Build, Maintain and Bill

Intraoperative Echo Service 101

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OBJECTIVES

Upon completion of the lecture, the participant should understand the economic considerations that are important for providing intraoperative echocardiography (IOE) service, which include: 1) capital, personnel, and service costs, 2) improved patient care and outcomes leading to fewer operative complications, 3) proper billing and documentation, 4) generation of patient reports and archival of patient studies, and 5) costs associated with credentialing and attaining/maintaining certification. It is important that physicians and institutions understand the practical and financial implications of this service from the cost, patient benefit and reimbursement perspectives (1).

CAPITAL EQUIPMENT COSTS

The initial costs related to initiating a new intraoperative echo service include the capital purchase of equipment and training of personnel. An ultrasound system capable of providing the essential services costs between $150,000 and $250,000 depending on the features, software packages, number and type of probes, training, and the purchase of an ongoing service contract. A multiplane TEE transducer will cost between $20,000 and $50,000 depending on the vendor, three-dimensional capabilities, and whether the probe is new or refurbished. Three-dimensional TEE imaging is becoming increasingly available so that physicians and hospitals considering a purchase, should strongly consider systems capable of producing three-dimensional imaging.

A complete IOE service should also provide epicardial and epiaortic imaging, which requires additional probes that are compatible with the same intraoperative system. These surface probes are also used for transthoracic echocardiography and for imaging the internal jugular or subclavian veins to provide ultrasound guided central venous cannulation (2). The higher frequency probes (7 MHz) are used for pediatric transthoracic echocardiography, while lower frequency probes (2 MHz or 3 MHz) are used for adult transthoracic echocardiography. Three-dimensional echocardiography is also possible with certain transthoracic probes. A complete perioperative echocardiography service thus includes a wide variety of probes, which must be compatible with one or more ultrasound machines.

An IOE service may operate independently or in association with an echocardiography service outside the operating room. If an IOE is to operate independently of other services, consideration should be made for securing storage space for digital media, patient reports, viewing stations, and cleaning and storage areas. Maintenance costs include service contracts for upgrades, repair and maintenance of the echocardiographic system, cleaning and storage, report generation, a quality improvement program, and digital media storage.

TRAINING PERSONNEL

A new intraoperative echocardiography service requires one or several competent physician echocardiographers. The costs associated with training or hiring physicians depends on the particular service model at each institution. A few options are possible to fulfill this need. An anesthesiologist or cardiologist may already be on staff who possesses appropriate training, experience and proficiency in performing intraoperative echocardiography. Such a scenario enables the service to commence without significant “start-up” costs in personnel training. If an experienced echocardiographer is not on staff, costs will be incurred for recruiting a new cardiovascular anesthesiologist or cardiologist with appropriate training and expertise. One experienced echocardiographer can provide “on the job” training to others using a mentoring approach (3). This is probably the most cost effective manner to train anesthesiologists and is a particularly attractive option in private practice settings. Another approach is for an individual anesthesiologist to spend a dedicated period of time in a more formal educational program (4), such as during a cardiovascular anesthesia fellowship. Taking the time away from an established practice setting, whether academic or private practice, is costly and may not be practical in all situations.
Savage and colleagues have described their one-year educational program for intraoperative echocardiography (4), which focuses on acquiring the necessary cognitive and technical skills to proficiently perform IOE.

**PATIENT BENEFIT**

IOE is used to evaluate cardiac function, volume status, pathologic lesions and corrective surgical repairs. The monetary benefit varies, depending on the particular indication for TEE. Use of IOE to evaluate surgical repair allows for immediate detection of a pathologic defect during the initial surgical procedure, reducing the likelihood of repeat cardiac surgery. Potential savings per patient from a TEE detected defect not requiring further intervention has been estimated between $30,000 and $70,000 per patient at one institution (5). Use of IOE to assess congenital heart disease and evaluate the corrective repair, allows for immediate detection of inadequate surgical repair. A discussion on the cost effectiveness of intraoperative TEE, reported that TEE was instrumental in diagnosing inadequate surgical repair in 20% of pediatric cardiac patients, saving between $30,000 and $70,000 per patient in which intraoperative echo altered the surgical plan (5). In a study of high risk patients undergoing myocardial revascularization, IOE was responsible for alterations in surgical management in 33% and alterations in anesthetic management in 51% of patients (6). The monetary benefit for ischemia monitoring with IOE is unclear.

A cost-benefit analysis by Benson and Cahalan accounted for the incidence of problems detected by TEE in various types of cardiac surgery and the cost associated with not discovering the problem intraoperatively (7). Their analysis revealed a monetary benefit to TEE use as presented in the following table:

<table>
<thead>
<tr>
<th>Type of Surgery</th>
<th>Monetary Benefit per case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital</td>
<td>$875</td>
</tr>
<tr>
<td>Valve Repair</td>
<td>$750</td>
</tr>
<tr>
<td>CABG</td>
<td>$100-$500</td>
</tr>
<tr>
<td>Valve</td>
<td>$125</td>
</tr>
</tbody>
</table>

**TEE REPORT AND BILLING**

The ability to effectively communicate the TEE examination results to other health care professionals and the medical record is an essential component of performing intraoperative TEE (8). Many third party insurers require a complete interpretation and report to be generated by the echocardiographer for payment of professional services. The best way to insure a complete examination and report is to perform the comprehensive multiplane TEE examination in a routinely consistent manner, and to document the results of the examination on a standardized reporting form. The Society of Cardiovascular Anesthesiologists website (www.scahq.org) provides a sample reporting form for intraoperative echo. Key components of this form are a brief patient history that indicates the planned surgical procedure, operation performed, requesting physician, indication for TEE (e.g., evaluate valve repair), probe placement procedure, echocardiographic services performed, and pertinent TEE findings.

**Billing for TEE**

Reimbursement for intraoperative TEE is dependent on third party payer contracts, whether the echocardiographer is a cardiologist or anesthesiologist, and the geographical region. Many third party payers have adopted the Center of Medicare Services policy that defines reimbursable indications for intraoperative TEE:

“The interpretation of TEE during surgery is covered only when the surgeon or other physician has requested echocardiography for a specific diagnostic reason (e.g., determination of proper valve placement, assessment of the adequacy of valvuloplasty or revascularization, placement of shunts or other devices, assessment of vascular integrity, or detection of intravascular air). To be a covered service, TEE must include a complete interpretation/report by the performing physician. Coverage for evaluation, however, is not allowed for monitoring, technical trouble shooting, or any other purpose that does not meet the medical necessity criteria for the diagnostic test.”

The key points for reimbursement of IOE services should include:

1) **Documentation that the surgeon or other physician is requesting echocardiography for a specific diagnostic reason.** The medical record should indicate this request either by an order in the medical record, the operative consent form, progress notes, or at the very least within the dictated echocardiography report. It is a good practice for the patient report to indicate the medical necessity for performing the TEE and the
physician who requested the IOE service. It should also be clear whether the IOE was performed for
diagnostic, monitoring, or research purposes.

2) **A complete interpretation and report is generated by the echocardiographer.** Best practices include
submission of a copy of the completed, signed TEE report with the billing sheet.

3) **When TEE is used for monitoring by the physician who places the TEE probe and another physician
provides a diagnostic exam and report, the monitoring physician only receives compensation for
placement of the probe.** There is no reimbursement for diagnosis when intraoperative TEE is used solely
for monitoring.

**Billing Codes for Intraoperative TEE**

93312 Echocardiography, transesophageal, real time with image documentation (2D) (with or without M-
mode recording); including probe placement, image acquisition, interpretation, and report
This service involves placement of the transesophageal probe, obtaining the appropriate images and views, and
critical analysis of the data. Patients with increased risks of hemodynamic disturbances may require probe insertion
and interpretation of the echocardiogram. This includes, but is not limited to, histories of congestive heart failure,
severe ischemic heart disease, valvular disease, aortic aneurysm, major trauma and burns. It may also be indicated in
certain procedures that involve great shifts in the patient's volume status. Such procedures may include vascular
surgery, cardiac surgery, liver resection/transplantation, extensive tumor resections and radical orthopedic surgery.
The use of TEE may also be indicated when central venous access is contraindicated or difficult and it is not
possible to adequately assess blood loss and replacement, impairment of venous return, and right and left heart
function without the TEE.

93313 Echocardiography, transesophageal, real time with image documentation (2D) (with or without M-
mode recording); placement of transesophageal probe only
Although the procedure is generally safe, the proper insertion of the probe requires skill and judgment. There are a
few inherent risks to placement of the probe, including pharyngeal and/or laryngeal trauma, dental injuries,
esophageal trauma, bleeding, arrhythmias, respiratory distress and hemodynamic effects. There have even been case
reports of perioperative death attributed to TEE probe placement.

93314 Echocardiography, transesophageal, real time with image documentation (2D) (with or without M-
mode recording); image acquisition, interpretation and report only
This code is used when one physician inserts the probe and another physician interprets the images. Physicians who
obtain and interpret cardiac images and provide a report but who did not place the TEE probe should use this code
to report their service.

93315 - Transesophageal echocardiography for congenital cardiac anomalies; including probe placement,
image acquisition, interpretation and report
This service involves placement of the transesophageal probe, obtaining the appropriate images and views, and
critical analysis of the data in patients with congenital cardiac anomalies. This includes, but is not limited to,
congenital valve problems, such as bicuspid aortic valve, septal defects, including patent foramen ovale, and more
complicated congenital heart defects. This includes, but is not limited to, all the indications listed for code 93312,
but in patients with congenital cardiac anomalies.

93316 - placement of transesophageal probe only (for congenital cardiac anomalies)
This is the equivalent of code 93313, but in patients with congenital cardiac anomalies.

93317 - image acquisition, interpretation and report only (for congenital cardiac anomalies)
This is the equivalent of code 93314, but in patients with congenital cardiac anomalies.

93318 - Echocardiography, transesophageal (TEE) for monitoring purposes, including probe placement, real
time 2-dimensional image acquisition and interpretation leading to ongoing (continuous) assessment of
(dynamically changing) cardiac pumping function and to therapeutic measures on an immediate time basis
This code is used when the patient's condition, as described under 93312, requires repetitive evaluation of cardiac
function in order to guide ongoing management.

93320 - Doppler echocardiography, pulsed wave and/or continuous wave with spectral display
This code is used to evaluate blood velocity and flow patterns through various cardiac and vascular structures. Stenotic lesions generally lead to increased blood velocity proportional to the degree of stenosis, thereby providing a method to assess the severity of stenosis. Velocity measurements are also used to calculate the area of stenotic valves and regurgitant orifices. This code may be submitted along with code 93312 or 93315.

93325 - Doppler color flow velocity mapping
This code is used to evaluate the direction and character of blood flow through various cardiac and vascular structures. This code may be submitted along with code 93312 or 93315.

76998 – Ultrasound guidance, intraoperative

76999 – Unlisted ultrasound procedure (eg. diagnostic interventional)

Use of Modifiers
If the TEE is performed for diagnostic purposes by the same anesthesiologist who is providing the anesthesia service, modifier 59 should be appended to the TEE code to note that it is distinct and independent from the anesthesia service. If the anesthesiologist does not own the TEE equipment, s/he reports only the professional component of the TEE service and should append modifier 26 (Professional Component) to the TEE code.

Diagnosis Codes
Equally important for billing is to indicate the appropriate ICD-9 code that identifies the pathologic lesion for which the echocardiogram is performed. Common ICD-9 codes that qualify for reimbursement are listed in the CMS Report Policy of each particular Local Carrier Determination. Any diagnosis not listed is not covered for reimbursement. Claims submitted without a covered ICD-9 code are denied for reasons of failing to justify medical necessity. A typical billing sheet that includes both commonly used CPT and ICD-9 codes is provided in table at the end of this handout.

Credentialing
Many third party carrier policies include a statement similar to that the CMS policy which states, “Physicians who perform, supervise, and/or interpret the studies must be capable of demonstrating training and experience specific to the study performed or interpreted and maintain documentation for post payment audit”. At the very least, the institution in which the TEE is performed should credential the physician echocardiographer. Further demonstration of qualifications may be accomplished the successful completion of either of two examinations administered by the National Board of Echocardiography (NBE): the “Perioperative Transesophageal Echocardiography Certification Examination” or “An Examination of Special Competence in Echocardiography”. Board certification is also available through NBE after requisite training in perioperative echocardiography (9). CMS Policy does not specifically state that the physician echocardiographer should pass one of these examinations. However, physicians may use the successful completions of these exams combined with clinical experience to demonstrate training and expertise worthy of reimbursement or credentialing within their hospital.

QUALITY IMPROVEMENT PROGRAM
There is a national expectation that all clinical service programs incorporate some type of quality improvement program, and intraoperative echocardiography should be no exception. This issue has reached national prominence for the practice of medicine in general as we have seen pay for performance initiatives promoted by the Center for Medicare Services, Joint Commission, and other governmental agencies. A task force comprised of SCA and ASE members established definition and expectations for quality improvement in perioperative echocardiography in 2006 (10). The task force defined perioperative echocardiography as cardiac ultrasound in surgical patients immediately before, during, or after their operation, including TEE, epicardial, epiatriotic, and TTE, and 2-D, 3-D, Doppler, and M-mode echocardiography. A periodic review of the service includes caseload, performance, interpretation, record keeping, and equipment. The task force recommended caseload expectation for the entire service of 25 intraoperative cases per month, and defined a case as a single patient encounter. Recommendations for individual maintenance of skills were exposure to 50 exams per year, 25 of which to be personally performed, 15 hours of CME related to TEE every 3 years, and participation in CQI through a monthly case conference, which can be counted towards the CME, but a maximum of 2 case conference CME hours per year may be designated towards
the overall CME requirement. A minimum of 5 cases per year should be reviewed for each individual echocardiographer annually. It is unclear how many programs across the country have quality improvement programs that meet the guidelines set forth by the task force five years ago.

REFERENCES:
### TEE BILLING FORM

**Date of Service:**

**Physician requesting service:**

**Physician Echocardiographer:**

#### PROCEDURE CODES (check all procedures performed)

- [ ] 93312-26: Echocardiography, transesophageal, real time with image documentation (2D) (with or without M-mode recording) including probe placement, image acquisition, interpretation & report
- [ ] 93313-26 TEE probe placement only
- [ ] 93314: Interpretation/report only
- [ ] 93315-26 Echocardiography, transesophageal, real time with image documentation (2D) including probe placement, image acquisition, interpretation & report (as 93312) for congenital anomalies
- [ ] 93316-26 TEE probe placement only
- [ ] 93317: Interpretation/report only for congenital anomalies
- [ ] 93318-26: TEE used for monitoring purposes only
- [ ] 93320-26: Doppler echocardiography, pulsed wave and/or continuous wave with spectral display
- [ ] 93325-26: Doppler color flow velocity mapping

#### ICD-9 CODES (Check all that identify the diagnostic indication for TEE)

**LEFT VENTRICLE**

- [ ] Cardiomegaly 429.3
- [ ] Functional disturbance following cardiac surgery 429.4
- [ ] Fluid overload 276.6
- [ ] Hypertrophic obstructive cardiomyopathy 425.1
- [ ] Alcoholic cardiomyopathy 425.5
- [ ] Other cardiomyopathy 425.4
- [ ] Ventricular septal defect 745.4
- [ ] Left ventricular aneurysm 414.10
- [ ] Acquired cardiac septal defect 429.71

**MITRAL VALVE**

- [ ] Rheumatic mitral stenosis 394.0
- [ ] Rheumatic mitral regurgitation 394.1
- [ ] Rheumatic mitral stenosis with regurgitation 394.2
- [ ] Mitral regurgitation – non rheumatic 424.0
- [ ] Ruptured chordae tendineae 429.5
- [ ] Ruptured papillary muscle 429.6
- [ ] Other papillary muscle disorders 429.81

**AORTIC VALVE**

- [ ] Rheumatic aortic stenosis 395.0
- [ ] Rheumatic aortic insufficiency 395.1
- [ ] Rheumatic aortic stenosis with insufficiency 395.2
- [ ] Other aortic valve disease with AS or AI 424.1
- [ ] Congenital stenosis of aortic valve 746.3
- [ ] Congenital insufficiency of aortic valve 746.4

**COMBINED AORTIC/MITRAL VALVE DISEASE**

- [ ] Mitral stenosis with aortic stenosis 396.0
- [ ] Mitral stenosis with aortic insufficiency 396.1
- [ ] Mitral insufficiency with aortic stenosis 396.2
- [ ] Mitral insufficiency with aortic insufficiency 396.3
- [ ] MS and/or MI with AS and/or AI 396.8

**TRICUSPID VALVE**

- [ ] Rheumatic disease, stenosis or regurgitation 397.0
- [ ] Other, stenosis or regurgitation 424.2

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**PULMONIC VALVE**

- [ ] Rheumatic diseases of the pulmonic valve 397.1
- [ ] Pulmonary valve disorder, non-rheumatic 424.3

**ENDOCARDITIS (any valve)**

- [ ] Bacterial 421.0
- [ ] Endocarditis, not specified as bacterial 424.90

**AORTA**

- [ ] Atherosclerosis 440.0
- [ ] Dissection of thoracic aorta 441.01
- [ ] Thoracic aneurysm: [ ] ruptured 441.1 [ ] unruptured 441.2
- [ ] Injury to thoracic aorta 901.0

**HYPOTENSION**

- [ ] Septicemia 038.9
- [ ] Volume depletion 276.5
- [ ] Cardiogenic shock 785.51
- [ ] Traumatic shock 958.4
- [ ] Postoperative shock 998.0
- [ ] Shock, unspecified 785.50

Hypotension: [ ] specified 458.8 [ ] unspecified 458.9

**TUMORS**

- [ ] Benign neoplasm of the heart 212.7
- [ ] Neoplasms of unspecified nature 239.8

**CONGENITAL**

- [ ] Ostium secundum ASD or patent foramen ovale 745.5
- [ ] Ostium primum 745.61
- [ ] Partial anomalous pulmonary venous connection 747.42
- [ ] Patent ductus arteriosus 747.0

**MISCELLANEOUS**

- [ ] Air embolism 999.1
- [ ] Iatrogenic pulmonary embolism 415.11
- [ ] Other pulmonary embolism 415.19
- [ ] Atrial fibrillation 427.31
- [ ] Atrial flutter 427.32