

Appropriate Use of Iodinated Contrast Material in Thoracic CT

Primary Authors: Jeffrey P. Kanne, M.D.
Ella A. Kazerooni, M.D. M.S.

Purpose and Rationale

This project aims to decrease any existing inappropriate use of intravenous iodinated contrast material for thoracic CT.

The inherent contrast between air in the lungs and surrounding soft tissues allows for the detection of isolated lung parenchymal (e.g. nodules, diffuse lung disease, bronchiectasis) abnormalities without the use of iodinated contrast material. A significant number of thoracic CT scans may be performed inappropriately with the use of intravenous iodinated contrast material as radiologists or referring physicians may be unfamiliar with circumstances in which the use of intravenous contrast material is not advantageous.

Resources

ACR Practice Guidelines for the Performance of High-Resolution Computed Tomography (HRCT) of the Lungs in Adults (2009).

Guidelines for management of small pulmonary nodules detected on CT scans: a statement from the Fleischner Society. MacMahon H, Austin JH, Gamsu G, Herold CJ, Jett JR, Naidich DP, Patz EF Jr, Swensen SJ; Fleischner Society. *Radiology* 2005 Nov;237(2):395-400.

Hospital or practice policies on the use of intravenous contrast material in chest CT.

Appendix A (indications for HRCT and nodule follow-up not requiring iodinated contrast material)

Measures

Metric 1

Numerator Number of thoracic CT exams with appropriate contrast use
Denominator Number of eligible contrast-enhanced thoracic CT exams¹

Metric 2

Numerator Number of thoracic CT exams with inappropriate contrast use
Denominator Number of eligible contrast-enhanced thoracic CT exams

¹ CT examinations performed with contrast (CPT 71260) for indications listed in appendix A, specifically excluding CT angiography of the chest and coronary CT angiography.

Metric 3

Numerator Number of thoracic CT exams with uncertain contrast use
Denominator Number of eligible contrast-enhanced thoracic CT exams

Metric 4

Numerator Number of thoracic CT exams categorized as not applicable
Denominator Number of eligible contrast-enhanced thoracic CT exams

Collecting Baseline Data

Obtain a list of consecutive contrast-enhanced thoracic CT exams (CPT 71260) performed for the indications listed in Appendix A, specifically excluding CT angiography of the chest and coronary CT angiography. From among those performed within the study period, you may choose to use 50 consecutive cases; every second, third or fourth case until 50 have been selected; all of the cases done on a specific day or set of days; or any other strategy that will result in a set of 50 or more cases identified at random. Data can be obtained from CPT codes, PACS, RIS, etc.

Assign one or more individuals to review the cases and categorize their use of contrast as appropriate, inappropriate, uncertain, not applicable, (based on the indications in Appendix A). Categorize cases as uncertain if there is not enough information available at the time of the study (e.g., provided history) to make an appropriateness determination. Categorize them as not applicable if there is an additional indication present at time of examination that warrants use of contrast or use of an alternative agent.

Baseline Data Analysis

Calculate the percentage of cases from among your samples in each of the four categories. This becomes your baseline.

Data should be evaluated in the aggregate but can also be analyzed by prescribing radiologist and/or radiologic technologist performing the exam

Factors that Can Influence Performance

After analyzing the baseline data, determine where there is room for improvement. Examine the cases categorized as inappropriate to identify any patterns of contributing factors. If the percentage of uncertain cases is high, reflect also on ways to improve documentation sufficient for determinations to be made. Reflect on your setting and practice, and identify factors that may have influenced your results. Design an intervention to address these factors.

Possible contributors may include:

- Referring physicians requesting contrast when not indicated, and the radiologist prescribes as requested. Here, a program may be appropriate to educate referring

physicians about the circumstances in which intravenous contrast is not required for diagnosis.

- Radiologists are unfamiliar with the indications for which the use of intravenous contrast material is not necessary to render an appropriate diagnosis. Here, the appropriate intervention might be to educate the radiologists about indications for and against IV contrast use.
- Hospital or practice system processes, including technologist errors, result in contrast administration when it is not requested by the ordering physician or prescribed by the radiologist. If this is suspected, perform a root cause analysis of your facility's CT workflow to identify steps during which misadministration of contrast material could occur (e.g. hand written protocols, use of too similar abbreviations for with and without contrast). Here, the intervention might be to redesign the workflow or create resources to address the vulnerability, including checklists, departmental guidelines, etc.

In selecting an intervention, pick one to implement that you think has the best likelihood of positive effect. Do not perform multiple interventions at once; if you do you will not be able to determine which one had an effect.

Post-Intervention Data Collection and Analysis

Plan to collect data again at a set interval—three to six months after baseline—and then at specified intervals thereafter for the duration of the project (one to three years is typical).

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 collected 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.

Data should continue to be collected over time. If improvement is continuing, the same intervals for data collection should be recommended. As improvement plateaus the interval for measuring and the number of exams that are measured can be reduced—as long as the metrics are stable. If a significant decrease in performance is seen, the project should start anew with analysis as to cause and potential fix.

You may want to make a chart or graph of your performance over time to identify trends and patterns. Review the data with your project team after every data 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.

Appendix A

Indications for HRCT and nodule follow-up not requiring the use of intravenous iodinated contrast material

1. Evaluation of diffuse pulmonary disease discovered on chest radiographs, conventional CT of the chest, or other CT examinations that include portions of the chest, including selection of the appropriate site for biopsy of diffuse lung disease.
2. Evaluation of the lungs in patients with clinically suspected pulmonary disorders with normal or equivocal chest radiographs.
3. Evaluation of suspected small airway disease.
4. Evaluation of suspected bronchiectasis.
5. Quantification of the extent of diffuse lung disease for purposes of evaluating effectiveness of treatment.
6. Follow-up of pulmonary nodule(s) is the only indication for the CT examination.