

## Respiratory therapy in pleural empyema. A systematic review of the literature\*

MURILO CARLOS AMORIM DE BRITTO<sup>1</sup>, MARIA DO CARMO MENEZES BEZERRA DUARTE<sup>2</sup>,  
SILVIA MARIA MENDES DA CONCEIÇÃO SILVESTRE<sup>3</sup>

### ABSTRACT

Some techniques used in respiratory therapy are not based on sound scientific evidence. The misuse of such techniques can be harmful in terms of adverse effects and may not be cost-effective. A systematic review of the literature was performed using the Oldmedline, Medline, Cinahl and Lilacs databases, as well as the registry of clinical trials registered by the Cochrane Library and National Institutes of Health. The focus of the review was on trials addressing the efficacy of respiratory therapy in treating pleural empyema in children, adolescents and adults. No such trials were found. We can conclude that there is a lack of data regarding the efficacy of respiratory therapy in pleural empyema. In order to provide such data, clinical trials are warranted.

**Keywords:** Empyema pleural/rehabilitation; Evidence-based medicine; Physical therapy techniques; Review [Publication Type]; Randomized controlled trials

---

### INTRODUCTION

Respiratory therapy came onto the scene in 1901, when the benefit of postural drainage in the treatment of bronchiectasis was reported.<sup>(1)</sup> At that time, decisions made in daily clinical practice were based on data from scientific studies that were, in the majority, conducted using rudimentary methods, on the current knowledge of the physiopathology of the disease in question, on personal experience, on information obtained from

textbooks and on the opinions of professors or experts. That modus operandi certainly would not suit the needs of the modern health professional. There are those who explicitly follow the paradigms of evidence-based medicine, and there are others who are less rigid. For those in either category, research has evolved, and scientific information has grown in recent years such that physicians, physical therapists and other professional in the

---

\*Study conducted at the Pernambuco Mother and Child Institute, Recife, Pernambuco, Brazil.

1. PhD in Public Health. Pulmonologist Pediatrician at the Pernambuco Mother and Child Institute, Recife, Pernambuco, Brazil

2. Masters in Mother-Child Health, Intensivist Pediatrician at the Pernambuco Mother and Child Institute, Recife, Pernambuco, Brazil

3. Masters student in Mother-Child Health at the Pernambuco Mother and Child Institute, Recife, Pernambuco, Brazil; Pediatrician at the Children's Hospital of Luanda, Luanda, Angola

Correspondence to: Murilo Carlos Amorim de Britto. Rua dos Coelhos, 300, CEP: 50070-550. Cx. Postal 1.393. Boa Vista, Recife, PE. Tel.: 55 81 2122-4147. E-mail: murilo.britto@bol.com.br; home page: <http://www.imip.org.br>

Submitted: 2 May 2005. Accepted, after review: 18 May 2005.

area must maintain a critical attitude and keep their knowledge up to date in terms of the interventions that they implement.

The objective of respiratory therapy is the removal of secretions from the airways, thereby reducing bronchial obstruction and airway resistance, facilitating gas exchange and reducing respiratory effort. In acute affliction, respiratory therapy aims to shorten the duration of the disease or of the functional repercussions. In chronic diseases, the aim is to retard or prevent disease progression.<sup>(2)</sup>

According to textbooks on pediatrics and pulmonology, the treatment of pleural empyema consists of support measures, pleural drainage and antibiotic therapy targeting the prevalent etiologic agents. However, there are no consistent guidelines for the use of respiratory therapy.<sup>(3-5)</sup> A recent review of the literature regarding respiratory therapy in pediatric patients did not list empyema as an indication for respiratory therapy.<sup>(2)</sup> Nevertheless, in routine practice, most children and adolescents with empyema receive respiratory therapy. Based on these observations, we conducted a systematic review of the literature dealing with the efficacy of respiratory therapy in pleural empyema.

## METHODS

Since randomized trials are the best research tool for testing the efficacy of an intervention, and randomization is the most efficacious means of minimizing biases, we sought out studies of that nature, as well as other reviews of randomized trials.<sup>(6)</sup> We decided to select the trials according to the criteria established by Jadad et al., which classifies studies by allocation concealment, masking, and losses during the follow-up period.<sup>(7)</sup>

Since no studies involving children and adolescents were found in the initial phase of the search, we opted not to restrict our search to articles involving any particular age group. Therefore, studies involving adults were included, which allowed the review to be more comprehensive.

We included studies that compared patients receiving respiratory therapy with those not receiving such therapy.

We conducted a systematic review of the literature, seeking out clinical trials related to respiratory therapy used to treat pleural empyema in the following databases: PubMed - a service of

the National Library of Medicine that furnishes citations for biomedical articles published since the 1950s, including the databases OLDMEDLINE (the first medical database, which encompasses the fields of medicine, nursing, odontology and veterinary medicine, and well as the health care system and preclinical sciences, covering the period from 1951 to 1965) and MEDLINE (the successor to OLDMEDLINE, covering the period from 1966 to the present); CINAHL - a database dealing with nursing and related health care fields (compiled since 1982); LILACS - database of Latin American and Caribbean Health Sciences Literature (compiled since 1982); The Cochrane Library registry of clinical trials; and the National Institutes of Health registry of trials. The search was conducted up through June of 2004. The search terms and syntaxes used to search for clinical trials in the PubMed, CINAHL and LILACS databases are shown in Chart 1. We also searched for other systematic reviews of the literature within the Cochrane Library database (using the term "pleural effusion" and on MEDLINE (using the terms "[pleural effusion] AND systematic[sb]"). We looked for articles in Spanish, English or Portuguese. We also contacted Brazilian pulmonologists and pediatricians via e-mail in an attempt to locate studies that were as yet unpublished or had been published in journals that have not yet been indexed.

The selected studies were added to a database in duplicate using the computer program, Review Manager. Each study was then checked and evaluated by two independent reviewers. The concordance between each pair of evaluations was determined by the Kappa test.

## RESULTS

In the search conducted, no studies meeting the pre-established criteria were found. Therefore, the meta-analysis could not be carried out.

## DISCUSSION

"'In my experience' is a phrase that usually introduces a statement of rank, prejudice or bias. The information that follows it cannot be checked, nor has it been submitted to any analysis other than some vague tally in the speaker's memory." - Michael Crichton, 1971.

In the present review, we determined that there

Chart 1 - Search strategy syntax used in searching the PubMed, CINAHL and LILACS databases for clinical trials regarding respiratory therapy as a treatment for pleural empyema

PubMed:  
 (pleural empyema) AND ((clinical[Title/Abstract] AND trial[Title/Abstract]) OR clinical trials[MeSH Terms] OR clinical trial[Publication Type] OR random\*[Title/Abstract] OR random allocation[MeSH Terms] OR therapeutic use[MeSH Subheading])

CINAHL:  
 (pleural and empyema and (trial\$ or random\$ or therapeutic\$)).mp. [mp=title, cinahl subject headings, abstract, instrumentation]

LILACS:  
 ((derrame AND pleural) AND (Pt randomized controlled trial OR Pt controlled clinical trial OR Mh randomized controlled trials OR Mh random allocation OR Mh double-blind method OR Mh single-blind method) AND NOT (Ct animal AND NOT (Ct human and Ct animal)) OR (Pt clinical trial OR Ex E05.318.760.535\$ OR (Tw clin\$ AND (Tw trial\$ OR Tw ensa\$ OR Tw estud\$ OR Tw experim\$ OR Tw investiga\$)) OR ((Tw singl\$ OR Tw simple\$ OR Tw doubl\$ OR Tw doble\$ OR Tw duplo\$ OR Tw trebl\$ OR Tw trip\$) AND (Tw blind\$ OR Tw cego\$ OR Tw ciego\$ OR Tw mask\$ OR Tw mascar\$)) OR Mh placebos OR Tw placebo\$ OR (Tw random\$ OR Tw randon\$ OR Tw casual\$ OR Tw acaso\$ OR Tw azar OR Tw aleator\$) OR Mh research design) AND NOT (Ct animal AND NOT (Ct human and Ct animal)) OR (Ct comparative study OR Ex E05.337\$ OR Mh follow-up studies OR Mh prospective studies OR Tw control\$ OR Tw prospectiv\$ OR Tw volunt\$ OR Tw volunteer\$) AND NOT (Ct animal AND NOT (Ct human and Ct animal)))

is a real lack of high-quality scientific evidence to support the use of respiratory therapy as a treatment for pleural empyema, be it in children, adolescents or adults. The only references that addressed this theme were those found in four textbooks, in which no studies evaluating the efficacy of such therapy were cited. Therefore, it only remains to explore arguments based on the experience of experts on the subject or of professionals in the area.

Even when the problems related to conclusions based on "personal experience" are taken into account, we are of the opinion that, in view of the paucity of better quality evidence, it is worthwhile to make reference to such conclusions. There is no justification for stating that cases of empyema in which drainage is not employed are, through compression or some similar mechanism, more rapidly resolved by respiratory therapy. It would also be illogical to think that respiratory therapy can accelerate the elimination of pus to a greater degree than that achieved through pleural drainage. The total time spent in respiratory therapy sessions is quite short in comparison to the overall duration of the disease, and a few minutes of treatment would not be significantly efficacious. In addition,

the tube used for drainage causes pain when there is friction with the pleura, thereby making the process of "expressing" the retained fluid more difficult.

If we extrapolate the evidence obtained in studies of acute uncomplicated pneumonia to pleural empyema, the conclusion would also be to recommend against respiratory therapy. In one randomized trial involving 54 adults, no benefit was found.<sup>(8)</sup> In a similar study, longer hospital stays and more bouts of fever were observed in patients submitted to respiratory therapy.<sup>(9)</sup> In a recent randomized trial involving children from one to twelve years of age and meeting all of the criteria for methodological quality established in the CONSORT Statement, it was demonstrated that the procedure significantly prolonged hospital stays and increased the frequency of fever.<sup>(10-11)</sup>

Neither is respiratory therapy innocuous. Even disregarding more aggressive therapeutic measures, such as noninvasive ventilation (currently included in the arsenal of professionals in the area), respiratory therapy can result in significant complications. It has been reported that respiratory therapy tends to provoke reflux, which can in turn

cause obstruction of the airways and aspiration pneumonia, as well as other complications.<sup>(12)</sup>

The cost of the treatment must also be taken into consideration. One session of respiratory therapy runs approximately 30 minutes and requires the presence of a licensed professional, as well as costly equipment (BiPAP, a flutter device, etc.). In addition, hospital materials (saline solution, bronchodilators, cleaning products, etc.) are consumed. The resources expended on these cases could be more judiciously allocated to patients suffering from illnesses in which respiratory therapy has been proven efficacious.

Despite the fact that, in our attempt to locate unpublished studies, we contacted individual who are specialists in the area, it is possible that our search was too narrow and that we therefore overlooked some relevant study that could have been included in our review. However, it has been shown that randomized studies whose results are favorable to the therapy evaluated therein have a greater chance of being published.<sup>(13)</sup> Consequently, it is more likely that any potentially overlooked or unpublished studies would have attested to the inefficacy of respiratory therapy and therefore would not have affected our findings.

Since we only sought studies published in Portuguese, Spanish or English, we cannot rule out the possibility of a language bias. Therefore, there might have been randomized trials published in other languages that were excluded. Despite these limitations, the present review provides a reasonably broad perspective on the subject.

Based on the outcome of this review, we can conclude that future randomized trials are warranted in order to evaluate the efficacy of respiratory therapy in pleural empyema in individuals of any age.

## REFERENCES

1. Moriyama LT, Guimarães MLLG, Juliani RCTP. Fisioterapia respiratória para crianças. In: Rozov T, editor. Doenças pulmonares em pediatria. Diagnóstico e tratamento. São Paulo: Atheneu; 1999. p.609-17.
2. Wallis C, Prasad A. Who needs chest physiotherapy? Moving from anecdote to evidence. *Arch Dis Child*. 1999;80(4):393-7.
3. Britto MCA, Falbo Neto GH, Ferreira OS, Bezerra PGM, Vilela PC, Alencar LF, et al. Derrame pleural. In: Figueira F, Ferreira OS, Alves JGB, editors. *Pediatria*. Instituto Materno Infantil de Pernambuco (IMIP). 2a editores. São Paulo: MEDSI; 1996. p.442-6.
4. Rodrigues JC. Derrames pleurais. In: Rozov T, editor. Doenças pulmonares em pediatria. Diagnóstico e tratamento. São Paulo: Atheneu; 1999. p. 233-44.
5. Winnie GB. Pleurisy. In: Behrman RE, Kliegman RE, Jenson HB, editors. *Nelson textbook of pediatrics*. 17th ed. New York: W B Saunders; 2003. p.1461-3.
6. Schulz KF, Grimes DA. Generation of allocation sequences in randomised trials: chance, not choice. *Lancet*. 2002;359(9305):515-9.
7. Jadad AR, Moore RA, Carroll D, Jenkinson C, Reynolds DJ, Gavaghan DJ, et al. Assessing the quality of reports of randomized clinical trials: is blinding necessary? *Controlled Clinical Trials*. 1996;17(1):1-12.
8. Graham WG, Bradley DA. Efficacy of chest physiotherapy and intermittent positive-pressure breathing in the resolution of pneumonia. *N Engl J Med*. 1978;299(12):624-7.
9. Britton S, Bejstedt M, Vedin L. Chest physiotherapy in primary pneumonia. *BMJ*. 1985;290(6483):1703-4.
10. Tartari JLL. Eficácia da fisioterapia respiratória em pacientes pediátricos hospitalizados com pneumonia adquirida na comunidade: um ensaio clínico randomizado [tese]. Porto Alegre: Faculdade de Ciências Médicas da Universidade Federal do Rio Grande do Sul; 2003.
11. Moher D, Schulz KF, Altman DG. CONSORT Group. The CONSORT statement: revised recommendations for improving the quality of reports of parallel-group randomised trials. *Lancet*. 2001;357(9263):1191-4.
12. Ribeiro MAGO, Cunha ML, Etchebehere ECC, Camargo EE, Ribeiro JD, Condino-Neto A. Efeito da cisaprida e da fisioterapia respiratória sobre o refluxo gastroesofágico de lactentes chadares segundo avaliação cintilográfica. *J Pediatr (Rio J)*. 2001;77(5):393-400.
13. Sutton AJ, Duval SJ, Tweedie RL, Abrams KR, Jones DR. Empirical assessment of effect of publication bias on meta-analyses. *BMJ*. 2000;320(7249):1574-7.