

# Standardized Reporting of CT Pulmonary Angiography for Acute Pulmonary Embolism *Individual or Group PQI*

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## Purpose and Rationale

CT pulmonary angiography (CTPA) is the most commonly performed test to detect acute pulmonary embolism. The interpretation of CTPA results, and use of the results in clinical decision-making is based on a combination of features in the radiology report and the pre test probability of pulmonary embolism. A technically high quality CTPA examination result may more consistently translate into a decision to treat or not treat for pulmonary embolism than a lesser quality examination.

The rate of indeterminate CTPA studies is reported to be 0.5-10.8%. Among indeterminate CTPA examinations, poor contrast opacification contributes to 40% of examinations and motion artifact to 74%. It has been suggested that optimal opacification in the main pulmonary artery should be 250 H.

The goal of this project is to monitor and improve adherence to the use of standardized elements in CT pulmonary angiography reports.

## Project Resources

1. Abujudeh HH, Kaewlai R, Farsad K, Orr E, Gilman M, Shepard JA. Computed tomography pulmonary angiography: an assessment of the radiology report. *Academic Radiology* 2009;16(11):1309-1315
2. Jones SE, Wittram C. The indeterminate CT pulmonary angiogram: imaging characteristics and patient clinical outcome. *Radiology* 2005;237:329-337

## Project Measures

### Metric 1

Numerator # CTPA reports that include the overall quality statement  
Denominator # total # of CTPA examinations performed

### Metric 2

Numerator # CTPA reports that include the 3 CTPA quality metrics  
Denominator # total # of CTPA examinations performed

### **Metric 3**

Numerator # CTPA reports that state results as positive, negative or inconclusive  
Denominator # total # of CTPA examinations performed

### **Metric 4**

Numerator # inconclusive CTPA reports that describe the anatomic level down to which PE can confidently be excluded  
Denominator # total # of inconclusive CTPA examinations reported

\*Note: users of this template may choose to use one, some or all of the proposed metrics as relevant to their practice. Metric #1 should be used at a minimum. Metrics #3 and #4 are linked, and are strongly recommended to be used and used together. Highly subspecialized practices may want to include metric 2.

## **Baseline Data Collection**

Make a plan for selecting cases. Using CPT codes (chest CT with contrast,), PACS or RIS data, identify a list of consecutive CTPA exams.

### **Metrics 1-2:**

Obtain the final reports for the exams and review for the following overall exam quality and the 3 CTPA quality metrics:

1. overall exam quality
  - excellent: optimal for diagnosis
  - satisfactory: adequate enough to render a diagnosis
  - poor: inconclusive
2. adequacy of pulmonary arterial enhancement:
  - optimal: more than enough enhancement for diagnosis down to and including the subsegmental arteries
  - adequate: sufficient enhancement for diagnosis down to and including the subsegmental arteries, with
  - suboptimal: insufficient enhancement for diagnosis down to and including the subsegmental arteries
3. adequacy of breath hold:
  - optimal: no respiratory motion artifact
  - adequate: sufficient enough to render a diagnosis
  - suboptimal insufficient to render a negative or positive diagnosis
4. presence or absence of other factors affecting scan quality, such as:
  - noise, beam hardening artifact, streak artifact as may occur with indwelling catheters or hardware

Potential CTPA quality reporting template:

Exam quality: Overall exam quality is [*<excellent/satisfactory/poor>*]. Pulmonary arterial enhancement is [*<optimal/adequate/suboptimal>*], the breath hold is [*<optimal/adequate/suboptimal>*], and there [*<are or are no>*] significant artifacts impacting image quality [*<fill in type of artifact>*].

Exam quality: Exam quality is excellent. Pulmonary arterial enhancement is *optimal*, the breath hold is *optimal*, and there are *no* significant artifacts impacting image quality.

Exam quality: Exam quality is poor. Pulmonary arterial enhancement is *suboptimal*, the breath hold is *adequate*, and there *are* significant artifacts impacting image quality specifically *excessive image noise secondary to large body habitus*.

#### **Metrics 3-4:**

The impression of the CTPA report should include a statement of the examination results that conveys if the study is positive, negative, or inconclusive. When inconclusive, the impression should state down to what anatomic level (lobar, segmental, subsegmental) pulmonary embolism can be excluded.

Potential CTPA impression template:

Impression:

1. [*<Positive/Negative/Inconclusive>*] for acute pulmonary embolism.
2. [*<For inconclusive studies only: PE is excluded down to the XX pulmonary arterial level>*].

A reasonable target would be to end up with 50-100 CTPA exams, which forms the dominator for the metrics 1-3. The target number of cases should be based on the number of CTPA examinations performed in your radiology practice as a whole or as an individual. The number of inconclusive CTPA exams forms the denominator for metrics 4. Studies should be coded as to whether or not the reports include an overall quality statement and the three specific CTPA quality metrics, which form the numerator of the specified metrics 1-3 respectively. Code the impression for a statement of exam results (positive, negative or inconclusive) and if down to what anatomic level pulmonary embolism can be excluded; this forms the numerator for metric 4.

A tally sheet may be useful, to include radiologist name, subspecialty (if applicable), presence or absence of the overall quality evaluation, the three specific CTPA quality metrics, whether the study is positive, negative or inconclusive, and if inconclusive, down to what anatomic level pulmonary embolism can be excluded.

#### **Data Analysis**

The goal is to achieve high compliance with the reporting standard. There may always be cases for which some deviation from the policy is medically appropriate, so 100% compliance may not be reasonable or desirable. It is reasonable, however, to set a goal of 0 reports not adhering to the reporting standard.

#### **Factors Potentially Influencing Performance**

After analyzing the data, identify metrics where there is room for improvement. Reflect on your setting and practice and identify factors that may have influenced your results. Then, design an intervention intended to improve performance.

Possible contributors may include:

1. Lack of radiologist standard reporting template:
  - See example provided
  - Work with IT staff or colleagues to create a reporting template
2. Lack of familiarity with or use of report templates, which could be part of your voice recognition software or RIS. Work with IT staff or colleagues to integrate templates into the practice workflow and

promote their use.

3. Lack of a transcriptionist template for CTPA quality reporting. Work with the transcription staff or company to adopt a CTPA quality template.
4. Lack of familiarity of pulmonary arterial anatomy and CT artifacts. An appropriate intervention might be an educational program to review pulmonary arterial anatomy, and types/causes of artifacts
5. The radiologist awareness of the impact of study quality and reporting on referring provider medical decision-making. An appropriate intervention might be an educational program to review the impact of CTPA reports on downstream medical decision-making.

### **Post Intervention Data Collection**

Plan to collect data again six months after baseline and then every six months for the duration of the project (one to three years is typical). In the interim, implement your intervention.

Make sure that cases are collected, tallies are performed and metrics are analyzed the same way as at baseline. The only exceptions to this would be to adjust the number of cases identified if more cases are needed for analysis or to correct a problem identified with the baseline data collection procedure. If so, once the procedure has been corrected use it consistently going forward.

You may want to make a chart or graph of your performance on the metrics to identify trends and patterns. Review the data with your project team after every six month collection period.

If you are meeting your goals, no further changes may be necessary. However, you should plan to take steps to institutionalize whatever changes contributed to successful performance. If additional improvement is possible, look at your processes again and design additional interventions. It is generally best to only make one intervention per study cycle so that conclusions can be drawn about what caused the observed effect.

Once performance has stabilized or you feel the project is well underway, consider selecting and launching another PQI project.