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| **Application of the Pediatric Appropriate Use Criteria (AUC)****To Initial Outpatient Echocardiogram Orders** |
| **Measure Description:** This metric will assess the proportion of initial outpatient transthoracic echocardiograms (TTEs) performed for indications rated Rarely Appropriate. Indications related to one of the following 4 categories based on the tables in the AUC document1 will be chosen for quarterly assessment. Detailed indications for each category are provided at the end of this form and in the data entry form.1. Palpitations and arrhythmias2. Syncope3. Chest pain4. Murmur |
| Numerator  | Number of TTEs included in the denominator that were ordered for AUC indications rated Rarely Appropriate.  |
| **Denominator**  | Twenty initial outpatient TTEs ordered by any provider in patients ≤ 18 years of age for AUC indications related to any of the 4 categories listed above (palpitations and arrhythmias, syncope, chest pain or murmur).  **Excluded Populations:*** Studies for which details of clinical indication are not available.
* Patients with history of a previous evaluation with an echocardiogram.
* Patients referred from inpatient services.
* If a specific patient scenario is not available in the current AUC document
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| **Period of Assessment** | 20 TTE studies every quarter.  |
| **Sources of Data** | Retrospective review of medical records for 20 TTE orders for any of the 4 categories (palpitations and arrhythmias, syncope, chest pain or murmur). *Data collection sheet is attached.* This sheet has some optional components, but the rest are mandatory. Centers may choose to modify this sheet for collection of additional data.  |
| **Rationale** |
| Since 2005 the American College of Cardiology Foundation, in conjunction with other societies, has released Appropriate Use Criteria (AUC) for various diagnostic tests and procedures for adult patients. The first pediatric AUC were published in Nov 2014.1 The primary intent of AUC is to evaluate patterns of care by physicians and improve resource utilization. The AUC have been designed to guide provider's decision-making at the time of ordering a test. Unlike guidelines that are very broad in their scope, the AUC provide indications with more specific clinical scenarios. AUC have served as an important quality improvement tool in adult cardiology and are being increasingly recognized as an important link in the chain of quality improvement processes by hospitals and accreditation bodies. 2 The first multicenter pediatric AUC implementation study reported that the overall rate for studies ordered for indications rated Rarely Appropriate was 12%, but there was a wide variation between physicians and centers. 3 Majority of the Rarely Appropriate indications were related to one of the four categories chosen for this metric. The current metric only includes patients who have undergone an echocardiogram, since it is an echocardiographic lab-based metric. It therefore does not address the issue of “underutilization” where an echocardiogram was not performed when it was indicated. However, this is not an area of significant concern based on recent data.4 Application of this AUC quality metric in usual clinical care will help in benchmarking the appropriateness of care by various providers ordering echocardiograms. It will also provide the framework for labs to design educational activities to improve the appropriateness of echocardiograms ordered for initial outpatient evaluation of pediatric patients.  |
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| **Clinical Recommendation(s)** |
| 1. Campbell RM, et al. ACC/AAP/AHA/ASE/HRS/SCAI/SCCT/SCMR/SOPE 2014 Appropriate Use Criteria for Initial Transthoracic Echocardiography in Outpatient Pediatric Cardiology. J Am Coll Cardiol 2014 Nov; 64(19):2039-2060.
2. The IAC Standards and Guidelines for Pediatric Echocardiography Accreditation. QI measure guidelines implemented on 2/3/2016:Section 2.1C The facility should evaluate the appropriateness of the initial outpatient transthoracic echocardiogram performed and categorize as: appropriate, may be appropriate; or rarely appropriate. There should be a mechanism for education of referring physicians to improve the appropriateness of testing.
3. Sachdeva R, et al. Pediatric Appropriate Use Criteria Implementation Project: A Multicenter Outpatient Echocardiography Quality Initiative. J Am Coll Cardiology 2015:66:1132-40.
4. Stern KWD, et al. Factors Influencing Pediatric Outpatient Transthoracic Echocardiography Utilization Before Appropriate Use Criteria Release: A Multicenter Study. J Am Soc Echocardiogr. 2017 Dec;30(12):1225-1233.
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| **Attribution** |
| This metric will be reported by each echocardiography lab performing pediatric TTE. Data will be assessed every quarter by the laboratory director or their designee and reviewed with the physicians ordering TTEs. The labs will be responsible for developing and instituting their own processes for improving appropriateness of TTE orders. Some such examples are, improving the order intake process, integration of AUC with the electronic order system and other educational interventions suggested at the end of this form. Some on-line educational resources and a sample Power-Point presentation have been included with this form. In addition, a sample letter for providing feedback to the providers is also attached here. |
| **Method of Reporting** |
| The overall lab AUC quality metric for each cycle will be reported as the percentage of studies performed for the indications rated Rarely Appropriate. The data collection sheet will auto-populate the lab aggregate data. |
| **Challenges to Implementation** |
| 1. The AUC document does not include all possible case scenarios that could present to outpatient settings. In such instances the AUC indications would not be applicable, and the scenario should be considered “unclassifiable” and excluded from the metric.
2. Identification of patients for the 4 specific categories chosen for the metric may be challenging if the labs or clinics do not have any existing databases. The lab directors will have to determine how they will collect the data required for this metric based on their existing workflow.
3. Variations among labs in terms of their policies for accepting orders from outside physicians (open vs. closed labs) may influence the proportion of studies ordered by cardiologists versus non-cardiologists.
4. Different systems to receive echo orders (electronic/paper/others) and variations in who actually enters the echo orders (provider/sonographer/other clinic staff) may impact determination of the exact AUC indication if the clinical notes are not reviewed. Availability of detailed clinical information may vary depending on access to clinic notes. This will significantly impact assignment of AUC indication.
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**Instructions to complete the data collection form (Excel spreadsheet):**

**SECTION 1:** Center characteristics

1. Fill out the center characteristics and information that will help collate data across centers.

**SECTION 2:** Patient and Study information

1. This section is *OPTIONAL* but may be helpful for internal tracking by the centers and for giving feedback to providers ordering echo.
2. Each line represents ONE patient/echo. At least twenty patients should be evaluated each quarter.
3. Study location is center specific if there are multiple clinic locations. Centers will use free text in this column based on their outpatient clinic model.
4. Ordering provider type has a drop down menu to choose from.

**SECTION 3**: Echo indication and AUC rating

1. This section is *MANDATORY.*

For *EACH ROW*: Fill in the echo order details for the patient.

1. INDICATION CLASS:
	1. Click on a cell under the column for “Indication Class,”
	2. Click the arrow to the RIGHT of the cell and a drop-down menu will appear
	3. Choose the appropriate indication: murmur, chest pain, syncope or palpitations and arrhythmias. (This will populate the cell for this patient).
2. INDICATION DESCRIPTION
	1. Select the specific AUC indication from the drop-down menu.
	2. Suggestion: As you review each patient, you may find it useful to refer to the AUC tables provided below to assign the category.
	3. The cells under the columns for “Indication Number” and “AUC rating” will get auto-populated after you choose the indication description.

**SECTION 4**: Summary of data

1. This section auto-populates based on information you have entered in SECTION 3.
2. This will automatically summarize the % of RARELY appropriate, MAYBE appropriate and APPROPRIATE from the list of patients you enter above

**Table 1. Palpitations and Arrhythmias**

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| **Indication** | **Appropriate Use Rating** |
| Palpitations |
|  | Palpitations with no other symptoms or signs of cardiovascular disease, a benign family history, and no recent ECG | **R (2)** |
|  | Palpitations with no other symptoms or signs of cardiovascular disease, a benign family history, and a normal ECG | **R (1)** |
|  | Palpitations with abnormal ECG | **M (6)** |
|  | Palpitations with family history of a channelopathy | **R (3)** |
|  | Palpitations in a patient with known channelopathy | **M (4)** |
|  | Palpitations with family history at a young age (before the age of 50 years) of sudden cardiac arrest or death and/or pacemaker or implantable defibrillator placement  | **A (7)** |
|  | Palpitations with family history of cardiomyopathy | **A (9)** |
|  | Palpitations in a patient with known cardiomyopathy | **A (9)** |
| ECG Findings |
|  | PACs in the prenatal or neonatal period | **R (3)** |
|  | PACs after the neonatal period  | **R (3)** |
|  | Supraventricular tachycardia  | **A (7)** |
|  | PVCs in the prenatal or neonatal period | **M (6)** |
|  | PVCs after the neonatal period  | **M (6)** |
|  | Ventricular tachycardia | **A (9)** |
|  | Sinus bradycardia  | **R (2)** |
|  | Sinus arrhythmia | **R (1)** |

Appropriate Use Key: A = Appropriate; M = May Be Appropriate; R = Rarely Appropriate

ECG = Electrocardiogram

PACs = Premature Atrial Contractions

PVCs = Premature Ventricular Contractions

**Table 2. Syncope**

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| **Indication** | **Appropriate Use Rating** |
|  | Syncope with or without palpitations and with no recent ECG | **R (3)** |
|  | Syncope with no other symptoms or signs of cardiovascular disease, a benign family history, and a normal ECG | **R (2)** |
|  | Syncope with abnormal ECG | **A (7)** |
|  | Syncope with family history of channelopathy | **M (5)** |
|  | Syncope with family history at a young age (before the age of 50 years) of sudden cardiac arrest or death and/or pacemaker or implantable defibrillator placement | **A (9)** |
|  | Syncope with family history of cardiomyopathy | **A (9)** |
|  | Probable neurocardiogenic (vasovagal) syncope | **R (2)** |
|  | Unexplained pre-syncope | **M (4)** |
|  | Exertional syncope | **A (9)** |
|  | Unexplained post-exertional syncope | **A (7)** |
|  | Syncope or pre-syncope with a known non-cardiovascular cause | **R (2)** |

Appropriate Use Key: A = Appropriate; M = May Be Appropriate; R = Rarely Appropriate

ECG = Electrocardiogram

**Table 3. Chest Pain**

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| **Indication** | **Appropriate Use Rating** |
|  | Chest pain with no other symptoms or signs of cardiovascular disease, a benign family history, and a normal ECG | **R (2)** |
|  | Chest pain with other symptoms or signs of cardiovascular disease, a benign family history, and a normal ECG | **M (6)** |
|  | Exertional chest pain  | **A (8)** |
|  | Non-exertional chest pain with no recent ECG | **R (3)** |
|  | Non-exertional chest pain with normal ECG | **R (1)** |
|  | Non-exertional chest pain with abnormal ECG  | **A (7)** |
|  | Chest pain with family history of sudden unexplained death or cardiomyopathy | **A (8)** |
|  | Chest pain with family history of premature coronary artery disease | **M (4)** |
|  | Chest pain with recent onset of fever | **M (6)** |
|  | Reproducible chest pain with palpation or deep inspiration | **R (1)** |
|  | Chest pain with recent illicit drug use | **M (6)** |

Appropriate Use Key: A = Appropriate; M = May Be Appropriate; R = Rarely Appropriate

ECG = Electrocardiogram

**Table 4. Murmur**

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| **Indication** | **Appropriate Use Rating** |
|  | Presumptively innocent murmur with no symptoms, signs, or findings of cardiovascular disease and a benign family history  | **R (1)** |
|  | Presumptively innocent murmur with signs, symptoms, or findings of cardiovascular disease | **A (7)** |
|  | Pathologic murmur  | **A (9)** |

Appropriate Use Key: A = Appropriate; M = May Be Appropriate; R = Rarely Appropriate

ECG = Electrocardiogram