Differential implementation of special society pleural guidelines according to craft-group: impetus toward cross-specialty guidelines?

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ABSTRACT

We examined the effects of a programme to improve adherence to British Thoracic Society pleural procedure guidelines at our institution. Following a baseline audit, we performed an intervention to enhance adherence to these guidelines. We then performed a postintervention audit. At baseline, there were different levels of guideline adherence depending on the specialty of the clinician inserting chest tubes. Interventions to improve adherence were hampered by limited access to non-respiratory teams. Thus, improvements in response to intervention were also specialty specific. Overall, procedures performed by respiratory medicine had higher adherence rates compared with those performed by non-respiratory teams. We concluded that guidelines promoted at a local level by one specialty have limited traction on members of another specialty. For pleural procedures, which cross specialty boundaries, we propose that future guidelines be developed jointly by all relevant specialties. This could facilitate unified guideline implementation at the clinical coalface.

KEYWORDS: Pleural disease, pleural intervention, chest tube insertion

Introduction

Chest tubes are often needed to manage pleural effusions and pneumothorax. However, the insertion procedure can be complicated by sepsis, organ puncture and death,[1] and these unfortunate events continue to occur despite heightened awareness within the profession.[2]

Our institution (the Royal Melbourne Hospital, Melbourne, Australia) is a 400-bed university teaching hospital providing a full range of adult tertiary medical and surgical services. At the time of writing, no hospital-wide policy on chest tube insertion existed. The procedure can be undertaken on the hospital wards by any treating unit depending on their skills and the availability of appropriate supervision.

In August 2010, the British Thoracic Society (BTS) updated its guidelines for pleural procedures.[3] Upon release of these guidelines, we audited the adherence of our hospital to guidelines for all ward-based chest tube insertions. We deliberately limited our audit to ward-based insertions to ensure that procedural indications and clinical urgency were comparable. We reasoned that, in off-ward settings (emergency, intensive care, radiology or the operating theatres), chest tubes were placed for a wider spectrum of indications and, thus, were inappropriate for comparison to ward-based procedures.

We subsequently instituted a multidimensional intervention to improve guideline adherence, and then evaluated the effectiveness of our strategy.

Methods

Audit strategy

At baseline, all patients receiving chest tubes on the general hospital wards from 1 September 2010 to 28 February 2011 were identified by interrogating the hospital radiology database. A sensitive (but non-specific) search strategy was used; all chest X-ray reports during this period that included any of the following terms were retrieved; 'ICC', 'I.C.C', 'intercostal catheter', 'chest tube', 'pleural catheter' or 'pneumothorax'. This last broad term was included because of the common local phraseology 'to exclude pneumothorax' used when requesting imaging postinsertion (or removal) of chest tubes. Each retrieved imaging procedure was then individually hand-checked to determine whether a chest tube had been inserted. Chest tubes inserted in non-ward areas were specifically excluded, for the reason described earlier.

To verify the reliability of this search strategy, results were crosschecked against the respiratory department ultrasound (US) database, which started in November 2010 (the date of equipment purchase). This crosscheck was only able to track chest tubes inserted by respiratory medicine staff. However, we reasoned that, if the search strategy was sensitive enough to identify most (or all) respiratory-inserted tubes, it was also likely to identify most chest tube insertions performed by other teams on the wards.

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The medical records of patients undergoing chest tube insertion were then reviewed. Five BTS recommendations verifiable from records were selected for audit: (i) written consent, (ii) in-hours insertion (8 am to 5 pm, Monday to Friday), (iii) for pleural fluid, US guidance at the time of the procedure (direct US localisation), (iv) documented small-bore tube (<15 F), and (v) minimum recommended pathology requested on pleural fluid (protein, lactate dehydrogenase, gram-stain, cytology and microbiology).

In addition, inpatient mortality was also determined, as were analgesic requirements over the 24-h period following tube insertion.

A post-interventional audit was subsequently undertaken for 1 September 2011 to 29 February 2012, using a protocol identical to the baseline audit.

Multifaceted intervention

Analysis of baseline data identified several groups of doctors inserting chest tubes on the ward: (i) the respiratory medicine unit, (ii) the cardiothoracic surgical unit and (iii) other units. Over the 6 months between the two audit periods, we implemented a multifaceted strategy to improve guideline adherence. However, the intensity (and penetration) of the intervention was limited by differential access to the doctors' specialty (Table 1). Respiratory medicine received procedural training, whereas cardiothoracic surgery and other units received mainly guideline education.

Pleural service development

For the respiratory medicine unit, the lead consultant (MH) and two registrars completed the e-learning chest tube module of the Thoracic Society of Australia and New Zealand (TSANZ), which is now available online.[4] Chest tube insertions by the registrars were supervised by the consultant until they were deemed competent. (Simulation[5] was not used for training because both registrars were in their final year of training and had performed considerable numbers of chest tube insertions previously.) With the support of the radiology department, training in pleural US to Royal College of Radiology Level 1 standard was completed by all three doctors.

Advertisement of the pleural service

For other ward units, the availability of the pleural service for chest tube insertion was publicised at an hour-long dedicated hospital grand round entitled 'Pleural interventions' on 11 August 2011, which was attended by all hospital ward units. Patient review and, if appropriate, a pleural procedure under US guidance were offered within 24 h of referral.

Guideline education

For ward units other than respiratory medicine, details of the BTS guidelines were also disseminated at the grand round. Given that cardiothoracic surgery was the other major provider of chest tube insertion, an additional hour-long 'Pleural intervention' presentation was given at the educational meeting of the cardiothoracic surgery unit. Ongoing assistance in the form of US support was offered.

This project received approval from the Royal Melbourne Hospital Ethics Committee as a low-risk quality improvement project.

Results

Search results

The sensitive baseline radiology search retrieved 7,184 candidate chest X-rays (Fig 1). Of these, 7,141 X-rays did not involve ward-based chest tube insertion. Of the 43 cases of ward-based insertion identified, 39 records were available. No additional patients were identified through the US database.

Following the intervention, 7,775 candidate chest X-rays were retrieved by the search terms. Of these, 7,726 X-rays did not involve ward-based chest insertion and 49 ward-based insertions were identified. Only one additional case was identified through the US database. Of these, 48 records were available.

Care providers

Parent units in the baseline audit were respiratory medicine (nine), cardiothoracic surgery (16) and other units (14) (Fig 2). Of patients under other units, nine chest tubes were inserted by the parent unit, four were inserted by cardiothoracic surgery and one by respiratory medicine.

Parent units in the postintervention audit were respiratory medicine (12), cardiothoracic surgery (12) and other units (24). Of patients under other units, 12 chest tubes were inserted by respiratory medicine, six were inserted by cardiothoracic surgery and six by the parent unit.

Between the two periods, respiratory medicine overtook cardiothoracic surgery to become the major provider of chest tube insertions on the ward, doubling its share of all procedures from 10/39 (26%) at baseline to 24/48 (50%) following the intervention (two-sample test of proportions $p=0.02$). Among patients under other units, respiratory medicine's share of chest tube insertions also increased significantly from 1/14 (7%) to 12/24 (50%) (two-sample test of proportions $p=0.05$).

Chest-tube indications

Most chest tubes were inserted for pleural effusion, whether because of infection, malignancy or other causes (Table 2). However, for both audit periods, non-respiratory units inserted substantially more chest tubes for pneumothorax compared with respiratory medicine.

Guideline adherence

Respiratory medicine

At baseline, adherence to guidelines was good for in-hours insertion 9/10 (90%), direct US guidance for pleural effusion 7/9 (78%) and minimum fluid analysis 8/9 (89%). These rates were maintained following the intervention (Fig 3a).

At baseline, rates of written consent 1/10 (10%) and documented small-bore tubes 3/10 (30%) were low. Both rose to 20/24 (83%) following intervention (Fig 3a).

Other units (including cardiothoracic surgery)

At baseline, guideline adherence was low for all five parameters; in-hours insertion 17/29 (59%), written consent 4/29 (14%), direct US guidance 8/19 (42%), documented small bore tubes 2/29 (7%) and minimum fluid analysis 3/17 (18%).

Following intervention, there was no discernible improvement in guideline adherence for all five parameters (Fig 3b).

Patient outcomes

Inpatient mortality

During the baseline period, two patients died during their inpatient stay from causes unrelated to chest tube insertion (chronic renal failure and head and neck cancer). During the post-intervention period, three inpatient deaths occurred, unrelated to chest tube insertion (chronic renal failure, aspiration pneumonia and massive haemoptysis from endobronchial tumour).

Analgesic requirements

The need for pain relief in the first 24 h was significantly lower in patients documented to have a small-bore chest tube (6.0 ± 8.0 mg of subcutaneous morphine equivalent) compared with patients with large-bore tubes (20.3 ± 18.5 mg of subcutaneous morphine equivalent, $p<0.001$)

Discussion

In this study, we examined the success of implementing chest tube insertion guidelines on the ward at a local level. Our key finding was that the specialty unit of the doctor inserting the chest tube profoundly influenced the uptake of this initiative.

The response to our intervention could be viewed positively. The development of a pleural service within respiratory medicine was associated with enhanced guideline adherence in areas of practice previously deficient. At the same time, advertisement and provision of this service to other ward units attracted appropriate referrals and expanded the overall proportion of guideline-adherent chest tube insertions.

Pleasingly, adherence to recommendations was associated with better patient outcome. The move towards small-bore catheters was associated with significantly reduced analgesic requirements. This is not a novel finding.[6] All these results compare favourably with a recent UK-wide audit of chest tube insertion.[7]

However, the least successful aspects of our intervention offer the most valuable lesson. The specialty of the doctor inserting chest tubes affected the uptake of guideline adherence: (i) baseline guideline adherence was markedly lower in non-respiratory medicine units, including cardiothoracic surgery, (ii) our implementation strategies had limited access to doctors outside of respiratory medicine and (iii) even after the quality improvement intervention, procedures performed by non-respiratory medicine units continued to show low adherence to guidelines.

Some of the results could be explained by the slightly different caseload encountered by non-respiratory units, which inserted more chest tubes for pneumothorax and a few cases of haemothorax (Table 2). These patients often require out-of-hours procedures, and a larger bore-tube might sometimes be necessary. However, these differences in indication cannot explain the poor guideline adherence rates for written consent, US guidance (for effusions) and minimum fluid analysis (for effusions). Other possible reasons include less focus on pleural medicine within those units or the regular quarterly turnover of residents, which often hampers quality-improvement efforts.

The bulk of our initiative was implemented within respiratory medicine. This was performed with minimal additional resources. An extra session per week for two consultants (MH and DS) was provided for 4 months between the two audit periods and dedicated to training registrars in US and chest tube procedures. The pleural service was then implemented without ongoing funding or personnel.

Table 1. Quality improvement interventions according to specialty.

	Multifaceted intervention programme			
Target unit	**Chest-tube training**	**Ultrasound training**	**Guideline education**	**Pleural service advertisement**
Respiratory medicine	+++	+++	+	Not applicable
Cardiothoracic surgery	–	–	+++	+
Other units	–	–	+	+++

+++ = primary target audience for the intervention; + = secondary target audience for the intervention; – = no access.

Table 2. Indication for chest tube insertion according to specialty of inserting team.

Indication	**Baseline audit**		**Post-intervention audit**	
	Respiratory medicine (n=9)	**Other units (n=30)**	**Respiratory medicine (n=24)**	**Other units (n=24)**
Pneumothorax	1	10	1	7
Haemothorax	–	2	–	1
Malignancy	1	4	9	6
Infection	6	2	5	2
Other effusion	2	11	10	8

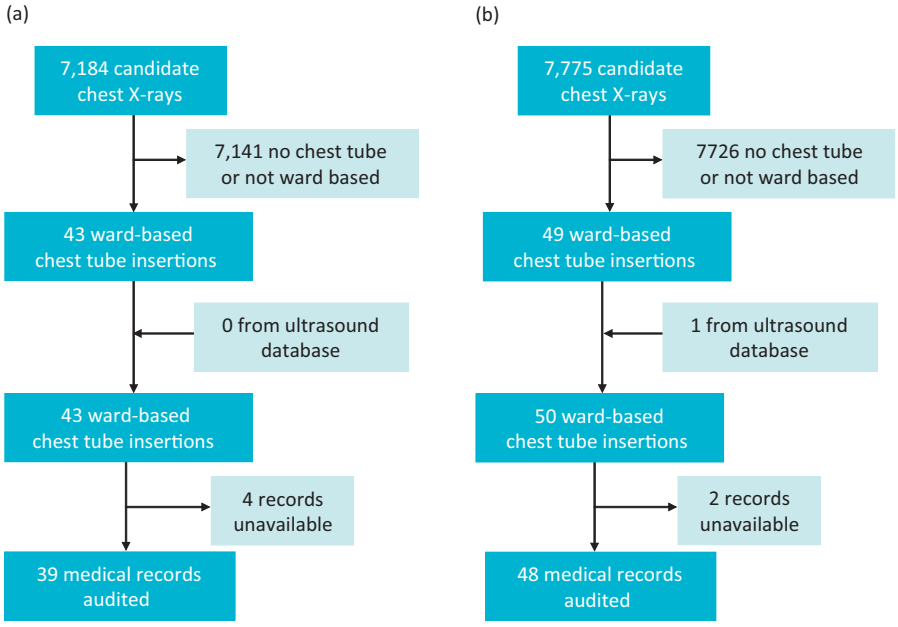

Fig 1. Flow diagram showing the results of radiology searching for (a) baseline and (b) post-interventional audits.

Following implementation, the registrars' workload increased by approximately 4 h per week, and the lead consultant's by 1–2 h per week. Despite this, the respiratory registrars remained enthusiastic about gaining proficiency in both US and pleural interventions. US equipment was purchased by proceeds from a hospital 'Christmas appeal'. However, even had our hospital borne the expense, we estimate that capital expenditure would have been recovered within 6 months (by expedited chest drainage and reduced hospital length of stay).[8] We believe that this programme could feasibly be replicated in

Fig 2. Units inserting chest tubes during the (a) baseline (n=39) and (b) post-intervention (n=48) audits. The share of respiratory medicine of chest tube insertions increased from 23% during the baseline period to 50% during the postintervention period. CTS = cardiothoracic surgery.

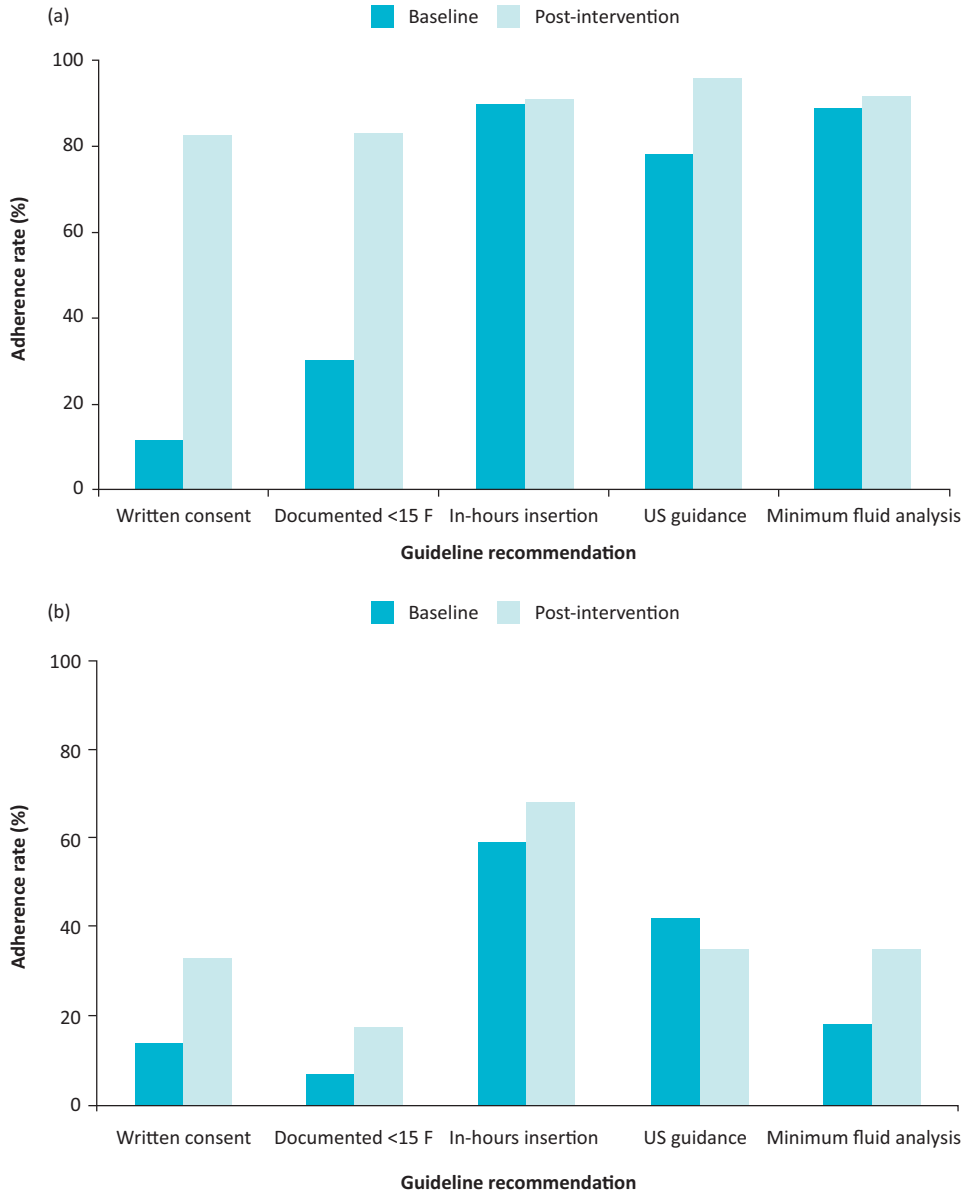

Fig 3. Adherence to British Thoracic Society pleural procedures guidelines. (a) Guideline adherence by respiratory medicine before and after the intervention. (b) Guideline adherence by other units (including cardiothoracic surgery) before and after the intervention. US = ultrasound.

many district general hospitals, given appropriate allocation of resources.

The number of chest tube insertions on the wards by units other than respiratory medicine or cardiothoracic surgery fell slightly from nine procedures in the initial 6 months, to six procedures in the second 6 months. The implementation of a pleural service might have contributed to this drop. However, it is clear even on the initial audit that insufficient procedures were being performed on these other units by any one doctor. Thus, it appears unlikely that chest tube insertion can remain a 'general medical skill' at our institution. We believe redirecting such procedures to the pleural service is the most appropriate course of action to ensure patient safety.

Outside of respiratory medicine, we were unable to mandate or provide procedural or US training. Instead, we provided extensive guideline education through dedicated pleural sessions at hospital-wide grand rounds as well as unit-specific presentations to cardiothoracic surgery, both of which were cordially received.

It could be argued that wider guideline implementation within our organisation might have given better results across all teams. However, attempting to change practice in other units is more challenging than within one's own unit. We were significantly limited by local organisational constraints, which probably also exist in many other tertiary hospitals. Working towards an agreed procedural standard across all units hospital-wide remains our ideal (yet to be realised), especially if coupled with regular audit.

From a wider perspective, our data have major implications for the development of future guidelines. For procedures performed by multiple specialties, we suggest that one way to overcome systematically the influence of craft group on guideline uptake, is to review the current philosophy of guideline development altogether.

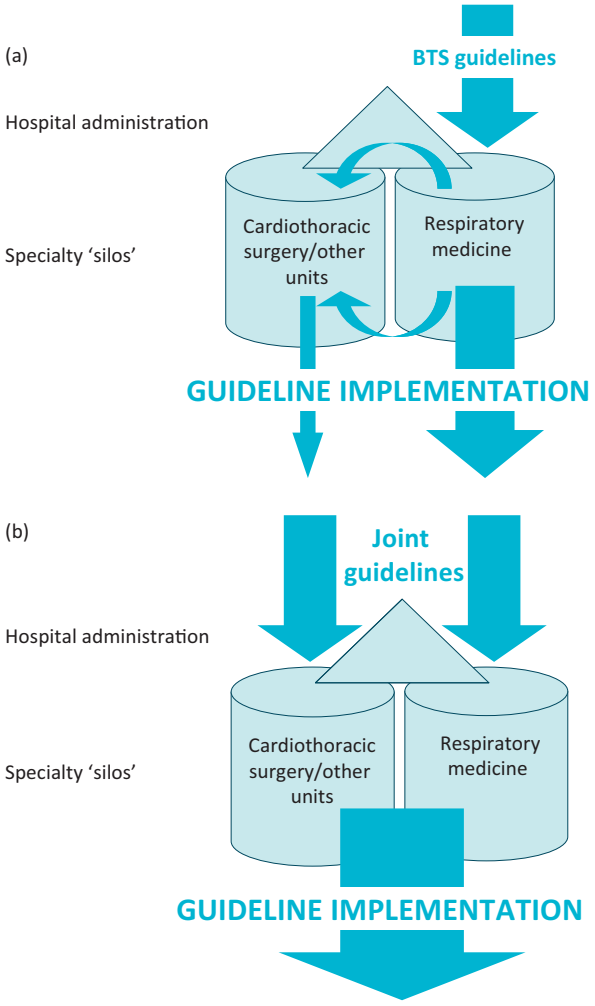

Fig 4. The likely impact of guideline provenance on successful guideline implementation. (a) Current model of guideline implementation within a hospital, showing dilution of effect occurring between siloed hospital specialties, and ensuing suboptimal guideline implementation. (b) Proposed model of joint guidelines, implemented by cooperating teams in concert.

Currently, guidelines are often issued by a single special society and championed by members of that specialty within their hospital (Fig 4a). The penetration of the guidelines throughout that institution then depends on the influence of that specialty 'silo' relative to other units. In this model, even politically strong units are likely to find that guideline adherence by other teams is limited. This could be explained by varying clinical perspectives, limited guideline applicability to different case-mixes (perceived or real) and an unwillingness to be 'dictated to' by another craft-group.

To overcome these difficulties, we propose a different guideline model (Fig 4b). Guidelines for a procedure undertaken by multiple specialties could benefit from cross-specialty development and endorsement. Current BTS pleural guidelines do already receive input from stakeholders, including surgical societies during their development.[9] However, importantly, at the end of the day, the guidelines still only belong to a single specialty, that is, the BTS. A more equal collaboration might be useful to attract 'buy-in' by surgical and other specialties. This could involve a special society relinquishing sole ownership over guidelines traditionally under its control, and partnering with its surgical counterparts to produce a document with wider applicability.

Although such collaborations might be cumbersome, they are likely to promote unified implementation at the local clinical coalface. There are clear precedents of such cooperation among specialties in other clinical areas.[10] Multispecialty implementation of guidelines at a local level is most likely to succeed if each team is implementing guidelines written jointly by all relevant specialties.

Our initiative did not investigate clinical practice in emergency, intensive care or radiology, but the same issues probably apply.

In summary, we propose that future guidelines for procedures that cross specialty boundaries (such as pleural guidelines) could be developed and 'branded' under joint auspices with other relevant special societies. This is likely to facilitate unified local implementation across different specialties. ■

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