British Society of Echocardiography
Affiliated to the British Cardiovascular Society

Accreditation in Community Echocardiography

Information Pack

This pack is for the use of all candidates undergoing the accreditation process and becomes effective as of July 2012.

This document supersedes all previous versions.

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Contents

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Welcome message from Accreditation Chair

Dear Candidate,

The process underlying Accreditation is set up to assist the echocardiographer in training and it is important that you read all the information carefully before commencing your specific speciality logbook.

The written section of the Assessment is held twice each year: in several venues around the UK and Republic of Ireland. Full details and registration forms are on the website www.bsecho.org.

We would like every BSE member to undertake the relevant Accreditation process, which has, as its ultimate aim, the achievement and maintenance of high standards of clinical echocardiography for the benefit of our patients.

A list of Accredited members is maintained on the BSE website. The process has to be regulated, and the standard of proficiency required for each specific Accreditation has to be set at a high enough level to command the respect of our professional colleagues. Subject to these constraints, we want to make it possible for as many members as possible to obtain Accreditation, and not to put any unnecessary barriers in their way.

Please let us know if we can assist you in this process.

Mr Keith Pearce
BSE Accreditation Committee

British Society of Echocardiography
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Introduction and Aims

- Accreditation is run as a service for members of the British Society of Echocardiography and is not a compulsory or regulatory certificate of competence or excellence.
- Accredited echocardiographers are expected to be able to perform and report echocardiographic studies unsupervised.
- Accreditation is a minimum requirement and cannot be regarded as a guarantee of competence.
- The accreditation process comprises a written exam (theory and case reporting sections) and a practical (logbook and cases submission) assessment.
- Echo skills can only be maintained by continued education and practical involvement in echocardiography. The importance of this underlined by limiting Accreditation to 5 years after which re accreditation must be sought.

Summary of process requirements

- You must be a member of the British Society of Echocardiography
- You should address all queries regarding accreditation to:
  BSE Accreditation Administrator, address details are available on the website Tel: 020 7345 5185 Fax: 020 7345 5186 Email: accreditation@bsecho.org
- You should register for the written assessment using the form found on the BSE website. This will advise the date and location of the next examination.
- You must pass the written assessment before submitting the practical assessment (logbook and cases)
- The practical assessment cases should be collated from a time period starting 12 months before to 12 months after passing the written section e.g. exam taken in April 2009 can include practical cases from: 1st April 2008 – 30th April 2010.
- You must submit:
  - 5 full cases accompanied by reports signed by yourself
  - A logbook containing 200 reports of a specific case mix
  - The full mentor/supervisors sheets -appendices 6 and 13.
  - If you have an accredited supervisor you must also enclose the supervisor only sheets, appendices 11 and 12.
- The deadline for submitting the Logbook is 2 months after the last date of collection of cases. Failure to submit by this deadline will necessitate repeating the entire process from the beginning.
- Extensions to this deadline may be granted only following periods of maternity or extended sick leave or in exceptional circumstances. Extension requests must be submitted in writing to the Chair (c/o the accreditation administration office) **before the original deadline.** This must be done by using the extension request form which can be obtained by contacting the BSE Accreditation Administrator. A charge of £100 will be made for each request.

- A fee of £150 is charged for the complete Accreditation process. This fee is payable, in advance upon registration for the written section of the examination and will also cover the logbook submission. Candidates who are unsuccessful in the written section of the examination will be charged a reduced fee of £75 to re-sit this section. This reduced fee only applies to candidates who re-sit the examination within 12 months. Resubmission of logbook reports/cases is subject to a fee of £75. Candidates are entitled to 1 resubmission in the practical assessment, after which the entire process must be undertaken again.
- The full training syllabus is available in appendix 2.
- Appeals - Please see the Appeals section on the website for details.

Details of written assessment and practical assessments

Written section

- The written assessment is held on two occasions each year. The Spring examination is held at multiple locations. There is a further Autumn examination held as part of the British Society of Echocardiography annual meeting. Full details of dates and venues, and registration forms, are circulated with the BSE Newsletter and on the BSE website.
- The written assessment is conducted under formal examination conditions. It is comprised of two parts: the Theory section and the Reporting section. The suggested reading list is available in appendix 1.
- Both parts of the examination will be computer marked - guidelines in appendix 5.
- In the written assessment it is necessary to pass both the multiple choice and imaging questions at the same exam sitting. The approximate pass mark for the Theory Section is 95/125 marks (76%) and for the Reporting Section 30/50 (60%).
- There is no bar to re-sitting the written assessment.
- Accreditation will only be awarded once a candidate has also successfully completed the practical assessment (logbook and cases). A satisfactory performance at the written assessment alone does not allow ‘partial accreditation‘.

Theory Section

- This consists of 25 questions which must be answered within 60 minutes. The questions test knowledge of echocardiographic findings with some additional questions on basic cardiology and up to 5 questions on physics.
- The subject matter reflects the spectrum of clinical practice according to both frequency and technical complexity. Thus valve disease is more frequently represented than ischaemic disease since, though seen less commonly in clinical practice, it presents a greater challenge to the echocardiographer.
- This part of the examination will be marked +1 for correct answers, 0 for incorrect or unanswered questions (no negative marking).
- There are no ‘trick‘questions.

- Each question comprises a brief statement followed by 5 questions relating to the statement. Candidates are required to say whether each question is 'true' or 'false' a blank response is used for 'don't know'. Some example questions are provided in Appendix 3.
- There are no fixed number of correct answers i.e. for each question it is possible for every answer to be false or every answer to be true, or any combination of true or false.
- The maximum possible mark is 125.

Reporting (imaging)

- This will consist of 50 questions, typically 5 questions on each of 10 case studies. Each question will have 4 possible answers and candidates will be asked to select the best answer. These reflect the range of clinical material seen in routine echocardiographic practice. Normal or near-normal studies may be presented.
- Each case will have 5 associated MCQ questions asking the candidate to select the best response from four answers (single best answer). The clips and stills will last 1-3 minutes, and will contain sufficient information to answer the questions.
- An example question is provided in appendix 4. Each case is worth a total of 5 marks giving a total of 50.

Practical assessment

- **Logbooks and cases must be fully anonymised – please read the BSE Policy on the Non-Anonymisation of Patient data in appendix 14. A major breach of this policy will result in a fail**.
- The Logbook and cases must be presented within the time frame outlined earlier. Do not bring Logbooks and cases to present at the time of the written assessment, and do not submit them until you know you have passed the examination.
- Logbook submission: The Logbook should be submitted in **one ring binder/file folder with the different categories separated by dividers**. Any Logbooks **not** submitted in this format will be immediately returned to the candidate for rectification.
- Submitted at the same time in a separate envelope should be;
  - The Mentor/Supervisor sections, if applicable, (fully completed) and the candidate final check list - appendix 15.
  - Cases on disc or memory stick and all case reports.
- The submission should be sent to BSE Accreditation Office, address details are available on the website
- Your practical section should be testified by an experienced echocardiographer. If this person cannot be a supervisor they still need to fill in all parts of the mentor/supervisor section. If you have an accredited supervisor they need to fill in the mentor/supervisor section **and** the supervisor section.

PLEASE SEE APPENDIX 16 FOR THE DEFINITIONS OF MENTOR AND SUPERVISOR

Logbook

- The Logbook should comprise details of 200 **transthoracic** cases personally **performed and reported** by you during the specified period of 24 months. It is not acceptable to include cases reported by you that have been performed by someone else.
- The format for the Logbook is a set of copies of actual clinical reports enclosed in a folder or binder. The reports should ensure:
    - **All** patient data has been removed including: full date of birth, name or address. See appendix 14
    - All cases have been collected in accordance with local requirements for data protection i.e. your trust policy.
    - Inclusion of cavity and Doppler measurements, objective observations and a comment - appendices 7 and 8.
    - The signature and full name of the candidate is included. At least the final 150 cases should be reported primarily by the candidate alone although they may be checked by another operator.

- The studies should reflect the normal case-load of a general adult department with the following constraints:

    - Assessment of left ventricular function (including regional wall motion abnormalities): at least 50 cases.
    - Native valvular heart disease: at least 25 cases.
    - Pericardial disease: at least 2 cases.
    - Diseases of the ascending aorta: at least 2 cases.
    - Examples of congenital disease (eg ASD): where possible.
    - Suspected endocarditis: where possible.
    - Cardiomyopathies (including HCM): at least 2 cases.
    - No more than 1/3 of the studies should be completely normal

The different categories of echoes should be separated by dividers.

- A tally of the primary diagnosis assigned to each case must be entered on the appropriate enclosed summary sheet - appendix 9.
- If possible there should be one or more examples of unusual diagnoses such as myxoma. More than one candidate from the same institution is permitted to study the same patient if the diagnosis is unusual but each candidate must do their own report.
- If you have problems finding enough specific cases, discuss this with your supervisor who may consider arranging for you to attend a larger centre.

Case Submission

- Five full studies with reports must be submitted. The cases **must** be anonymised. This is the section that is often done least well and is where many candidates fail. It is worth spending extra time doing this to make sure the submission is as good as it can be. Remember that it is assumed you will submit your best cases, so we will expect the studies to be complete and of a high standard. Also, remember we are assessing your echo skills not the pathology you are sending in. The following diagnoses are required:
    - A normal study demonstrating appropriate use of machine settings for optimal imaging and correct use of standard views (parasternal, apical, subcostal, suprasternal), M Mode (minimum Ao/LA, MV, LV) and 2D, CW, PW and Colour Doppler to assess chambers and valves.
    - An assessment of aortic stenosis.
    - An assessment of mitral or aortic regurgitation.
    - An assessment of LV function.
    - The fifth case of a different pathology to the other cases (e.g. pericardial effusion/constriction, mitral stenosis, cardiomyopathies, LVH, PFO etc).
- The studies must demonstrate all appropriate echocardiographic views and must show the methods of measuring all dimensions on M-mode or 2D and all parameters on Doppler echocardiography.
- **All** cases must have patient data removed. Some machinery cannot do this post-examination so please ensure due care is taken to put 'case 1' instead of patient's name or patient's personal details. Alternatively you may wish to use descriptions of pathology such as "aortic stenosis". It does not matter so long as it is very clear to the marker.
- Please ensure that each case presented is clearly labelled so that the marker is able to easily match the case with the report.
- Reports should include quantitative measurements, observations and a conclusion or summary.
- The candidate must demonstrate the use of standard Doppler equations.
- The cases must be submitted as digital loops and stills within a PowerPoint presentation.
- A guide to getting the cases right is available in appendix 10.
- Cases that are of high quality may be copied to be used in subsequent BSE written exams.

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Appendix 1 -Suggested Reading List

The syllabus is set by the Accreditation Committee of the British Society of Echocardiography and is presented as a guide to candidates.

The reading list is provided by the Accreditation Committee of the British Society of Echocardiography.

There are many excellent books on echocardiography and some examples are listed below. In addition to those listed there are many small basic texts which are a useful introduction to the subject.

- Authoritative textbooks (starting with the simpler texts as a suggestion)
- Echo made Easy Sam Kaddoura Churchill Livingstone 2001 ISBN 0443061882
- Echocardiography: Guidelines for reporting – a practical handbook Helen Rimington and John Chambers Taylor & Francis 1998 ISBN 1850700117
- Cardiac Ultrasound Leonard M Shapiro & Antoinette Kenny Manson Publishing 1999 ISBN 1874545081
- Feigenbaum‘s Echocardiography H.Feigenbaum Lippicott, Williams & Wilkins 2004 ISBN 0781731984
- Textbook of Clinical Echocardiography Catherine Otto W. B. Saunders 2004 ISBN 0721607896

Useful review articles:

- Wranne B, Baumgartner H, Flachskampf FA, Hasenkam M, Pinto F. Stenotic lesions (editorial). Heart 1996; 75 (Suppl.2);36-42. Downloadable from http://heart.bmjjournals.com/supplements.shtml
- M Enriquez-Sarano, C Tribouilloy. Quantitation of mitral regurgitation: rationale, approach, and interpretation in clinical practice. Heart 2002; 88 (Suppl 4): iv1-iv3. Downloadable from http://heart.bmjjournals.com/supplements.shtml
- S Y Ho Anatomy of the mitral valve. Heart 2002; 88 (Suppl 4): iv5-iv10. Downloadable from http://heart.bmjjournals.com/supplements.shtml
- T Irvine, X K Li, D J Sahn, A Kenny. Assessment of mitral regurgitation. Heart 2002; 88 (Suppl 4): iv11-iv19. Downloadable from http://heart.bmjjournals.com/supplements.shtml
- D Pellerin, S Brecker, and C Veyrat. Degenerative mitral valve disease with emphasis on mitral valve prolapse. Heart 2002; 88 (Suppl 4): iv20-iv28. Downloadable from http://heart.bmjjournals.com/supplements.shtml
- Gardin JM, Adams DB, Douglas PS, Feigenbaum H, Forst DH, Fraser AG, Grayburn PA, Katz AS, Keller AM, Kerber RE, Khandheria BK, Klein AL, Lang RM, Pierard LA, Quinones MA, Schnittger I; American Society of Echocardiography. Recommendations for a standardized report for adult transthoracic echocardiography: a report from the American Society of Echocardiography's

Nomenclature and Standards Committee and Task Force for a Standardized Echocardiography Report. J Am Soc Echocardiogr. 2002 Mar;15(3):275-90. Downloadable from www.asecho.org

- Zoghbi WA, Enriquez-Sarano M, Foster E, Grayburn PA, Kraft CD, Levine RA, Nihoyannopoulos P, Otto CM, Quinones MA, Rakowski H, Stewart WJ, Waggoner A, Weissman NJ. Recommendations for Evaluation of the Severity of Native Valvular Regurgitation with Two-dimensional and Doppler Echocardiography. J Am Soc Echocardiogr 2003;16:777-802. Downloadable from http://www.asecho.org/freepdf/valvularregurg.pdf
- Cheitlin MD, Armstrong WF, Aurigemma GP, Beller GA, Bierman FZ, Davis JL, Douglas PS, Faxon DP, Gillam LD, Kimball TR, Kussmaul WG, Pearlman AS, Philbrick JT, Rakowski H, Thys DM. ACC/AHA/ASE 2003 guideline update for the clinical application of echocardiography—summary article: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (ACC/AHA/ASE Committee to Update the 1997 Guidelines on the Clinical Application of Echocardiography). *Circulatio*n.2003
- http://www.acc.org/clinical/guidelines/echo/summary_article.pdf
- BSE website www.bsecho.org, downloads, BSE Echo report – Recommendations.

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Appendix 2 -Training syllabus for BSE accreditation

Training syllabus for BSE accreditation

Topics that maybe included in the multiple choice examination

1 General Section

General Concepts

The place of echocardiography

Clinical role of echocardiography and Doppler

- Information that echocardiography can, and cannot provide
- 'Ruling out' pathology (sensitivity, specificity & Baye's 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
- X-ray ventriculography and coronary angiography
- contrast C-T
- Magnetic resonance imaging
- Nuclear Cardiology

Service Provision

Advantages/disadvantages of technician-led versus physician-led service
Costs: fixed and variable
Provision and indication for specialised techniques, e.g. TOE. Stress echo, Contrast echo
Availability and access
Controlling workload
Training & motivation of staff
Audit, Quality Control, Clinical Governance

Relationship with patients

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

Reporting and Documentation

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

Imaging Physics & Instrumentation

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.

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

Ultrasound Transducers

Piezo-electric effect
General concepts of 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

Imaging physics

Factors affecting choice of imaging frequency: typical practical values for adults & children
Broad-band imaging
Harmonic imaging
B mode and M Mode methods.
Scanning speed limitations, relationships between pulse repetition frequency, frame rate, lines per frame, field of view, depth to be imaged.
Concept of Parallel Processing and its influence on frame rate and image quality
Effect on evaluation of rapid motion, temporal resolution.
Grey scale and dynamic range
Measurement and optimisation of Resolution: axial, azimuthal and elevation
Lateral resolution and grating artefacts
Reverberation artefacts
Limiting factors for detecting small targets

Echo Instrumentation

Function of machine controls: Transmit power; overall gain; time gain compensation; reject, logarithmic compression,
Signal processing, dynamic range, pre-processing; post processing
Optimisation of imaging parameters, including transducer frequency, scan angle, gamma correction, spatial and temporal smoothing

Optimising Images

Use of gel (infection risk from transducer, operator)
Positioning of the subject
Standard views: Parasternal, apical (4, 5 and 2-chamber), subcostal, suprasternal, right parasternal), long and short axis
Use of non-standard views
Adapting for subjects with difficult windows, ventilated patients, ward-based echo's

Storage and Display of Images

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

Doppler physics & fluid dynamics

Basic Fluid Dynamics

Fluid flow: significance of peak & mean velocities
Determination of volumetric flow
Continuity equation
Laminar & turbulent flow: Reynolds' equation (qualitative)
Transition from Laminar to turbulent flow: inlet jet
Bernoulli equation

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
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

Doppler instrumentation

Spectral Doppler Instrumentation

Duplex Doppler using imaging transducers
The 'Stand-alone' Doppler probe
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

Colour Flow Instrumentation

The colour display: BART convention
Colour maps to show velocity scales
Image domination and additive colour modes
Basic principles of Tissue Doppler Imaging, including optimisation of filters for detecting tissue versus blood velocities
Difference between velocity and power (signal amplitude) displays

TOE Instrumentation

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

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

Recording methods

Advantages/disadvantages of recording on: videotape, photographic or dye-transfer prints, thermal strip chart
Basic understanding of digital image processing and recording methods: pixel density, volume of data, concept of data compression, storage in RAM or magneto-optical disc format

Cardiac Anatomy and Physiology

Anatomy of the thorax

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

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

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 Cardiac Cycle

Temporal relationships of the ECG, chamber pressures and valve movements
Typical values for intracardiac pressures
Relationship of valve movements to heart sounds

Cardiac functional parameters

Measurements and calculations

On-screen measurement of length, slope, area, volume and time interval, and their significance for 2-D 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 and Simpson's rule methods
Limitations of measurement and/or calculation validity in presence of poor quality and/or off-axis images

Doppler determination of cardiac output, ejection time and velocity acceleration

Methods of measuring diastolic dysfunction: E/A ratio, deceleration time, pulmonary venous flow patterns
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

Contrast Studies

Significance of spontaneous echo contrast
Optimisation of machine control settings for detecting contrast
Indications for a bubble contrast study
Technique for performing a hand-agitated contrast study
Clinical precautions

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)
Clinical application for LV opacification and Doppler enhancement

Pathology

Mitral Valve Disease

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

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

Mitral regurgitation

Aetiologies and typical echocardiographic features of:

- rheumatic
- mitral annular calcification
- 'Floppy MV'/ myomatous mitral valve
- ischaemic
- functional
- infective endocarditis

Assessment of severity by**:**

- Chamber sizes and volume overload
- CW Doppler
- PISA
- Pulmonary vein flow patterns
- Indirect effects

Aortic Valve Disease

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

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 function

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
- CW Doppler
- Colour Doppler
- Indirect effects

Role of TOE in assessing aetiology and severity

Tricuspid Valve Disease

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

Rheumatic tricuspid valve stenosis

Echocardiographic features
Assessment of severity by imaging and Doppler

Tricuspid Regurgitation

Aetiologies and echocardiographic features of:

- Rheumatic
- prolapse
- congenital
- endocarditis
- carcinoid
- functional

Assessment of severity by:

- 2D imaging and M-mode
- CW Doppler
- Colour Doppler
- Indirect effects

Pulmonary Valve Disease

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

Pulmonary Valve Stenosis

Echocardiographic features
Assessment of severity by spectral Doppler
Detection of infundibular obstruction by spectral Doppler

Pulmonary Regurgitation

Aetiologies and echocardiographic features
Assessment of severity by

- CW Doppler
- Colour Doppler
- Indirect effects

Infective Endocarditis – Rick factors for I.E

Typical echocardiographic appearance of vegetations in bacterial and fungal endocarditis
Preferred locations for vegetations
'Jet' lesions

Endocarditis associated with congenital disease and HCM
Complications: abscess, fistula, perforation
Role of TOE in suspected endocarditis
Monitoring of IE

Prosthetic Valves

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

- Ball & cage
- Tilting Disc
- Bi-leaflet
- Stented Bioprostheses

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

Prosthetic valve stenosis

Assessment by 2D, M-mode and Doppler
Normal ranges
Use of Continuity Equation for aortic prostheses

Prosthetic valve regurgitation

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

Cardiomyopathies

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

Hypertrophic Cardiomyopathy

2D, M-mode and Doppler features of Hypertrophic Cardiomyopathy
Differentiation from other causes of hypertrophy, e.g. 'athletic heart'
Techniques for measurement of left ventricular wall thickness, detection of intracavity flow acceleration
Assessment of right ventricular involvement
Associated abnormalities, e.g. mitral regurgitation

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

Pericardial Disease

Anatomy of the normal pericardium

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

Echocardiographic features of pericardial fluid

Location of fluid in relation to patient position and fluid volume
Differentiation from pleural effusion
Assessment of volume of pericardial fluid
Role of echocardiography in pericardiocentesis

Features of tamponade

Collapse of RA and/or RV walls
Effect on IVC
Effect on A-V valve flow velocities during respiratory cycle.

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

Coronary Artery Disease and Systolic LV function

Anatomy & nomenclature of the major branches of the coronary arteries
Relationship of coronary anatomy to standard echocardiographic imaging planes
Nomenclature for describing myocardial segments (ASE convention)
Analysis of segmental systolic myocardial function
Use of stress echocardiology to assess for myocardial ischemia
Diastolic dysfunction in coronary artery disease
Global measures of LV function:

- Ejection Fraction
- Stroke Distance
- Stroke Volume and Cardiac output

Myocardial Infarction and its sequelae

2D, M-mode and Doppler features of:

- post-infarction VSD
- mitral papillary muscle rupture
- tamponade
- mural thrombus
- myocardial scarring
- Dressler's syndrome
- left ventricular aneurysm – true aneurysm vs pseudoaneurysm

Pulmonary Hypertension

2-D, M-mode and Doppler features of pulmonary hypertension
Aetiologies: primary; post pulmonary embolism; secondary to left-sided lesions; lung disease

Diseases of the Aorta

Technique for examining the ascending and descending thoracic aorta
Echocardiographic features of the normal aortic root, sinuses of Valsalva, ascending aorta and aortic arch
2-D, M-mode and Doppler features of:

- Marfan's 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

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 defects
- Persistent ductus arteriosus
- Bicuspid aortic valve

- Sub- and supra-valve aortic stenosis
- Aortic coarctation
- Pulmonary stenosis
- Ebstein's anomaly
- Fallot's tetralogy

Role of contrast echocardiography in evaluating shunts in adults
Calculation of shunts
Role of TOE in adult congenital disease

Likely echocardiographic findings for common clinical presentations:

Heart failure or breathlessness
Arrhythmia
Ejection systolic murmur
Hypertension
Collagen abnormalities
Renal failure
Stroke

Additional topics

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

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Appendix 3 -Proficiency Examination: Example Theory Questions

Answer ‗True' (T) or ‗False' (F) to each of the following. Each correct answer gains one mark, whilst each incorrect answer. A question left blank does not gain any marks.

Q1	**In an ultrasound imaging system:**	
a)	Sector width, sector depth and frame rate can all be controlled independently	F
b)	Frame rate falls as sector width increases	T
c)	Using a lower frequency transducer improves the frame rate	F
d)	The frame rate increases as sector depth increases	F
e)	Using Colour Flow Doppler reduces the frame rate	T

Q2	**On a Spectral Doppler display:**	
a)	The velocity at which aliasing occurs increases at higher ultrasound frequencies	F
b)	The velocity at which aliasing occurs increases at greater depths	F
c)	The velocity at which aliasing occurs increases at greater sector angle	F
d)	At 2 MHz the aliasing velocity at 10 cm is approximately 1.5 m/s	T
e)	The aliasing velocity can be increased by increasing the pulse rate (High PRF)	T

Q3	**In assessing Tricuspid Regurgitation:**	
a)	Pulmonary systolic pressure (PAP) can be calculated using the formula	F
	PAP = 4 x (Peak TR Velocity)2	
b)	Presence of proximal flow acceleration indicates at least moderately severe TR	T
c)	Both apical and parasternal views should be used to view the colour jet	T
d)	In very severe (‘free‘) regurgitation, the calculation of pulmonary pressure is invalid	T
e)	Additional information can be obtained from flow patterns in the SVC and IVC	T

Q4	**In a patient with systemic hypertension:**	
a)	Mean LV wall thicknesses are always greater than 1.1 cm	F
b)	Peak aortic ejection velocity is increased	F
c)	Typically the trans-mitral e-wave has reduced amplitude and increased deceleration time	T
d)	Typically the Isovolumic Relaxation Time (IVRT) is reduced	F
e)	The presence of mitral or aortic regurgitation indicates additional pathology	F

Q5	**An Atrial Septal Defect (ASD) may be associated with:**	
a)	Paradoxical interventricular septal motion	T
b)	No obvious defect of the atrial septum on imaging	T
c)	Right ventricular dilatation	T
d)	Left ventricular dilatation	F

Appendix 4 -Proficiency Examination: Example Reporting Questions

SELECT THE SINGLE BEST ANSWER There is no negative marking. One mark added for a correct answer, no mark deducted for an incorrect answer.

Case 1
Male age 46
Request: Systolic murmur
Data: IVS 1cm; LVIDd 4.2cm; PWT 1cm; LVIDs 3cm; LA 3.6cm; Ao valve 2.7cm; PA 2.2cm; Pulmonary FVI 32; LVOT 2.2cm; LVOT FVI 29; LV to RV pressure gradient 118mmHg; BP 150/88

1. Describe the main abnormality
a. Apical VSD
b. Endocardial cushion defect
c. Subaortic VSD X
d. ASD

2. What is the likely aetiology?
a. Congenital X
b. Inferior myocardial infarction
c. Anterior myocardial infarction
d. Endocarditis

3. What is the pulmonary to systemic flow ratio
a. 0.9
b. 1.0
c. 1.1 X
d. 1.3

4. What is the RV systolic pressure?
a. 20mmHg
b. 32mmHg X
c. 38mmHg
d. 42mmHg

5. Which of these is correct?
a. RV and LV are normal X
b. RV is dilated and LV is normal
c. LV is dilated and RV is normal
d. LV and RV are both dilated

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Appendix 5 - Computerised Marking Sheets – Guidance Notes

Instructions will be given on the day of the exam. However, please try to familiarise yourself with the process beforehand. The exam is marked by computer so these instructions need to be followed exactly.

Part 1 Theory Section

A. Time

The theory section will last 60 minutes.

B. Format

The theory section will consist of multiple choice questions.

C. Answers

A column for answers is provided on the question sheet but final answers must be marked on the computer marking sheet.

For one paper the answers will be either TRUE or FALSE

Please mark like this ▬ using an HB pencil.

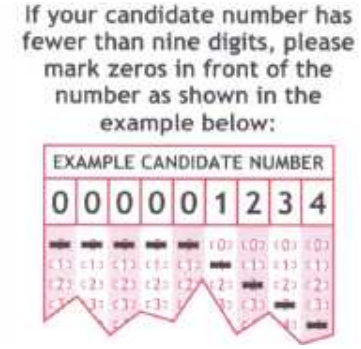
To answer TRUE mark through the [T] [T]
To answer FALSE mark through the [F] [F]

To cancel a response you can use an eraser

There will be NO negative marking for this paper – each correct answer will receive a score of 1. Incorrect or unanswered questions/stems will receive a score of 0.

D. Additional Information

You will need to write your Candidate Registration Number, with additional leading zeros if necessary to make nine digits in the box labelled Candidate No. Then code this into the boxes underneath. If, for example, your Candidate Registration Number is 09-123, you should place a line through 0 in the first five columns, through 9 in the sixth column, through 1 in the seventh column, 2 in the eighth and 3 in the ninth.



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Part 2 Reporting Section

A. Time

The reporting section will last 90 minutes

B. Format

The section will consist of 10 cases, each with 4 single best answer questions relating to it

C. Answers

A column for answers is provided on the question sheet but final answers must be marked on the computer marking sheet

For each question there is only one correct answer, a choice of A B C or D

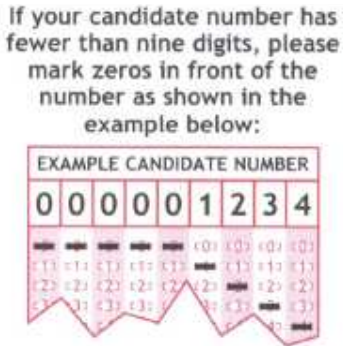
Please mark like this ▬ using an HB pencil.

To cancel a response use an eraser

There will be NO negative marking for this paper – each correct answer will receive a score of 1. Incorrect or unanswered questions/stems will receive a score of 0.

D. Additional Information

You will need to write your Candidate Registration Number, with additional leading zeros if necessary to make nine digits in the box labelled Candidate No. Then code this into the boxes underneath so if, for example, your Candidate Registration Number is 09-123, you should place a line through 0 in the first five columns, through 9 in the sixth column, through 1 in the seventh column, 2 in the eighth and 3 in the ninth.



The College Number is 92 and the Test No for this section is ###, they will be given again on the day of the exam.

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Appendix 6 - Curriculum Based Competency Assessment Tool

SUPERVISOR OR MENTOR TO COMPLETE DURING CANDIDATE'S TRAINING PERIOD

How to use this document:
You should keep it with you throughout your training period
At each hospital, you must have a mentor/supervisor who should be a senior and experienced echocardiographer.
Your mentor/supervisor should initial and date each entry once he or she is satisfied that you are competent to perform and report it unsupervised. This competency checklist should be submitted with your logbook.
The theory component will be self-taught. Your department should have suitable text-books

1. BASIC ECHOCARDIOGRAPHY

Knowledge

- **Basic principles of ultrasound**
- **Basic principles of spectral Doppler**
- **Basic principles of colour flow Doppler**
- **Basic instrumentation**
- **Ethics and sensitivities of patient care**
- **Basic anatomy of the heart**
- **Basic echocardiographic scan planes**
    - **Parasternal long axis standard, RV inflow, RV outflow**
    - **Parasternal short axis including aortic valve, mitral valve and papillary muscles**
    - **Apical views, 4- and 5-chamber, 2-chamber and long-axis.**
    - **Subcostal and suprasternal views**
- **Indications for transthoracic and transoesophageal echocardiography**
- **Normal variants and artefacts**

Practical competencies	**Initials and date**
Interacts appropriately with patients	
Understands basic instrumentation	
Cares for machine appropriately	
Can obtain standard views	
Can optimise gain setting, sector width, depth, harmonics, focus, sweep speed, Doppler baseline and scale, colour gain	
Can obtain standard measurements using 2D or M-mode	

Can recognise normal variants;

Eustachian valve, chiari work, LV tendon ☐

Can use colour examination in at least two planes for all valves optimising gain and box-size ☐

Can obtain pulsed Doppler at

a) left ventricular inflow (mitral valve) ☐

b) left ventricular outflow tract (LVOT) ☐

c) right ventricular inflow (tricuspid valve) ☐

d) 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**
    - **Aneurysm, pseudoaneurysm,**
    - **Ventricular septal and papillary muscle rupture**
    - **Ischaemic mitral regurgitation**
- **Features of dilated, and hypertrophic cardiomyopathy**
- **Common differential diagnosis**
    - **Athletic heart, hypertensive disease**

Practical competencies	**Initials and date**
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	**Initials and date**
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	**Initials and date**
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	**Initials and date**
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	**Initials and date**
Can recognise broad types of replacement valve	
Can recognise paraprosthetic regurgitation	
Can recognise prosthetic obstruction	

7. INFECTIVE ENDOCARDITIS

Knowledge

- **Duke criteria for diagnosing endocarditis**
- **Echocardiographic features of endocarditis**
- **Criteria for TOE**

Practical competencies	**Initials and date**
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 mxyoma**
- **Differentiation of atrial mass**
- **Normal variants and artifacts**

Practical competencies	**Initials and date**
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	**Initials and date**
Can differentiate a pleural and pericardial effusion	
Can recognise the features of tamponade	
Can judge the route for pericardiocentesis	
Can recognise restrictive physiology	
Differentiation of pericardial constriction from restrictive myopathy	

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	**Initials and date**
Can recognise a secundum ASD	
Can calculate a shunt	

Supervisor/ Mentor

Name _____

Signature_____

Appendix 7 -Suggested format for a report

This is a basic framework for a report; Appendix 4 includes further details for candidates to look through. Guidelines are also available on the BSE website:

A report should have a section for objective M-mode or 2D dimensions and Doppler measurements. There should be a section for describing observations and a short conclusion. Please see "Minimum Data set for Transthoracic Echocardiography" at www.bsecho.org.

Measurements - Measurements of intracardiac dimensions can be useful in monitoring, disease progression. These can be made using M-mode or 2D and must be interpreted in the light of the size and sex of the patient. Many pragmatic normal ranges are outdated and modern data based on large populations include upper dimensions previously regarded as abnormal. Doppler measurements should be listed (see normal valves chart on BSE Website).

Text - This should include a description of observations made in a logical order. The order will vary for the operator and the study. The most important feature might be described first. Alternatively each anatomical region might be discussed in turn. Interpretation should not be a part of this section and even minor abnormalities are best described. These can be put into context in the conclusion. It is usually not advisable to describe each modality in turn or to describe findings at each window as is sometimes done. This is confusing since small differences can emerge between different windows or repetitions occur. It is better to integrate all windows and all modalities. Normal findings should also be stated and if a region could not be imaged this should also be admitted. This gives the reader the confidence that a systematic study has been undertaken rather than a study focused on only a region of interest.

Conclusion - This should summarize the whole study and be easily understood by a non-echocardiographer. It should identify any abnormality, its cause and any secondary effect. No interpretation should be offered that is not derived from the recorded study, and no medical advice should normally be given.

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Appendix 8 – Report Format

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 AS PER APPENDIX 14

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
Study classification (routine, urgent, emergency)
Date on which the study was requested, reported
Height and weight
Blood pressure
Videotape or disk number/identifier)

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: (e.g. peak gradient, mean gradient, MVA) – recommended measurements and calculations are included in Section 3 of this document (also, please refer to BSE Minimum Dataset2)
- 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 TTE 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, comparison with previous echocardiographic studies or reports should be made and important differences (or similarities) highlighted. Technical limitations of the study or its interpretation should be included.

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Appendix 9 -Transthoracic Proficiency: Summary Sheet

Complete this sheet and place it at the front of your Logbook

Name:…….. Membership No…….

Date of Passing Adult Written Examination…….

Only one diagnosis can be assigned to each study.

Summarise the primary diagnosis assigned to each case in your Logbook. (Note the target guidelines for case mix)

Primary Diagnosis	Number of cases
Left Ventricular Function Assessment (≥ 50) Native valvular heart disease (≥ 25) Pericardial Disease (≥ 2) Disease of the Ascending Aorta (≥ 2) Congenital heart disease (where possible) Suspected Endocarditis (where possible) Cardiomyopathy (including HCM) (≥ 2) No Significant Cardiac Abnormality (< 1/3) Other Pathology	
Total Cases (200)	

Appendix 10 - Getting the Cases right

This section of the submission will be reviewed in great detail by the assessors.

Candidates are most often failed at this stage of the process.

The 5 cases are assumed to be your best work. Do not choose patients who are poorly echogenic.

Optimise the 2D and Doppler images. Make sure you have optimised the gain setting, sector width, depth, harmonics, focus, sweep speed, Doppler baseline and scale, colour gain. Candidates may be failed on just this aspect. If these points are not done well in your submission it may be assumed that you will have poor quality images on your routine cases.

Read the mark sheet that your supervisor and the central markers will be using to assess the study. You need to show all normal views, including the subcostal and suprasternal views.

Only include loops and stills that you wish to be assessed. Ensure that loops and stills with measurements shown match the parameters quoted in the report.

Ensure that the M-mode correctly aligned. If it is too difficult take your measurements from the 2D images or the measurements may be very inaccurate.

Get the Doppler right. Place the cursor correctly and alter the Doppler scale and sweep speed appropriately. Get the best signal before recording. Optimise the colour Doppler gains before recording. Use the stand alone probe for the aortic stenosis case (and other cases, if appropriate) and demonstrate you are able to obtain a CW Doppler signal from the apical, right parasternal and suprasternal windows in your search for the peak gradient.

You must be able to use the common Doppler equations e.g. continuity equation, calculation of a shunt, estimation of pulmonary artery systolic pressure.

Each case should be accompanied by a full and comprehensive report. This should include a summary that can be understood by any non-echocardiographer.

GOOD LUCK

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Appendix 11 - Supervisor submission with the candidate's logbook and case submission – SUPERVISOR ONLY

Accreditation in Transthoracic Echocardiography:

- The role of the local supervisor is of great importance
- The supervisor is responsible for ensuring the candidate has undergone a programme of training in echocardiography.
- The supervisor should have personally observed the candidate scanning prior to submission of the logbook and cases and be satisfied that the standard of scanning is good. The supervisor should be satisfied the candidate has achieved the competencies in the curriculum based assessment tool and if satisfied should sign off the competencies.
- The supervisor should review the 5 cases that the candidate is due to submit and should mark them on the mark sheets included in the accreditation pack. If the supervisor does not feel any of the candidate's cases is of sufficient quality to pass the exam the candidate should be directed to discard that case and to prepare another study. If any deficiencies in the candidates knowledge or scanning technique is uncovered on reviewing the cases this should be remedied prior to the candidate preparing further cases.

Supervisor Marking Sheet for Cases Performed by Candidate

Candidate Name: _____Candidate Number _____

Summary Sheet:

Case No.	Indication	Pathology	Acceptable	Signature
1		Normal		
2				
3				
4				
5				

I enclose a completed mark sheet for each of the 5 studies performed and reported by the candidate. I am satisfied that the cases submitted are sufficient quality that that candidate should be accredited.

Supervisor (signed) _____ Date _____

Supervisor's name _____ BSE member number_____

Date of attendance at BSE Supervisor Training session: _____

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Appendix 12 – Supervisors check list for each case – SUPERVISOR ONLY

Candidate Membership number: …… Case No: ……

Referral Diagnosis: ……

Marking system 0- Poor, 1-Borderline, 2-Good
A pass for any single case is 20 out of 30 marks OR 19 out of 28 marks
If a single case scores below 15 out of 30 or 14 out of 28 and/or 2 cases score below 20 out of 30 or 19 out of 28 the candidate will fail this section of the exam.

1. ECG trace present and usable? Yes ☐ No ☐

ECG Mark 0 / 1 / 2

2. M-Mode (shown in at least one case if not used routinely)

Is the cut on-axis?	Yes ☐	No ☐
Are the M-mode views of good quality?	Yes ☐	No ☐

M-mode Mark 0 / 1 / 2

General Comments:_____

3. 2-D Images

Is the image optimised? (gain setting, sector width, depth, harmonics, focus)	Yes ☐	No ☐	
Are the following views shown (if applicable)?			
Parasternal Long Axis	Yes ☐	No ☐	N/A ☐
RV Inflow	Yes ☐	No ☐	N/A ☐
Parasternal Short Axis	Yes ☐	No ☐	N/A ☐
Apical Four Chamber	Yes ☐	No ☐	N/A ☐
Apical Two Chamber	Yes ☐	No ☐	N/A ☐
Apical Long Axis	Yes ☐	No ☐	N/A ☐
Subcostal	Yes ☐	No ☐	N/A ☐
Suprasternal	Yes ☐	No ☐	N/A ☐
Are any relevant views missing?	Yes ☐	No ☐	N/A ☐

General Comments:_____

2D optimisation Mark 0 / 1 / 2

Are the 2D views of good quality and on axis? Mark 0 / 1 / 2

Are the 2D views complete? Mark 0 / 1 / 2

4. Measurements from M-mode or 2D

Are the measurements correct? Yes ☐ No ☐ N/A ☐

General Comments:_____

Are the* M-mode / 2D *measurements correct? Mark 0 / 1 / 2

5. Colour Doppler

Is Colour Flow Imaging used?	Yes ☐	No ☐	N/A ☐
Is it of good quality? (colour gain, appropriate sample size)	Yes ☐	No ☐	N/A ☐
Is its use appropriate to the pathology?	Yes ☐	No ☐	N/A ☐

General Comments:_____

Is the colour Doppler of good quality and appropriate? Mark 0 / 1 / 2

6. Spectral Doppler

Are Pulsed and Continuous Wave Doppler Used?	Yes ☐	No ☐	N/A ☐
Are the waveforms of good quality? (sweep speed, Doppler baseline and scale)	Yes ☐	No ☐	N/A ☐
Is its use appropriate to the pathology?	Yes ☐	No ☐	N/A ☐
Are accurate measurements made?	Yes ☐	No ☐	N/A ☐
Are appropriate calculations made?	Yes ☐	No ☐	N/A ☐
Are calculations performed correctly?	Yes ☐	No ☐	N/A ☐
Is the ‗Stand Alone' probe used appropriately? (At least in one case)	Yes ☐	No ☐	N/A ☐
Are all Doppler measurements correct?	Yes ☐	No ☐	N/A ☐

General Comments:_____

Is the spectral Doppler of good quality and appropriate? Mark 0 / 1 / 2

Are the Doppler measurements correct? Mark 0 / 1 / 2

7. Report:

Does it include accurate measurements?	Yes ☐	No ☐	N/A ☐
Does it contain appropriate/accurate Doppler calculations?	Yes ☐	No ☐	N/A ☐
Does it describe all parts of the heart?	Yes ☐	No ☐	N/A ☐
Are descriptions complete?	Yes ☐	No ☐	N/A ☐
Does the report relate appropriately to the request?	Yes ☐	No ☐	N/A ☐
Does it offer conclusions?	Yes ☐	No ☐	N/A ☐
Are the conclusions accurate and relevant?	Yes ☐	No ☐	N/A ☐

Comments:_____

Are the study & report done in a logical and systematic order? Mark 0 / 1 / 2

Does the report match the recorded images? Mark 0 / 1 / 2

Are descriptions complete? Mark 0 / 1 / 2

Does it contain an accurate assessment of LV and RV function? Mark 0 / 1 / 2

Are the conclusions accurate and relevant? Mark 0 / 1 / 2

Overall impression of the study? Mark 0 / 1 / 2

TOTAL MARK _____ **/ 28 or 30**
(ring as appropriate)

(NB - 28 only if <u>no</u> M-mode used)

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Appendix 13 –Supervisor OR Mentor statement to accompany the Practical Assessment

Re: (Candidates name) _____

	Initial
I certify that the candidate has undergone a programme of training in echocardiography	
I certify I have observed the candidate scanning and I am satisfied that he/she is competent at completing a full transthoracic echo study.	
I certify that the candidate has reached a standard of training to be able to independently perform and report a transthoracic echocardiographic study. He/she has reached all of the mandated competencies. I have signed off the candidate's competency sheet.	
I certify that the candidate above has **performed** and **reported** the 250 cases included in the accompanying Log Book within a 24 month period.	
I certify that all cases are fully anonymised (no patients personal details such as names, full date of births or addresses) as per Appendix 14	
I certify that all cases are signed with name printed of the candidate	
I certify that these cases are being handed in as per Trust policy Guidelines	

Supervisor's/ Mentor's name: _____

Signature: _____ Date: _____

I am satisfied that the candidate above has performed and reported the 250 cases included in the accompanying Log Book within a 24 month period in this department and five cases are also enclosed.

Head of Echocardiography's name: _____

Signature: _____ Date: _____

Notes: The Head of Echocardiography is usually the lead clinician or consultant cardiologist with overall responsibility for echocardiography.

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Appendix 14 – BSE Policy on the Non-Anonymisation of Patient Data

Introduction

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

Guidance is provided to NHS staff 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 contrast, anonymised information is not confidential and may be used.

Key identifiable information includes:

Patient's name, address, full post code, date of birth;
NHS number and local identifiable codes;
Anything else that may be used to identify a patient directly or indirectly. For example, rare diseases, drug treatment or statistical analyses which have very small numbers within a small population may allow individuals to be identified.

Anonymisation requires the removal of such information from all reports and images.

For accreditation purposes, BSE Administrators and BSE Markers must not be able to identify the patient from the detail or combination of details given.

Speakers presenting on behalf of the BSE at meetings and speakers on courses/meetings awarded BSE re-accreditation points must ensure that all presentation material is anonymised.

Guidance to candidates submitting Logbooks and Cases for Accreditation

The NHS Code of Practice on confidentiality means that evidence submitted for the practical part of the Accreditation process must have all patient identification removed.

In order for evidence to be considered to have been anonymised, BSE Administrators and BSE Markers must not be able to see any of the identifiers listed above. As age is relevant to the assessment either the age or year of birth must be provided however a full date of birth must not be shown.

Reports

Please note that correction fluid may still allow data to be visible if you look at the back of the page, as does placing a sticker over the patient data. Marker pen often fades so that data may be correctly disguised at the point of posting to us but not when we are posting it back to you.

We therefore advise:

Cutting out the patient data or

Deleting data electronically prior to printing or
Using corrective fluid or marker pen, then photocopying the sheet

Cases

In order for cases to be classed as anonymous BSE Administrators and BSE Markers must not be able to gain personal information about the patient that is not directly relevant to the echocardiogram. This means that name, address, NHS/Hospital number and full date of birth must not be visible on the report that is enclosed with the images nor on the images themselves. If the age is not given separately the year of birth must be left visible on the report.

Please see the notes above about correctly removing patient ID from the paper report that is enclosed with the cases.

We appreciate that the removal of patient ID from cases may be difficult depending on the machine being used, we therefore advise that the cases are specifically collected for the BSE and the data inputs are made relevant to your cases.

E.g. Patient Name could be 'BSE Case 1' or 'Aortic Stenosis', Patient Number could be your membership number followed by case number, '1111-1'

Explanatory notes for the inclusion of patient identifiable data in any medium are NOT acceptable.

Breach of NHS Code of Practice on Confidentiality

Major breach:

One or more examples of detailed patient demographics (e.g. name and address)

OR

One or more examples of patient data sufficient to allow a patient to be traced in any way

OR

Multiple examples of patient identifiable information insufficient alone to trace the patient (on more than 5% of the reports within the logbook or more than 5% of the images in the cases).

Minor breach:

Rare examples of patient identifiable information found within the logbook (on less than 5% of the reports in the logbook or less than 5% of the images in the cases). These might include, for example, name or date of birth but insufficient information to identify the patient.

In the event of a major breach:

The candidate will automatically fail.

The BSE Administrator will remove the evidence containing patient identifiable information.

The candidate will be informed of the fail and notified of the reason for it.

The data in question will be placed in an envelope, which will be sealed. Two BSE Administrators will sign across the seal and the envelope will be marked 'PRIVATE AND CONFIDENTIAL' and clearly marked with the candidate's BSE membership number.

The candidate will have 4 weeks from the date of notification of a major breach to collect the envelope from the BSE Office in person. There will be no opportunity to anonymise data at this time. Dates and times of collection must be arranged with the BSE Office beforehand and photo identification produced at the time of collection.

After 4 weeks from the date of notification BSE Administrators will destroy uncollected data.

The Chair of the Accreditation Committee will be notified of all major breaches and will make the decision as to whether the Head of Information Governance at the candidate's place of employment should be notified.

In the event of a minor breach:

The BSE Administrator will remove the evidence containing patient identifiable information.

The candidate will be informed of the breach and notified of the reason for it.

The data in question will be placed in an envelope, which will be sealed. Two BSE Administrators will sign across the seal and the envelope will be marked 'PRIVATE AND CONFIDENTIAL' and clearly marked with the candidate's BSE membership number.

The candidate will have 4 weeks from the date of notification of a minor breach to attend the BSE Office in person and anonymise the data. Dates and times of attending must be arranged with the BSE Office beforehand and photo identification produced at the time of attendance.

After 4 weeks from the date of notification BSE Administrators will destroy non-anonymised data and the submission will be classified as a fail.

British Society of Echocardiography
Affiliated to the British Cardiovascular Society

Appendix 15 - Final check list

To be filled in by the candidate and submitted at the front of the logbook.

Before submitting your Practical Assessment, ensure that you have complied with all the following requirements. If you do not have an enrolled supervisor, ignore point 4.:

I am a BSE Member and my Subscription is up to date ☐
This has been handed in per my agreed deadline ☐
The Supervisor/Mentor sections (Appendix 6 and 13) are fully completed and enclosed ☐
I have a trained supervisor and the Supervisor sections (Appendix 11 and 12) are enclosed. ☐
My Name, Address and Membership Number are clearly marked on the Log Book, Case Submission and case reports ☐
The completed Log Book Summary Sheet and this checklist are at the front of the logbook. ☐
My cases are on (delete as necessary) CD/ DVD / Memory Stick/Other (please specify) _____
The 5 reports relating to the cases are enclosed, in the correct order in an envelope along with Disc/Memory stick. ☐
My return address is also on the outside of the package. ☐

All materials are securely packed, with reinforcing tape if needed, addressed to:

BSE Accreditation Administrator
Docklands Business Centre
10-16 Tiller Road
London
E14 8PX

Signed _____

Date _____

Appendix 16 – Definitions of Supervisor and Mentor

Ideally BSE would like each candidate undertaking this Accreditation process to have a trained BSE supervisor. It is recognised that this may not always be possible and therefore can still complete the process with a mentor.

MENTOR

A mentor is any person involved in the field of Echocardiography who is willing and able to support the candidate during the process. They do not have to hold BSE Accreditation.

A mentor can:

- Sign off the curriculum based competency assessment tool (Appendix 6 – page 32)
- Sign the Supervisor or Mentor statement to accompany the practical assessment (Appendix 13 – page 44).

A mentor must not:

- Complete the Supervisors submission with the candidate's logbook and case submission (Appendix 11 – page 41)
- Submit the Supervisors check list for each case (Appendix 12 – page 42). If a mentor submits these they will be disregarded.

The logbook and cases will be assessed by 2 trained BSE markers.

SUPERVISOR

A supervisor is a person who holds BSE Adult TTE Accreditation (ideally for 1 year) and who has attended a BSE Supervisors training session.

A supervisor can:

- Sign off the curriculum based competency assessment tool (Appendix 6 – page 32)
- Sign the Supervisor or Mentor statement to accompany the practical assessment (Appendix 13 – page 44).
- Complete the Supervisors submission with the candidate's logbook and case submission (Appendix 11 – page 41)
- Submit the Supervisors check list for each case (Appendix 12 – page 42).

The supervisor should enter the date that they attended a BSE Supervisor training session on the appropriate form (Appendix 11 – page 41). This will be verified by the BSE Accreditation administrator and proof of attendance may be requested.

A trained supervisor acts as the first marker and the submission will be assessed by 1 trained BSE marker.