resulting from occlusion of the circumflex coronary artery may commonly be seen in the following left ventricular segments**	
a.	mid anteroseptal	
b.	basal inferolateral	*
c.	apical inferior	
d.	basal inferoseptal	
e.	apical anterior	

Appendix 6: Written exam image reporting questions example

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 spent 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.



1	The arrow indicates:	A
a.	Anterior mitral valve leaflet	
b.	Posterior mitral valve leaflet	*
c.	Coronary sinus	
d.	Mitral valve annulus	
e.	Zone of coaptation	

Appendix 7: Report Format & Logbook Marking Criteria

THIS IS A SUGGESTED FORMAT FOR A REPORT WITHIN THE WORKPLACE.

PLEASE NOTE ALL REPORTS SUBMITTED IN THE LOGBOOK AND ACCOMPANYING THE CASES MUST BE ANONYMISED

The report should comprise the following sections:

Demographic and other Identifying Information

- Obligatory information
- Patient's name
- Medical record number, NHS number or other unique identifier
- Age
- Gender
- Indications for test
- Referring clinician identification
- Interpreting echocardiographer identification
- Date of study

Additional, optional information

- Location of the patient (e.g. outpatient, inpatient, etc.)
- Location where study was performed (e.g. Echo department, Cath lab, ITU, theatre, etc.)
- Study classification (routine, urgent, emergency)
- Date on which the study was performed
- Height and weight Blood pressure
- Medications administered

Echocardiographic study

- This covers the main content of the report.
- For each cardiac structure, the report is divided as follows:

Descriptive terms:

- Phrases that are used to construct the text content of a report, describing morphology (e.g. mitral leaflet -thickened tips) and function (e.g. mitral leaflet –reduced

- mobility of the PMVL) of cardiac structures.

Measurements/analysis:

Examples to include: Vmax, peak gradient, mean gradient, valve area. LA / LV / RV /RA dimensions. Regurgitant jet quantification including; vena contracta, PISA, regurgitation volume, effective office area.

Diagnostic statements:

Phrases that add echocardiographic interpretation to descriptive terms (e.g. appearance of rheumatic mitral valve disease, suitable for commissurotomy).

Summary

This important section should contain final comments that address the clinical question posed by the TOE request. This may comprise simple repetition of key descriptive terms from within the main part of the report (e.g. “severe LV dysfunction”). It may add clinical context to the technical aspects of the report, particularly with respect to abnormal findings. Where possible, a comparison with previous echocardiographic studies or reports should be made, and important differences (or similarities) should be highlighted. Technical limitations of the study or its interpretation should be included.

Logbook marking criteria

When marking a candidate’s logbook, the Assessor will review a selection of reports in the candidate’s logbook. The British Society of Echocardiography reserves the right to review all logbook reports if deemed appropriate.

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)
Indication for TOE present	
Appropriate 2D and m-mode (if relevant) measurements present	
Appropriate Doppler measurements / calculations present	
Do measurements / Doppler calculations match descriptions	
All parts of heart described	
Descriptions complete	
Appropriate to request	
Conclusion appropriate to findings (No conclusion = automatic fail)	

Reporting marking comments:

- No conclusion = automatic fail for report being reviewed.
- More than two “no’s” per report results in that report failing.
- 30% of cases deemed as being failed = Fail of entire logbook

Logbook outcomes include:

Satisfactory logbook for BSE accreditation

OR

Unsatisfactory at present and a resubmission is required.

Resubmission requirements will be discussed with the candidate and detailed feedback provided to assist the candidate with a resubmission.

Unsuccessful candidates will be informed by Assessor after discussion with the senior Assessor.

Appendix 8: Guidance for the removal of patient identifiable data

The duty of confidentiality arises from the common law of confidentiality, professional obligations and staff employment contracts. Breach of confidence may lead to disciplinary measures, 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:

a. **Patient's name**
b. **Address**
c. **Full post code**
d. **Date of birth**
e. **NHS number and local identifiable codes**

Key identifiable information may also include information that can be used to identify a patient directly or indirectly. For example, rare diseases, drug treatment, or statistical analyses involving 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 gender and age/year of birth.

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

We advocate against using other electronic anonymisation methods as sometimes data is still present. If in doubt, manually remove patient identification information before use.

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

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

Appendix 9: Viva case 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 for the patient case study to be passed.
A minimum of two patient case studies will be assessed. The BSE reserves the right to assess all five patient viva cases.

Adult Transoesophageal Accreditation **Case 1 – Aortic valve/stenosis pathology** 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 relevant) Accurate throughout with minor errors only		**2D measurements/M-mode (if relevant)** 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 Good quality CWD. No images missing which are key to pathology assessment No measurements significantly inaccurate that are key to pathology assessment (LVOT diameter, LVOT VTI and AV VTI)		**Pathology assessment** Missing, poor quality CWD signal. Images missing which are key to pathology assessment Measurements key to pathology assessment significantly inaccurate and change the categorisation of the pathology (LVOT diameter, LVOT VTI and AV VTI)	
Report Complete, accurate and comprehensive description of all parts of the heart Correct categorisation of chosen pathology (NB trivial abnormalities may be included in this case) Correct interpretation of findings in the clinical context		**Report** Incomplete or inaccurate or partial and inaccurate description of parts of the heart Incorrect categorisation of chosen pathology Incorrect interpretation of findings in the clinical context	

Adult Transoesophageal Accreditation **Case 2 – Regurgitant pathology** 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	
2D measurements/M-mode (if relevant) Accurate throughout with minor errors only		**2D measurements/M-mode (if relevant)** 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 Good assessment of regurgitation. Understanding of the methods available to assess severity and accurate demonstration if appropriate (eg PISA/Vena contracta/PV flow) No images missing which are crucial to pathology assessment No measurements significantly inaccurate that are crucial to pathology assessment		**Pathology assessment** Poor or inadequate assessment of severity. Failure to return Doppler baseline to normal after PISA assessment Images missing which are crucial to pathology assessment Measurements key to pathology assessment significantly inaccurate and change the categorisation of the pathology	

Report 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** 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	

Adult Transoesophageal Accreditation **Case 3 – Endocarditis or intracardiac mass** 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 relevant) Accurate throughout with minor errors only		**2D measurements/M-mode (if relevant)** Frequent inaccuracies or isolated inaccuracies that change the categorisation of the chosen	
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	

Pathology assessment Appropriate measurement of Simpson's method, M-mode showing systolic and diastolic measurements in both 4C & 2C view. Correlates with visual impression and other methods No images missing which are crucial to pathology assessment No measurements significantly inaccurate which are crucial to pathology assessment.		**Pathology assessment** Incomplete assessment of Simpson's/M-mode or measured inaccurately and changes the categorisation of the reported EF Images missing which are crucial to pathology assessment Measurements key to pathology assessment significantly inaccurate and change the categorisation of the pathology	
Report Complete and accurate Comprehensive and accurate description of all parts of the heart Correct categorisation of chosen pathology (NB trivial abnormalities may be included in this case) Correct interpretation of findings in the clinical context.		**Report** 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	

Adult Transoesophageal Accreditation **Case 4 – Other pathology** 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 relevant) Accurate throughout with minor errors only		**2D measurements/M-mode (if relevant)** 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 Appropriate measurement of Simpson's method, M-mode showing systolic and diastolic measurements in both 4C & 2C view. Correlates with visual impression and other methods No images missing which are crucial to pathology assessment No measurements significantly inaccurate which are crucial to pathology assessment.		**Pathology assessment** Incomplete assessment of Simpson's/M-mode or measured inaccurately and changes the categorisation of the reported EF Images missing which are crucial 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 (NB trivial abnormalities may be included in this case) 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	

Adult Transoesophageal Accreditation **Case 5 – No significant abnormality** Practice must be satisfactory in all areas to pass			
Evidence of satisfactory practice	**Tick**	**Evidence of unsatisfactory practice**	
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 relevant) Accurate throughout with minor errors only		**2D measurements/M- mode (if relevant)** 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	
LV assessment Good quality M-mode of the LV and Ao/LA. No crucial images missing No measurements significantly inaccurate.		**LV assessment** Poor quality or missing M-mode of the LV and Ao/LA Images missing which are crucial to assessment Measurements crucial to assessment significantly inaccurate	
Report Complete and accurate Comprehensive and accurate description of all parts of the heart Correct categorisation of chosen pathology (NB trivial abnormalities may be included in this case) Correct interpretation of findings in the clinical		**Report** 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	

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Appendix 10: Image acquisition marking criteria

The marking criteria for the image acquisition assessment are shown below.
The simulator may be loaded with different pathologies.
The candidate will be asked to obtain a high-quality image of a specific view.

N.B. No blind spot between upper oesophageal and mid oesophageal views. Not all views may be possible in the available time.

- Image acquisition should take no more than 20 mins (10 images at 2 mins each).
- If there are concerns, assessors should question the candidate - if they can demonstrate appropriate knowledge/competence when questioned this may be sufficient.
- Candidates should not fail as a result of one poor image.
- Pass mark = 80% of acquired images are of good quality.

The senior assessor can provide constructive feedback in a separate room to enable a direct comparison of the candidate's image acquisition to the expected standards.

Image acquisition list

Spend 1-2 minutes on each acquisition	Image	Satisfactory	
		Yes	No
1.	2D MO 4 Chamber view		
2.	2D MO 5 Chamber view		
3.	2D MO mitral commissural view		
4.	2D MO 2 Chamber view		
5.	2D MO LAX view		
6.	2D MO AV SAX view		
7.	2D MO AV LAX view		
8.	2D MO LA appendage view		
9.	2D MO R/L Upper/lower pulm. veins		
10.	2D RV inflow/outflow view		
11.	MO Bicaval view		
12.	MO modified bicaval view		
13.	2D TG Basal SAX view		
14.	2D TG Mid Papillary view		
15.	2D TG 2 Chamber view		
16.	2D TG LAX with CWD across aortic valve		
17.	2D TG RV inflow view		
18.	2D Deep TG view		
19.	Desc Aorta SAX view		
20.	Desc Aorta LAX view		
21.	UO Aortic arch LAX view		
22.	UO Aortic arch SAX view		
23.	MO Asc Aorta LAX view		
24.	MO Asc Aorta SAX view		

Please circle the most appropriate score:

Body Position				
1 Looks awkward and uncomfortable.	2	3 Occasional awkward movement.	4	5 Appears at ease and moves comfortably.
Probe Handling				
1 Has difficulty moving the probe using excess force. Jerky.	2	3 Occasional difficulty or forceful use of probe.	4	5 Adjusts and moves the probe with ease. Smooth.
Recognition of anatomy				
1 Does not seem to be able to recognise obvious structures.	2	3 Some difficulty recognising structures.	4	5 Appears to recognise the anatomy without difficulty
Recognition of view				
1 Excess thinking time before attempting to find next view.	2	3 Some thinking time between moving on to find next view	4	5 Very little thinking time between each view.
Economy of movement				
1 Repetitve movements and non-purposeful movements.	2	3 Occasionally repetitions and non-purposeful movement.	4	5 No repetitive moves and purposeful movements.
Safety of movement				
1 Moves probe in oesophagus while tip in extremes of flexion; locks probe tip	2	3 Maintains some degree of probe tip flexion while moving probe in oesophagus	4	5 Releases all flexion while moving probe in oesophagus
Overall observed score				
1 Appeared at beginner level.	2	3 Appeared to have had some experience with TOE.	4	5 Appeared a skilled user.

Appendix 11: Mentor Statement & Declaration

The candidate must email a completed copy to accreditation@bsecho.org at the point of registration for a practical assessment.

I confirm that I have provided overall supervision and guidance for the following candidate, during the period in which they have performed and reported logbook studies and viva cases. ☐

I have reviewed the logbook and viva cases prior to the submission, and I am fully satisfied that the candidate has met the BSE submission criteria. ☐

I believe the candidate is ready to attend the practical assessment to present their work. ☐

Following the assessment, should the BSE wish to contact me for any information, I will be able to answer any questions the BSE may have regarding the candidate's performance.

Full name of mentor	
Mentor job title	
Mentor place of work	
Mentor email address	
Mentor phone number	
Name of candidate	
BSE ID of the candidate	
Candidate's place of work	

By signing this document, I declare that the information provided in this document is true and correct to the best of my knowledge.

Mentor signature:

Date:

Appendix 12: Appeal guideline and application

Appeal application process for all BSE accreditation specialities

The following information is provided by the British Society of Echocardiography (BSE) to assist a candidate who wishes to appeal the decision of their practical assessment for any of the BSE accreditation specialities. There is no appeals process for the written examination.

Please read the following information to ascertain if there are grounds for an appeal. The information below will also provide an overview of the appeal process from start to finish.

1. **Reasons for appeal**

An appeal for the following reasons is welcomed by the BSE Accreditation Committee:

- A decision to refuse to accredit a person
- A decision to request a resubmission of cases (logbook or/and video-case)
- A decision to impose a condition of accreditation
- A decision to revoke accreditation on retrospective review of submitted works for quality assurance purposes
- Any other decision that is not listed above, for which the candidate feels is relevant

2. **The Appeals Panel and role**

The appeals panel will consist of two senior assessors who have not been involved with the original assessment and who are not from the same centre as the candidate submitting the appeal.

The appeal's panel role is to:

- Look at the information used by the assessor/person who made the initial decision
- Clear up any misunderstanding
- Correct any errors
- Make a final verdict on whether the initial decision should be upheld, varied or changed
- Provided a detailed response to the candidate informing them of the decision along with feedback as to why this decision has been reached.

3. **The appeals process**

Candidates submitting an appeal must complete and return the following to the accreditation operational team within **2 months** of the initial practical assessment.

- Complete appeal form (see below)

- Any relevant documentation (Assessor's mark sheets/comments)
- **Appeal fee £100** to be paid by BACS (see bank details below)-
  Bank Natwest- Account number:73699519, Sort code- 53-70-15, include **A-**followed by your **BSE ID** number as the payment reference.

Please note that if the appeal outcome changes from the original decision, the fee will be reimbursed.

Please send this form via email to **accreditation@bsecho.org**. If you have any supporting documents or case presentations, please request an upload link from the accreditation team.

4. **Appeal outcome**

The appeal panel appointed will review the appeal application. This will usually be at the next practical assessment day to ensure a fair hearing (please be mindful that assessors are volunteers of the BSE who have other work and life commitments and should not be expected to work above what is reasonable).

The panel will provide written feedback on the appeal outcome and any relevant feedback. This will be provided to the candidate who submitted the appeal within 28 days of the appeal being heard.

The review panel's decision is final. There is no appeal against the decision of the appeals panel.

APPEAL FORM

Applicant Details:

Title: ☐ Dr ☐ Mr ☐ Ms ☐ Mrs ☐ Miss ☐ Other (please specify): Click or tap here to enter text.

Membership number: Click or tap here to enter text.

Hospital/Company: Click or tap here to enter text.

Candidate postal address: Click or tap here to enter text.

Telephone: Click or tap here to enter text.

Email: Click or tap here to enter text.

Question 1: What decision are you appealing?

☐ A decision to refuse to accredit a person (go to Question 3).

☐ A decision to request a resubmission of cases (go to Question 3).

☐ A decision to request a resubmission of reports (go to Question 3).

☐ A decision to impose a condition of accreditation (go to Question 3).

☐ A decision to revoke accreditation on retrospective review of submitted works for quality ☐ assurance purposes (go to Question 3).

☐ Other (go to Question 2).

Question 2: Please list the details of the condition or conditions, or any other decision, that you are appealing (after filling in the information, go to question 3).

Click or tap here to enter text.

Question 3: When did you receive notice of this decision? (After filling in the information, go to Question 4).

Click or tap here to enter text.

Question 4: What are your reasons for appealing the decision?

You may wish to attach additional documents to this form. Please ensure you detail which exact cases and which sections of marking you are querying. Please provide copies of the original cases and reports submitted if appropriate

Click or tap here to enter text.

By signing below, you confirm that you have read the guidelines and are aware of the timeframe required to provide a complete outcome for this appeal application.

Appeal fee £100 payment date: Click or tap to enter a date.

Signature: Click or tap here to enter text.

Date: Click or tap to enter a date.

End of form

Appendix 13: Terms and Conditions Written Exam

By registering for the written exam, the candidate agrees to the terms and conditions listed below.

1. **To pursue the written (theory) examination for BSE level II accreditation,** a candidate must:
    a. Have an active (paid) BSE membership.
    b. The membership account must be populated with the candidate's full name as it appears on their government photo identification.
    c. The membership account must include a complete postal address, contact telephone number and a current email address.
    d. The candidate is responsible for updating their BSE profile before registering interest to take the written exam.
    e. The candidate must read the relevant accreditation pack before registering for the exam.

2. **Pre-registration** is a **compulsory step** to register interest in taking the exam; this must be completed after becoming a paid BSE member and completing the online pre-registration form. Through pre-registration, the candidate grants the BSE permission to share personal data with Pearson VUE testing services.
    a. Pre-registration must be completed within the advertised registration period.
    b. Requests after registration closing dates will not be accepted.
    c. Payment is not expected at the point of pre-registration.

3. **Special accommodations:** additional time, nursing or relief breaks, could be permitted if the candidate:
    a. Provides documentation from a governing body to confirm the details and reasoning for the special accommodations.
    b. The documentation must be submitted within the pre-registration window to allow time for BSE to approve and for Pearson VUE to accommodate the request.
    c. The candidate must immediately contact the Accreditation department if a diagnosis has been made post-pre-registration.
    d. All queries will be directed to accreditation@bsecho.org, quoting the five-digit BSE ID number.

4. **Registration through Pearson VUE:** upon successfully transferring data to Pearson VUE, the candidate will receive automated messages to create a Pearson VUE account and then book the exam.
    a. Candidates must read the booking instructions and book the exam within the registration booking window.

b. Late registrations will not be accepted.

5. **Fee payment:** the appropriate fee must be paid in full when booking the exam. The reduced rate only applies to candidates who have taken the second attempt after an unsuccessful first attempt (physical).

6. **Cancellations:** cancellations made less than 7 working days before the exam will not be eligible for a refund. Cancellations must be made more than 7 working days before the exam through Pearson VUE.

Appendix 14: Terms and Conditions- Practical assessment

Assessment eligibility:

The BSE Practical Assessment is available to Level II candidates who have successfully passed the written exam with a current membership.

Level 1 candidates with a current membership and a completed logbook are eligible to take the practical assessment.

A mandatory booking fee must be paid when registering for a practical assessment. This fee is non-refundable and cannot be transferred under any circumstances. Places for assessments are allocated on a first-come, first-served basis and depend on the successful submission of the logbook. Once a venue reaches its capacity, candidates' names will be added to the waiting list. Registration will close once the maximum capacity for the practical assessment is reached.

When registering for the waiting list, the candidate acknowledges that a logbook submission deadline is advertised on the registration page and that the candidate intends to submit their logbook by that deadline, even while on the waiting list.

BSE reserves the right to reject registrations that are not eligible for the assessment.

**Booking fee noted online and in the relevant accreditation pack. Fees are subject to annual increases.*

Cancellations:

Cancellations with less than one week's notice (7 calendar days or less) will be classed as a no-show and automatically fail.

Appeals may be considered by the Accreditation Committee in cases of extenuating circumstances.

All cancellations must be made in writing to accreditation@bsecho.org stating name, membership number, date and time of confirmed assessment and reason for cancellation.

Personal Property:

BSE accepts no liability for the loss of belongings at the assessment venue.

Candidates are allowed to bring a bottle of water, any device, and printed reports needed for their assessment. These items can be stored in a simple carrier for easy movement between stations.

Cloakroom facilities differ between venues; we advise candidates to pack their belongings appropriately. Candidates must keep their photographic identification with them at all times.

All items are left in designated areas at the owner's risk. Please do not bring any other valuables.

Logbook and Digital Cases

Logbook reports and digital cases must fulfil the requirements and timelines detailed in the relevant Accreditation pack. The logbook must be submitted by the date advertised on the event's practical registration page.

By registering for the practical assessment, you, as the candidate, have accepted the following:

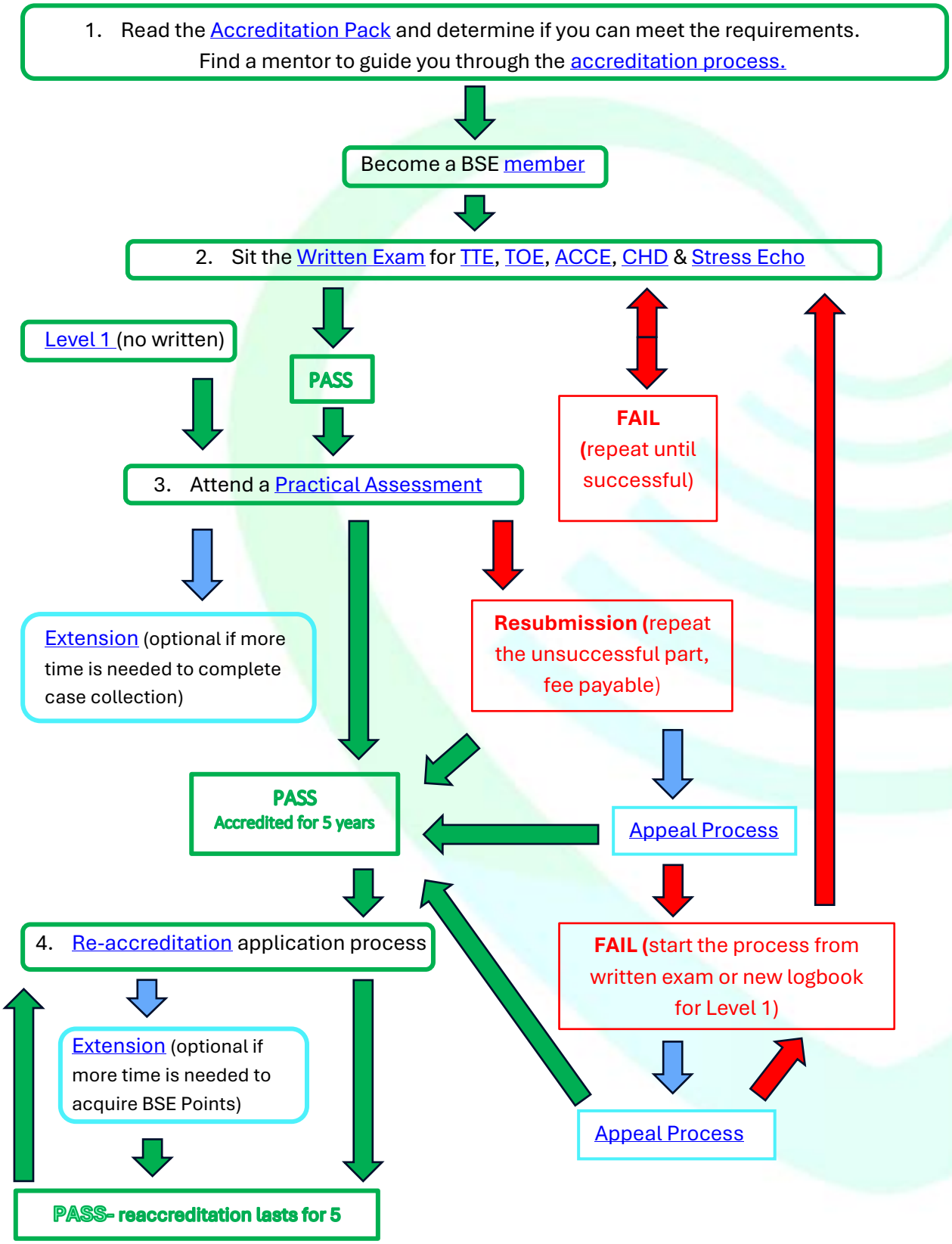
1. You have read the accreditation pack and understand the requirements for achieving BSE accreditation.
2. You have paid the relevant fees and your membership is current.
3. You have passed the written exam, and your work is ready for submission on the date you registered.
4. Your logbook must be submitted by the deadline advertised on the registration page, unless an extension has been authorised by the BSE.
5. Failure to submit the logbook by the agreed deadline will result in the loss of your placement.
6. You understand that the exam and booking fees paid are non-transferable and non-refundable.

Accommodation and Travel:

All participants are responsible for their travel and accommodation if required.

British Society of Echocardiography

Accreditation Process Overview



Useful Links & Contacts

Click the following titles to link to areas of **www.bsecho.org**

- **Accreditation process**
- **Education resources (protocols & guidelines)**
- **Extension requests**
- **Logbook portal**
- **Pearson VUE Testing**
- **Practical assessments**
- **Re-accreditation**
- **Regional representatives map**
- **Written examination dates**

Join the Accreditation Clinics on the first Thursday of each month at 1 pm to ask questions about accreditation. These clinics are hosted by the Accreditation team, with support from a committee member involved in the assessment process.

Sign up for a 👉 Accreditation clinics

Contacts

- **All accreditation** queries (including exam registrations) and requests to access the portal should be made to **accreditation@bsecho.org**
- Membership questions should be sent to membership@bsecho.org
- Events, education and e-learning questions should be sent to events@bsecho.org
- Concerns or complaints should be directed to admin@bsecho.org
- Phone number for all areas: 0208 065 5794 (Mon-Fri 9 am-5 pm, excluding UK public holidays)