The nursing management of chest drains: a systematic review

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Authors' objectives
To present the best available evidence related to the nursing management of chest drains.

Searching
MEDLINE, CINAHL, Current Contents, the Cochrane Library, EMBASE, Expanded Academic ASAP and PsycLIT were searched using the keywords 'chest near tube', 'chest near drain', 'pleural near tube', 'pleural near drain', 'thoracic near tube', 'thoracic near drain' and 'underwater near seal near drain'. The reference lists of all identified studies and review papers were examined.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion. Ultimately, findings from other study designs were also discussed.

Specific interventions included in the review
Studies of interventions related to the management of chest drain dressings, tubing, drainage units, disconnection and removal were eligible for inclusion. Interventions related to the promotion of drainage, the promotion of lung expansion, the minimisation of complications and the promotion of patient comfort were considered. The included studies investigated the manipulation or not of chest drain tubing, including milking versus stripping, and the Quick Relaxation Technique during chest drain removal.

Participants included in the review
Studies in hospitalised adults or minors (under 18 years) with chest drains were eligible for inclusion.

Outcomes assessed in the review
The primary outcomes of interest were those related to the following:

the promotion of drainage, such as the amount of fluid drained and the presence of clots in the tubing; lung expansion, such as the presence of bilateral breath sounds and the absence of fluid fluctuations in the drainage unit;

patient comfort, such as the incidence and intensity of pain; and

the minimisation of complications such as infection, pneumothorax and impairment of cardiovascular function.

How were decisions on the relevance of primary studies made?
All studies identified through the database searches were assessed for relevance based on the title and abstracts. The studies identified from reference list searches were assessed from their title. The author does not state how many people performed the selection.

Assessment of study quality
A critical appraisal form (available in the report) was used to assess randomisation; whether cointerventions, outcome measurement and baseline characteristics were similar between the groups; blinding; and adequacy of follow-up. Two people assessed methodological quality using a standard form (available in the report). The author does not state whether this was done independently, or how any disagreements were resolved.

Data extraction
Two reviewers extracted the data using a data extraction form (available in the report). The author does not state whether this was done independently, or how any disagreements were resolved. Data were extracted on the author, journal and year of the study; method, setting and participants; interventions; outcome measures; results; and conclusions.

**Methods of synthesis**

How were the studies combined?

A narrative summary was presented because a statistical pooling was inappropriate.

How were differences between studies investigated?

The studies were grouped according to which review question matched their major focus. The broad groups were dressings, tubing, drain bottle/unit, disconnection, and removal of chest drains. Differences in the population, intervention and outcome measures within the groups could be examined from the tables. The results from the individual studies were shown in forest plots.

**Results of the review**

Four RCTs (n=469) that addressed review questions about chest drain tubing, and one RCT (n=24) that addressed a review question about removal of the chest drain, were included. Ultimately, indirect evidence from RCTs and other study designs also contributed to the results.

Dressings.

No RCTs were found that addressed the question of what type of dressing should be used around the insertion site, or how often they should be changed. Only discussion papers were retrieved.

Chest drain tubing.

Four RCTs (n=469) compared milking with stripping. One trial in adult men undergoing coronary artery bypass (n=49) indicated that chest tubes remained patent with or without milking or stripping, and showed no significant difference in total drainage volume, heart rate or arrhythmias. A trial in adults who had undergone myocardial revascularisation (n=200) showed no statistically-significant difference in cardiac tamponade or surgical re-entry, and no clinically significant difference in total drainage or the number of manipulation episodes. A trial in adult cardiac surgical patients (n=204) showed no significant difference in mediastinal or thoracic output. A small trial in paediatric (3 to 21 years) oncology patients (n=16) showed no significant difference in the frequency of pain, incidence of fever, breath sounds or radiographic findings between patients whose tubes were not stripped and those whose tubes were stripped. No RCTs were found that specifically addressed the effect of chest tube position on drainage.

Chest drain bottle or unit.

No RCTs were found that specifically investigated how often the chest drainage bottle or unit should be changed to minimise the risk of complications. No research evidence was found to inform the optimal position of the bottle to facilitate drainage.

Disconnection.

No RCTs were found that addressed whether tubing should be clamped after disconnection of the drainage bottle, or when moving a patient.

Removal of chest drain.

No RCTs were found that investigated the optimal patient position during removal of the drain. One small trial in aorta-coronary bypass surgery patients (n=24) investigated the optimal breathing pattern during removal to promote patient comfort. No significant difference in pain, measured on a visual analogue scale, was shown between the Quick Relaxation Technique plus analgesia versus analgesia alone.
Authors' conclusions
There is a need for rigorous research in all areas relating to the nursing management of chest drains.

CRD commentary
The range of interventions eligible for inclusion in this review was very broad and reflected the imprecise objective. The inclusion criteria for the participants, interventions, outcomes and study design were stated, as was a list of specific questions to be addressed. However, the lack of evidence from RCTs ultimately led to the inclusion of studies that did not meet the stated inclusion criteria, which becomes apparent only on reaching the results section. The included studies were presented adequately in tabular format, but there was no clear distinction between those that met the pre-stated inclusion criteria and those that were additional inclusions. Since the review methods reported refer only to the study design stated in the inclusion criteria (i.e. RCTs), this abstract summarises only the results from RCTs, and only those that actually addressed the stated review questions.

The search for studies was fairly comprehensive and included appropriate sources, but it might have missed unpublished studies. The search dates were not reported, nor whether there were any restrictions on language. It is not explicit whether the studies were selected for inclusion by one or more than one person independently; this, and the inclusion of studies outside of the stated inclusion criteria, raises questions about selection bias. Validity was assessed using appropriate criteria for RCTs but the results were not shown or reported. Validity was not apparently assessed for the other study designs that were ultimately included. A hierarchy of evidence was used, but this does not obviate the need for appropriate validity assessment within each study design. A narrative summary of results was appropriate considering the clinical heterogeneity between the studies.

The author's conclusions do follow from the evidence presented. Since research evidence in this area is very weak, a more specific statement about future research needed in the light of this review would have been very useful.

Implications of the review for practice and research
Practice: The author did not state any implications for practice, but did highlight the many variations in current practice.

Research: The author states that there is a need for rigorous research in all areas relating to the nursing management of chest drains, and that nursing management of chest drains in minors requires urgent research.

Bibliographic details

Other publications of related interest

Indexing Status
Subject indexing assigned by CRD

MeSH
Chest Tubes; Drainage /nursing /instrumentation; Evidence-Based Medicine

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**Record Status**
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.