Accreditation in Adult Critical Care Echocardiography

Information Pack

This pack is for the use of all candidates undergoing the accreditation process and becomes effective as of October 2013.
## Contents

Welcome message from Accreditation Chair.......................... 3  
Introduction and Aims................................................. 4  
Summary of process requirements................................ 4  
Details of written assessment and practical assessments...... 5  
Written section....................................................... 5  
Theory section....................................................... 5  
Reporting (imaging)................................................. 6  
Practical assessment............................................... 6  
Logbook.................................................................... 6  
Digital case submission........................................... 7  
Appendix 1 – Suggested Reading List............................ 9  
Appendix 2 – Training syllabus for written section............. 11  
Appendix 3 – Proficiency examination: Example Theory Questions 25  
Appendix 4 – Proficiency examination: Example Reporting Question 26  
Appendix 5 – Computerised Marking Sheets – Guidance Notes 27  
Appendix 6 – Curriculum Based Competency Assessment Tool 29  
Appendix 7 – Suggested format for a report....................... 37  
Appendix 8 – Report format........................................ 38  
Appendix 9 – Critical Care Proficiency: Summary Sheet........ 40  
Appendix 10 – Getting the Digital cases right.................. 41  
Appendix 11 – Supervisor submission with the candidate’s logbook and cases 42  
Appendix 12 – Check list for each case......................... 43  
Appendix 13 – Supervisor/Mentor statement to accompany the Practical Assessment 45  
Appendix 14 – Guidelines on Anonymity......................... 46  
Appendix 15 – Final check list.................................... 49  
Appendix 16 – Definition of a Supervisor / Mentor............ 50
Adult Critical Care Accreditation

The British Adult Critical Care Accreditation process represents a joint venture between the British Society of Echocardiography (BSE) and the Intensive Care Society (ICS).

The process is primarily offered as a service to the members of both these specialist societies. It is designed to accommodate the requirements of those working within the Critical Care environment.

Full details and registration forms are available on the website www.bsecho.org. We would encourage individuals to undertake the Accreditation process, which has as its ultimate aim the achievement and maintenance of high standards of clinical echocardiography for the benefit of 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 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 Chair,
BSE Accreditation Committee
Introduction and Aims

- Accreditation is run as a service for members of the British Society of Echocardiography and Intensive Care Society and is not a compulsory or regulatory certificate of competence or excellence.
- Accredited members are expected to be able to perform and report echocardiographic studies unsupervised.
- 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 collected over a period of 24 months with the examination being taken at any point within this period.
- You must submit:
  - 5 full cases accompanied by reports signed by yourself
  - A logbook containing 250 reports of a specific case mix (or 150 cases if you hold BSE Adult TTE or TOE Accreditation)
  - 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 that can be obtained by contacting the BSE Accreditation Administrator. A charge of £100 will be made for each request regardless of the outcome.
• 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.

• 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 annually in 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. Questions will be compiled from the syllabus in appendix 2.
• 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 25 questions relate directly to the curriculum within the pack (5 on physics and the other 20 amongst the other categories of the curriculum).
• The subject matter reflects the spectrum of clinical practice according to both frequency and technical complexity.
• 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 critical care 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 250 transthoracic cases personally performed and reported by you during the allowed period of 24 months. It is not acceptable to include cases reported by you that have been performed by someone else. Up to 50 cases may be reassessment studies. For those who already hold BSE TOE accreditation the requirements are 150 transthoracic cases.
- The format for the Logbook is a set of copies of actual clinical reports, preferably printed reports, enclosed in a folder or binder. The reports should be:
- **Anonymised**, this means no patient information to be shown such as full date of birth, names or address. See appendix 14
- All cases should be collected in accordance with local requirements for data protection i.e. your trust policy.
- The reports should include cavity and Doppler measurements, objective observations and a comment (appendices 7 and 8).
- All reports submitted must carry the signature and full name of the candidate. 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 ICU department with the following included in the case mix:
  - Cases for assessment of the shock state (including left ventricular function assessment and post cardiac arrest and sepsis syndromes).
  - Cases for assessment of valve function/exclusion of a cardiac source of embolus.
  - Cases for right ventricular assessment (pulmonary embolism/cor pulmonale/effects of ventilation).
  - Cases showing pericardial disease +/- pleural effusion.
  - Cases of assessment of volaemic status and volume responsiveness.
  - Cases showing diseases of the aorta (eg. aortic root or ascending root dilatation, aortic dissection, aortic trauma assessment).
  - Cases of suspected endocarditis.
  - Cases of refractory hypoxaemia / difficult to wean cases including PFO.
  - Cases showing complications of acute myocardial infarction.
  - Up to 50 cases may be ICU reassessment studies.
  - No more than 50 studies should be completely normal.

- In the logbook 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. Any inotropic and ventilator support should be documented in the report.

The following diagnoses are required:

- A substantially normal and comprehensive study demonstrating appropriate use of machine settings for optimal imaging and correct use of standard views (parasternal, apical, subcostal, suprasternal), M Mode and 2D, CW, PW and Colour Doppler to assess chambers and valves. It is suggested that this study is performed outside the ICU environment.
- A study demonstrating assessment of hypovolaemia and fluid responsiveness.
- A study showing assessment of cardiogenic shock (any cause).
- 2 cases of a different pathology to the other cases (e.g. valvular pathology, aortic dissection, pericardial effusion 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 patients name or patients personal details. Alternatively you may wish to use descriptions of pathology such as “Normal Study”. It doesn’t 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 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.
Appendix 1 - Suggested Reading List

The syllabus is set by a joint group of the British Society of Echocardiography and Intensive Care Society 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 just 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
- Feigenbaum’s Echocardiography H.Feigenbaum Lippicott, Williams & Wilkins 2004 ISBN 0781731984

Useful review articles:


• Jones AE et al., Randomised controlled trial of immediate vs delayed goal-directed US to identify the cause of non-traumatic hypotension in emergency department patients. Crit Care Med 2004

• Jensen M et al., TTE for cardiopulmonary monitoring in the ICU Eur J Anaesthesiol 2004

• Cholley B et al., Echocardiography in the ICU: time for widespread use. Intensive Care Med 2005;32:9

• Lang RM, Bierig M, Devereux RB, Flachskampf FA, Foster E, Pellikka PA, Picard MH, Roman MJ, Seward J, Shanewise JS, Solomon SD, Spencer KT, St John Sutton M, Stewart WJ. Recommendations for Chamber Quantification: A Report form the American Society of Echocardiography’s Guidelines and Standards Committee and the Chamber Quantification Writing Group, Developed in Conjunction with the European Association of Echocardiography, a Branch of the European Society of Cardiology. J Am Soc Echocardiogr 2005;18: 1440-63

• Neri L et al., Toward an US curriculum for critical care medicine. Crit Care Med 2007;25:S290-

• Breitkreutz R et al., Focused echocardiographic evaluation resuscitation management: concept of an ALS-conformed algorithm Crit Care Med 2007-

• A position statement: echocardiography in the critically ill. On behalf of a collaborative working group of the BSE. JICS volume 9 (2) 2008

• Echocardiography practice, training and accreditation in the ICU: document for WINFOCUS. Price S et al., Cardiovasc Ultrasound 2008;6:49-

• BSE website www.bsecho.org, downloads, BSE Echo report – Recommendations.
Appendix 2 - Training syllabus for BSE accreditation in CCE

Questions in the written section of the process (theory and reporting) will be taken from this syllabus.

1. The role of TTE in the critically ill patient

- Awareness of the potential for TTE to guide first-line management of the critically ill
- Awareness of important pathology that can be missed by TTE
- Awareness of specific indications for TOE examination
- Appropriate action and inaction in relation to clinical findings
- Awareness of indications for immediate expert assistance
- Knowledge of common indications in acute/critical care
- Knowledge of the relationship between TTE, TOE and other methods of assessing cardiac status (e.g. MRI)
- Knowledge of the potential hazardous biological effects of ultrasound eg. heating/resonance

1.1 Service design and provision

- Awareness of mechanisms for safe devolution of critical care echocardiography
- Awareness of how to design a service to suit local need
- Awareness of the importance of linking cardiology and critical care services
- Appreciation of service costs: outlay and ongoing
- Awareness of issues surrounding staff training
- Knowledge of the importance of quality control within devolved echo services
- Awareness of equipment maintenance including infection control

1.2 Professional relationships

- Awareness of providing patient explanation relevant to the clinical setting
- Awareness of maintaining professional interdepartmental relationships with colleagues

1.3 Reporting and Documentation

- Knowledge of standard report structure
- Awareness of accurate documentation of cardiorespiratory support at the time of the study
- Awareness of the distinction and importance of both a technical and clinical report
- Awareness of the Data Protection Act with respect to echocardiography reporting
- Awareness of the need for appropriate storage systems for echocardiograms
- Awareness of digital acquisition and storage systems, scan converters and digital memories
2. Imaging Physics & Instrumentation

2.1 Concepts and Terminology

- Knowledge of compression wave definitions: frequency, wavelength, propagation velocity and their units of measurement
- Knowledge of the differences between audible and ultrasound frequencies

2.2 Propagation of ultrasound through tissues

- Knowledge of the speed of sound in different body tissues
- Knowledge of the frequency range used for diagnostic imaging
- Knowledge of the distinction between specular reflection and backscatter
- Knowledge of the principles of attenuation and scattering

2.3 Ultrasound Transducers

- Knowledge of the piezo-electric effect
- Knowledge of the structure of the 2D ultrasound beam including far (Fraunhofer) and near (Fresnel) zones and the importance of side lobes
- Knowledge of beam steering methods: mechanical vs electronic
- Knowledge of focusing methods including dynamic receive focusing
- Knowledge of appropriate focus position and use of dual focus

2.4 Imaging physics

- Knowledge of appropriate imaging frequencies in adults
- Knowledge of the effect of harmonics on imaging quality
- Knowledge of B mode and M Mode imaging methods
- Knowledge of the relationship between pulse repetition frequency, frame rate, lines per frame, field of view, and imaging depth.
- Awareness of ‘parallel processing’ and influence on frame rate and image quality
- Knowledge of the grey scale and dynamic range
- Knowledge of optimisation of resolution: axial, lateral and temporal
- Knowledge of reverberation artefacts
- Knowledge of factors limiting detection of small targets

2.5 Echo Instrumentation

- Knowledge of machine controls: overall gain, time gain compensation, reject, and logarithmic compression
- Knowledge of signal processing, dynamic range, pre-processing and post processing
- Knowledge of correct imaging optimisation including transducer frequency, scan angle, spatial and temporal smoothing
2.6 Optimising Images

- Awareness of the importance of optimal patient positioning
- Appreciation of the importance of the use of echo gel and the relevant infection risk
- Knowledge of all standard views
- Awareness of the potential and pitfalls for the use of non-standard views

3. Doppler physics & fluid dynamics

3.1 Basic Fluid Dynamics

- Knowledge of fluid flow: significance of peak and mean velocities
- Knowledge of determination of volumetric flow using the continuity equation
- Knowledge of laminar and turbulent flow: Reynolds’ equation (qualitative)
- Knowledge of the transition from laminar to turbulent flow: inlet jet Bernoulli equation

3.2 Principles of Doppler

- Knowledge of the generation of the Doppler effect by red blood cells and ultrasound waves
- Knowledge of the Doppler equation and factors influencing the magnitude of Doppler shift
- Knowledge of the concept of spectral analysis: fast Fourier transform (qualitative)
- Knowledge of the spectral Doppler display: mean, modal and peak velocities
- Awareness of the limitation of CW Doppler caused by lack of depth discrimination
- Knowledge of the audible range of Doppler shift frequencies
- Knowledge of the effect of beam angle errors on Doppler velocities
- Knowledge of the concept of aliasing including cause and clinical manifestation
- Knowledge of the Nyquist limit
- Knowledge of the influence of transducer frequency/sample depth/beam angle on aliasing
- Awareness of high pulse repetition frequency PW Doppler and range ambiguity
- Awareness of the advantages and disadvantages of CW, PW and HPRF modes
- Knowledge of the concept of colour flow imaging as multi-sampled PW
- Knowledge of the effect of aliasing when using colour Doppler
- Appreciation of the effect of packet size/colour mode/sector size on frame rate and aliasing
- Awareness of the principles of pulse wave tissue Doppler

4. Doppler instrumentation

4.1 Spectral Doppler Instrumentation

- Awareness of the appropriate use of the ‘stand-alone’ Doppler probe
- Knowledge of the spectral display: positive/negative velocities, scale and baseline controls
- Awareness of the effect of high and low pass filter and intensity threshold (‘reject’) settings
- Knowledge of setting pulsed Doppler sample volume: influence of gate length and distance
- Awareness of representation of signal strength by image intensity
- Awareness of how aliasing manifests on the spectral display
4.2 Colour Flow Instrumentation

- Knowledge of the colour display: ‘BART’ convention
- Knowledge of the use of colour maps to show velocity scales

- Knowledge of the relationship between velocity and power (signal amplitude) displays
- Awareness of the principles of Tissue Doppler Imaging

5. Deformation Analysis

5.1 Principles of myocardial deformation

- Awareness of the concepts of myocardial displacement, velocity, strain and strain rate

6. Cardiac Anatomy and Physiology

6.1 Anatomy of the thorax

- Knowledge of thoracic anatomy including vascular structures

6.2 Gross anatomy of the heart

- Knowledge of basic relevant cardiac embryology
- Knowledge of the nomenclature of the cardiac chambers and valves
- Knowledge of the relationships between the cardiac chambers, valves and blood vessels
- Knowledge of the pericardial reflections

6.3 Cardiac anatomy and physiology as demonstrated by echocardiography

- Knowledge of echocardiographic anatomy: chambers/valves/great vessels/pericardium
- Knowledge of normal variants in standard echocardiographic planes
- Knowledge of the phases of atrial function: reservoir/conduit/contractile phases
- Knowledge of the effect of AF on the appearance of cardiac function
- Knowledge of cardiac remodelling in response to chronically elevated preload /afterload
- Knowledge of the effects of vasoactive drugs and positive pressure ventilation on cardiac physiology

6.4. Coronary anatomy and relationship to LV function

- Knowledge of the anatomy of the major coronary arteries
- Knowledge of the derived regional blood supply to the cardiac walls
- Knowledge of the nomenclature for describing myocardial segments: 16 and 17 segment models
- Knowledge the definitions of segmental systolic myocardial function:
6.5 The Cardiac Cycle

- Knowledge of the temporal relationships of the ECG/chamber pressures/valve movements
- Knowledge of typical values for intracardiac pressures
- Knowledge of the relationship of valve movements to heart sounds
- Knowledge of valve opening and closure signals on Doppler recordings
- Knowledge of the timing of aortic valve closure as a marker of end-ejection in M-mode
- Knowledge of the effect of spontaneous unsupported ventilation on the cardiac cycle

7. Cardiac functional parameters

7.1 General measurements and calculations

- Knowledge of on-screen measurement of length/slope/area/volume/time interval
- Knowledge of measurement significance in 2-D/M-mode/spectral Doppler displays
- Awareness of the effect of off-axis images on area and volume measurements
- Knowledge of geometric assumptions in estimation of chamber volumes with M mode/2D
- Awareness of the limitation of single plane measurements of atrial size
- Knowledge of standard M-mode measurements including LV wall thickness

7.2 Methods for determining systolic function and cardiac work

- Awareness of the importance of overall visual assessment of LV function
- Appreciation of technique limitations/selection for assessing LV function
- Application of the following measures of LV function/ejection fraction where appropriate:
  - LV fractional shortening
  - LV volume measurements: biplane area/area-length/Simpson’s methods
  - Doppler velocity time integral calculation of stroke distance/stroke volume/cardiac output
  - M-mode assessment of annular function: TAPSE/MAPSE
- Awareness of the influence of volume status/vasoactive medication on the above

7.3. Methods for determining diastolic function

- Appreciation of the importance of diastolic function
- Knowledge of the four progressive stages of diastolic dysfunction
- Knowledge of the characteristic transmitral, pulmonary venous and tissue velocity (TDI) Doppler flow patterns associated with each stage
• Knowledge of accurate assessment of E/A velocity and ratio and deceleration time
• Awareness of pseudonormal transmitral filling
• Knowledge of identifying pseudonormal filling using pulmonary venous Doppler assessment
• Awareness of the effect of significant mitral regurgitation on transmitral flow patterns
• Appreciation of the potential effects of ventilation/vasoactive medication/sepsis on diastolic function

7.4 Methods for determining fluid status/responsiveness

• Knowledge of the normal patterns of IVC movement on inspiration in
  o unsupported spontaneous respiration
  o patient triggered positive pressure ventilation
  o mandatory positive pressure ventilation
• Knowledge of percentage IVC collapse with respiratory cycle indicating fluid responsiveness
• Knowledge of the use of inter-atrial septal motion as an indicator of filling status
• Knowledge of trans-mitral/aortic velocity variation as an indicator of fluid responsiveness
• Knowledge of the clinical definition of fluid responsiveness
• Awareness of the use of serial targeted studies to assess the effects of vasoactive medication/fluid challenges

8. Contrast Studies

• Awareness of the significance of spontaneous echo contrast
• Knowledge of indications for a bubble contrast study:
  o diagnosis of intracardiac shunts and PFO
  o diagnosis of left sided SVC
  o assessment of unexplained hypoxaemia
• Knowledge of the technique for performing a hand-agitated contrast study:
  o optimal injection site injection
  o timing
  o use of valsalva to accentuate right to left shunts
• Knowledge of the effects of positive pressure ventilation on intra-cardiac shunts
• Awareness of the interaction between ultrasound and encapsulated contrast agents
• Awareness of the main indications for LV and RV opacification

9. Mitral valve

9.1 Normal Mitral Valve

• Knowledge of the 2D, M-mode and Doppler characteristics of the normal mitral valve
9.2 Mitral stenosis

- Recognition of valvular appearance in rheumatic mitral stenosis
- Recognition of valvular and subvalvular calcification in degenerative valve disease
- Measurement of orifice area by planimetry
- Measurement of mean/end-diastolic gradient using CW Doppler
- Measurement of ‘pressure half-time’: technique and limitations

9.3 Mitral regurgitation

- Recognition of functional regurgitation related to LV chamber size or wall ischaemia
- Recognition of bowing of the leaflets, mitral valve prolapse, flail leaflet, Barlow leaflets
- Recognition of calcified annulus and retracted calcified leaflets
- Recognition of the features of a rheumatic valve
- Recognition of features of infective endocarditis
- Assessment of severity
  - Colour jet size in relation to LA
  - Assessment of regurgitant fraction
  - CW Doppler: shape and density of contour of Doppler signal
  - Vena contracta width
  - PISA and effective regurgitant orifice area
  - Pulmonary vein flow patterns
  - Indirect effects on LV and LA
  - Awareness of the influence of volume status/ inotropes/ventilation on severity
- Awareness of the echocardiographic indications for TOE assessment of the mitral valve

10. Aortic Valve

10.1 Normal Aortic Valve

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

10.2 Aortic stenosis

- Recognition of valvular appearance in senile degenerative aortic stenosis
- Recognition of the features of a bicuspid aortic valve
- Recognition of the appearance in rheumatic aortic valve disease
- Recognition of subvalvular and supravalvular obstruction
- Planimetry of the valve area
- Assessment of peak and mean gradients using CWD
- Awareness of cross-checking peak gradient using right parasternal/suprasternal windows
- Measurement of valve area using the continuity equation
10.3 Aortic regurgitation

- Recognition of functional regurgitation related to ectasia of the aortic root
- Recognition of AR related to bicuspid valve
- Recognition of flail leaflet
- Recognition of the features of a rheumatic valve
- Recognition of features of infective endocarditis including aortic root abscesses
- Appreciation of the relevance of TOE where root abscess is suspected
- Assessment of severity
  - Colour jet size in relation to the LV and LVOT
  - CW Doppler: shape and density of contour of Doppler signal
  - PHT of the CWD signal
  - Vena contracta width
  - Diastolic flow reversal in the descending aorta
  - Indirect effects on LV size
  - Measurement of the EROA
  - Awareness of the influence of volume status/ inotropes/ventilation on severity

11. Tricuspid Valve Disease

11.1 Normal Tricuspid valve

- Knowledge of the 2D, M-Mode and Doppler characteristics of the normal tricuspid valve

11.2 Tricuspid stenosis

- Recognition of valve appearance and increased transvalvular peak gradient

11.3 Tricuspid regurgitation

- Recognition of functional regurgitation related to dilatation of the RV
- Recognition of artefact TR in association with trans-tricuspid wires
- Recognition of TR related to endocarditis
- Recognition of the features of a rheumatic/carcinoid valve
- Assessment of severity
  - Colour jet size in relation to RA size
  - CW Doppler: shape and density of contour of Doppler signal
  - Vena contracta width
  - Diastolic flow reversal in the hepatic veins
  - Awareness of the influence of volume status/ inotropes/ventilation on severity
12. Pulmonary Valve Disease

12.1 Normal Pulmonary valve

- Knowledge of the 2D, M-Mode and Doppler characteristics of the normal tricuspid valve

12.2 Pulmonary stenosis

- Recognition of valve appearance and increased transvalvular peak gradient

12.3 Pulmonary regurgitation

- Recognition of common functional jet vs pathological jets
- Assessment of severity
  - Colour jet size in relation to the PA size
  - CW Doppler: shape and density of contour of Doppler signal
  - Awareness of the influence of preload/inotropes/ventilation on severity

13. Infective endocarditis

- Knowledge of risk factors for infective endocarditis
- Knowledge of pathological patterns: right vs left sided vegetations
- Recognition of typical echocardiographic appearance of vegetations
- Recognition of anterior aortic root abscess
- Recognition and awareness of ‘kissing’ lesions
- Recognition of acute valvular dysfunction or wall perforation
- Recognition of vegetations on intracardiac foreign objects eg. pacing wires
- Knowledge of the indications for TOE in suspected endocarditis

14. Prosthetic Valves

14.1 Normally functioning prosthetic valves

- Knowledge of the appearance of a well-seated normally functioning prosthetic valve
  - Tilting Disc
  - Bi-leaflet
  - Ball & cage
  - Bioprostheses: stented and stentless
- Appreciation of echo artefacts resulting from prosthetic valves
- Knowledge of where to source normal range values for transvalvular gradients
- Knowledge of normal pattern of washing jets according to different valve type
14.2 Prosthetic valve stenosis

- Knowledge of assessment using 2D, m-mode and CWD assessment
- Knowledge of the use of the continuity equation in prosthetic valve assessment

14.3 Prosthetic valve regurgitation

- Knowledge of the appearance of abnormal para-valvular leaks using colour Doppler
- Knowledge severity assessment using CWD

15. Cardiomyopathies

15.1 Dilated cardiomyopathy

- Recognition of the key echocardiographic features of DCM
- Knowledge of the causes of DCM
- Recognition of intra-cardiac thrombus

15.2 Hypertrophic cardiomyopathy

- Knowledge of diagnostic wall thickness ratio in HCM
- Recognition of systolic anterior motion of the mitral valve using 2D and M-mode imaging
- Assessment of mid-cavity flow acceleration for detection of obstruction
- Awareness of the effect of inotropes on mid-cavity gradients
- Awareness of the differential diagnosis and features of an athletic heart

15.3 Restrictive cardiomyopathy

- Awareness of potential diagnosis of restrictive cardiomyopathy with:
  - moderate to severe diastolic dysfunction
  - preserved systolic function

15.4 Non-compaction

- Recognition of the main features of LV non-compaction
- Knowledge of the clinical manifestations of non-compaction

15.5 Takotsubo cardiomyopathy

- Recognition of the classical appearance of a Takotsubo’s cardiomyopathy
- Knowledge of the clinical causes of Takotsubo’s cardiomyopathy
16. Myocardial ischaemia

16.1 Acute myocardial ischaemia

- Recognition of acute regional wall motion abnormalities
- Knowledge of the coronary anatomy relevant to those wall motion abnormalities
- Recognition of acute valve dysfunction due to acute ischaemia

16.2 Early post-infarction complications

- Recognition of post-infarction complications
  - LV dysfunction
  - Papillary muscle rupture and flail mitral valve leaflet
  - Acute VSD
  - Free wall perforation and tamponade
  - True and pseudo-aneurysm formation
  - Dresslers syndrome

17. Intracardiac Masses

- Recognition of intracardiac thrombus in typical locations and the relevant causes
- Recognition of a typical atrial myxoma

18. Pericardial Disease

18.1 Echocardiographic features of pericardial fluid

- Recognition of a pericardial effusion as distinct to a pleural effusion
- Measurement and categorisation of volume of pericardial fluid

18.2 Features of tamponade

- Recognition of the progressive signs of cardiac tamponade
  - Collapse of the RA
  - Diastolic and then systolic collapse of the RV free-wall
  - Exaggerated interdependence of tricuspid/mitral/aortic Doppler velocities
  - Splinting of the IVC
  - Awareness that cardiorespiratory support may distort the classical echocardiographic features of tamponade
  - Awareness that cardiovascular compromise may occur in the critically ill without classical features of tamponade

18.3 Features of pericardial constriction

- Recognition of an abnormal thickened and bright pericardium
- Awareness of how to distinguish pericardial constriction from restrictive cardiomyopathy
19. Assessment for pulmonary hypertension

- Knowledge of aetiologies:
  - Acute:
    - tricuspid valve destruction/dysfunction due to all motion abnormalities
    - pulmonary embolism
    - physiological pulmonary vasoconstriction
  - Chronic
    - primary
    - secondary to chronic lung disease/pulmonary emboli
    - left heart lesions
- Knowledge of RV size and functional assessment by
  - visual assessment
  - fractional area change
  - TAPSE
- Appreciation of the effect on septal motion of volume and pressure overload including
  - ‘D’ deformity
  - paradoxical septal motion

20. Diseases of the aorta

- Knowledge of normal aortic sizes
  - Ascending
  - Arch
  - Descending limb
- Awareness of the features of Marfans syndrome
- Recognition of a dissection flap and associated findings

21. Grown-up congenital heart disease

- Recognition of atrial septal defects
- Recognition of ventricular septal defects
- Recognition of aortic coarctation
- Knowledge of the shunt calculation

22. The post cardiac arrest patient

- Awareness of the technical considerations inherent in peri-arrest echocardiography
- Knowledge of the relationship between peri-arrest echo and the ALS algorithm
- Knowledge of the process and role of focused peri-arrest echocardiography in excluding:
  - Cardiac tamponade
  - Gross left ventricular overload and failure
  - Gross hypovolaemia
23. Assessment of the hypotension/shock/acute breathlessness

- Awareness of the order in which life-threatening pathology should be sought and remedied
- A full study should be undertaken following exclusion and remedy of abnormalities in the following hierarchy
  o Pericardial fluid
  o Aortic dissection
  o Severe hypovolaemia
  o Evidence of massive pulmonary embolism
  o LV dysfunction: causes and sequelae
  o RV dysfunction: causes and sequelae
  o Acute valvular pathology

24. LV assessment in sepsis

- Knowledge of the potential effects of sepsis on ventricular function
- Awareness that functional status during sepsis is poorly reflective of baseline function
- Knowledge of how echocardiography findings should influence:
  o volume resuscitation and maintenance
  o inotrope/vasopressor selection and dosing
  o decisions regarding further cardiovascular support
- Awareness of the need for re-assessment following changes in therapy
- Awareness of the need for re-assessment following resolution sepsis

25. Assessment in blunt and penetrating cardiac trauma

- A full study should be undertaken following exclusion and remedy of abnormalities in the following hierarchy
  o Pericardial fluid
  o Aortic dissection
  o LV dysfunction: causes and sequelae
  o RV dysfunction: causes and sequelae
  o Acute valvular pathology
- Recognition of the need for urgent TOE in the presence of:
  o a wide mediastinum on CXR and normal TTE findings
  o any other clinical findings that do not correlate with TTE findings
26. Assessment in failure to wean from mechanical ventilation

- Recognition of the need for a full standard echocardiographic assessment with particular focus on:
  - search for unexpected vegetations
  - consideration of the presence of intracardiac shunts
  - consideration of unexpected pulmonary emboli
  - assessment of observed fluid balance compared with cumulative volume status

27. Assessment post cardio-pulmonary by-pass/surgical and obstetric intervention

- Awareness of the transient effects of cardio-pulmonary by-pass on ventricular function
- Awareness of the need for frequent re-assessment in this setting
- Awareness of unusual causes of LV dysfunction following surgical intervention including:
  - regional tamponade: the need for TOE to visualise posterior collections
  - thromboembolism
  - fat embolism
  - amniotic fluid embolism
  - peri-anaesthetic myocardial ischaemia
  - fluid overload
  - intrathoracic pressure effects on cardiac chambers
  - intrathoracic pressure causing graft occlusion

28. Findings/clinical settings in the critically ill which should trigger expert help

- Echo windows insufficient to answer the clinical question
- Greater than moderate valvular dysfunction
- Any concern regarding prosthetic valve function
- Post myocardial infarction complications
- Suspected takotsubo cardiomyopathy
- Suspected hypertrophic cardiomyopathy
- Moderate to severe diastolic dysfunction: to exclude restrictive cardiomyopathy
- Suspected or impending cardiac tamponade
- Abnormal appearance of the pericardium: to exclude constrictive pericarditis
- Intracardiac mass
- Suspected congenital heart disease
- Unusual intracardiac devices such as TAVI, Mitraclips or LVAD
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.

<table>
<thead>
<tr>
<th>Q1</th>
<th>In an ultrasound imaging system:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Sector width, sector depth and frame rate can all be controlled independently</td>
</tr>
<tr>
<td>b)</td>
<td>Frame rate falls as sector width increases</td>
</tr>
<tr>
<td>c)</td>
<td>Using a lower frequency transducer improves the frame rate</td>
</tr>
<tr>
<td>d)</td>
<td>The frame rate increases as sector depth increases</td>
</tr>
<tr>
<td>e)</td>
<td>Using Colour Flow Doppler reduces the frame rate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q2</th>
<th>In assessing Tricuspid Regurgitation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Pulmonary systolic pressure (PAP) can be calculated using the formula PAP = 4 x (Peak TR Velocity)^2</td>
</tr>
<tr>
<td>b)</td>
<td>Presence of proximal flow acceleration indicates at least moderately severe TR</td>
</tr>
<tr>
<td>c)</td>
<td>Both apical and parasternal views should be used to view the colour jet</td>
</tr>
<tr>
<td>d)</td>
<td>In very severe ('free') regurgitation, the calculation of pulmonary pressure is invalid</td>
</tr>
<tr>
<td>e)</td>
<td>Additional information can be obtained from flow patterns in the SVC and IVC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q3</th>
<th>In a patient with significant hypovolaemia:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>LV appears hyperdynamic with increased contractility and reduced end-systolic cavity size</td>
</tr>
<tr>
<td>b)</td>
<td>LV fractional shortening and ejection fraction may be normal</td>
</tr>
<tr>
<td>c)</td>
<td>E/A and E/E' ratios may be normal</td>
</tr>
<tr>
<td>d)</td>
<td>Non-collapsible dilated IVC is a common finding</td>
</tr>
<tr>
<td>e)</td>
<td>Early diastolic free wall collapse is seen</td>
</tr>
</tbody>
</table>
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

48 year old male admitted to the Intensive Care Unit
Mitral E wave velocity varies from 0.77 m/s to 1.36 m/s with respiration

1. Which phrase best describes the key abnormality?
   a. There is a large pleural effusion present
   b. There is a posterior pericardial effusion only present
   c. There is a large global pericardial effusion present
   d. There is a large anterior pericardial effusion only present

   X

2. The pericardial effusion is likely to be of haemodynamic significance because:
   a. The maximum depth is more than 2 cm
   b. There is diastolic collapse of the right atrium
   c. There is an increase in mitral inflow of more than 40% with inspiration
   d. There is a decrease in mitral inflow of more than 40% with inspiration

   X

3. Regarding the left ventricle:
   a. Systolic function appears hyperdynamic
   b. There is apical akinesis
   c. There is marked LVH with good contraction
   d. None of the above is true

   X

4. The pericardial effusion in this case is secondary to:
   a. Aortic dissection
   b. Myocardial infarction
   c. Ventricular rupture
   d. There is insufficient information to determine aetiology

   X

5. The right ventricle:
   a. Appears dilated and impaired consistent with blunt trauma injury
   b. Demonstrates frank diastolic collapse
   c. Is dilated consistent with acute pulmonary embolism
   d. None of the above

   X
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 before hand. 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 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.
Part 2 Digital Reporting Section

A. Time
The digital reporting section will last 90 minutes

B. Format
The digital 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.
Appendix 6 - Curriculum Based Competency Assessment Tool

Supervisor/mentor to fill in during candidates 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, professional attitude, general concepts, equipment

Knowledge
TTE and TOE

Ethics and sensivities of patient care including consent in the ICU
Knowledge of appropriate referral mechanisms for expert opinion
Indications and contraindications for TOE
Limitations of some portable devices with basic configuration
Understanding of digital data storage, analysis and archiving
Understanding of principles of Quality Assurance and Audit
Knowledge of local and national guidelines regarding infection control

Practical competencies

<table>
<thead>
<tr>
<th></th>
<th>Initials and Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Interacts appropriately with patients</td>
<td></td>
</tr>
<tr>
<td>☐ Looks after and cares for equipment appropriately</td>
<td></td>
</tr>
</tbody>
</table>

2. PHYSICS and ANATOMY

Knowledge
Basic principles of ultrasound
Basic principles of spectral Doppler
Basic principles of colour flow Doppler
Basic principles of tissue Doppler

Anatomy and physiology
Basic anatomy of the heart
Basic echocardiographic scan planes
Normal variants and artefacts
Knowledge of the effects of vasoactive drugs on physiology and ability to interpret potential echo findings within that context
Knowledge of the effects of ventilation on physiology and potential echo findings
Practical competencies including image acquisition, advanced instrumentation

<table>
<thead>
<tr>
<th></th>
<th>Initials and Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>Can obtain standard views</td>
</tr>
<tr>
<td>☐</td>
<td>Can optimise gain setting, sector width, depth, harmonics, focus, sweep speed, Doppler baseline and scale, colour gain</td>
</tr>
<tr>
<td>☐</td>
<td>Can obtain standard measurements using 2D or M-mode</td>
</tr>
<tr>
<td>☐</td>
<td>Can recognise normal variants, e.g. Eustachian valve, chiari work, LV tendon</td>
</tr>
<tr>
<td>☐</td>
<td>Can use colour examination in at least two planes for all valves optimising gain and box-size</td>
</tr>
<tr>
<td>☐</td>
<td>Can obtain pulsed Doppler at</td>
</tr>
</tbody>
</table>
| | 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  
| | e) SVC, IVC  
| | f) Knowledge of normal and abnormal pulmonary venous flow (including variation with inspiration) |
| ☐ | Can obtain CW Doppler of the pulmonary valve & main pulmonary artery |

3. LEFT VENTRICLE and CARDIAC FUNCTION PARAMETERS

Knowledge

Coronary anatomy and correlation with 2D views of left ventricle.  
Segmentation of the left ventricle (16 and 17 segment models)  
Wall motion assessment  
Measurements of global systolic function: (MAPSE, LVOT VTI, stroke volume, fractional shortening, ejection fraction using Simpson’s rule)  
Diastolic function with doppler mitral valve filling patterns & normal range and influence of ventilation on these parameters  
Other measures of diastolic function including pulmonary vein flow pattern - if possible on TTE- and tissue Doppler of mitral annulus  
Appearance of typical complications after myocardial infarction (Aneurysm, pseudoaneurysm, ventricular septal and papillary muscle rupture, ischaemic mitral regurgitation)  
Features of dilated, and hypertrophic cardiomyopathy  
Understands causes of a hypokinetic left ventricle  
Understands effect of positive and negative inotropes on left ventricular function  
Understands impact of positive pressure ventilation on left ventricular function
### 4. RIGHT HEART and TRICUSPID VALVE DISEASE

#### Knowledge
- Causes of tricuspid and pulmonary valve disease
- Causes of right ventricular dysfunction – acute and chronic
- Causes of pulmonary hypertension – acute and chronic
- Assessment of pulmonary pressures - systolic and diastolic
- Knows concept of PaccT
- The imaging features of acute and chronic pulmonary hypertension
- Understands effect of positive and negative inotropes on right ventricular function
- Understands impact of positive pressure ventilation on right ventricular function
- Understands difference between volume and pressure load on RV

#### Practical competencies

<table>
<thead>
<tr>
<th>Initials and Date</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Can differentiate normal RV size from dilated RV</td>
<td></td>
</tr>
<tr>
<td>Can assess RV systolic function using TDI &amp; M mode (TAPSE)</td>
<td></td>
</tr>
<tr>
<td>Can estimate PA systolic pressure</td>
<td></td>
</tr>
<tr>
<td>Can estimate right atrial pressure from the appearance of the IVC and hepatic venous flow</td>
<td></td>
</tr>
<tr>
<td>Can assess respiratory variability of the IVC</td>
<td></td>
</tr>
<tr>
<td>Awareness and assessment of impact on ventilation settings on IVC reactivity and RV size and function</td>
<td></td>
</tr>
<tr>
<td>Can recognise mechanism of tricuspid regurgitation</td>
<td></td>
</tr>
<tr>
<td>Can estimate different severities of tricuspid regurgitation</td>
<td></td>
</tr>
</tbody>
</table>

### 5. PERICARDIAL DISEASE AND TAMponade

#### Knowledge
- Causes of tamponade and echocardiographic features – RV/RA collapse, effect on IVC, A-V valve flow velocities and respiratory variation
- Effects of positive pressure ventilation on echo features of tamponade
- Understanding the pitfalls post-cardiac surgery
- Features of pericardial constriction
- Recognition that tamponade is a clinical diagnosis
# Practical competencies

<table>
<thead>
<tr>
<th>Can differentiate a pleural and pericardial effusion</th>
<th>Initials and Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can recognise the echo features of tamponade</td>
<td></td>
</tr>
<tr>
<td>Can judge the route for pericardiocentesis</td>
<td></td>
</tr>
<tr>
<td>Can recognise constrictive physiology</td>
<td></td>
</tr>
<tr>
<td>Awareness of referral to expert opinion for differentiation of constrictive/restrictive cardiomyopathy</td>
<td></td>
</tr>
</tbody>
</table>

## 6. HAEMODYNAMICS AND VOLUME RESPONSIVENESS, PRELOAD

See also section 4-7

### Knowledge

- Principles of cardiac output measurement using TTE and TOE
- Principles of echo assessment of PASP and RV function
- Principles of estimation of LAP
- Understands the effects of positive pressure ventilation on volume assessment
- Understands the principles of volume responsiveness assessment including fluid loading manoeuvres
- Understands effects of inotropic support on cardiac function

### Practical competencies

<table>
<thead>
<tr>
<th>Can measure cardiac output accurately from LV measurements</th>
<th>Initials and Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understands cardiac output measurements from RV</td>
<td></td>
</tr>
<tr>
<td>Demonstrates principle of LVOT flow variations and stroke volume variation (SSV)</td>
<td></td>
</tr>
<tr>
<td>Understands measurement and estimation of RV size (RVEDA/LVEDA ratio, RV basal diameter)</td>
<td></td>
</tr>
<tr>
<td>Can estimate LAP from E/A pattern, E/E’ ratio and pulmonary venous flow, interatrial septal motion</td>
<td></td>
</tr>
<tr>
<td>Can measure LA size</td>
<td></td>
</tr>
<tr>
<td>Can measure PASP</td>
<td></td>
</tr>
<tr>
<td>Can measure IVC collapsibility and size (spontaneously breathing and ventilated) as possible indicators for preload</td>
<td></td>
</tr>
<tr>
<td>Understands indication for bubble study to assess for PFO/interatrial shunt</td>
<td></td>
</tr>
</tbody>
</table>

## 7. MITRAL VALVE DISEASE

### Knowledge

- Normal anatomy of the mitral valve, the subvalvular apparatus and their relationship with LV function
- Causes of mitral stenosis and methods of assessment
- Cause of mitral regurgitation e.g.
  - Ischaemic, functional, prolapsed/degenerative, rheumatic, endocarditis
- Understands the effects of IPPV, sedation, filling status and vasoactive drugs on the severity of regurgitation
- Understands the importance of optimal haemodynamics for assessment of dynamic mitral regurgitation
- Recognises indication for referral to expert opinion
Practical competencies

<table>
<thead>
<tr>
<th>Can recognise rheumatic disease</th>
<th>Initials and Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can assess mitral stenosis (including subvalvular apparatus) 2D planimetry, pressure half-time, gradient</td>
<td></td>
</tr>
<tr>
<td>Can recognise mitral prolapsed</td>
<td></td>
</tr>
<tr>
<td>Can recognise functional mitral regurgitation</td>
<td></td>
</tr>
<tr>
<td>Can recognise features of severe, acute mitral regurgitation leading to haemodynamic compromise</td>
<td></td>
</tr>
<tr>
<td>Can assess and quantify severity of regurgitation, chamber size, signal density, regurgitant volume, proximal flow acceleration &amp; vena contracta</td>
<td></td>
</tr>
</tbody>
</table>

8. AORTIC VALVE DISEASE and AORTA

Knowledge

Normal anatomy of the AV
Bicuspid AV and associated abnormalities
Causes of aortic valve disease
Causes of aortic disease including potential complications of trauma
Methods of assessment of aortic stenosis and regurgitation
Recognising pitfalls for assessment of AS and AR including underlying LV function.
Basic criteria for surgery or expert review

Practical competencies

<table>
<thead>
<tr>
<th>Can recognise bicuspid, rheumatic, and degenerative disease</th>
<th>Initials and Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can recognise and assess a stenotic aortic valve to recognise significant pathology</td>
<td></td>
</tr>
<tr>
<td>Can derive peak &amp; mean gradients using continuous wave Doppler</td>
<td></td>
</tr>
<tr>
<td>Can measure valve area using the continuity equation</td>
<td></td>
</tr>
<tr>
<td>Can recognise and assess severity of aortic regurgitation leading to haemodynamic compromise in the presence/absence of significant ventricular disease</td>
<td></td>
</tr>
<tr>
<td>Can recognise and assess dilatation of the ascending aorta</td>
<td></td>
</tr>
<tr>
<td>Knows the echocardiographic signs of dissection</td>
<td></td>
</tr>
</tbody>
</table>

9. INFECTIVE ENDOCARDITIS

Knowledge

Duke criteria for diagnosing endocarditis
Common pathogens
Echocardiographic features of endocarditis
Criteria for TOE
Indications for referral to surgery and expert opinion
## Practical

<table>
<thead>
<tr>
<th>Can recognise typical vegetations</th>
<th>Initials and Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can recognise an abscess</td>
<td></td>
</tr>
<tr>
<td>Can recognise complications such as valve regurgitation/ perforation</td>
<td></td>
</tr>
</tbody>
</table>

### 10. REPLACEMENT HEART VALVES

#### Knowledge

Common types of valve replacement - artificial and biological  
Criteria of expected normal values and flow characteristics depending on model and size  
Common types of valve repairs  
Concept of TAVI and mitral clips  
Features of adequate function and common signs of failure  
Recognises indications for referral for detailed assessment and expert opinion, including patient-prosthesis mismatch

#### Practical competencies

| Can recognise broad types of replacement valve | Initials and Date |
| Can recognise features of valvular repair | |
| Can recognise significant paraprosthesis regurgitation | |
| Can recognise significant prosthetic obstruction/stenosis | |

### 10. INTRACARDIAC MASSES AND DEVICES

#### Knowledge

Types of masses found in the heart including intracardiac thrombus  
Knowledge about the role of contrast use for detection of masses  
Right and left atrial masses or thrombus in interatrial septum  
Features of a myxoma and pathophysiological effect  
Artificial devices pacemaker wires, pulmonary artery catheter, central lines etc  
Knowledge about relation of infective endocarditis and indwelling devices  
Role of TOE in identifying or excluding intracardiac masses eg thrombus in LAA  
Normal variants and artifacts

#### Practical competencies

| Can recognise a LA myxoma | Initials and Date |
| Can recognise intra-atrial mass/thrombus | |
| Can differentiate LV thrombus and trabeculation | |
| Can detect pacing wires, central line and other devices. | |
11. ADULT CONGENITAL HEART DISEASE

Knowledge

Anatomy and echo features of basic congenital disease:
ASD, VSD, partial & complete atrio-ventricular defects
Sub and supravalvar aortic stenosis
Ebstein’s anomaly
Tetralogy of Fallot
Aortic coarctation
Common artifacts and normal findings (e.g. Chiari network etc)
Role of contrast
Principle of shunt calculation
Estimation of pulmonary artery pressure

Practical competencies

<table>
<thead>
<tr>
<th></th>
<th>Initials and Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Can recognise a secundum ASD</td>
<td></td>
</tr>
<tr>
<td>☐ Can recognise a VSD</td>
<td></td>
</tr>
<tr>
<td>☐ Knows how to assess for PFO and possible referral</td>
<td></td>
</tr>
</tbody>
</table>

12. CONTRAST STUDIES

Knowledge

Indications and referral for contrast studies
Bubble contrast echo, provocation manoeuvres including Valsalva in ventilated patients
Knows concerns regarding contrast use on the ICU

Practical competencies

<table>
<thead>
<tr>
<th></th>
<th>Initials and Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Can recognise and assess for PFO or knows when to refer</td>
<td></td>
</tr>
</tbody>
</table>

13. STRESS ECHO

Knowledge

Indications for stress echocardiography – including for ischaemia and viability assessment
14. ECHO IN EMERGENCY SYNDROMES

Knowledge
See also previous sections

Causes of shock in the ICU and principal echocardiographic features
Echo use in the peri-arrest situation
Echo use peri- acute MI
Echo findings associated with acute pulmonary embolus
Hypovolaemia
Sepsis and sepsis syndromes
Cardiac tamponade
Dynamic left ventricular outflow tract obstruction
Severe, acute valve disease including trauma
Chest trauma and myocardial contusion
Value of repeated focused echo studies following fluid/inotrope interventions

Practical competencies

| Can differentiate between the main causes of shock in the ICU | Initials and Date |
| Can recognise signs of acute right heart strain, pulmonary embolus |
| Can recognise features of hypovolaemia |
| Can recognise pericardial fluid collection/tamponade |
| Can recognise features of acute LVOT obstruction |
| Can recognise LV and RV impairment as cause of shock or failure to wean |
| Can recognise features suggestive of high left atrial pressure |
| Knows assessment of IVC reactivity and LVOT variations to estimate fluid-responsiveness (ventilated and spontaneously breathing) |
| Can recognise the echocardiographic features and pathologies of cardiac and aortic trauma |

Supervisor/ Mentor

Name ________________________________________________________________

Signature______________________________________________________________
Appendix 7 - Suggested format for a report

This is a basic framework for a report; Appendix 8 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 values 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.
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
Inotropic support
Ventilatory support
Current haemodynamic status
Referring clinician identification
Interpreting echocardiographer identification
Date of study

Additional, optional information
Location of the patient (e.g. ICU, HDU etc.)
Location where study was performed
Focused study: and why
Study classification (routine, urgent, emergency)
Date on which the study was requested, reported
Height and weight
Blood pressure
Digital tape 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 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.
Appendix 9 –Critical Care Proficiency: Summary Sheet

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

Name:……………………………………………………………………..    Membership No……………………………

Date of passing Critical Care 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)

<table>
<thead>
<tr>
<th>Primary Diagnosis</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of the shock state</td>
<td></td>
</tr>
<tr>
<td>Assessment of valve function</td>
<td></td>
</tr>
<tr>
<td>Assessment of right ventricular function</td>
<td></td>
</tr>
<tr>
<td>Pericardial disease/effusion</td>
<td></td>
</tr>
<tr>
<td>Assessment of volaemic status and volume responsiveness</td>
<td></td>
</tr>
<tr>
<td>Diseases of the aorta</td>
<td></td>
</tr>
<tr>
<td>Suspected endocarditis</td>
<td></td>
</tr>
<tr>
<td>Refractory hypoxaemia/difficult to wean</td>
<td></td>
</tr>
<tr>
<td>Complications of acute MI</td>
<td></td>
</tr>
<tr>
<td>ICU Reassessment studies ($\leq$ 50)</td>
<td></td>
</tr>
<tr>
<td>No Significant Cardiac Abnormality ($\leq$ 50)</td>
<td></td>
</tr>
<tr>
<td>Other pathology</td>
<td></td>
</tr>
</tbody>
</table>

Total Cases (250)
Appendix 10 - Getting the Digital 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.

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.

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

Accreditation in Critical Care 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:

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Indication</th>
<th>Pathology</th>
<th>Acceptable</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
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<td></td>
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</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 Supervisor Training session: ______________________
Appendix 12 – Check list for each case

Candidate Membership number: …………………… Case No: ……………….

Referral Diagnosis: ………………………………………..

Marking system 0- Poor, 1-Borderline, 2-Good
A pass for any single case is 22 out of 34 marks OR 21 out of 32 marks
If a single case scores below 17 out of 34 or 16 out of 32 and/or 2 cases score below 22 out of 34 or 21 out of 32 the candidate will fail this section of the exam.

1. Is the patient on inotropes? Yes ☐ No ☐
Is the patient on ventilatory support? Yes ☐ No ☐

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? Yes ☐ No ☐
(gain setting, sector width, depth, harmonics, focus)

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

Is the image quality adequate for diagnosis? Mark 0 / 1 / 2
Are the views complete? Mark 0 / 1 / 2
Are the views appropriate to the pathology? 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? Mark 0 / 1 / 2

Is it's use appropriate to the pathology? Mark 0 / 1 / 2

6. Spectral Doppler

Are Pulsed and Continuous Wave Doppler Used? Yes □ No □ N/A □
Are the waveforms of good quality? Yes □ No □ N/A □
(sweep speed, Doppler baseline and scale)
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 □
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:_____________________________________________________________________

Is haemodynamic information included? Mark 0 / 1 / 2

Is the report well structured and logical? Mark 0 / 1 / 2

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

Is there a comprehensive assessment of RV and LV function? Mark 0 / 1 / 2

Is there a summary or conclusion? Mark 0 / 1 / 2

Is the conclusion accurate and relevant? Mark 0 / 1 / 2

TOTAL MARK /34
(or 32 if no M-mode used)
Appendix 13 - Supervisor/Mentor statement to accompany the Practical Assessment

Re: (Candidates name) ______________________________

| I certify that the candidate has undergone a programme of training in echocardiography | Initial |
| 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 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 in the Critical Care environment. 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 (or 150 cases if BSE Adult TTE/TOE Accreditation held) 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) | |
| 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 requisite number of cases included in the accompanying Log Book within a 24 month period in this department and five digital 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. The supervisor is the person with immediate responsibility for training and directing the candidate.
Appendix 14 - 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.


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.
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)
• Sign the Supervisor or Mentor statement to accompany the practical assessment (Appendix 13).

A mentor must not:

• Complete the Supervisors submission with the candidate’s logbook and case submission (Appendix 11)
• Submit the Supervisors check list for each case (Appendix 12). If a mentor submits these they will be disregarded.

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

SUPERVISOR

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

A supervisor can:

• Sign off the curriculum based competency assessment tool (Appendix 6)
• Sign the Supervisor or Mentor statement to accompany the practical assessment (Appendix 13).
• Complete the Supervisors submission with the candidate’s logbook and case submission (Appendix 11)
• Submit the Supervisors check list for each case (Appendix 12).

The supervisor should enter the date that they attended a Supervisor training session on the appropriate form (Appendix 11). 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 marker.