NQF #IEP-005-10
Pulmonary CT Imaging for Patients at Low Risk for Pulmonary Embolism

Measure Description

Rationale: The use of CT to evaluate patients with suspected pulmonary embolism (PE) has increased rapidly, sometimes in patients at very low-risk of PE. Clinical decision rules to identify adults at low risk of PE have been validated and incorporated into consensus clinical guidelines[1] that define specific criteria for which CT imaging should be obtained in patients with suspected PE.

Goal: To reduce the unnecessary use of CT imaging in patients with suspected PE.

Measure – Percent of patients undergoing CT pulmonary angiogram for the evaluation of possible PE who are at low-risk for PE consistent with guidelines[1] prior to CT imaging.

Level of Analysis: Facility / group

Organization: Partners Health Care

[1] Torbicki A, Perrier A, Konstantinides S, et al. Guidelines on the diagnosis and management of acute pulmonary embolism: the Task Force for the Diagnosis and Management of Acute Pulmonary Embolism of the European Society of Cardiology (ESC). Eur Heart J. 2008 Sep;29(18):2276-315

Measure Title	Pulmonary CT Imaging for Patients at Low Risk for Pulmonary Embolism
Brief description of measure	Percent of patients undergoing CT pulmonary angiogram for the evaluation of possible PE who are at low-risk for PE consistent with guidelines[1] prior to CT imaging.
Numbers	ED-Rad-3
Numerator Statement	The number of denominator patients with either: a low clinical probability and any negative D-dimer, or an intermediate clinical probability and a negative high-sensitivity D-dimer, or no pretest probability documented.
Numerator Details	Number of hemodynamically stable patients who receive CT pulmonary angiograms for suspected pulmonary embolism who have of either†: 1. a low clinical probability* of PE and a negative D-Dimer OR 2. a low clinical probability* of PE and no D-Dimer performed OR 3. No documentation of a pre-test probability †Documentation at the time of test ordering, timed prior to test initiation. *clinical probability can be determined by a structured prediction tool (Wells, Revised Geneva) or implicit judgment Specific test cutoffs will be determined by each ED or institution a priori. DiNisio M, Squizzato A, Rutjes WS, et al. Diagnostic accuracy of d-dimer test for exclusion of venous thromboembolism: a systematic review. J Thromb Haemost. 2007;5:296-304.
Denominator Statement	Number of patients who have a CT pulmonary angiogram (CTPA) for the evaluation of possible pulmonary embolism
Denominator Inclusion	Age ≥18 CT pulmonary angiogram performed
Denominator Exclusions	Hemodynamically *un*stable pulmonary embolism suspected by hypotension and/or shock, as defined by: Definition of Systemic Hypotension: systolic blood pressure <90mm Hg or a reduction of at least 40mmHg for at least 15 min1
Data Source	Initial sampling will be based upon patients receiving a Pulmonary Angiogram CT (based on appropriate CPT or HCPCS procedure code) in the ED. Chart review, electronic

	medical record (EMR) or clinically enriched administrative data (e.g. CPT-2 codes). It is not possible to collect this measure from standard administrative data.
Intended Use	Internal quality improvement and public reporting
Calculation Algorithm	See attached data sheet 1. identify all e.g. patients undergoing CT PA using appropriate procedure codes 2. review available data for evidence of pretest probability. This can include the medical record, and/or computerized or paper-based physician orders, 3. divide number of patients with CT PA and low risk or no pretest probability BY the total number of patients with CT PA.
Specification Notes	Only European guidelines are currently available and current, but these have been reviewed positively by physicians in the US such as Goldhaber.
References	1: Torbicki A, Perrier A, Konstantinides S, et al. Guidelines on the diagnosis and management of acute pulmonary embolism: the Task Force for the Diagnosis and Management of Acute Pulmonary Embolism of the European Society of Cardiology (ESC). Eur Heart J. 2008 Sep;29(18):2276-315 2: Goldhaber SZ. European society of cardiology practice guidelines on acute pulmonary embolism: an American's commentary and personal perspectives. Pol Arch Med Wewn. 2009 Jan-Feb;119(1-2):6-7. PubMed PMID: 19341171. 3. DiNisio M, Squizzato A, Rutjes WS, et al. Diagnostic accuracy of D-Dimer test for exclusion of venous thromboembolism: a systematic review. J Thromb Haemost. 2007;5:296-304.

Emergency Department Imaging Efficiency Measures

Sample CT Ordering Form for Measure #IEP-005-10
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Patient Sticker or Stamp

For all ED patients (age ≥ 18) on whom a CT pulmonary angiogram is ordered:

Patient Name _____ Medical Record Number _____

Date of ED Visit: _____

1) Is this patient:

☐ Hemodynamically unstable (systolic blood pressure <90mm Hg or a reduction of at least 40mmHg for at least 15 min)

If so, stop and order CT

2) Pretest Probability:

Please circle this patient's pre-test probability of having a PE as determined either implicitly or by using a validated prediction rule (below):

Low **Intermediate** **High**

For dichotomous Wells rule:

PE Unlikely **PE Likely**

If the pretest probability is **Intermediate**, **High** or **PE Likely**, stop and order CT

3) D-dimer

For patients with a **Low** or **PE Unlikely** pretest probability, please circle the result of the D-dimer assay:

Normal **Elevated**

If the D-Dimer is normal, the post-test probability is LOW and the CT is unlikely to be useful.

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Prediction tools

Revised Geneva Score		**Well's Criteria for Pulmonary Embolism**	
Variable	**Points**	**Variable**	**Points**
Predisposing factors			
Age >65 years	1	Immobilization at least 3 days, or Surgery in the Previous 4 weeks	1.5
Previous DVT or PE	3	Previous, objectively diagnosed PE or DVT?	1.5
Surgery (under general anesthesia)	2	Malignancy w/ Treatment within 6 mo, or palliative?	1
Active malignant condition (solid or hematologic, currently active or considered cured <1 year)	2		
Symptoms			
Unilateral lower-limb pain	3	Hemoptysis?	1
Hemoptysis	2		
Clinical Signs			
Heart rate 75–94 beats/min	3	Heart Rate > 100?	1.5
Heart rate >94 beats /min	5	Clinical Signs and Symptoms of DVT?	3
Pain on lower-limp deep venous palpation and unilateral edema	4		
Clinical Judgment			
		PE Is #1 Diagnosis, or Equally Likely	1.5
Clinical Probability		Clinical Probability (3 levels)	
Low	0-3	Low	0-1
Intermediate	4-10	Intermediate	2-6
High	≥11	High	≥7
		Clinical Probability (2 levels)	
		PE Likely	0-4
		PE Unlikely	>4

Based on: Le Gal G, Righini M, Roy PM, Sanchez O, Aujesky D, Bounameaux H et al. Prediction of pulmonary embolism in the emergency department: the revised Geneva score. Ann Intern Med 2006;144:165–171. Wells PS, Anderson DR, Rodger M, Ginsberg JS, Kearon C, Gent M et al. Derivation of a simple clinical model to categorize patients probability of pulmonary embolism: increasing the models utility with the SimpliRED D-dimer. Thromb Haemost 2000;83:416–420.

Sample Data Collection Form for Measure #IEP-005-10
Pulmonary CT Imaging for Patients at low risk for Pulmonary Embolism

For all ED patients with CPT codes for CT angiograms:

Patient Name _____ Medical Record Number _____

Date of ED Visit: _____

1. Exclusiona
    a. Hemodynamically unstable pulmonary embolism suspected by hypotension and/or shock prior to CT order time, (as defined by: systolic blood pressure <90mm Hg or a reduction of at least 40mmHg for at least 15 min)
        - If hemodynamically unstable Stop, circle "Exclusion" at end of form

    b. Age < 18 years
        - If < 18 years Stop, circle "Exclusion" at end of form

2. Clinical Probability (based on medical record):

    High or Intermediate Stop, circle "Appropriate" at end of form

    Low Proceed to Question **3**

    Not Documented Stop, circle "Inappropriate" at end of form

3. For those with a **Low** Clinical Probability

    D-Dimer assay result (compared to institutions reference level):

    Elevated Stop, circle "Appropriate"

    Normal Stop, circle "Inappropriate" at end of form

    Not performed Stop, circle "Inappropriate" at end of form

Appropriate **Inappropriate**