A retrospective audit of chest drain practice in a specialist cardiothoracic centre and concurrent review of chest drain literature

Claire Parkin

SUMMARY

- Clinical decisions related to chest drain practice are based on personal preference rather than on clinical evidence, which leads to diversity in practice
- This problem is compounded by the lack of evidence-based published literature relating to chest drainage, which should be influencing contemporary clinical practice
- A retrospective audit on chest drain practice is presented with the aim of highlighting diversity of views and practices about the management of chest drains
- A concurrent review of literature reveals the large volume of published literature that contains subjective experiential recommendations, rather than evidence-based inferences for practice

Key words: Audit • Chest drainage • Evidence-based practice

INTRODUCTION

Chest drains are used to manage various thoracic conditions such as pneumothorax, haemothorax, pleural effusion and empyema or may be placed in the pericardial and mediastinal cavities to remove excess fluid following cardiac surgery (Welch, 1993).

Whilst it is the responsibility of the doctor to insert the chest drain, it is the responsibility of both the nurse and the doctor to maintain the drain and monitor the patient. In both respects, safe practice requires an understanding of the anatomy and physiology of the pleural and cardiac spaces; an appreciation of the pathology of the relevant conditions; and a working knowledge of physics and air/fluid flow and function of thoracic drainage.

Many clinical decisions related to chest drain use are reported to be based on personal preference rather than on clinical evidence, which leads to diversity in practice (Godden and Hiley, 1998; Yeoh *et al.*, 2000). Furthermore, complications are more likely to arise if clinicians caring for patients with chest drains do not have the necessary skills and training (Tang *et al.*, 1999). The problem of variance in practice is attributable to several factors, the most pertinent of which is the lack of evidence-based published literature relating to chest drainage, which should be influencing contemporary clinical practice.

The findings of a retrospective audit, designed to establish current practice in a large tertiary referral cardiothoracic centre, revealed both diversity and similarity in chest drain practices amongst the nursing and medical professions. The results, along with information obtained from a concurrent review of chest drain literature, will be used to formulate research initiatives and to guide the development of multidisciplinary clinical guidelines. The specific aim is to establish uniform practice among all members of the multidisciplinary team.

AUDIT

Medical and nursing roles in caring for patients with chest drains are distinct: therefore two audit tools were developed. These were piloted with seven nurses and three doctors, then revised accordingly. A copy of the appropriate audit form to complete was then sent to all 899 clinicians in current employment (674 nurses and 225 doctors).

A low response rate was expected from several groups of clinicians. The sample of 225 doctors, for example, included 19 (8.4%) who were locums, fellows or audit personnel, 44 (19.6%) registrars in specialist training and 58 (25.8%) junior doctors. These groups were less likely to have inserted a chest drain due to being in training, too junior, on rotation, or working away from the clinical environment. Additionally, 83 (36.9%) of the doctors were con-

Author: CL Parkin, MSc, BSc Hons, RN, Research Practitioner, Royal Brompton and Harefield NHS Trust, London
Address for correspondence: Nursing Research Department, Royal Brompton Hospital, Sydney Street, London SW3 6NP
E-mail: c.parkin@rbh.nthames.nhs.uk

sultants, half of whom work in specialities where chest drains are used less often (21 (25.3%) in respiratory medicine and 19 (22.9%) in cardiology). However, of the consultants, 29 (34.9%) work in specialities most likely to be inserting chest drains (15 (18.1%) in anaesthetics, 12 (14.4%) in cardiothoracic surgery and 2 (2.4%) in intensive care). The other 14 consultants (16.9%) work in paediatrics. Of the whole sample of clinicians, 14 (9.3%) were specialist registrars.

Of the 674 nurses audited, 202 (30%) had little or no contact with chest drains, for example those working in theatres and recovery; the specialist nurses in haematology, pain control, infection control, research and Macmillan nurses; those working in outpatients; plus some respiratory and paediatric units. Additionally, junior nurses in paediatrics are not permitted to remove chest drains. These factors contributed to the response rate being 266 (39.5%) out of 674 nurses. Nurses and doctors who have little or no contact with chest drains in their usual clinical area were still sent audit forms with the aim of capturing a response from those who may work in areas using chest drains through additional roles such as agency/locum work.

In total, there were 301 completed responses (266 nurses and 35 doctors) to analyse.

Clinicians were asked to state their clinical area. The responses revealed that, despite the comparatively low overall response rate, *all* clinical areas (adult and paediatric intensive care units, cardiology, cardiothoracic surgery, respiratory medicine and outpatients, haematology, histopathology, catheter labs, theatres and recovery, and research laboratories) plus individual specialists, were represented. Conditions for which the drain was *in situ* included varying cardiac, respiratory and post surgical thoracic conditions (pneumo-, haemo- and chylothorax, pleural effusion, empyema, post surgery).

RESULTS

Analgesia use

Nurses were asked to state which type of analgesia they administered prior to chest tube removal and doctors were asked to state what analgesia they prescribed for chest tube removal and used for chest tube insertion. Neither profession stated whether analgesia or anti-inflammatory medication was given whilst the drain remained *in situ*. Currently there are no guidelines or protocols on individual patient pain assessment and analgesia use related to chest drainage.

The use of 56 different combinations of analgesia for tube removal were reported by the 266 nursing respondents. Ten of these are given as examples in Table 1: 10 examples (out of 56 combinations) of analgesia given by nurses prior to chest tube removal. The 35 doctors reported the use of 22 different combinations of analgesia for chest tube removal. Finally, 10 (3.8%) nurses and 4 (11.4%) doctors said they did not give any analgesia for tube removal.

Morphine sulphate – 1–2 mg, 0–15 minutes prior to tube removal – was the most widely adopted treatment, given by 29 (10.6%) nurses. The next most popular treatment was two co-codamol or co-proxamol tablets, 20–60 minutes prior to removal, given by 23 (8.6%) nurses. The 44 other combinations were each administered by <6% of nurses (i.e. fewer than 16 nurses). The doctors did not have a 'most popular' combination. Each of the 22 combinations was administered by <6% of the doctors responding (i.e. fewer than 2 doctors per combination). These results indicated that further analysis of pain control is required and emphasised the need for the establishment of a pain control programme for chest drain removal.

The type of analgesia required should be determined by nursing and medical staff after careful assessment of, and in accordance with, the patients' pain tolerance while the drain has been *in situ* (Avery, 2000). Entonox was not used despite Gallon (1998) stating that patients are usually given entonox for analgesia during drain removal. Bryden *et al.* (1997) reported that inhalational analgesia provides effective pain relief for the removal of chest drains after cardiac surgery; however, entonox use with isoflurane 0.25% was demonstrably more effective than entonox alone for removal of the second drain, but not the first drain. Payne *et al.* (1991) reported no significant reduction in pain and an increase in diastolic blood pressure, when using entonox as a supplement to local anaesthesia for minor surgical procedures; and Arfeen *et al.* (1994) observed an appreciable incidence of arterial desaturation during entonox use by women in labour.

Patients who received Ketorolac seemed to experience reduced pain intensity (Puntillo, 1996) and Carson *et al.* (1994)reported that, although pain intensity was not reduced with lidocaine, the patients' experience was improved. The use of eight different doses of

Table 1. Ten examples (out of 56 combinations) of analgesia given by nurses prior to chest tube removal

Analgesia, dose and time given prior to removal of chest tube	% of nurses who gave this combination
Morphine 1–2 mgs 0–15 mins prior	10.6% (n = 29)
Morphine 30 mgs 30 mins prior	0.4% (n = 1)
Tramadol 100 mgs 20–30mins prior	3.8% (n = 10)
Oramorph 10–20 mgs 30 mins prior	2.8% (n = 7)
Pethidine 50–100 mgs 15–30 mins prior	2.8% (n = 7)
Xylocaine 1%–2% 10mls 10–20mins prior	0.4% (n = 1)
Cocodamol/Coproxamol. 2 tabs. 20–60 mins prior	8.6% 9 (n = 23)
Voltarol 100 mgs 30–60 mins prior	0.7% (n = 2)
Lidocaine&Pethidine ?dose 10–20 mins prior	5.7% (n = 15)
None	3.8% (n = 10)

Tramadol (non-proprietary)
Oramorph (Oramorph, Boehringer Ingelheim, Berkshire, UK)
Pethidine (non-proprietary)
Xylocaine (AstraZeneca, Hertfordshire, UK)
Voltarol (Voltarol, Novartis,Surrey, UK)
Diamorph (non-proprietary)

1% and 2% lidocaine local anaesthetic, given prior to tube insertion, were reported: for example, seven doctors (20%) used 2–5 ml of 1% lidocaine, while three (8.6%) used 10–20 ml of 2% lidocaine. Tomlinson and Treasure (1997) recommend that 10 ml of 2% lidocaine should be used, giving two to five minutes for it to take effect. Wong and Pasero (1997) suggest buffering the lidocaine with sodium bicarbonate prior to use, to reduce burning and stinging. The British Thoracic Society Guidelines state that adequate analgesia – either oral or intramuscular (IM) – should be administered all the time the drain is *in situ* (Miller and Harvey, 1993), and Gross (1993) advises that an opioid analgesic should be administered prior to insertion. Published research on the benefits of analgesia used prior to or on insertion, whilst the tube is *in situ* and for tube removal, is inconclusive.

Tube size and drainage volume

Fifteen doctors (42.9%) reported that they based their choice of tube size on patient size and 12 (34.3%) chose tube size according to the nature of the fluid to be drained. Four doctors (11.4%) reported using larger bore tubes for viscous fluids or effusions or for failure of expansion with a smaller tube. One doctor (2.9%) reported using smaller bore tubes for pneumothoraces, whilst two other doctors (5.7%) used >28F French (28F) Gauge for adults routinely. Three doctors (8.6%) based their decision on the amount of fluid they anticipated needed to be drained, while one (2.9%) used whatever drain size was available. These results reflected the variation of current practices. The Royal Brompton Hospital (RBH) surgical intensive care unit manual recommends 24F for the average male for pneumothoraces and size 28F for haemothoraces (RBH Surgical Intensive Care Manual, 1994), though this is not evidence-based.

Problems with drainage occur when tubing becomes coiled, looped or clotted and literature recommends shortening tubing to suit the individual patient (Schmelz *et al.*, 1999). Also, the longer the length of the tubing, the more tubing there is to clear clots from/strip thereby increasing intrathoracic pressures (Gordon *et al.*, 1997; Duncan and Erickson, 1982).

Nine doctors (25.7%) reported that they did shorten tubing to suit the needs of their individual patients; 17 (48.6%) said they did not. The remainder (25.7%) did not give an answer.

Nurses were asked to document which factors impair drainage. Almost all nurses (97.4%) reported that drainage is impaired when tubing is kinked or when the bottle is full. Other factors mentioned were: tubing being coiled on the floor – by 56 nurses (21.1%); coiled on the bed – by 60 (22.6%); or looped – 54 (20.4%). The latter factors arise in the literature most often, and are caused primarily by tubing that has not been shortened to suit the individual patient, or if the patient is sitting in a low chair and the tubing is left coiled on the floor. Tubing should be lifted every 15 minutes, if dependent looping cannot be avoided (Schmelz *et al.*, 1999). Ideally the tubing should be laid across the bed or chair before dropping vertically to the drainage bottle. The tubing should be tailored to each patient's needs, allowing room to manoeuvre, but preventing loop formation (Avery, 2000). Laboratory simulation has demonstrated that dependent loops in tubing impede drainage, which predisposes patients to pleural effusions, impaired gas exchange and infection (Gordon *et al.*, 1997). The literature shows a bias towards maintaining straight tubing; however, the evidence base is limited.

Doctors were also asked to state how they determined 'acceptable or unacceptable drainage' in their patients. Five doctors (14.3%) stipulated specific volumes (e.g <25 ml per hour post coronary artery bypass grafting surgery or <10 ml in 24 hours for thoracic drainage). Ten doctors (28.6%) looked for chest X-ray improvements, five (14.3%) swinging or bubbling and seven (20%) improvements on clinical examination.

Suction

A large majority (89%) of the nurses stated that the vacuum setting controlled the level of suction applied to the drain, and 237 (40%) stated that the amount of fluid in the drain had an effect on the level of vacuum. Twenty-nine nurses (10.9%) cited patient position, 45 (17%) drain type and 34 (12.8%) tubing position as having a role in vacuum level. However, the literature suggests that all of these factors influence vacuum level. Enerson and McIntyre (1966) conclude that a suction source is not needed because the hydrostatic column of fluid in tubing causes negative pressure to –100 cm H_2O and Munnell (1997) concludes that resistance to drainage increases as fluid accumulates in the drain.

Doctors were asked to state what level of suction they would apply to a drain. Responses varied from no suction at all up to –10 kpa or –10 cm H_2O. Units used were kilopascals (kpa), centimetres of water (cm H_2O), millimetres of mercury (mmHg) and atmospheres (ATMs). Eleven doctors (31.6%) applied between –2 and –10 kpa, with the majority of those applying –5 kpa. Six doctors (17.1%) applied no suction. Three (8.6%) applied between –5 and –10 cm H_2O. Others applied –3 to –5 mmHg or –3 to –4 ATMs. Units of measurement used are not equivalent: for example, –4 ATMs is equivalent to –405 kpa, for example (Science Made Simple, 1966). Bar-El *et al.* stress that pleural drainage systems may exert excessive and dangerous high negative pressures if high airflow is utilised (Bar-El *et al.*, 2000).

There is no consensus in the literature on how much suction should be applied, although the most commonly used pressure is about –5 kpa (Avery, 2000) or –20 cm H_2O (Munnell, 1997). 'Too little' suction prevents lung expansion, increasing the risk of tension

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pneumothorax, fluid accumulation and infection, and 'too much' suction perpetuates an air leak and causes air stealing, where the flow of air through the lung and into the drainage system is too rapid for adequate oxygenation to occur. This can lead to hypoxia and lung entrapment (Tang *et al.*, 1999). Some research seems to show that the length of time that the chest tube is *in situ* is shorter with suction than without (Yeoh *et al.*, 2000); however, with the dearth of evidence, inferences for practice remain inconclusive.

Changing the bottle, clamping, milking and stripping

More than three-quarters of nurses (78.9%) would clamp a drain in order to change the bottle, 147 (55.1%) would do so to disconnect drains, 86 (32.5%) post pneumonectomy, 70 (26.4%) to clear tubing and 49 (18.5%) for patient transfers.

Harriss and Graham (1991) advise that drains should never be clamped, because air is prevented from leaving the pleural space, which may cause pneumothorax. There is no need to clamp the tubing if care is taken when mobilising and transporting patients and the principles of good chest drain management are adhered to (Harriss and Graham, 1991). Drains should be clamped only when changing bottles over, or after accidental disconnection, and should be unclamped as soon as possible, according to Brandt *et al.* (1994). The British Thoracic Society guidelines also discourage clamping, as quoted by Yeoh *et al.* (2000).

The majority of nurses (81.9%) reported changing the bottle when it became full, 110 (41.5%) changed the drain according to length of time *in situ* and 77 (29.1%) changed the tubing if it became blocked. Munnell (1997) reported that, as fluid collects in the bottle, resistance to drainage increases, implying that collection bottles should not be left until they are full.

This audit also revealed that in some cases a bottle is removed to take a measurement, or changed because it is unpleasant to look at, both of which may increase risk of infection and also cost. Huang *et al.* (1999) found no significant differences in infection rates or length of stay between patients whose drainage bottles were changed every 72 hours compared to 24 hours and Hornick (1992) concluded that bottles could stay in place for up to six days.

Ninety-two nurses (34.7%) and two doctors (5.7%) used the roller clamp to clear clots from the tubing. There is an ongoing debate surrounding intrathoracic pressure changes and lung damage caused by stripping (Duncan and Erickson, 1982; Isaacson and Brewer, 1986; Lim-Levy *et al.*, 1986). Almost two-thirds (63%) of nurses and 10 doctors (28.6%) said that they 'milked' and shook the tubing to clear clots, as recommended by the Royal Marsden Manual of Clinical Nursing Procedures (Mallett and Bailey, 1996). Twenty-five nurses (9.4%) would change the bottle over completely, while 56 nurses (21.1%) and six doctors (17.1%) would disconnect and flush the tubing if it was blocked. The Royal Marsden Manual of Clinical Nursing Procedures (Mallett and Bailey, 1996) recommends disconnection only if there is risk of total tube blockage. Although bottle change may be necessitated daily, breaking the closed system is not recommended as it provides a portal for entry of bacteria, and should therefore be kept to a minimum (Mallett and Bailey, 1996). Welch (1993) states that milking and stripping are harmful and can result in lung damage even from a small amount of negative pressure. Avery (2000) advises replacing blocked tubing to avoid milking and Gallon recommends milking drains regularly using specialised rollers (Gallon, 1998). Lim-Levy *et al.* (1986) conducted a trial where males, post surgery, had their drains either stripped, milked or neither. They found no differences and concluded that milking or stripping is unnecessary providing tubes are positioned appropriately (to avoid dependent loop formation). Literature pertaining to clamping, milking and stripping chest tubes is contradictory and inconclusive.

Drain security and dressings

Members of both professions were asked to report on any methods used to secure the chest tube to the patient and the drain bottle tubing to the patients' chest tube. Seventy-eight nurses (29.4%) reported using tape between the chest drain bottle tubing and the chest tube itself, whilst 148 (55.8%) did not secure connections. In contrast, seven doctors (20%) used tape to secure the drain in place; 24 (68.6%) used anchoring sutures; nine (25.7%) used a dressing and 12 (34.3%) used purse string sutures. The Royal Brompton Hospital Surgical Intensive Care Manual (1994) recommends the use of the mattress suture. Whilst it could be argued that the connections are usually secure and 'tight' enough, there has been an ongoing debate in the literature as to whether connections require 'added' security or not. What is known is that without any additional method of security, such as tape, the risk of disconnection does exist. A further issue is that connections which are taped may become disconnected under the tape allowing air to enter unnoticed (Godden and Hiley, 1998; RBH Nursing Policies and Guidelines Group, 1999).

Nurses were also asked about dressings which were put in place by doctors after insertion of the chest tube; dressings which they used themselves after tube removal; and, under what circumstances would they change dressings?

Results showed that 25 different combinations of dressings are being used on chest drains after insertion. Figure 1 illustrates the most popular dressings being used. Combinations of dressings used include use of Lyofoam and Sleek, ribbon gauze, Allevyn and Tegaderm. Whilst 166 nurses (62.2%) reported that doctors applied a simple dry dressing such as Mepore, the use of additional dressings by doctors has highlighted

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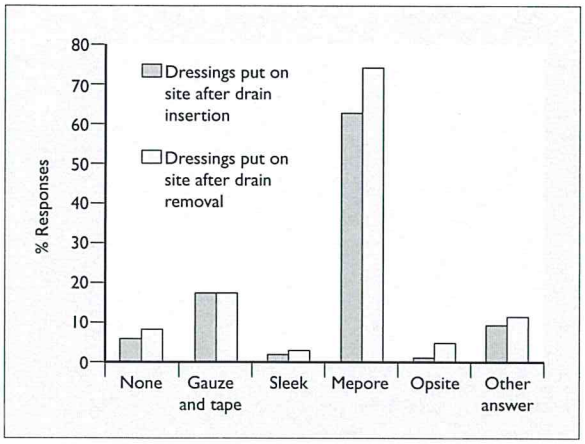

Figure 1. *Dressings used on chest drain site.*

questions of cost, knowledge of dressing types and their usage and patient comfort. A simple dry dressing (Mepore) was the preferred choice of dressing post drain removal (Figure 1). Other options were used, but dressing choice post removal was less diverse than dressing choice after insertion of the drain.

The audit illustrated that 227 nurses (85.3%) changed dressings because they were soiled, 157 (58.9%) because they were peeling off and 201 (75.5%) because the drain was being removed. Fewer nurses (40%) indicated that they changed the dressing due to the length of time it had been *in situ* or because it was an inappropriate dressing (37.4%).

There is no published evidence relating to appropriate dressings for use on chest drain sites after insertion or removal. Some studies recommend occlusive dressings, others paraffin gauze, others Betadine or bacteriostatic ointment (Godden and Hiley, 1998). A small, dry, non-adherent surgical dressing, with an adhesive border, that avoids heavy strapping and does not restrict chest movement, is recommended by Welch (1993). Avery (2000) advises that, post drain removal, a simple dry dressing is sufficient if sutures are tight and secure; dressings should be changed every 48–72 hours and the site kept clean and dry (Tang *et al.*, 1999). However, the Royal Marsden Manual of Clinical Nursing Procedures recommends gauze with Collodion strapped in place to create a seal (Mallet and Bailey, 1996). The literature therefore is inconclusive and does not inform practice.

Removal of chest drains

The Nursing Policies and Guidelines Group document on 'Procedure for the removal of under water seal chest drains' (RBH, 1999), states that patients should be instructed to do Valsalva's manoeuvre (VM) (McGuire, 1950). Seventy-two of the nurses (27.1%) and three doctors (8.6%) instructed their patients in carrying out this manoeuvre. Reasons for omitting the VM may have been either because the patient was unable to do the manoeuvre owing to postoperative pain and incapacity, and/or because of the potentially detrimental effects of the manoeuvre which have been identified (McGuire, 1950; Hoshiko, 1990; Metzger and Therrien, 1990). Four doctors (11.4%) and seven nurses (2.6%) did not give any instructions to their patients.

Nurses most commonly instruct their patients to 'breathe in and hold', i.e. to take three deep breaths and to hold their breath as the drain is removed. Conversely, it is more common amongst doctors to instruct patients to 'breathe out and hold' (see Figure 2). From a study looking at risk of recurrence of pneumothorax associated with tube removal at end-inspiration compared to end-expiration, Bell *et al.* (2001) concluded that both methods are safe.

The literature suggests that to prevent recurrent pneumothorax (Gallon, 1998), and to minimise risk of pleural air entry during drain removal (Tang *et al.*, 1999), patients should be told to take a deep breath and hold it while the drain is being removed or alternatively instructed to perform the Valsalva's manoeuvre (McMahon-Parkes, 1997). Tang and colleagues' survey on chest drain management by consultants specialising in chest medicine (CM), general surgery (GS), accident and emergency (A&E) and cardiothoracic surgery (CTS), reported that more consultants in GS and CTS prefer to use Valsalva's manoeuvre than consultants in CM and A&E (Tang *et al.*, 1999). The Royal Marsden Manual of Clinical Nursing Procedures guides nurses to instruct patients to 'inspire and hold their breath' (Mallet and Bailey, 1996). Referring to published literature, Welch (1993) states that authors usually recommend Valsalva's manoeuvre.

There is conflicting evidence on the safety of Valsava's manoeuvre. While the VM is safe for most people, negative effects have been reported for persons with cardiac pathology, aneurysms, neurosurgery or opthalmic surgery. Some of the dangers reported as resulting from VM are cardiac arrhythmias (Herman, 1987; Nishimura and Tajik, 1986), haemorrhage or rupture of aneurysms (McGuire *et al.*, 1950; Mitchell, 1986; Katz and Carmody, 1985). An additional danger from VM may be the precipitation of a pulmonary embolism (Hoshiko, 1990). Kotrly *et al.* (1980) observed that heart rate and pulse pressure changes are greater when the VM is performed in the sitting as opposed to the supine position. This observation may have implications for practice because it is often the

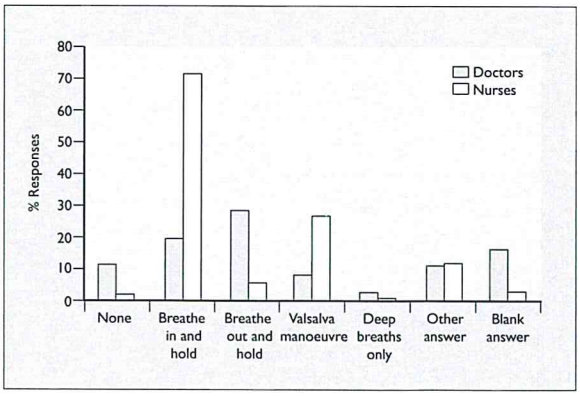

Figure 2. *Breathing instructions given for drain removal.*

case that patients are in the sitting position, being encouraged to perform the VM, whilst drains are being removed.

There is no consensus on any optimum breathing technique used for chest drain removal in the literature.

Doctors were asked to state whether a post drain removal chest X-ray had been performed. Almost all doctors (93.4%) performed a post drain removal chest X-ray. This may be unnecessary and cost-inefficient if post drain removal complications are low and if a pre-discharge chest X-ray is performed routinely anyway. Also, nurses were asked to state at how many days post drain removal the purse string sutures were removed. Answers varied between two and 14 days; however, 98 nurses (36.8%) reported that sutures were removed on day five. No reasons, e.g. infection, were given for leaving sutures *in situ* for two weeks despite this length of time having implications for length of hospital stay. Avery (2000) states that sutures should be removed five days after drain removal, although this is not evidence-based.

CONCLUSION

The findings of this audit demonstrated a wide diversity of views and practices about the management of chest drains. A concurrent review of chest drain literature has highlighted the large volume of published literature that contains subjective experiential recommendations, rather than evidence-based inferences. The audit has succeeded in raising more questions than it has answered.

There is a clear need for research development in the areas of practice with greatest diversity, which seem to be:

- analgesia use
- chest tube size and drainage volumes
- suction level
- drain bottle changes plus milking, stripping and clamping tubes
- drain security and dressing use
- chest tube removal practices.

It is important that an evidence-based approach is applied to both the care of the patient and the management of the drainage equipment to ensure patient comfort and drainage efficiency. Only specialists in this field, collating their expert knowledge, can achieve best practice. The introduction of multidisciplinary protocols and/or guidelines may minimise the confusion resulting from conflicting theories and help to standardise practice across the professions.

These audit results reflect the diversity in practice within only one institution; however, the literature review and audit results collectively highlight the wider need for more evidence-based management within the specific area of chest drain practice. Until evidence can be provided, however, it will be impossible to standardise practice within and across the professions using evidence-based guidelines. At this institution, several research studies are underway with the intention of addressing the lack of evidence base. These are: a double-blind randomised study of morphine sulphate, tramadol and ketoralac use for chest drain removal; a randomised controlled study to evaluate the haemodynamic effects of Valsalva's manoeuvre versus the 'inspire and hold' technique during chest drain removal; and finally the development of a prototype artificial thorax which will be used to investigate conditions that affect drainage (tube positioning, suction levels, fluid level in the collection chamber and so on) under controlled laboratory conditions. This last project is designed with the aim of identifying specific criteria, that if adhered to by clinicians, would mean that optimal conditions for drainage had been applied to the patient.

The development of guidelines on a national scale would facilitate linear practice across the professions and across institutions. For the present, however, each institution must evaluate and/or develop their own guidelines based upon the personal experiences and professional knowledge of their clinicians.

ACKNOWLEDGMENTS

The following people contributed to this retrospective audit of chest drain practice: Joy Godden, Senior Nurse for Surgery (Pilot Study); Andrew Parkin, Research Assistant/Medical Student (Data Collection and Data Entry) and the nurses and doctors who completed the audit.

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