

# TRACHEOSTOMY AUDIT

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## INTRODUCTION

Tracheostomy has traditionally been performed by ear nose and throat (ENT) surgeons as an open surgical operation. The introduction of the percutaneous dilational tracheostomy (PDT) has enabled non-ENT specialists (mostly intensive care physicians) to perform the procedure at the patient's bedside.

Reported advantages of the PDT approach compared to surgical tracheostomy (ST) include:

- shorter procedure time<sup>(1)</sup>
- more convenient location, as PDT can be performed at the patient's bedside, thus reducing the potential risks of transferring a critically ill patient to other parts of the hospital
- reduced financial spending, as no theatre costs are incurred<sup>(2,3)</sup>
- fewer reported post-procedure complications, particularly wound infection<sup>(4)</sup>
- some suggestion of better cosmetic appearance following decannulation<sup>(5)</sup>

Overall, current literature suggests that PDT is the technique of choice for elective tracheostomies in critically ill patients. At the Royal Lancaster Infirmary (RLI) both PDT and ST are performed.

This audit was designed to provide a 'snap shot' of tracheostomy practice at the RLI during the retrospective time period of March 2007 to March 2008. This was requested by the second author to provide information for the ENT department at the RLI. A further aim was to identify national and/or international guidelines relating to tracheostomy and to identify whether current practice at the RLI is in keeping with these recommendations. A literature search found few national or international guidelines, consequently there are currently no guidelines pertaining to tracheostomy practice in use at the RLI. Despite this, one set of guidelines that were repeatedly cited in the literature were those of the Belgian Society of Pneumology and the Belgian Association for Cardiothoracic Surgery regarding tracheostomy.<sup>(6)</sup> The guidelines were compiled after consideration of international peer-reviewed publications on the subject of tracheostomy and used levels of evidence as developed by the American College of Chest Physicians. The ENT department at the RLI support the use of these guidelines as audit standards in this article.

## RECOMMENDATIONS FROM THE GUIDELINES

1. PDT is recommended as the procedure of choice for performing elective tracheostomy in critically ill adult patients.

2. The modified Ciaglia Blue Rhino (a technique of inserting tracheostomy over guidewire guidance) is the suggested technique of choice for PDT.
3. It is recommended that PDT should be performed under bronchoscopic control.
4. The timing of tracheostomy should be individualised to each patient. However, in critically ill adult patients requiring prolonged mechanical ventilation, tracheostomy performed at an early stage (within the first week) may shorten the duration of artificial ventilation and length of stay in the intensive care unit (ICU).

A further finding of the literature search related to pre- and post-procedure imaging. Current hospital practice is to perform a chest X-ray post-PDT insertion to exclude pneumothoraces or tube malalignment. Recent studies suggest that this form of imaging is not routinely necessary (unless strong clinical suspicion of either complication exists) as both are fairly rare complications.<sup>(7)</sup> Instead, the increased use of neck ultra-sound scanning (USS) was advised prior to PDT insertion. This imaging technique can be used to identify neck vessels or structures not visible to the eye or by palpation. One study showed that the planned puncture site in nearly three quarters of reviewed cases had to be moved after USS highlighted evidence of vessels/structures that would prove problematic for PDT insertion.<sup>(8)</sup>

## METHODS

Casenotes were identified using the code word 'tracheostomy', including both surgical and PDT techniques. Only tracheostomies performed at the RLI were included.

A data collection tool was devised. Data was analysed using Microsoft EXCEL®.

## RESULTS

A total of 56 patients were identified; of these, 30 casenotes were located.

Twenty-three of the 30 tracheostomies were PDT approach, all performed by intensivists in the ICU at the RLI. Of these 30 cases, only one required immediate conversion to ST secondary to bleeding. Of the seven STs, all were performed by ENT surgeons. Four were elective procedures on ICU patients deemed unsuitable for PDT approach, one was an emergency procedure after failed PDT, and two cases were performed by the second author in the anaesthetic room after failed intubation following the induction of anaesthesia. These two patients went on to have their elective surgical procedure the following day and two to three days later were both successfully decannulated and discharged home in good condition.

There were five documented post-procedure complications, all following PDT approach: three cases of bleeding at the wound site; one of oedema; and one of granulomatous tissue formation. No pneumothoraces were found.

Documentation of imaging was considered: all PDTs had evidence of a reviewed chest X-ray post-procedure and 23% (6/23) of patients received a neck USS prior to PDT insertion. Seventy-eight percent (18/23) had documentation of the type of PDT kit used and 25% (8/23) of notes contained a reference to the method, kit type and size used.

The audited guidelines referred to critically ill adult patients requiring prolonged mechanical ventilation and requiring elective tracheostomy. Of the patients suitable for inclusion (N=28), 82% (23/28) received a PDT. Of the five ST cases, all had been considered for PDT; one was a conversion following failed PDT, and four cases were deemed not appropriate for PDT (because of a large goitre, fractured tracheal rings or aberrant neck anatomy).

As advised by the guidelines, all PDTs were performed using a modified form of the Ciaglia Blue Rhino and all had documentation stating PDT was performed under bronchoscopic control.

Time from endo-tracheal tube (ETT) ventilation to tracheostomy is shown in figure 1.

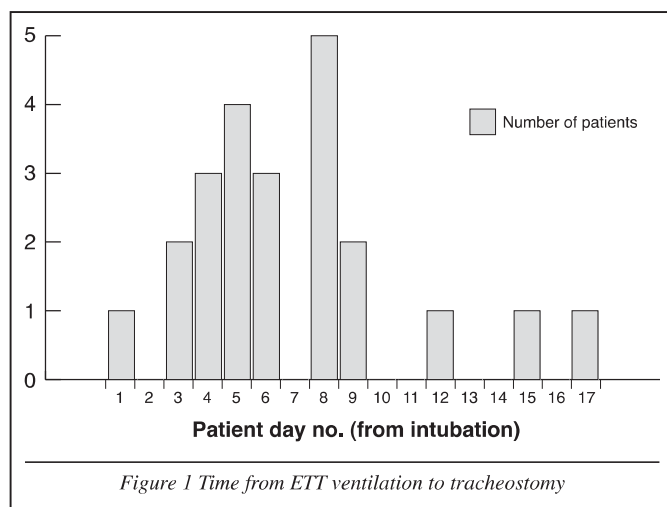


Figure 1 Time from ETT ventilation to tracheostomy

**DISCUSSION**

Although tracheostomy has traditionally been considered an ENT procedure, it was interesting to note that the majority were created by intensivists, rather than ENT surgeons, during the audited time period. In keeping with this fact, the majority were PDT. This method has the advantage that it can be performed at the patient’s bedside, reducing the potential risks of transporting a critically ill patient to different locations around the hospital and, as mentioned earlier, it can also help reduce theatre costs.

Only one PDT required conversion to ST; this was an emergency conversion secondary to bleeding. There was no documentation stating that this patient had had a neck USS prior to PDT. Although only one patient required immediate

conversion to ST, it should be noted that this was a life-threatening complication and as such an ENT surgeon skilled in ST must be available at all times, and at short notice, to perform the operation.

There were five documented complications post-PDT; three immediate secondary to bleeding and two complications of oedema and granulomatous tissue formation. The three complications secondary to bleeding did not have a neck USS prior to PDT. All patients had a chest X-ray post-procedure with no pneumothoraces or tube malposition identified. This finding could suggest that neck USS be a prudent imaging tool prior to PDT insertion with an aim to reduce the number of complications secondary to bleeding.

Documentation as to the type of PDT kit used was inconsistent. Seventy-eight percent (18/23) of the notes contained a reference to the technique used such as ‘perc.seldinger technique’ or ‘dilators used’. Thirty-five percent (8/23) of the notes contained a reference to the method, kit type and size used. Recording these details allows for longterm follow up and comparison of PDT kits, providing information that could assist in the decision making as to which PDT kit to use at the RLI. This is particularly important as PDT is a fairly new procedure and as such few longterm post-procedural studies exist and consequently the longterm complications of PDT are not currently available.

Considering the audited guidelines, all patients requiring tracheostomy were considered for PDT; only those patients who were deemed not suitable for PDT were referred for ST. All PDTs were of the recommended type (modified Ciaglia Blue Rhino) and all performed under bronchoscopic control. Regarding recommendation four (detailed above), the authors of the guidelines appreciate that owing to the potential rapid change in condition of a critically ill patient, it is near impossible to set rigid standards regarding time from ETT ventilation to tracheostomy and as such this guideline is meant as a recommendation based on studies reviewed by the authors. This audit found that 13 patients had a tracheostomy prior to day seven of ETT ventilation and ten on days 8-17. Of the ten patients not meeting the recommendation, all had documentation indicating that tracheostomy had been considered prior to day seven, but owing to a deterioration in the patients condition was postponed. Thus one can conclude that ICU staff at the RLI are meeting the audited guidelines. This suggests that no change of current practice would be necessary to incorporate the audited guidelines into day-to-day practice. The advantage of doing so is that a protocol of practice could be set in place, helping to enable a standardised level of patient care.

**RECOMMENDATIONS**

**To consider:**

- neck USS prior to all PDTs
- judicious use of chest X-ray post-PDT
- adoption of guidelines to allow standardised, auditable protocol of practice
- clear documentation of PDT kit used to allow longterm follow up

## REFERENCES

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## PEER REVIEW

**The editor invited senior colleagues in the Trust to comment on this audit and is grateful to them for their insight.**

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Percutaneous dilational tracheostomy (PDT) has become an increasingly common bedside procedure within Intensive Care, though neither the process nor the timing have become standardised within the UK.

In Lancaster, the decision to undertake a PDT rests with the Consultant Intensivist, usually after discussion with the patient's family and, though no local guideline exists, is invariably preceded by an ultrasound examination of the patient's neck. When the ultrasound demonstrates unfavourable anatomy the patient is discussed with the ENT team, and either added to the next available ENT list or performed by the on-call team, when available.

After one patient suffered a major complication with post-operative bleeding following an elective PDT, at Lancaster these procedures are now only undertaken during normal working hours, to ensure that a vascular surgeon is readily available if needed. The example, in this audit, of an urgent need for an attempted PDT to proceed to theatre, emphasises this. Emergency PDT, to secure a difficult and unprotected airway, does not suffer from the same restriction and is performed whenever clinically indicated.

This audit demonstrates the difficulty of performing retrospective analysis: only 54% of the patients' notes were traceable and, regrettably, poor note keeping makes it difficult to be sure how many of those actually had a USS of the neck prior to the PDT. Furthermore, two of the surgical tracheostomies reflect emergency procedures for failed intubations in theatre, which are probably of peripheral interest to an audit involving the value and role of guidelines.

Even though there are no guidelines for undertaking PDTs at Lancaster, it is gratifying to see that our practice is in line with guidelines followed elsewhere. The current TRACMAN study may answer questions about when PDTs should be undertaken in ICU, but not about the process itself. A prospective audit of PDTs would allow us to determine the frequency of use of the USS before the procedure and X-ray afterwards, and to establish the value of each in our hands.

The proposal that PDT should only be performed when ENT support is available is more contentious – whilst it might be necessary on occasion to convert a PDT to an ST, there is no evidence from this audit that the Intensivists needed urgent support from their ENT colleagues – the urgent conversion from PDT to ST in this audit, to control bleeding, was undertaken by a vascular surgeon in a patient whose airway was secured by a conventional endotracheal tube. On a personal level, the lesson I (CG) have drawn from this audit is that, as is so often the case, the standard of note keeping could be improved.