

Canterbury Hospital HealthPathways CTPA Review 2016

Aim

To review CT pulmonary angiogram (CTPA) scan numbers and positivity rates.

Background

Rates of CTPA requesting were discussed during Choosing Wisely meetings about emergency and radiology patient pathways. It was decided to review positivity rates against international best practice. It appears that a positive rate over 15.3% is acceptable¹, although there appears to be variation in positive rates from 9.3-25.3%² to 18-36%³ It was also suggested that seniority may affect ordering and positivity, so this was checked where possible.

Key Findings and Planned Improvements

- 21% of CTPAs requested for acute pulmonary embolism (PE) lead to a diagnosis of PE.
- Seniority of requestor does not appear to affect positivity rates.

Quality Improvement

- Consider sharing with other departments so they can benchmark their practice.
- Discuss findings with haematology department.
- Consider further clinical discussion about sub-segmental PE reporting, treatment, coding etc.
- Consider reporting/feedback opportunities, and departmental audit opportunities.
- Review Hospital HealthPathway (HHP) and ensure recommendations for CTPA are clear.
- Consider how best to share findings on HHP.

Next Audit

Further Canterbury Initiative audit not required.

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**Note – this is a clinical quality audit funded by the CDHB. It is not an independent, peer-reviewed audit.*

Method

The codes for CTPAs requested in Canterbury hospitals were checked using the CDHB Healthcare Analytics System (HCAS). The majority of CTPA events were coded Q20 CT CHEST CTPA. It was noted that ordering detail tended to group all Emergency Department requests, and orders from other departments were reported under the consultants or teams. More detailed request information was available from the electronic requests used widely throughout the hospitals. This more detailed data was extracted from the Data Warehouse to include who the CTPA was actually ordered by, and their role. The requesting detail was also extracted to confirm requests were for acute PE. Data from 2016 was used because a data failure occurred in late 2016, although this information was able to be added later. Extra CTPA data was found for those scans requested without electronic requests. Clinical details had to be reviewed in Health Connect South (HCS) to confirm they were querying acute PE. These CTPAs could only be grouped by ordering department and acute PE positive rate. Positivity was generally confirmed by clinical discharge coding data.

Results

A total of 1810 CTPAs ordered in 2016 were reviewed. There were 1576 (87%) requests that appeared to be querying acute PE. The others were for malignancy staging, aortic dissection without mentioning PE or for chronic PEs. The reviewed requests were for 1407 individual patients, and it was noted that 153 patients had at least two CTPAs during 2016, with 15 patients undergoing 3 CTPAs and one having four.

Overall Positive Rate

Pulmonary embolus was confirmed by clinical coding with checks to ensure the dates of admission and discharge contained the visit date for CTPA. In a small handful of cases the CTPA report was noted to be positive late in the evening with official admission date the following day. There were also a small number of patients who weren't admitted so positivity was found by reviewing the CTPA report only. Patients with multiple CTPAs were rechecked to ensure positivity only related to new or more extensive embolus. Pulmonary emboli related to the date of CTPA were found in 324 cases, giving a positive rate of 21%.

Requesting Person Detail

Details about the person ordering the CTPA and their role were available for 1356 (86%) of the acute PE requests. Table 1 shows the breakdown of roles and positive PE rates.

Table 1

Requesting Person Role	Count	%	PE	% Positive
Registrar	709	52%	157	22%
House Surgeon	476	35%	94	20%
SMO	163	12%	23	14%
Fellow	3	0.2%	1	33%
Nurse/CNS	5	0.4%	0	-

Requesting Department Detail

Each CTPA event recorded overseeing clinician or team and requesting department. This information was compared along with positive PE rates. The numbers of CTPAs requested by departments over the review period ranged from 1 to 484 (31% of requests), with a median of 16 requests (interquartile range 6-59). Percentage of CTPAs positive for acute PEs, in departments with more than 10 CTPA requests, ranged from 4% to 32%, median 19% (IQR 14-24%).

Discussion

In Canterbury there were anecdotal suggestions that CTPAs were being ordered inappropriately. A previous unpublished study, albeit with a less comprehensive methodology and done some years ago, recorded a positivity rate of less than 10% (personal communication). These concerns, coupled with discussion about opportunities to progress Choosing Wisely initiatives, were the foundation for this review.

This review showed the positivity rate for CTPAs ordered in Canterbury for the possible diagnosis of acute PE was 21% overall. The Royal College of Radiologists state that a positivity rate of less than 15.3% suggests CTPAs are being ordered too often and should precipitate a process to reduce ordering.¹ Based on this standard, CTPAs are not being ordered too often in Canterbury. Furthermore, the Canterbury positivity rate is consistent with the rates recommended in one systematic review and an Australasian observational study.^{2,3}

However, this review did not examine the appropriateness of CTPA ordering for individual patients. It is possible, that among the 79% of CTPAs which were negative for a PE, a number were ordered without good clinical justification. Furthermore, it is observed that positivity rates vary among departments. Consequently, although this review is reassuring, there is doubtless some room for improvement. The Hospital HealthPathways PE pathway will be examined to ensure it is clear and correct about the indications for CTPA, and this report will be disseminated to encourage compliance with those indications.

A further concern about CTPA ordering is that small (subsegmental) PEs, which might have little or no clinical significance, and with older diagnostic options would not have been found, are being diagnosed and subsequently treated with anticoagulation. This review did not discern the size or clinical significance of PEs in individual patients, nor the appropriateness of treatment. Advice will be sought from appropriate specialists to see if guidance can be added to Hospital HealthPathways about the threshold of PE significance mandating anticoagulation.

References

1. Appropriateness of usage of computed tomography pulmonary angiography (CTPA) investigation of suspected pulmonary embolism. The Royal College Of Radiologists [Internet]. [cited 2015 Dec 18]. Available from: <https://www.rcr.ac.uk/audit/appropriateness-usage-computed-tomography-pulmonary-angiography-ctpa-investigation-suspected>
2. Mos ICM, Klok FA, Kroft LJM, de Roos A, Dekkers OM, Huisman MV. Safety of ruling out acute pulmonary embolism by normal computed tomography pulmonary angiography in patients with an indication for computed tomography: systematic review and meta-analysis. *J Thromb Haemost* 2009; 7: 1491_8.
3. Mountain et al. RESPECT-ED: Rates of Pulmonary Emboli (PE) and Sub-Segmental PE with Modern Computed Tomographic Pulmonary Angiograms in Emergency Departments: A Multi-Center Observational Study Finds Significant Yield Variation, Uncorrelated with Use or Small PE Rates. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5137866/>