Changes: The Latest Revisions to the *ICAEL Standards*

Note: This document contains a summary of the major revisions made to the ICAEL Standards. For a complete version of both the *ICAEL Standards for Accreditation in Adult Echocardiography Testing* and the *ICAEL Standards for Accreditation in Pediatric Echocardiography Testing*, please visit [www.icael.org/icael/apply/standards.htm](http://www.icael.org/icael/apply/standards.htm).
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JUNE 2010 | As an accreditation organization, the ICAEL is committed to maintaining a program that balances the changing needs of both the echocardiography community and the general public by influencing the quality of patient care provided. The *ICAEL Standards* are the most important component of that commitment. Composed by physicians and sonographers from the ICAEL sponsoring organizations, the *ICAEL Standards* are critically reviewed by the ICAEL Board of Directors and revised every two years and as needed.

The ICAEL is pleased to announce the release of the 2010 *ICAEL Standards*, now available for download from the website at [www.icael.org/icael/apply/standards.htm](http://www.icael.org/icael/apply/standards.htm)

**The 2010 ICAEL Standards become effective December 1, 2010.** In instances where the *Standards* are relaxed (e.g.: lower numbers of continuing education credits required for Medical and Technical Directors), the requirements are effective immediately. Laboratories may apply using either the new *Standards* or the 2008 version, for a period of six months. Applications submitted after December 1, 2010 must be in compliance with the 2010 *ICAEL Standards*.

Applicant laboratories will benefit from the enhanced clarity and more inclusive nature afforded by the revisions. The following article provides a detailed overview of the key revisions made within the *ICAEL Standards*. As in all previous versions of the *Standards*, the revised *Standards* include both requirements and recommendations for echocardiography laboratories. For clarity purposes, the full version of the *Standards* is formatted so that **all revisions made since the prior release appear as highlighted text**.

Please note: You have the option in Adobe Reader to print this PDF either with or without the highlighting. [In the Print box, locate the drop menu under Comments and Forms; select ‘Document’ to hide highlights or ‘Document and Markup’ to include highlights.]

The 2010 *ICAEL Standards* are published in a format that enables laboratories performing any one or all of the types of testing to easily access the specific guidelines relevant to their laboratory. Separate documents are published for Adult and Pediatric laboratories. Within each, Part I Organization contains the standards related to the operational aspects of the echocardiography (supervision and personnel; support services; physical facilities; examination data archiving; examination reports and laboratory records; laboratory safety and patient confidentiality; quality assurance and multiple site and mobile services) and therefore should be reviewed closely by all participating laboratories. As detailed within the Adult Introduction preamble, in order to achieve accreditation for Transesophageal Echocardiography (TEE) or Stress Echocardiography, laboratories are required to be accredited in Adult Transthoracic Echocardiography. Laboratories may submit completed applications for all testing areas, at the same time, or have the option of first applying for transthoracic and adding on TEE or stress echocardiography at a later date. Pediatric laboratories must also apply in Pediatric Transthoracic to be eligible to apply for Pediatric Transesophageal. Again, laboratories may submit completed applications for both testing areas, at the same time, or having the option of first applying for pediatric transthoracic and adding pediatric TEE at a later date. Applications for Fetal Echocardiography can be submitted alone or with adult or pediatric applications.

The 2010 *ICAEL Standards* also contain Parts II, III and IV, Transthoracic Echocardiography Testing, Adult Transeosophageal Echocardiographic Testing and Adult Stress Echocardiographic Testing. Sections devoted to Instrumentation; Indications, Order Process and Scheduling; Elements and Components of Examination Performance and Procedure Volumes are repeated within each testing area. Laboratories are encouraged to review the testing sections applicable to the types of testing performed, to ensure compliance with the current *ICAEL Standards*.

As the subsequent step in the accreditation process, participating laboratories utilize the corresponding application to document their compliance with the *ICAEL Standards*. The ICAEL anticipates the release of the ICAEL Online Accreditation application before the conclusion of 2010.
PART I: ORGANIZATION

Reduced CME and CE Requirements

The number of required continuing education credits relevant to echocardiography, as attained during a three year period, has been reduced from 30 credits to 15, for both the Medical and Technical Directors. The medical and technical staff credit requirements remain at 15 CME credits, over a three year period. For both the Medical Director and medical staff members, only 10 of the credits are required to be Category I, with non-Category I credits now accepted for the remaining five credits.

The Medical Director must document at least 15 hours of CME relevant to echocardiography over a period of three (3) years. 10 hours must be Category 1 AMA. The other five (5) echocardiography related hours may be non-category I (i.e. ASE CME).

The Technical Director must document at least 15 hours of echocardiography related continuing education over a period of three (3) years. All hours must be relevant to echocardiography.

The medical staff must document at least 15 hours of CME relevant to echocardiography over a period of three (3) years. 10 hours must be Category 1. The other five (5) echocardiography related hours may be non-category I (i.e. ASE CME).

Medical Directors and All Medical Staff Applying Under the Practice Experience Pathway Will be Required to Document NBE Testamur Status by 2015

The training and experience requirements include a practice experience pathway for both the Medical Director and medical staff. This specific pathway is designated for those physicians that did not complete a formal training program in echocardiography. In addition to possessing both a minimum of three years of echocardiography practice experience and interpretation of a minimum number of echocardiogram/Doppler examinations (at least 1800 for Medical Directors and 1200 for medical staff), the physicians applying under this pathway will be required to document testamur status by the National Board of Echocardiography (NBE) by January 1, 2015. All interpreting physicians qualifying under this pathway will be required to comply with the new standard, whether they are first time applicants or applying for reaccreditation.

As stated on the National Board of Echocardiography’s (NBE) website (www.echoboards.org), the ASCeXAM is the examination of special competence in adult echocardiography. The ASCeXAM (originally called the ASEeXAM) is intended for those who wish to demonstrate special competence in all areas of echocardiography. The title of “Testamur” is designated for those who successfully pass the ASCeXAM. The examination is currently offered once a year. It is administered in a computer-based, multiple-choice examination format, allowing candidates to take the examination at a testing center convenient to their location.

The ICAEL recommends that physicians intending to apply under the practice experience pathway begin planning now to be in compliance with this impending requirement. The examination is currently offered once a year and the application deadline is generally six months prior to the examination administration (for example for the October 18, 2010 examination, applications were due by April 5, 2010).
The Medical Director must meet one of the following criteria:

A) Level III training in echocardiography.
B) Level II training in echocardiography plus one year of experience that includes interpretation of at least 600 echocardiogram/Doppler examinations.
C) Three years of echocardiography practice experience and at least 1800 echocardiogram/Doppler examination interpretations, with Testamur status by the National Board of Echocardiography (NBE) in Echocardiography by 2015.

The medical staff members must meet one or more of the following criteria:

A) Level III training in echocardiography.
B) Level II training in echocardiography.
C) Three years of echocardiography practice experience and interpretation of at least 1200 echocardiogram/Doppler examinations with Testamur status by NBE in Echocardiography by 2015.

**Strengthened Language Related to Sonographer Credentialing**

The Standards include guidelines to ensure that the laboratory employs individuals possessing the proper training, experience and competency to perform and interpret echocardiography examinations. Focusing on the qualifications of the sonographers, the following comment is now included:

1.4 All members of the technical staff must be qualified sonographers.

Comment: Though the standards include multiple pathways by which a technical staff member may document experience and training, the ICAEL encourages that all staff members acquire an appropriate credential in echocardiography within two years of completion of pathway B, C or D. By 2014, the laboratory must have a process in place to ensure that all sonographers become credentialed.

**Avoidance of Musculoskeletal Disorders (MSD)**

Language related to avoidance of work related musculoskeletal disorders (MSD) during ultrasound scanning was added to the Physical Facilities (Laboratory Space) section:

2.1.1 A policy must be in place to address technical staff safety, comfort and avoidance of work related musculoskeletal disorders (MSD).

Comment: For additional information regarding MSD, please visit:

- [www.sdms.org/OSHA/ctool.asp](http://www.sdms.org/OSHA/ctool.asp)
**Enhanced Details Related to Timely Reporting of Examination Data**

Guidelines are now included to specify the acceptable timeframes for interpretation and reporting. In addition, a statement was added discussing that “sonographer worksheets, comments or other communication of findings must not be provided to anyone other than the interpreting physician”.

**3.2.4 Routine inpatient echocardiographic studies must be interpreted by a qualified physician within 24 hours of completion of the examination. Outpatient studies must be interpreted by the end of the next business day. The final verified (by the interpreting physician) signed report must be completed within 48 hours after interpretation.**

**Laboratory Safety**

Within the section related to the specific emergency supplies that must be readily available by laboratories providing special echocardiography procedures, such as transesophageal and stress echocardiograms, suction equipment is now listed. In addition, an echocardiography laboratory providing special echocardiographic procedures must have an emergency procedure plan and emergency supplies, as specified in the *Standards*, must be readily available for transesophageal and sedated echocardiograms.

**Multiple Enhancements to the Quality Assurance Section**

*Incorporation of Appropriate Use Criteria (AUC)*

Appropriate Use Criteria (AUC) are developed and published by several medical specialty societies including the American College of Cardiology Foundation. Such criteria are written to define “when to do” and “how often to do” a given procedure in the context of scientific evidence, the health care environment, the patient’s profile and a physician’s judgment. The criteria are designed to examine the use of diagnostic and therapeutic procedures to support efficient use of medical resources, while also providing patients with quality, appropriate care.

Through the incorporation of AUC, the *ICAEL Standards* now require laboratories applying for accreditation to measure and evaluate the appropriate use of echocardiography in their practice as part of their ongoing quality assessment programs, to improve patient care. It is important to note that laboratories are not required to achieve a defined percentage or level of appropriate studies, nor will laboratories be judged based upon the results of their metrics. Rather, the purpose of requiring measurement of appropriate use is for self-education of the facility and self-assessment of areas for improvement.

**5.1.1 Appropriate Use Criteria (AUC)**

As part of the ongoing quality improvement program, facilities providing echocardiography imaging must incorporate the measurement of the appropriate use criteria published and/or endorsed by professional medical organization(s).

**5.1.1.1 Appropriate use must be measured in a minimum of 30 consecutive TTE, TEE and Stress patients annually. In addition to measuring appropriateness, a policy for ongoing monitoring of appropriateness for TTE, TEE and stress echocardiograms should be in place by 2012.**

**5.1.1.2 Overall results must be documented. The percentage of appropriate, inappropriate and uncertain indications for testing must be measured.**
5.1.1.3 A program for education and reporting must be developed and include:

A) Patterns of adherence to AUC
B) Baseline rates of adherence
C) Goals for improvement of adherence to appropriate use criteria
D) Measurement of improvement rate
E) Confidential comparison reports on patterns of adherence in aggregate by ordering physician, ordering practice and interpreting practice

5.1.1.4 Documentation of measurement of AUC will be a mandatory requirement for accreditation effective January 1, 2012.

More Rigorous Instrument Maintenance Guidelines

The Standards now state that “Instrumentation used for diagnostic testing must be maintained in good operating condition.”

In addition, the annual use of a phantom is now suggested:

The accuracy of all laboratory imaging equipment should be tested annually using a phantom.

New Guidelines for Report Timeliness

Routine inpatient echocardiographic studies must be interpreted by a qualified physician within 24 hours of completion of the examination. Outpatient studies must be interpreted by the end of the next business day. The final verified (by the interpreting physician) signed report must be completed within 48 hours after interpretation.

One Type of Echocardiography Conference is Now Specified

In previous versions of the Standards, the types of required echocardiography conferences were divided. The new Standards now require quality assurance conferences, to be held quarterly:

5.1.8 Echocardiography conferences:

Quarterly echocardiography quality assurance conferences must be held to review the results of variability, correlation and report timelines, to address discrepancies and to discuss difficult cases and laboratory issues. Attendance by the medical and technical directors or their designees is required at all meetings. All medical and technical staff are required to attend at least two of the four meetings. Minutes of the meetings and attendance must be recorded.

Annual Summary Required for Quality Assurance Record Keeping

Related to Quality Assurance record keeping, it is now specified that “The records must include an annual summary of information and must include a description of how the information is used to improve quality in the echocardiography laboratory”.

Three Specific Categories of QA Measures Are Now Required

Applicant laboratories are now required to conduct specific Quality Assurance measures, per identified frequencies and other variables, as defined within the Standards:

5.1.10 Required QA measures:

5.1.10.1 Variability: Ejection fraction (EF), wall motion analysis and degree of regurgitation/stenosis must be assessed on a minimum of two cases per modality per quarter to be reviewed in quarterly conferences. The cases must represent as many
physicians as possible. A policy for the medical director to address discrepancies must be in place.

5.1.10.2 Report timeliness, completeness: Report review for timeliness, completeness – a minimum of 10 random reports per quarter evaluated for time of study performed and time of final report generation and report completeness. The reports must represent as many physicians as possible. A policy for the medical director to address discrepancies must be in place.

5.1.10.3 Correlation: Ejection fraction (EF), wall motion analysis and degree of regurgitation/stenosis will be correlated on a minimum of two per modality per quarter with other imaging modalities in quarterly conferences. A policy for the Medical Director to address discrepancies must be in place.

PART II: ADULT TRANSTHORACIC ECHOCARDIOGRAPHY TESTING

Related to two-dimensional (2-D) imaging, the Standards now define that “the system should include harmonic capabilities and instrument settings to enable optimization of ultrasound contrast agents”. Specific to spectral display for pulsed (PW) and continuous wave (CW) Doppler studies, the Standards now state that “there should be a system setting to display low frequency Doppler filtering for tissue Doppler display.”

A new cardiac ultrasound system characteristic is now required:

An audible output must be present at the time of acquisition. A permanent recording of the Doppler waveform and corresponding image that utilizes a digital image storage method that should be compatible with DICOM standards.

Corresponding to the incorporation of Appropriate Use Criteria (AUC), as discussed above in the Organization section, the section of the Standards related to Indications, Ordering Process and Scheduling now includes a related statement:

There must be a mechanism for education of referring physicians to ensure appropriate use. (See Organization 5.1.1.3)

Within the Elements and Components of Examination Performance section, it is now stated that “Examination performance must include proper technique.” Guidelines related to patient evaluation are now included, “The patient's height and weight must be measured and recorded prior to the examination, so that measurements can be indexed, when appropriate, to parameters of body size.” In addition, enhancements have been made to the elements of study performance section, including the addition of language specifying that the performance of a 2-D/M-Mode/Doppler examination according to the laboratory specific and appropriate protocol that incorporate all views and imaging planes mandated by the ICAEL Standards (3.2.1, 3.2.2).

Two additional elements of study performance are now included:

Representative image storage of all images and data

Timely report generation and communication of results
In addition, the elements of study quality have been augmented:

The sequence of the laboratory specific and appropriate protocol should be followed whenever possible for consistent acquisitions and allowance for additional views when clinically indicated.

Within Components of the Transthoracic Echocardiogram, the following guidelines are now specified, “For all imaging protocols, if any required view or Doppler signal cannot be adequately obtained, it should be recorded and labeled in order to demonstrate that is was attempted.”

“LV diastolic function should be evaluated through a combination of PW and tissue Doppler techniques” is now specified as a standard Doppler flow evaluation.

To further define the use of contrast, the following is now included:

3.2.3 Use of contrast for suboptimal image quality: Contrast is indicated for use when two contiguous segments are not visualized as it provides greater accuracy in determining left ventricular function.

A) If contrast is used, there must be a written policy for the use of contrast agents.
B) If contrast is not able to be used there must be a policy for alternative imaging.
C) Contrast should be used in the presence of poor endocardial border definition for quantification of chamber dimensions, volumes, ejection fraction and assessment of regional wall motion.
D) Poor endocardial border definition is defined as the inability to detect two or more contiguous segments in any three of the apical views.
E) Contrast should also be used to assess conditions such as hypertrophic cardiomyopathy or when left ventricular thrombus is suspected.

Within Section 4 Examination Interpretation, specific to reporting, the demographics of height, weight, gender and blood pressure are now required elements of the standardized report.

Also within Section 4 Examination Interpretation, the guidelines for 2-dimensional and/or M-mode numerical data have been expanded by the discussion of “additional measurements may be indicated and when performed, should be included” as well as a comment; “Normal ranges may be included in the report. The text should comment on whether a given dimension is within normal limits, or if abnormal, to what extent.” Related to report text, it is now specified that “If any structure is not well visualized this must be noted.” In addition, the following is now specified, “The final report must be reviewed, signed and dated manually or electronically by the interpreting physician. Electronic signatures must be password protected and indicate they are electronically recorded. Stamped signatures or signing by non-physician staff is unacceptable.”
PART III
ADULT TRANSESOPHAGEAL
ECHOCARDIOGRAPHIC (TEE) TESTING

Within Section 2 Indications, Order Process and Scheduling, the following language is now included, related to guidelines for verification the indication “If the indication for the examination and/or clinical history are not clear, the physician performing the TEE must verify the clinical history and an appropriate indication before proceeding with the examination.”

The definition of procedure types and protocols has been clarified by the addition of the following language “It is recognized that in some instances “limited” TEEs are performed (i.e. in the OR with time constraints or when a follow up examination is performed to evaluate specific pathology) that may limit or prevent a complete evaluation. However, the routine practice of a laboratory should be the performance of a comprehensive evaluation.

B) The TEE is an invasive examination and usually is performed using conscious sedation. The laboratory must demonstrate that all medical and technical staff routinely adhere to the global conscious sedation policies in place for the medical facility as required by the Joint Commission or other appropriate accrediting organizations.”

Related to scheduling, the Standards now state, “Sufficient time must be included in the scheduling process for adequate post-sedation monitoring.” The scheduling of urgent TEE studies and emergent or stat TEE studies is now further defined, as follows:

A) An urgent or stat TEE study should be performed as soon as possible and may preempt other clinical laboratory activities.

B) Availability for emergencies: Qualified personnel and equipment should be available for urgent or stat studies outside of normal working hours in most tertiary inpatient facilities or where appropriate in other medical facilities offering TEE services.

Further clarification of the components of the examination is now included, as follows

3.3.6 Components of the examination: A protocol must be in place that defines the standard views and components of a comprehensive TEE examination. Indications for performance of a TEE examination must be included. A complete TEE and TEE-Doppler examination includes standard views from multiple planes including views of all cardiac structures and selected extracardiac structures. The examination should be performed in a methodical fashion although the order of imaging plane acquisitions and Doppler may vary so as to answer the question at hand in an expeditious fashion. Although limited TEE examinations may have a role in specific clinical situations, a laboratory should generally perform comprehensive examinations routinely, due to the high yield of unexpected findings.
Within the section devoted to report components, more detail is now provided related to demographics and report text:

3.4.1 The report must accurately reflect the content and results of the study. The report must include, but may not be limited to:

A) Demographics

1) The date of the study
2) The name and/or identifier of the laboratory
3) The name and/or identifier of the patient
4) The date of birth and/or age of the patient
5) Gender of the patient
6) The primary indication for the study. If clarification or verification of the indication was requested from the ordering physician prior to the examination, this should be included in the report.
7) The name of the performing physician
8) The name of the ordering physician and/or identifier
9) Blood pressure – Systolic and diastolic blood pressure must be obtained on or around the time of the study and displayed on the report.

Comment: The information must be sufficient to allow for the identification and retrieval of previous studies on the same patient.

B) Report text (including procedure comments) must include:

1) Medication used for the procedure
2) Ease of transducer insertion
3) Complications, if any
4) Components of procedure (i.e. color flow Doppler, PW/CW Doppler, contrast administration)

In addition, the guidelines related to measurement and Doppler, if obtained, have been augmented:

D) Measurements and Doppler if obtained:

1) Linear and/or volume/area measurements
2) Color and spectral Doppler interpretation statements regarding antegrade and retrograde flow abnormalities for each valve, along with any other Doppler velocity, gradient and/or volume measurements generally accepted as needed for documentation of pathology.

E) A summary of the results of the examination, including any pertinent positive and negative findings particularly those relative to the indication for exam.

F) The final report must be completely typewritten, including the printed name of the interpreting physician. The final report must be reviewed, signed and dated manually or electronically by the interpreting physician. Electronic signatures must be password protected and indicate they are electronically recorded. Stamped signatures or signing by non-physician staff is unacceptable.
PART IV
ADULT STRESS
ECHOCARDIOGRAPHIC TESTING

Related to two-dimensional (2-D) imaging, the *Standards* now define that “the system should include harmonic capabilities and instrument settings to enable optimization of ultrasound contrast agents.”

A new cardiac ultrasound system characteristic is now required:

**An audible output must be present at the time of acquisition.** A permanent recording of the Doppler waveform and corresponding image that utilizes a digital image storage method that should be compatible with DICOM standards.

Specific to stress echocardiography acquisition systems, the importance of side-by-side comparison capabilities is now emphasized:

**The capability of side-by-side comparison of images from baseline and different stages of stress.** Side by side review may be accomplished within the ultrasound stress package or on a dedicated offline workstation.

Corresponding to the incorporation of Appropriate Use Criteria (AUC), as discussed above in the Organization section, the section of the *Standards* related to Indications, Ordering Process and Scheduling now includes a related statement:

**There must be a mechanism for education of referring physicians to ensure appropriate use.**
(See Organization 5.1.1.3)

Within the ordering process and scheduling section, the definition of procedure types has been modified:

**D)** Doppler stress echocardiography compares antegrade and retrograde flows (if present) before, during and/or after stress. Doppler stress echocardiography may be performed alone or in conjunction with treadmill, bicycle, pacing or pharmacological stress.

**E)** Contrast agents may be used in conjunction with treadmill, bicycle, pacing or pharmacological stress to optimize endocardial border definition or enhance Doppler signals.
The training and supervision section now provides greater detail, including specific guidelines for nonphysicians as well as the minimum number of qualified individuals required to be present during stress testing:

**STANDARD – Training and Supervision**

3.1 Stress echocardiography is a diagnostic test which, if performed and/or interpreted incorrectly, can lead to serious consequences for the patient.

3.1.1 Accurate performance of stress echocardiography requires that the performing sonographer and interpreting physician are adequately trained and experienced to perform and interpret stress echocardiograms.

3.1.2 All personnel directly supervising stress procedures must have appropriate training/experience. While physician presence during stress testing is not required, the facility must assure that appropriate staff is present based upon the types of procedures being performed and the patients’ risks of adverse events.

3.1.3 If a nonphysician (e.g. properly trained nurse, physician assistant, nurse practitioner, exercise physiologist) practicing under the physician's license is supervising the stress test, the Medical Director or physician director of the stress laboratory must provide written attestation of appropriate training and competence as outlined in the American College of Cardiology/American Heart Association Clinical Competence Statement on Stress Testing. (See Bibliography).

Note: See Bibliography for specific training and competence requirements.

3.1.4 At a minimum, at least two qualified people are required to be in attendance during stress testing.

3.1.5 Basic Life Support – All personnel, including physicians, directly supervising stress procedures must have appropriate training/experience and must be certified in basic life support.

3.1.6 Advanced Cardiac Life Support – There must be ACLS certified personnel on site and immediately available during cardiac stress procedures.

Related to elements of examination performance and proper patient positioning during image acquisition, “beds with imaging drop sections are strongly recommended.” Also within that section, it is now specified that “Contrast is indicated for use when two contiguous segments are not visualized as it provides greater accuracy in determining left ventricular function. Contrast must be used if this is not accomplished with harmonic optimal imaging.” Also enhanced is the language related to treadmill stress testing and pharmacologic echo testing, “For treadmill stress, post stress images must be obtained within 60 seconds of peak stress. If images are obtained beyond 90 seconds it should be noted in the report. For pharmacologic echo, images must be obtained within the last 60 seconds of each stage.”
Within elements of study quality, the avoidance of artifacts when using contrast is now included.

The stress echocardiogram components of examination are now precisely defined:

A) Treadmill stress echo: Images must be obtained at baseline and immediately post exercise. All LV segments need to be visualized and compared side by side (baseline vs. peak exercise). The required views are parasternal long axis view, parasternal short axis view, apical four-chamber view and apical two-chamber view, or apical long axis, apical four-chamber view, apical two-chamber view and apical short-axis view.

B) Bicycle stress echo protocols: At a minimum, images must be obtained at baseline and immediately post exercise. All LV segments need to be visualized and compared side by side. The required views are parasternal long axis view, parasternal short axis view, apical four-chamber view and apical two-chamber view or apical long axis, apical four-chamber view, apical two-chamber view and apical short-axis view.

C) Pharmacologic stress echo: Images must be obtained at baseline and three other phases. Common protocols include digitizing rest, low-dose, pre-peak and peak, or rest, low-dose, peak and recovery. All LV segments need to be visualized and compared side by side. The required views are parasternal long axis view, parasternal short axis view, apical four-chamber view and apical two-chamber view, or apical long axis, apical four-chamber view, apical two-chamber view and apical short-axis view.

D) Contrast is indicated for use in patients when two contiguous segments are not visualized and provides greater accuracy in determining left ventricular function. Laboratories should have a written policy for use of contrast agents for stress echocardiography.

E) A Doppler stress echocardiogram includes interrogations of flow velocities (from the same site) before, during and/or immediately following stress. Doppler stress echocardiography may be utilized to document gradient changes that occur with stress, or to evaluate diastolic filling pattern changes that occur with stress.

Within the stress echocardiogram report components, the demographics of height, weight, gender and blood pressure are now required elements of the standardized report. In addition, the following is now specified, “The final report must be reviewed, signed and dated manually or electronically by the interpreting physician. Electronic signatures must be password protected and indicate they are electronically recorded. Stamped signatures or signing by non-physician staff is unacceptable.”

An appendix has been added to this section, for the purpose of defining training and competency requirements for stress test supervision by nonphysicians. The American College of Cardiology/American Heart Association Clinical Competence on Stress Testing document is a reference for these details.
ICAEL STANDARDS FOR PEDIATRIC
ECHOCARDIOGRAPHY LABORATORIES

The majority of revisions to the pediatric version of the ICAEL Standards are consistent with those discussed above in the summary of adult revisions. Below is a summary of the significant changes specific to The ICAEL Standards for Pediatric Echocardiography Laboratories:

PART I: ORGANIZATION

The core level of expertise required of pediatric medical staff is clarified:

Physicians with this level of expertise are expected to be able to perform and interpret TTEs in normal infants, children and adolescents, and in those with childhood heart disease with consultation as needed.

Three Specific Categories of QA Measures Are Now Required
Applicant laboratories are now required to conduct specific Quality Assurance measures, per identified frequencies and other variables, as defined within the Standards:

5.1.7 Required QA measures

5.1.7.1 Variability:
Ejection fraction (EF), degree of regurgitation/stenosis and ventricular septal defect gradients must be assessed on a minimum of two cases per modality per quarter to be reviewed in quarterly conferences. A policy for the Medical Director to address discrepancies must be in place.

5.1.7.2 Report timeliness:
Report review for timeliness, completeness – a minimum of 10 random reports per quarter evaluated for time of study performed and time of final report generation and report completeness. The reports must represent as many physicians as possible. A policy for the Medical Director to address discrepancies must be in place.

5.1.7.3 Correlation:
Ejection fraction (EF), degree of regurgitation/stenosis and ventricular septal defect gradients will be correlated on a minimum of two per modality per quarter with other imaging modalities in quarterly conferences. A policy for the Medical Director to address discrepancies must be in place.
PART II: PEDIATRIC TRANSTHORACIC ECHOCARDIOGRAPHY TESTING

Within the ordering process and scheduling section, the definition of the procedure types and protocols are clarified:

2.2.2 Definition of procedure types and protocols.

A) Complete study: A complete imaging study is one that defines the cardiac and visceral position and a complete segmental image analysis of the heart from multiple views and also defines the cardiac anatomy and physiology as fully as possible using imaging and Doppler modalities.

B) Limited study: A limited study generally examines a specific region of interest of the heart and/or addresses a defined clinical question. Limited studies are not sufficient if the patient with suspected congenital heart disease has never had a complete echocardiogram before.

Section 3 Elements and Components of Examination Performance now includes enhanced elements of study performance and quality:

A) Optimizing patient position with careful attention to comfort and safety. This is particularly important in vulnerable patients such as critically ill neonates.

B) Appropriate patient distraction such as with movies or sedation utilizing appropriate institutional protocols

C) Correct transducer selection for patient size

D) Optimization of equipment settings and display of ECG

E) Performance of a complete 2-D/M-Mode/Doppler imaging and hemodynamic examination according to the laboratory specific protocols that incorporate all views and imaging planes mandated by the ICAEL Standards (3.2.1, 3.2.2).

F) Representative image storage of all images and data

G) Timely report generation and communication of results
PART III:
PEDIATRIC TRANSESOPHAGEAL ECHOCARDIOGRAPHY (TEE) TESTING

Specific to guidelines for pediatric transesophageal ultrasound transducers, the following guidelines are now in place:

A) Transesophageal ultrasound transducers must be those manufactured for the ultrasound system used in the laboratory.

B) Pediatric transesophageal ultrasound transducers should incorporate multiplane imaging capabilities where the patient is of sufficient size to allow such probe use. In cases where extremely small infants are examined, the use of a “mini” single plane TEE transducer may be appropriate.

PART IV
FETAL ECHOCARDIOGRAPHY TESTING

The study performance and quality standards are enhanced as follows:

3.1.1 Elements of study performance and quality include, but are not limited to:

A) Optimizing patient position with careful attention to comfort and safety.
B) Correct transducer selection for patient size.
C) Optimization of equipment gain and display setting.
D) Performance of a 2-D/M-Mode/Doppler examination according to the laboratory specific and appropriate protocol that incorporates all views and imaging planes mandated by the ICAEL Standards (3.2.4)
E) Representative image storage of all images and data
F) Timely report generation and communication of results.

In Conclusion

The ICAEL strives to publish standards that facilitate continuous improvement of the quality of care provided in noninvasive vascular laboratories. For assistance or more information regarding the Standards, please contact the ICAEL staff at 800-838-2110, or visit the ICAEL website at www.icael.org/icael/apply/standards.htm.