

Guidelines of the Indian Association of Cardiovascular and Thoracic Anaesthesiologists and Indian College of Cardiac Anaesthesia for perioperative transesophageal echocardiography fellowship examination

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ABSTRACT

During current medical care, perioperative transesophageal echocardiography (TEE) has become a vital component of patient management, especially in cardiac operating rooms and in critical care medicine. Information derived from echocardiography has an important bearing on the patient's outcome. The Indian Association of Cardiovascular and Thoracic Anaesthesiologists (IACTA) has promoted the use of TEE during routine clinical care of patients undergoing cardiac surgery. An important mission of IACTA is to oversee training and certify anesthesiologists in the perioperative and intensive care use of TEE. The provision of "Fellowship" is by way of conducting IACTA – TEE fellowship (F-TEE) examination. This has been done annually for the past 7 years using well-established curriculums by accredited national and international societies. Now, with the transformation and reconstitution of IACTA education and research cell into the newly formed Indian College of Cardiac Anaesthesia, F-TEE is bound to meet international standards. To ensure that the examinations are conducted in a transparent and foolproof manner, the guideline committee (formulated in 2010) of IACTA has taken the onus of formulating the guidelines for the same. These guidelines have been formally reviewed and updated since 2010 and are detailed here to serve as a guide to both the examinee and examiner ensuring standardization, efficiency, and competency of the IACTA F-TEE certification process.

Key words: Guidelines; IACTA; ICCA; Transesophageal Echocardiography

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INTRODUCTION

Transesophageal echocardiography (TEE) has emerged as a noninvasive imaging modality of very significant diagnostic and clinical value. The accurate operation and interpretation of data obtained requires operator training, expertise, and skill. Both cognitive information and technical abilities are required for obtaining correct images. This implies a thorough understanding of the physical principles of sound transmission, as well as of fluid dynamics. With state-of-the-art echocardiography equipment, one acquires high quality two-dimensional (2D), three-dimensional or four-dimensional images, static and/or dynamic data sets to visualize the heart's structure and function, and applies Doppler principles and special technique such as speckle tracking technology to assess heart chamber, valve function, and the pericardial space including the aorta. Clinical usefulness and appropriate interpretation of such data must be performed through the integration of cardiovascular physiology and pathophysiology. The perioperative TEE fellowship (F-TEE) program offered by the Indian Association of Cardiovascular and Thoracic Anaesthesiologists (IACTA)/Indian College of Cardiac Anaesthesia is aimed at providing and improving the expertise of all echocardiographers manifesting a strong interest in attaining the goals as laid down by IACTA for achieving certification.

GOALS OF PERIOPERATIVE FELLOWSHIP EXAMINATION

The primary goals of the IACTA F-TEE examination are as follows:

- To set standards for competency and excellence in the field of perioperative TEE in India
- To bring credibility and provisional legitimacy to professionals performing perioperative TEE and thereby protecting patients from undergoing perioperative TEE examinations performed by unqualified persons
- To motivate and benefit students/fellows to train in TEE, become confident and certified in the use of TEE during the perioperative care of patients undergoing cardiac/noncardiac surgery and during Intensive Care Unit care
- The F-TEE course is designed to train and test the competency of an eligible individual to be able to independently perform, interpret, and report routine TEE studies. For this, IACTA has set

an Indian TEE curriculum and training criteria based on those set by the recognized international boards and institutions. The completion of F-TEE is neither compulsory nor a regulatory requirement

- To create an opportunity for certified individuals to become mentors and carry on the mission of education in TEE.

ELIGIBILITY CRITERIA

Any professional/postdoctoral or postgraduate student in any field relating to cardiac sciences such as cardiac anesthesia, cardiology, cardiac surgery, cardiac critical care wanting to learn TEE, who fulfills the training requirements satisfactorily with completed logbook and records of the TEE performed by him/her on a compact disc (CD) or a pen drive are eligible to sit for the F-TEE. This fellowship examination is not restricted to the above but open to noncardiac anesthetists/intensivists as well provided they satisfy the training requirements. They should be in good standing duly certified so by the head of the unit/department.

ESSENTIAL INSTRUCTIONS

Candidates are expected to interact with all the patients and obtain a detailed history and perform a detailed physical examination and procure informed consent before conducting a TEE examination. It is mandatory that all TEE procedures are performed under the direct supervision of a consultant who is certified in TEE or has sufficient experience in the field. Finally, although an assigned echo technologist/operating room technologist is available to clean the TEE probes, it is expected that all candidates (except those that are pregnant unless they have Occupational Safety and Health Administration certified protective equipment during the cleaning) are familiar with cleaning and disinfection of the TEE probes with both enzymatic and cidex sterilization.

RECOMMENDED TRAINING OBJECTIVES FOR PERIOPERATIVE TRANSESOPHAGEAL ECHOCARDIOGRAPHY FELLOWSHIP EXAMINATION SYLLABUS

Tables 1 and 2 summarize the training objectives of an examinee.

Table 1: Cognitive skills to be acquired by the examinee

Before the examination, a fellow must have a thorough knowledge of:

- The physical principles of echocardiographic image formation and blood flow velocity measurements
- Transducer manipulation and technical instrument settings critical to obtaining an optimal image using TEE
- Operation of ultrasonography, including all controls that affect the quality of data displayed
- Equipment handling, infection control, and electrical safety associated with perioperative echocardiography
- Pharyngeal and esophageal anatomy
- Indications, contraindications, and potential complications of perioperative TEE
- Normal tomographic cardiac anatomy as revealed by perioperative echocardiographic techniques
- Commonly encountered blood flow velocity profiles as measured by Doppler echocardiography and its principles
- TEE features of native valvular lesions and dysfunction
- TEE features of cardiac masses, thrombi, cardiomyopathies, pericardial effusion, and lesions of the great vessels
- TEE features of common congenital cardiac defect
- TEE features of myocardial ischemia and infarction
- TEE features of normal and abnormal biventricular function
- TEE features of air embolism
- Principles of tissue Doppler imaging, strain, strain rate, and speckle tracking
- 2D and 3D echo for different pediatric and adult cardiac lesions

TEE: Transesophageal echocardiography, 2D: Two-dimensional, 3D: Three-dimensional

Table 2: Technical skills expected from the examinee

- Operate ultrasonography - including the primary controls affecting the quality of the displayed data
- Various techniques of TEE probe placement and probe manipulation
- Recognition and management of possible complications of probe insertion
- Ability to insert a TEE probe safely in an anesthetized tracheally intubated patient
- Perform a basic TEE examination and differentiate normal structure and function from markedly abnormal cardiac structures and function
- Recognize marked changes in segmental ventricular contraction indicative of myocardial ischemia or infarction
- Recognize marked changes in global ventricular filling and ejection
- Recognize features of air embolism
- Recognize gross valvular lesions and dysfunction
- Recognize common congenital cardiac defects
- Recognize large intracardiac masses and thrombi
- Detect large pericardial effusions
- Recognize common echocardiographic artifacts
- Communicate echocardiographic results effectively to health-care professionals, and patients
- Recognize complications of perioperative echocardiography

TEE: Transesophageal echocardiography

CONDUCT OF THE TRANSESOPHAGEAL ECHOCARDIOGRAPHY FELLOWSHIP EXAMINATION

The annual F-TEE examination is conducted during the annual 3 days workshop (presently conducted at Bengaluru) in the following manner:

The F-TEE examination is a single examination, and there is no differentiation into distinct basic and advanced examinations, [Table 3]. The examination is conducted over 2 days (on 1st and 3rd days of the annual TEE workshop). The 1st day is devoted to the theory examination that has two parts; multiple choice questions (MCQs) and videos. The candidate is required to choose the single best response from the four options. There are no negative markings. A candidate needs to score 60% marks in each to become eligible for the practical examination. The questions will aim to cover the syllabus as mentioned in Tables 1, 2 and 5. Most MCQs test factual recall of information, but can be developed to test higher in-depth knowledge and its applications.

PREPARATION OF THE COMPACT DISC/PEN DRIVE

Candidates are required to provide a collection of TEE examinations performed by them during their training period with the help of a mentor. A normal study demonstrating appropriate use of machine settings for optimal imaging and correct use of appropriate standard 20 TEE views and additional views, M-Mode and 2D, continuous wave (CW), pulsed wave (PW) and color Doppler to assess chambers and valves should be included. As an example, a record of a patient with aortic stenosis should include a demonstration of the use of the CW Doppler from multiple windows, for example, (transgastric long-axis, deep transgastric). The calculation of valve area using the continuity

equation should also be included. The evaluation of moderate or severe aortic or mitral regurgitation should include appropriate quantification methods. Likewise, in a patient with coronary artery disease, evaluation of regional wall motion abnormalities, ejection fraction, and hemodynamic calculations should be included in this study.

Candidates are encouraged to bring their own laptop for the presentation before the examination board. The CD/pen drive shall be evaluated for the following:

1. Image acquisition, optimization, measurements, and interpretation will be assessed
2. Each study must be submitted as digital loops and still images within a PowerPoint presentation or uploaded onto a CD or a pen drive

Table 3: Pattern of examination

Written examination
Day-1 (3 h)
0.5 h: Introduction
1.5 h (90 min): 100 MCQs
1.0 h: 50 video
Day-2 announcement of the result of written examination: Only successful candidates are eligible to appear for practical examination
Practical examination
Day-3 (60 min/candidate)
20 min: "Hands-on" a simulator/patient
20 min: Logbook and evaluation of CD/pen drive
20 min: Grand-viva

MCQs: Multiple choice questions, OR: Operating room, CD: Compact disc

3. Number the studies as Case 1, Case 2, and so on without patient identification information
4. The list of cases included in the CD is to be mentioned in the logbook duly certified by the supervisor.

VIDEO RECORDINGS IN THE COMPACT DISC/PEN DRIVE

- Videos and loops of 25 cases from the logbook are to be included in the CD
- It is worth spending extra time doing this to make sure that 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 quality of images to be excellent
- The studies should be complete and of a high standard.

TRANSESOPHAGEAL ECHOCARDIOGRAPHY FELLOWSHIP LOGBOOK

The fellow has to submit a logbook containing the records of the various echocardiographic examinations that he has performed. The logbook should contain the records of 100 cases (performed over 24 months) 50 of which should have been performed and interpreted under supervision and 50 independently, which will be certified by the head of the unit/department. If the logbook is not as per the recommended norms, the candidate will not be able to clear the examination even if he has passed the theory and practical examinations. Of the 100 TEE cases

Table 4: All about the logbook and compact disc

The logbook is a set of copies of signed reports enclosed in a folder or binder. The cover page of the logbook and its contents must be submitted to the F-TEE examination board as hard copy

The logbook should consist of two sections

- (1) Record of 100 cases
- (2) Record of courses and educational meetings attended by the candidate

The logbook and digital CD will be reviewed during the practical examination

Imaging performed before and after cardiopulmonary bypass, i.e., during the same operation will count as one study

A study performed for the same patient on separate occasions may be counted as a separate study

The report should have all patient identification data removed, i.e., all cases should be collected in accordance with local requirements for data protection, i.e., your patient confidentiality (privacy) purposes

All reports submitted must carry the signature of the candidate

It is compulsory to carry the logbook during practical examination

In case of incomplete or no logbook, the candidate will be disqualified

A letter from the supervisor must be submitted with the completed logbook certifying that the studies have been recorded by the candidate and the signature of the supervisor in the logbook is mandatory

In case similar logbooks produced by two different candidates, both will be disqualified

F-TEE: TEE fellowship, TEE: Transesophageal echocardiography, CD: Compact disc

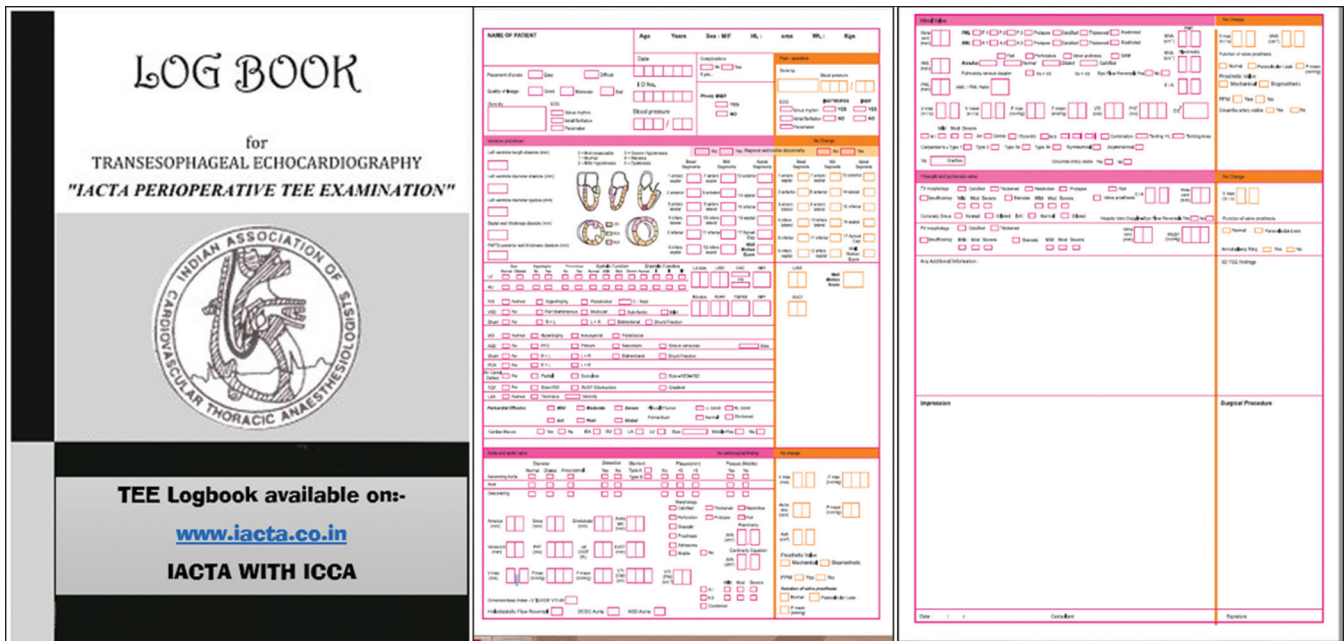


Figure 1: Sample copy of logbook

Table 5: The transesophageal echocardiography curriculum guide for preparation for the examination and preparation of the logbook

- About TEE machine
- Principles of Doppler ultrasound, ultrasonic image formation
- Artifacts
- Image planes and standard views
- Systolic left ventricular function
- Diastolic dysfunction
- TEE and cardiac catheterization
- The mitral valve: Replacement, repair
- The aortic valve and left ventricular outflow tract
- The right ventricle, tricuspid valve, and pulmonary valve
- Aspects of quantitative and semi quantitative echocardiography
- Stress echocardiogram
- Two-dimensional, pulse Doppler, continuous wave, and tissue Doppler and color flow studies
- Indications, contraindications, strengths and weaknesses of transthoracic, transesophageal and intracardiac echocardiography
- Perform exercise, dobutamine and dipyridamole stress echo, including recognition of complications, and their management
- Echocardiographic appearance of cardiac structures including cardiac chambers, valves, and major blood vessels
- Echocardiographic features with findings from other investigations including hemodynamic studies, computed tomography angiography, magnetic resonance angiography, and surgical/pathological correlation

Further details about the examination can be retrieved from the IACTA website, i.e., www.iacta.co.in. TEE: Transesophageal echocardiography, IACTA: Indian Association of Cardiovascular and Thoracic Anaesthesiologists

included in the logbook, at least 25 should be in the CD/pen drive which should be well edited. The details of the

fee structure, prevalent in that year of the examination and the logbook format are available on IACTA website www.iacta.co.in [Figure 1 and Table 4].

TYPES OF CASES IN THE LOGBOOK

How many logbook cases must I submit?

There must be a good case – mix and the suggested case – mix is as follows:

- At least 25 cases should include assessment of left ventricular function
- At least 25 cases should include assessment of valvular lesions undergoing repair or replacement
- Approximately 5–10 cases should include assessment of patients with pericardial disease
- At least 10 cases should include assessment of patient’s with diseases of the aorta.
- A minimum of 10 cases should include patients with congenital heart diseases (e.g., atrial septal defect, ventricular septal defect, tetralogy of Fallot, patent ductus arteriosus
- A couple of cases of suspected endocarditis
- There should be at least 3–4 cases of cardiomyopathy including at least two with hypertrophic cardiomyopathy
- The different categories should be indexed with a page depicting “contents” in the beginning
- In addition, remember we are assessing your echo skills and not the pathological lesions that you are submitting
- A colored logbook is preferred.

EVALUATION BY THE EXAMINER

- To pass the examination, the candidate must score 60% marks in both sections of the written examination, and satisfy the examiner in the oral, hands-on, the logbook and the grand viva
- The logbooks and the CD must adhere to the above norms and are assessed using an objective grading system
- The decision of the examination committee will be final
- Partial accreditation by passing the written examination alone is not possible.

CONCLUSION

In this document, we have provided the process for practitioners in India and surrounding countries to obtain certification in performing TEE during the perioperative period. IACTA has taken steps to formalize the process and the examination to allow it to be conducted with the required rigor and ability to test knowledge and thereby confirm eligibility for certification using standardized and recognized formats. By conducting this examination and providing certification, IACTA can provide confidence to the surgical care team by ensuring that anesthesia practitioners are skilled in the use of TEE during the perioperative period.

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Conflicts of interest

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