

Comprehensive Echocardiographic Examination	
Measure Description: This metric will assess the average completeness score, as measured by the <i>Comprehensiveness Exam Assessment</i> worksheet (Appendix 1), of initial transthoracic echocardiograms designated as complete studies (either inpatient or outpatient) for patients with hearts interpreted as structurally normal	
Numerator	The sum of the <i>Comprehensiveness Exam Assessment</i> worksheet (Appendix 1) scores for all transthoracic echocardiograms included in the denominator.
Denominator	The number of initial transthoracic echocardiograms designated as complete studies ¹ during the measurement period for patients with structurally normal hearts.
Denominator Exclusions	None
Denominator Exceptions	None
Definitions/Notes	1. Complete Studies- Studies that are identified as being focused, limited, or incomplete due to either patient instability or patient agitation will not be included.
Measurement Period	Quarterly
Sources of Data	Prospective flowsheet, retrospective review of stored echocardiographic images
Attribution	This metric will be reported by each echocardiography laboratory performing transthoracic echocardiography. The recommended optimal approach is for data to be assessed quarterly by the laboratory director or their designate and reviewed with the laboratory staff involved in the performance and interpretation of echocardiograms.
Care Setting	Inpatient or outpatient
Rationale	
Adequate image acquisition in echocardiography relies on a variety of components. The integration of two-dimensional imaging, color Doppler, and spectral Doppler is required for a comprehensive echocardiographic examination. A complete transthoracic echocardiogram is one that images all cardiac chambers, valves, and great vessels from a series of multiple orthogonal views and performs Doppler assessment of antegrade and retrograde flow across all cardiac valves, as well as the atrial and ventricular septa. Important echocardiographic components, or elements, that are not identified on echocardiograms in a specific echocardiography laboratory may result from limitations in image quality for a particular patient, incomplete delineation of the echo protocol to ensure assessment of these elements, or incomplete training of those tasked with obtaining the images. Assessment of the number of required elements identified as outlined in this quality improvement activity provides a method to evaluate compliance with imaging standards and may suggest to the echo lab particular processes that need revision.	
Clinical Recommendation(s)	

1) Picard et al. American Society of Echocardiography Recommendations for Quality Echocardiography Laboratory Operations. J Am Soc Echocardiogr 2011;24:1-10
“The standard integration of two-dimensional, color, and spectral Doppler modalities is required to provide a comprehensive evaluation by TTE and TEE imaging. Assessment of the number of complete studies with all components (two-dimensional, color, and Doppler) reported provides a method to estimate compliance with current imaging standards. This should be measured for each sonographer annually.
A complete TTE or TEE study is one that images all cardiac chambers, valves, and great vessels from a series of multiple views and performs Doppler assessment of antegrade and retrograde flow across all cardiac valves, as well as the atrial and ventricular septa.”

2) Lai WW et al. Guidelines and Standards for Performance of a Pediatric Echocardiogram: A Report from the Task Force of the Pediatric Council of the American Society of Echocardiography. J Am Soc Echocardiogr 2006;19:1413-30.

3) The IAC Standards and Guidelines for Pediatric Echocardiography Accreditation. Updated 8/2012.
“1.6.1.1B Complete Examination: Includes standard views from multiple planes including views of all cardiac structures and selected extracardiac structures.”

4) Lopez L et al. Recommendations for Quantification Methods During the Performance of a Pediatric Echocardiogram: A Report From the Pediatric Measurements Writing Group of the American Society of Echocardiography Pediatric and Congenital Heart Disease Council. J Am Soc Echocardiogr 2010;23:465-495

Challenges to Implementation

Time required identifying, selecting and reviewing echocardiograms.

Authors

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Appendix 1.

Comprehensive Exam Assessment WORKSHEET

Each worksheet is for ONE echo evaluation

Patient Name: _____ Date of Birth: _____
Sonographer: _____ Date of Study: _____
Interpreter: _____ Location of Study: _____
Echo Machine: _____
Reviewer: _____ Date of Review: _____
Time Spent for Review: _____

Indicate if each item listed is evaluated. Score as 1 for "Yes" response, 0 for "No".

SITUS, VEINS, ATRIA

YES NO

- Liver and stomach shown (transverse plane)
- Cardiac position
- IVC and aorta demonstrated in relation to spine (transverse plane)
- IVC, and SVC evaluated, imaging and color (in at least one view)(+/- azygous connection to SVC)
- IVC connection to atrium documented in at least one view
- Two left and two right pulmonary veins evaluated by color Doppler
- Coronary sinus visualized
- Atrial septum evaluated by imaging and color Doppler (in at least one view)

VENTRICLES

YES NO

- Ventricular septum is evaluated by color Doppler (in at least two views)
- Imaging for qualitative RV function assessment (in at least two views)
- Imaging of LV function (in at least two views)
- Evaluation adequate for measurement of LV end diastolic internal dimension or volume

- | | | |
|--------------------------|--------------------------|--|
| <input type="checkbox"/> | <input type="checkbox"/> | Evaluation adequate for measurement of LV end systolic internal dimension or volume |
| <input type="checkbox"/> | <input type="checkbox"/> | Evaluation adequate for measurement of LV end diastolic septal and ventricular end diastolic wall thickness or LV mass |
| <input type="checkbox"/> | <input type="checkbox"/> | LV Outflow evaluated by color Doppler/spectral Doppler (in at least one view) |
| <input type="checkbox"/> | <input type="checkbox"/> | RV Outflow evaluated by color/spectral Doppler (in at least one view) |

AV VALVES, SEMILUNAR VALVES

YES NO

- | | | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | TV imaging (adequate for measurement)/color/spectral Doppler (in at least one view) |
| <input type="checkbox"/> | <input type="checkbox"/> | TR jet evaluation by Doppler (in two views, if available) |
| <input type="checkbox"/> | <input type="checkbox"/> | MV imaging (adequate for measurement) /color/spectral Doppler (in at least one view) |
| <input type="checkbox"/> | <input type="checkbox"/> | MV in short axis (with and without color Doppler) |
| <input type="checkbox"/> | <input type="checkbox"/> | PV evaluated by imaging (adequate for measurement)/color Doppler/spectral Doppler (in at least two views) |
| <input type="checkbox"/> | <input type="checkbox"/> | AoV evaluated by imaging/color Doppler/spectral Doppler (in at least one view) |
| <input type="checkbox"/> | <input type="checkbox"/> | Coronary arteries evaluated by imaging/color Doppler in parasternal short-axis |

VESSELS

YES NO

- | | | |
|--------------------------|--------------------------|---|
| <input type="checkbox"/> | <input type="checkbox"/> | Evaluation adequate for measurement of AoV/Ao root/Ao sinotubular junction diameters in parasternal long-axis |
| <input type="checkbox"/> | <input type="checkbox"/> | Branch PA's evaluated by imaging/color Doppler/spectral Doppler (in at least one view) |
| <input type="checkbox"/> | <input type="checkbox"/> | Patent ductus arteriosus excluded in at least one view |
| <input type="checkbox"/> | <input type="checkbox"/> | Ascending Ao evaluated by imaging/color Doppler/spectral Doppler in at least one view |
| <input type="checkbox"/> | <input type="checkbox"/> | Ao Arch sidedness and branching evaluated by imaging/color Doppler |
| <input type="checkbox"/> | <input type="checkbox"/> | Ao Arch evaluated by imaging/color Doppler/spectral Doppler in suprasternal long-axis |
| <input type="checkbox"/> | <input type="checkbox"/> | Abdominal aorta evaluated by color Doppler/PW spectral Doppler in subxiphoid short axis/sagittal plane |

TOTAL SCORE (Maximum = 30):