Computed Tomography Pulmonary Angiogram (CTPA)

How important is the right cannula and gauge size?

University Hospitals Dorset
NHS Foundation Trust

Introduction

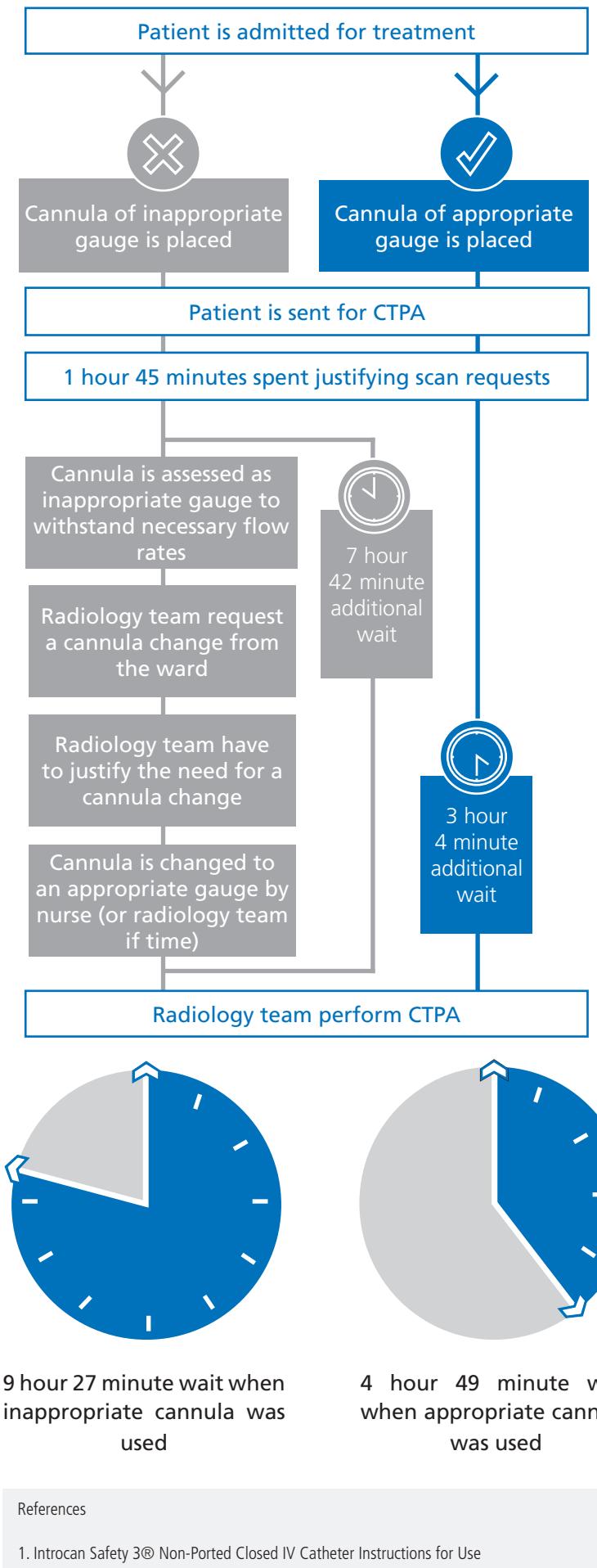
The large bolus of IV contrast media required for optimal visualisation of pulmonary arteries on computed tomography (CT), requires a peripheral IV cannula of suitable gauge to accommodate a flow rate of 6ml/sec. The cannulae with injection port, currently used in the trust mean that an 18 gauge IV cannula is required for all CT pulmonary angiogram (CTPA) examinations. These are difficult to place in patients with poor venous access, leading to delays in scanning and the patient's treatment. Switching as a trust to a different design of cannulae (Introcan Safety® 3 Non-Ported Closed IV Catheter) whose 20 gauge can accommodate flow rates of up to 10.5ml/s (based on contrast media with a viscosity of 2.3 mPa*s) [1], should prevent these delays. This initial audit was designed to assess the scale of the problem.

New Pathway: Aims

At the Royal Bournemouth Hospital, we carried out an audit to ascertain the delay caused to in-patient treatment when an unsuitable gauge of IV cannula is inserted on the ward. In addition, we aimed to assess whether switching to a different design of cannula, which can accommodate higher pressures and faster injection rates, would address this issue. Finally, we aimed to check that vetting delays for the procedures were not adding to the overall delay.

Methods

All CTPA in-patients for the month of September 2022 were audited, totaling 129 patients. The date and time of the initial request reaching Soliton (the radiology department's record system) was recorded, along with information regarding which brand and gauge of IV cannula was sited, how long it took to re-site an appropriate cannula (if required), when the patient could have been scanned and the time they were actually scanned. The time taken for the radiologists to justify the referrals was also recorded (Table 1).



9 hour 27 minute wait when inappropriate cannula was used

4 hour 49 minute wait when appropriate cannula was used

Results

Over the period of the audit, 129 CTPA referrals were completed. 56 patients did not have an appropriate gauge of IV cannula sited at the time of referral. The average time from referral to completion for patients who were correctly prepared for the examination was 4 hours 49 minutes. Those patients where the radiographers had to request the patient be re-cannulated with an appropriate gauge of IV cannulae, waited an average of 9 hours and 27 minutes for their scan; almost twice as long.

Over the duration of the audit, radiologists took an average of 1 hour 45 minutes to justify requests across both appropriate and inappropriate cannulae, with those that were submitted overnight waiting longer than those submitted during the day, due to there being no radiologists on site. Urgent cases are referred directly to an off-site teleradiology company.

The cost of the inappropriate gauge of IV cannulae, re-cannulating with the appropriate gauge of non-ported IV cannulae, totals £4.17 versus £3.08 if the 56 patients had been cannulated with the appropriate gauge of non-ported IV cannulae from the outset. Therefore, based on the number of patients included in this audit, the new pathway, with Introcan Safety® 3 Non-Ported Closed IV Catheter placed on the ward initially, could represent a saving of £732 per annum, and over 288 hours of radiographers time per annum. The new pathway would also reduce around 29kg of waste per annum by avoiding having to unnecessarily re-cannulate patients.

Moreover, waiting time for patients is reduced by 4 hours 38 minutes.

Duration of delay	Appropriate preparation	Poor preparation
<1 hour	8	0
1-5 hours	46	30
6-10 hours	9	8
11-15 hours	2	7
16-20 hours	7	5
21-24 hours	0	4
25-36 hours	1	1
37-48 hours	0	1
Total	73	56

Conclusion and Discussion

The use of an inappropriate gauge of IV cannula adds an average of 4 hours and 38 minutes to the time between referral and completion of examination in patients attending for CTPA. This leads to delays in treatment, worsened patient experience in hospital, and possible increased lengths of hospital stay, particularly for patients whose CTPA requests are submitted out of hours. At a time when pressures on hospital beds is so high, any means of reducing these delays should be considered.

The results of the audit were disseminated to referring doctors and wards to make them aware of the delays caused by inaccurate preparation of their patients for CTPA. Further auditing is required in our trust to ascertain any improvement to delays to patient treatment with the Introcan Safety® 3 Non-Ported Closed IV Catheter once practice changes have been implemented, and measure the cost-effectiveness of the benefits of the new IV cannulae.

Author: Sarah Jenkins | Bank Governance and Quality Manager | Radiology Department
University Hospitals Dorset | Royal Bournemouth Hospital

References

1. Introcan Safety 3® Non-Ported Closed IV Catheter Instructions for Use