ASE 2011 Appropriate Use Criteria for Echocardiography

Table 1. TTE for General Evaluation of Cardiac Structure and Function		
Suspected Cardiac Etiology—General With TTE		
1	Symptoms or conditions potentially related to suspected cardiac etiology including but not limited to chest pain, shortness of breath, palpitations, TIA, stroke, or peripheral embolic event	A (9)
2	Prior testing that is concerning for heart disease or structural abnormality including but not limited to chest X-ray, baseline scout images for stress echocardiogram, ECG, or cardiac biomarkers	A (9)
Arrhythmias With TTE		
3	Infrequent APCs or infrequent VPCs without other evidence of heart disease	I (2)
4	Frequent VPCs or exercise-induced VPCs	A (8)
5	Sustained or nonsustained atrial fibrillation, SVT, or VT	A (9)
6	Asymptomatic isolated sinus bradycardia	I (2)
Lightheadedness/Presyncope/Syncope With TTE		
7	Clinical symptoms or signs consistent with a cardiac diagnosis known to cause lightheadedness/ presyncope/ syncope (including but not limited to aortic stenosis, hypertrophic cardiomyopathy, or HF)	A (9)
8	Lightheadedness/presyncope when there are no other symptoms or signs of cardiovascular disease	I (3)
9	Syncope when there are no other symptoms or signs of cardiovascular disease	A (7)
Evaluation of Ventricular Function With TTE		
10	Initial evaluation of ventricular function (e.g., screening) with no symptoms or signs of cardiovascular disease	I (2)
11	Routine surveillance of ventricular function with known CAD and no change in clinical status or cardiac exam	I (3)
12	Evaluation of LV function with prior ventricular function evaluation showing normal function (e.g., prior echocardiogram, left ventriculogram, CT, SPECT MPI, CMR) in patients in whom there has been no change in clinical status or cardiac exam	I (1)
Perioperative Evaluation With TTE		
13	Routine perioperative evaluation of ventricular function with no symptoms or signs of cardiovascular disease	I (2)
14	Routine perioperative evaluation of cardiac structure and function prior to noncardiac solid organ transplantation	U (6)
Pulmonary Hypertension With TTE		
15	Evaluation of suspected pulmonary hypertension including evaluation of right ventricular function and estimated pulmonary artery pressure	A (9)
16	Routine surveillance (<1 y) of known pulmonary hypertension without change in clinical status or cardiac exam	I (3)
17	Routine surveillance (≥1 y) of known pulmonary hypertension without change in clinical status or cardiac exam	A (7)
18	Re-evaluation of known pulmonary hypertension if change in clinical status or cardiac exam or to guide therapy	A (9)
Table 2: TTE for Cardiovascular Evaluation in an Acute Setting		
Hypotension or Hemodynamic Instability With TTE		
19	Hypotension or hemodynamic instability of uncertain or suspected cardiac etiology	A (9)
20	Assessment of volume status in a critically ill patient	U (5)
Myocardial Ischemia/Infarction With TTE		
21	Acute chest pain with suspected MI and nondiagnostic ECG when a resting echocardiogram can be performed during pain	A (9)
22	Evaluation of a patient without chest pain but with other features of an ischemic equivalent or laboratory markers indicative of ongoing M	A (8)
23	Suspected complication of myocardial ischemia/infarction, including but not limited to acute mitral regurgitation, ventricular septal defect, free-wall rupture/tamponade, shock, right ventricular involvement, HF, or thrombus	A (9)
Evaluation of Ventricular Function after ACS With TTE		
24	Initial evaluation of ventricular function following ACS	A (9)
25	Re-evaluation of ventricular function following ACS during recovery phase when results will guide therapy	A (9)
Respiratory Failure With TTE		
26	Respiratory failure or hypoxemia of uncertain etiology	A (8)
27	Respiratory failure or hypoxemia when a noncardiac etiology of respiratory failure has been established	U (5)
Pulmonary Embolism With TTE		
28	Suspected pulmonary embolism in order to establish diagnosis	I (2)
29	Known acute pulmonary embolism to guide therapy (e.g., thrombectomy and thrombolytics)	A (8)
30	Routine surveillance of prior pulmonary embolism with normal right ventricular function and pulmonary artery systolic pressure	I (1)
31	Re-evaluation of known pulmonary embolism after thrombolysis or thrombectomy for assessment of change in right ventricular function and/or pulmonary artery Pressure	A (7)

Cardiac Trauma With TTE		
32	Severe deceleration injury or chest trauma when valve injury, pericardial effusion, or cardiac injury are possible or suspected	A (9)
33	Routine evaluation in the setting of mild chest trauma with no electrocardiographic changes or biomarker elevation	I (2)
Table 3: TTE for Evaluation of Valvular Function		
Murmur or Click With TTE		
34	Initial evaluation when there is a reasonable suspicion of valvular or structural heart disease	A (9)
35	Initial evaluation when there are no other symptoms or signs of valvular or structural heart disease	I (2)
36	Re-evaluation in a patient without valvular disease on prior echocardiogram and no change in clinical status or cardiac exam	I (1)
37	Re-evaluation of known valvular heart disease with a change in clinical status or cardiac exam or to guide therapy	A (9)
Native Valvular Stenosis With TTE		
38	Routine surveillance (<3 y) of mild valvular stenosis without a change in clinical status or cardiac exam	I (3)
39	Routine surveillance (≥3 y) of mild valvular stenosis without a change in clinical status or cardiac exam	A (7)
40	Routine surveillance (<1 y) of moderate or severe valvular stenosis without a change in clinical status or cardiac exam	I (3)
41	Routine surveillance (≥1 y) of moderate or severe valvular stenosis without a change in clinical status or cardiac exam	A (8)
Native Valvular Regurgitation With TTE		
42	Routine surveillance of trace valvular regurgitation I (1)	I (1)
43	Routine surveillance (<3 y) of mild valvular regurgitation without a change in clinical status or cardiac exam	I (2)
44	Routine surveillance (≥3 y) of mild valvular regurgitation without a change in clinical status or cardiac exam	U (2)
45	Routine surveillance (<1 y) of moderate or severe valvular regurgitation without a change in clinical status or cardiac exam	U (6)
46	Routine surveillance (≥1 y) of moderate or severe valvular regurgitation without change in clinical status or cardiac exam	A (8)
Prosthetic Valves With TTE		
47	Initial postoperative evaluation of prosthetic valve for establishment of baseline	A (9)
48	Routine surveillance (<3 y after valve implantation) of prosthetic valve if no known or suspected valve dysfunction	I (3)
49	Routine surveillance (≥3 y after valve implantation) of prosthetic valve if no known or suspected valve dysfunction	A (7)
50	Evaluation of prosthetic valve with suspected dysfunction or a change in clinical status or cardiac exam	A (9)
51	Re-evaluation of known prosthetic valve dysfunction when it would change management or guide therapy	A (9)
Infective Endocarditis (Native or Prosthetic Valves) With TTE		
52	Initial evaluation of suspected infective endocarditis with positive blood cultures or a new murmur	A (9)
53	Transient fever without evidence of bacteremia or a new murmur	I (2)
54	Transient bacteremia with a pathogen not typically associated with infective endocarditis and/or a documented nonendovascular source of infection	I (3)
55	Re-evaluation of infective endocarditis at high risk for progression or complication or with a change in clinical status or cardiac exam	A (9)
56	Routine surveillance of uncomplicated infective endocarditis when no change in management is contemplated	I (2)
Table 4: TTE for Evaluation of Intracardiac and Extracardiac Structures and Chambers		
57	Suspected cardiac mass	A (9)
58	Suspected cardiovascular source of embolus	A (9)
59	Suspected pericardial conditions	A (9)
60	Routine surveillance of known small pericardial effusion with no change in clinical status	I (2)
61	Re-evaluation of known pericardial effusion to guide management or therapy	A (8)
62	Guidance of percutaneous noncoronary cardiac procedures including but not limited to pericardiocentesis, septal ablation, or right ventricular biopsy	A (9)
Table 5: TTE for Evaluation of Aortic Disease		
63	Evaluation of the ascending aorta in the setting of a known or suspected connective tissue disease or genetic condition that predisposes to aortic aneurysm or dissection (e.g., Marfan syndrome) A (9)	A (9)
64	Re-evaluation of known ascending aortic dilation or history of aortic dissection to establish a baseline rate of expansion or when the rate of expansion is excessive	A (9)
65	Re-evaluation of known ascending aortic dilation or history of aortic dissection with a change in clinical status or cardiac exam or when findings may alter management or therapy	A (9)
66	Routine re-evaluation for surveillance of known ascending aortic dilation or history of aortic dissection without a change in clinical status or cardiac exam when findings would not change management or therapy	I (3)

Table 6: TTE for Evaluation of Hypertension, HF, or Cardiomyopathy		
Hypertension With TTE		
67	Initial evaluation of suspected hypertensive heart disease	A (8)
68	Routine evaluation of systemic hypertension without symptoms or signs of hypertensive heart disease	I (3)
69	Re-evaluation of known hypertensive heart disease without a change in clinical status or cardiac exam	U (4)
HF With TTE		
70	Initial evaluation of known or suspected HF (systolic or diastolic) based on symptoms, signs, or abnormal test results	A (9)
71	Re-evaluation of known HF (systolic or diastolic) with a change in clinical status or cardiac exam without a clear precipitating change in medication or diet	A (8)
72	Re-evaluation of known HF (systolic or diastolic) with a change in clinical status or cardiac exam with a clear precipitating change in medication or diet	U (4)
73	Re-evaluation of known HF (systolic or diastolic) to guide therapy	A (9)
74	Routine surveillance (<1 y) of HF (systolic or diastolic) when there is no change in clinical status or cardiac exam	I (2)
75	Routine surveillance (≥1 y) of HF (systolic or diastolic) when there is no change in clinical status or cardiac exam	U (6)
Device Evaluation (Including Pacemaker, ICD, or CRT) With TTE		
76	Initial evaluation or re-evaluation after revascularization and/or optimal medical therapy to determine candidacy for device therapy and/or to determine optimal choice of device	A (9)
77	Initial evaluation for CRT device optimization after implantation	U (6)
78	Known implanted pacing device with symptoms possibly due to device complication or suboptimal pacing device settings	A (8)
79	Routine surveillance (<1 y) of implanted device without a change in clinical status or cardiac exam	I (1)
80	Routine surveillance (≥1 y) of implanted device without a change in clinical status or cardiac exam	I (3)
Ventricular Assist Devices and Cardiac Transplantation With TTE		
81	To determine candidacy for ventricular assist device	A (9)
82	Optimization of ventricular assist device settings	A (7)
83	Re-evaluation for signs/symptoms suggestive of ventricular assist device-related complications	A (9)
84	Monitoring for rejection in a cardiac transplant recipient	A (7)
85	Cardiac structure and function evaluation in a potential heart donor	A (9)
Cardiomyopathies With TTE		
86	Initial evaluation of known or suspected cardiomyopathy (e.g., restrictive, infiltrative, dilated, hypertrophic, or genetic cardiomyopathy)	A (9)
87	Re-evaluation of known cardiomyopathy with a change in clinical status or cardiac exam or to guide therapy	A (9)
88	Routine surveillance (<1 y) of known cardiomyopathy without a change in clinical status or cardiac exam	I (2)
89	Routine surveillance (≥1 y) of known cardiomyopathy without a change in clinical status or cardiac exam	U (5)
90	Screening evaluation for structure and function in first-degree relatives of a patient with an inherited cardiomyopathy	A (9)
91	Baseline and serial re-evaluations in a patient undergoing therapy with cardiotoxic agents	A (9)
Table 7: TTE for Adult Congenital Heart Disease		
92	Initial evaluation of known or suspected adult congenital heart disease	A (9)
93	Known adult congenital heart disease with a change in clinical status or cardiac exam	A (9)
94	Re-evaluation to guide therapy in known adult congenital heart disease	A (9)
95	Routine surveillance (<2 y) of adult congenital heart disease following complete repair o without a residual structural or hemodynamic abnormality o without a change in clinical status or cardiac exam	I (3)
96	Routine surveillance (≥2 y) of adult congenital heart disease following complete repair o without residual structural or hemodynamic abnormality o without a change in clinical status or cardiac exam	U (6)
97	Routine surveillance (<1 y) of adult congenital heart disease following incomplete or palliative repair o with residual structural or hemodynamic abnormality o without a change in clinical status or cardiac exam	U (5)
98	Routine surveillance (≥1 y) of adult congenital heart disease following incomplete or palliative repair o with residual structural or hemodynamic abnormality o without a change in clinical status or cardiac exam	A (8)
Table 8: TEE		
99	Use of TEE when there is a high likelihood of a nondiagnostic TTE due to patient characteristics or inadequate visualization of relevant structures	A (8)
100	Routine use of TEE when a diagnostic TTE is reasonably anticipated to resolve all diagnostic and management concerns	I (1)
101	Re-evaluation of prior TEE finding for interval change (e.g., resolution of thrombus after anticoagulation, resolution of vegetation after antibiotic therapy) when a change in therapy is anticipated	A (8)
102	Surveillance of prior TEE finding for interval change (e.g., resolution of thrombus after anticoagulation, resolution of vegetation after antibiotic therapy) when no change in therapy is anticipated	I (2)
103	Guidance during percutaneous noncoronary cardiac interventions including but not limited to closure device placement, radiofrequency ablation, and percutaneous valve procedures	A (9)

104	Suspected acute aortic pathology including but not limited to dissection/transsection	A (9)
105	Routine assessment of pulmonary veins in an asymptomatic patient status post pulmonary vein isolation	I (3)
	TEE as Initial or Supplemental Test—Valvular Disease	
106	Evaluation of valvular structure and function to assess suitability for, and assist in planning of, an intervention	A (9)
107	To diagnose infective endocarditis with a low pretest probability (e.g., transient fever, known alternative source of infection, or negative blood cultures/atypical pathogen for endocarditis)	I (3)
108	To diagnose infective endocarditis with a moderate or high pretest probability (e.g., staph bacteremia, fungemia, prosthetic heart valve, or intracardiac device)	A (9)
	TEE as Initial or Supplemental Test—Embolic Event	
109	Evaluation for cardiovascular source of embolus with no identified noncardiac source	A (7)
110	Evaluation for cardiovascular source of embolus with a previously identified noncardiac source	U (5)
111	Evaluation for cardiovascular source of embolus with a known cardiac source in which a TEE would not change management	I (1)
	TEE as Initial Test—Atrial Fibrillation/Flutter	
112	Evaluation to facilitate clinical decision making with regard to anticoagulation, cardioversion, and/or radiofrequency ablation	A (9)
113	Evaluation when a decision has been made to anticoagulate and not to perform cardioversion	I (2)
	Table 9: Stress Echocardiography for Detection of CAD/Risk Assessment: Symptomatic or Ischemic Equivalent	
	Evaluation of Ischemic Equivalent (Nonacute) With Stress Echocardiography	
114	• Low pretest probability of CAD • ECG interpretable and able to exercise	I (3)
115	• Low pretest probability of CAD • ECG uninterpretable or unable to exercise	A (7)
116	• Intermediate pretest probability of CAD • ECG interpretable and able to exercise	A (7)
117	• Intermediate pretest probability of CAD • ECG uninterpretable or unable to exercise	A (9)
118	• High pretest probability of CAD • Regardless of ECG interpretability and ability to exercise	A (7)
	Acute Chest Pain With Stress Echocardiography	
119	• Possible ACS • ECG: no ischemic changes or with LBBB or electronically paced ventricular rhythm • Low-risk TIMI score • Negative troponin levels	A (7)
120	• Possible ACS • ECG: no ischemic changes or with LBBB or electronically paced ventricular rhythm • Low-risk TIMI score • Peak troponin: borderline, equivocal, minimally elevated	A (7)
121	• Possible ACS • ECG: no ischemic changes or with LBBB or electronically paced ventricular rhythm • High-risk TIMI score • Negative troponin levels	A (7)
122	• Possible ACS • ECG: no ischemic changes or with LBBB or electronically paced ventricular rhythm • High-risk TIMI score • Peak troponin: borderline, equivocal, minimally elevated	A (7)
123	Definite ACS	I (1)
	Table 10: Stress Echocardiography for Detection of CAD/Risk Assessment: Asymptomatic (Without Ischemic Equivalent)	
	General Patient Populations With Stress Echocardiography	
124	Low global CAD risk	I (1)
125	• Intermediate global CAD risk • ECG interpretable	I (2)
126	• Intermediate global CAD risk • ECG uninterpretable	U (5)
127	High global CAD risk	U (5)
	Table 11: Stress Echocardiography for Detection of CAD/Risk Assessment: Asymptomatic (Without Ischemic Equivalent) in Patient Populations With Defined Comorbidities	
	New-Onset or Newly Diagnosed HF or LV Systolic Dysfunction With Stress Echocardiography	
128	No prior CAD evaluation and no planned coronary angiography	A (7)
	Arrhythmias With Stress Echocardiography	
129	Sustained VT	A (7)
130	Frequent PVCs, exercise induced VT, or nonsustained VT	A (7)
131	Infrequent PVCs	I (3)
132	New-onset atrial fibrillation	U (6)
	Syncope With Stress Echocardiography	
133	Low global CAD risk	I (3)
134	Intermediate or high global CAD risk	A (7)

Elevated Troponin With Stress Echocardiography		
135	Troponin elevation without symptoms or additional evidence of ACS	A (7)
Table 12: Stress Echocardiography Following Prior Test Results		
Asymptomatic: Prior Evidence of Subclinical Disease With Stress Echocardiography		
136	• Coronary calcium Agatston score <100	I (2)
137	• Low to intermediate global CAD risk • Coronary calcium Agatston score between 100 and 400	U (5)
138	• High global CAD risk • Coronary calcium Agatston score between 100 and 400	U (6)
139	• Coronary calcium Agatston score >400	A (7)
140	• Abnormal carotid intimal medial thickness (≥0.9 mm and/or the presence of plaque encroaching into the arterial lumen)	U (5)
Coronary Angiography (Invasive or Noninvasive) With Stress Echocardiography		
141	Coronary artery stenosis of unclear significance	A (8)
Asymptomatic or Stable Symptoms With Stress Echocardiography Normal Prior Stress Imaging Study		
142	• Low global CAD risk • Last stress imaging study <2 y ago	I (1)
143	• Low global CAD risk • Last stress imaging study ≥2 y ago	I (2)
144	• Intermediate to high global CAD risk • Last stress imaging study <2 y ago	I (2)
145	• Intermediate to high global CAD risk • Last stress imaging study ≥2 y ago	U (4)
Asymptomatic or Stable Symptoms With Stress Echocardiography Abnormal Coronary Angiography or Abnormal Prior Stress Study No Prior Revascularization		
146	• Known CAD on coronary angiography or prior abnormal stress imaging study • Last stress imaging study <2 y ago	I (3)
147	• Known CAD on coronary angiography or prior abnormal stress imaging study • Last stress imaging study ≥2 y ago	U (5)
Treadmill ECG Stress Test With Stress Echocardiography		
148	• Low-risk treadmill score (e.g., Duke)	I (1)
149	• Intermediate-risk treadmill score (e.g., Duke)	A (7)
150	• High-risk treadmill score (e.g., Duke)	A (7)
New or Worsening Symptoms With Stress Echocardiography		
151	• Abnormal coronary angiography or abnormal prior stress imaging study	A (7)
152	• Normal coronary angiography or normal prior stress imaging study U	(6)
Prior Noninvasive Evaluation With Stress Echocardiography		
153	Equivocal, borderline, or discordant stress testing where obstructive CAD remains a concern	A (8)
Table 13: Stress Echocardiography for Risk Assessment: Perioperative Evaluation for Noncardiac Surgery Without Active Cardiac Conditions		
Low-Risk Surgery With Stress Echocardiography		
154	Perioperative evaluation for risk assessment	I (1)
Intermediate-Risk Surgery With Stress Echocardiography		
155	Moderate to good functional capacity (≥4 METs)	I (3)
156	No clinical risk factors	I (2)
157	• ≥1 clinical risk factor • Poor or unknown functional capacity (<4 METs)	U (6)
158	• Asymptomatic <1 y post normal catheterization, noninvasive test, or previous revascularization	I (1)
Vascular Surgery With Stress Echocardiography		
159	• Moderate to good functional capacity (≥4 METs)	I (3)
160	• No clinical risk factors	I (2)
161	• ≥1 clinical risk factor • Poor or unknown functional capacity (<4 METs)	A (7)
162	• Asymptomatic <1 y post normal catheterization, noninvasive test, or previous revascularization	I (2)
Table 14: Stress Echocardiography for Risk Assessment: Within 3 Months of an ACS		
STEMI With Stress Echocardiography		
163	• Primary PCI with complete revascularization • No recurrent symptoms	I (2)
164	• Hemodynamically stable, no recurrent chest pain symptoms, or no signs of HF • To evaluate for inducible ischemia • No prior coronary angiography since the index event	A (7)
165	165. • Hemodynamically unstable, signs of cardiogenic shock, or mechanical complications	I (1)
UA/NSTEMI With Stress Echocardiography		
166	• Hemodynamically stable, no recurrent chest pain symptoms, or no signs of HF • To evaluate for inducible ischemia • No prior coronary angiography since the index event	A (8)

ACS—Asymptomatic Postrevascularization (PCI or CABG) With Stress Echocardiography		
167	Prior to hospital discharge in a patient who has been adequately revascularized	I (1)
Cardiac Rehabilitation With Stress Echocardiography		
168	Prior to initiation of cardiac rehabilitation (as a stand-alone indication)	I (3)
Table 15: Stress Echocardiography for Risk Assessment: Postrevascularization (PCI or CABG)		
Symptomatic With Stress Echocardiography		
169	Ischemic equivalent	A (8)
Asymptomatic With Stress Echocardiography		
170	• Incomplete revascularization • Additional revascularization feasible	A (7)
171	• <5 y after CABG	I (2)
172	• ≥5 y after CABG	U (6)
173	• <2 y after PCI	I (2)
174	• ≥2 y after PCI	U (5)
Cardiac Rehabilitation With Stress Echocardiography		
175	Prior to initiation of cardiac rehabilitation (as a stand-alone indication)	I (3)
Table 16: Stress Echocardiography for Assessment of Viability/Ischemia		
Ischemic Cardiomyopathy/Assessment of Viability With Stress Echocardiography		
176	• Known moderate or severe LV dysfunction • Patient eligible for revascularization • Use of dobutamine stress only	A (8)
Table 17: Stress Echocardiography for Hemodynamics (Includes Doppler During Stress)		
Chronic Valvular Disease—Asymptomatic With Stress Echocardiography		
177	• Mild mitral stenosis	I (2)
178	• Moderate mitral stenosis	U (5)
179	• Severe mitral stenosis	A (7)
180	• Mild aortic stenosis	I (3)
181	• Moderate aortic stenosis	U (6)
182	• Severe aortic stenosis	U (5)
183	• Mild mitral regurgitation	I (2)
184	• Moderate mitral regurgitation	U (5)
185	• Severe mitral regurgitation • LV size and function not meeting surgical criteria	A (7)
186	• Mild aortic regurgitation	I (2)
187	• Moderate aortic regurgitation	U (5)
188	• Severe aortic regurgitation • LV size and function not meeting surgical criteria	A (7)
Chronic Valvular Disease—Symptomatic With Stress Echocardiography		
189	• Mild mitral stenosis	U (5)
190	• Moderate mitral stenosis	A (7)
191	• Severe mitral stenosis	I (3)
192	• Severe aortic stenosis	I (1)
193	• Evaluation of equivocal aortic stenosis • Evidence of low cardiac output or LV systolic dysfunction (“low gradient aortic stenosis”) • Use of dobutamine only	A (8)
194	• Mild mitral regurgitation	U (4)
195	• Moderate mitral regurgitation	A (7)
196	• Severe mitral regurgitation • Severe LV enlargement or LV systolic dysfunction	I (3)
Acute Valvular Disease With Stress Echocardiography		
197	• Acute moderate or severe mitral or aortic regurgitation	I (3)
Pulmonary Hypertension With Stress Echocardiography		
198	• Suspected pulmonary artery hypertension • Normal or borderline elevated estimated right ventricular systolic pressure on resting echocardiographic study	U (5)
199	• Routine evaluation of patients with known resting pulmonary hypertension	I (3)
200	• Re-evaluation of patient with exercise-induced pulmonary hypertension to evaluate response to therapy	U (5)
Table 18: Contrast Use in TTE/TEE or Stress Echocardiography		
201	• Routine use of contrast • All LV segments visualized on noncontrast images	I (1)
202	• Selective use of contrast • ≥2 contiguous LV segments are not seen on noncontrast images	A (8)