Evaluation of the literature on the effectiveness of physical therapy modalities in the management of children with cystic fibrosis

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Authors' objectives
To critically and objectively appraise the evidence that supports or refutes the use of various physical therapy modalities in the management of children with cystic fibrosis.

Searching
MEDLINE and Cumulated Index Medicus were searched from 1969 to 1992; no search strategy was provided.

Study selection
Study designs of evaluations included in the review
Studies were assessed on four inclusion criteria: (1) an adequately large sample size; (2) a methodology that was reproducible and had face validity; (3) sufficient length to determine immediate and long-term effects of physical therapy treatment; and (4) the use of outcome measures that were appropriate in determining the effectiveness of physical therapy modalities. Three criteria had to be met for the study to be included. The follow-up period of the studies varied from 13 days to 36 months.

Specific interventions included in the review
The physical therapy modalities evaluated were conventional physical therapy (percussion, vibration and postural drainage), exercise, forced expiratory technique (FET), positive expiratory pressure (PEP) mask, autogenic drainage and directed coughing.

Participants included in the review
Children aged up to 18 years with cystic fibrosis.

Outcomes assessed in the review
Outcome measures for the effectiveness of physical therapy were the forced expiratory volume in 3 seconds (FEV3) and the forced expiratory flow from 25 to 75% of the exhaled volume (FEF 25-75%). Fair outcome measures of effectiveness were forced expiratory volume in 1 second (FEV1), ratios of FEV1 and forced vital capacity (FEV1/FVC) for long-term pulmonary status, and radiological results.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
Study validity was assessed using an adaptation of Sackett's levels (1 to 5) and grades (A to C) of evidence (see Other Publications of Related Interest). The levels of evidence were: level 1, randomised trials with statistically significant evidence supporting or refuting the use of a given treatment, using conventional treatment as a control; level 2, randomised trials whose results are not statistically significant; level 3, non-randomised concurrent cohort comparisons between contemporaneous patients who did and did not receive the treatment; level 4, non-randomised historical cohort comparisons between current patients who did receive a specific treatment and former patients who did not; level 5, case studies without controls. Grade A evidence is supported by at least one level 1 trial, Grade B by at least one level 2 trial, and Grade C by level 3,4 or 5 trials. The authors do not state how the papers were assessed for validity, or how many of the authors performed the validity assessment.
Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction.

Methods of synthesis
How were the studies combined?
A narrative synthesis was undertaken using the adapted form of Sackett's levels and grades of evidence.

How were differences between studies investigated?
No tests for heterogeneity were undertaken on the primary studies, though subgroup analyses were performed for patients with either the acute or chronic form of cystic fibrosis.

Results of the review
Twelve studies (268 patients) met the inclusion criteria.

The evidence for treatment of children with cystic fibrosis during the acute state of the disease as assessed through pulmonary function test (PFT) was: (1) use of PEP mask, Grade C; (2) conventional physical therapy, Grade C; (3) replacement of 2 of 3 conventional physical therapy sessions per day with a moderate cycling exercise programme, Grade B; (4) directed coughing and conventional physical therapy not significantly different, Grade B.

The evidence for the treatment of children with cystic fibrosis during chronic state of the disease as assessed through PFT was: (1) conventional physical therapy prevents deterioration in pulmonary function, Grade C; (2) FETs alone, compared to FETs and conventional physical therapy, had significantly greater decline in PFTs, Grade A; (3) PEP masks were as effective as conventional physical therapy in improving PFT, Grades B and C; (4) exercise was an effective treatment modality, Grade C.

Authors' conclusions
The review evidence suggests: (1) conventional physical therapy and the PEP mask are effective in the treatment of children with cystic fibrosis during acute and chronic states; (2) FET is not effective as the sole treatment modality during the chronic state; (3) directed coughing is an adequate modality to use during an acute episode; (4) there is no evidence to support or refute the use of autogenic drainage in the acute or chronic state; and (5) exercise is an effective treatment modality in the chronic state, and in conjunction with postural drainage during the acute state.

CRD commentary
The review includes some elements of a systematic approach, but the exclusion of specific information weakens the rigour of the methodology. The objective of the review, its interventions and participants, inclusion and quality criteria are stated fairly clearly. Less apparent are the actual outcome measures used, although many are discussed. Inclusion and quality criteria are outlined, but their suitability and application are not considered. Similarly, methods of data extraction are not discussed. No mention of heterogeneity is made in the review, though a subgroup analysis is undertaken. No cost information is provided. The literature search would benefit from information on the strategy used. Information on the 12 studies is provided, but there is a lack of data on patient characteristics and drop-out rates. In developing the recommendation for physical therapists contained in the conclusions, some element of caution should be included about the limitations of the evidence which are outlined in the discussion section of the review.

Bibliographic details

Other publications of related interest
Sackett DL, Hayes RB, Guyatt GH, Tugwell P. Clinical epidemiology. A basic science for clinical medicine. 2nd ed.
Indexing Status
Subject indexing assigned by CRD

MeSH
Autogenic training; Child; Cough; Cystic Fibrosis; Drainage, Postural; Forced Expiratory Volume; Physical Therapy Modalities; Positive-Pressure Respiration

AccessionNumber
11994005108

Date bibliographic record published
30/04/1997

Date abstract record published
30/04/1997

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.