

Living Friendly Summaries of the Body of Evidence using Epistemonikos (FRISBEE)

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What is the effect of chest physiotherapy in hospitalized children with pneumonia?

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Abstract

Chest physiotherapy is applied in clinical practice for the treatment of pneumonia. However, its use is still controversial. Searching in Epistemonikos database, which is maintained by screening 30 databases, we identified one systematic review including two relevant randomized controlled trials. We combined the evidence using meta-analysis and generated a summary of findings table following the GRADE approach. We concluded it is unclear whether chest physiotherapy increases or decreases the length of hospitalization, severity, or the time to clinical improvement in children with pneumonia because the certainty of the evidence is very low.

Resumen

La kinesioterapia respiratoria es ampliamente utilizada en la práctica clínica para el tratamiento de la neumonía, sin embargo, su efecto en niños con neumonía aún es controvertido. Utilizando la base de datos Epistemonikos, la cual es mantenida mediante búsquedas en 30 bases de datos, identificamos una revisión sistemática que incluye dos estudios aleatorizados pertinentes a la pregunta. Realizamos un metanálisis y tablas de resumen de los resultados utilizando el método GRADE. Concluimos que existe incertidumbre sobre si la kinesioterapia respiratoria tiene algún efecto sobre el tiempo de hospitalización, severidad y resolución clínica en niños con neumonía porque la certeza de la evidencia es muy baja.

Problem

Pneumonia is an acute inflammatory lung disease, affecting people at different ages worldwide. However, the most severe consequences and morbidity are related to young children and elderly subjects. Chest physiotherapy has been widely used for pediatric patients. The main goal of this therapy is to assist the clearance of bronchial secretions, maintain lung capacities and to improve clinical outcomes reducing airway resistance and work of breathing.

Methods

We used Epistemonikos database, which is maintained by screening more than 30 databases, to identify systematic reviews and their included primary studies. With this information, we generated a structured summary using a pre-established format, which includes key messages, a summary of the body of evidence (presented as an evidence matrix in Epistemonikos), meta-analysis of the total of studies, a summary of findings table following the GRADE approach and a table of other considerations for decision-making.

Key messages

- It is unclear whether chest physiotherapy increase or decrease the length of hospitalization, severity, or the time to clinical improvement in children with pneumonia because the certainty of the evidence is very low.
- There is a high probability of future evidence changing what we know about this question.

About the body of evidence for this question

What is the evidence. See evidence matrix in Epistemonikos later	We found only one systematic review [1] including two pertinent randomized controlled trials [2],[3].
What types of patients were included	The studies included hospitalized patients with pneumonia that were clinically stable for receiving chest physiotherapy. Both baseline risk and pneumonia severity of patients were variable. Age ranged from 29 days to 12 years.
What types of interventions were included	Different types of chest physiotherapy were used. The first study applied standardized chest physiotherapy including positioning, thoracic vibration, thoracic compression, positive expiratory pressure, breathing exercises and forced exhalation with the glottis open or 'huffing' [2]. The other study made postural drainage, thoracic squeezing, chest percussion, vibration, cough stimulation and secretions suctioning (if necessary)[3]. Frequency and duration of chest physiotherapy were variable. In the first study patients received it three times daily [2] and in the other study patients received it twice daily for 30 minutes each session[3]. All studies were compared with standard treatment (oxygen administration, antibiotics and fluids if necessary).
What types of outcomes were measured	Time to clinical resolution, hospital length of stay, arterial oxygen saturation, X-ray, lung auscultation, and cough duration.

Summary of findings

The information on the effects of chest physiotherapy is based on two randomized trials including 177 patients. Both studies included hospital length of stay as an outcome. One study measured clinical severity [2] and one study considered time to clinical improvement [3].

- It is unclear whether chest physiotherapy increases or decreases hospital length of stay in children with pneumonia because the certainty of the evidence is very low.
- It is unclear whether chest physiotherapy increases or decreases the clinical severity of pneumonia in children with pneumonia because the certainty of the evidence is very low.
- It is unclear whether chest physiotherapy increases or decreases the time to clinical improvement in children with pneumonia because the certainty of the evidence is very low.

Chest physiotherapy for pneumonia in children				
Patients	Children hospitalized from 28 days to 12 years			
Intervention	Chest physiotherapy			
Comparison	Standard treatment			
Outcomes	Absolute effect*		Relative effect (95% CI)	Certainty of the evidence (GRADE)
	WITHOUT Chest physiotherapy	WITH Chest physiotherapy		
Hospital length of stay	Average time 6 days	Average time 7 days	MD 1.02 (-0.68 to 2.72)	⊕○○○ ^{1,2} Very low
	In average, the chest physiotherapy group had 1 day more of length of hospitalization (margin of error: 0.68 days less to 2.72 days more)			
Clinical Severity before discharge (score : 0-7 points)	Score 0.41	Score 0.57	MD 0,16 (-0.17 to 0.49)	⊕○○○ ^{1,2} Very low
	In average, clinical severity was 0.16 points more in the chest physiotherapy group (margin of error: 0.17 points less to 0,49 points more)			
Time to clinical improvement	Average time 4.32 days	Average time 4.56 days	MD 0.24 (-0.40 to 0.88)	⊕○○○ ^{1,2} Very low
	Time to clinical improvement was 6 hours more in the chest physiotherapy group (margin of error:-9.5 hours less to 21 hours more)			

MD: Mean difference.
Margin of error = 95% confidence interval (CI).
GRADE: evidence grades of the GRADE Working Group (see later in this article).

* The risk **WITHOUT chest physiotherapy** is based on the risk in the control group of the trials. The risk **WITH chest physiotherapy** (and its margin of error) is calculated from relative effect (and its margin of error).

¹ We downgraded the certainty of the evidence for imprecision, since the confidence interval includes both superiority and inferiority of the intervention.
² The certainty of the evidence was decreased in two levels because of inconsistency, since the populations studied are highly heterogeneous.

About the certainty of the evidence (GRADE)*

⊕⊕⊕⊕
High: This research provides a very good indication of the likely effect. The likelihood that the effect will be substantially different† is low.

⊕⊕⊕○
Moderate: This research provides a good indication of the likely effect. The likelihood that the effect will be substantially different† is moderate

⊕⊕○○
Low: This research provides some indication of the likely effect. However, the likelihood that it will be substantially different† is high.

⊕○○○
Very low: This research does not provide a reliable indication of the likely effect. The likelihood that the effect will be substantially different† is very high.

*This concept is also called 'quality of the evidence' or 'confidence in effect estimates'.
† Substantially different = a large enough difference that it might affect a decision.

Other considerations for decision-making

To whom this evidence does and does not apply

- This evidence can be applied in children between 29 days and 12 years old with clinical diagnosis of pneumonia of variable etiology (bacterial or viral) and who are hospitalized and in stable clinical condition to receive chest physiotherapy.
 - This evidence cannot be applied to newborns or intensive care unit patients.
-

About the outcomes included in this summary

- Outcomes included in this summary are those which had more information and those used in clinical guidelines.
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Balance between benefits and risks, and certainty of the evidence

- We could not perform a proper risk/benefit assessment because there is uncertainty about the latter.
-

What would patients and their doctors think about this intervention

- Health professionals have a subjective perception of a positive effect of chest physiotherapy, especially in patients with bronchial hypersecretion and increased work of breathing.
 - Chest physiotherapy use in non-responders does not seem to be supported by the evidence and is associated with costs. However, in settings where there are no resource constraints, some patients and doctors may be motivated to use an unproven therapy whose perception is generally positive. In these cases, it is particularly important to inform the patient about the certainty of the evidence.
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Resource considerations

- Chest physiotherapy is associated with high cost, since a trained professional is required. It is not possible to estimate the cost/benefit because there is uncertainty about the latter.
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Feasibility and implementation

- Chest physiotherapy is feasible in most hospitals due to professional presence in pediatric units. However, the insufficient relationship between number of patients and professional supply in each center must be considered.
-

Differences between this summary and other sources

- Conclusions obtained in this summary are consistent with the systematic review identified and the recommendations of the main clinical guidelines [4],[5], where the application of chest physiotherapy as coadjunctive treatment in patients with pneumonia is not recommended. However, some guidelines [6],[7], mention that it could improve physiological parameters such as respiratory rate and oxygenation in patients with bronchial hypersecretion.
 - Clinical and epidemiological evidence about the uses of chest physiotherapy in pediatric respiratory patients must be considered since there are worldwide differences in chest physiotherapy technique.
-

Could this evidence change in the future?

- The probability of evidence changing in the future is high, due to the very low certainty of the evidence.
 - It is likely that a new systematic review, or an update of the existing one, would provide additional information, since at least one ongoing randomized controlled study was identified [8].
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How we conducted this summary

Using automated and collaborative means, we compiled all the relevant evidence for the question of interest and we present it as a matrix of evidence.



Starting from any systematic review, Epistemonikos builds a matrix based on existing connections in the database.
 The author of the matrix can select relevant information for a specific health question (typically in PICO format) in order to display the information set for the question.
 The *rows* represent systematic reviews that share at least one primary study, and *columns* display the studies.
 The boxes in green correspond to studies included in the respective reviews.

Follow the link to access the **interactive version**: [Chest physiotherapy in hospitalized children with pneumonia](#)

Notes

The upper portion of the matrix of evidence will display a warning of “new evidence” if new systematic reviews are published after the publication of this summary. Even though the project considers the periodical update of these summaries, users are invited to comment in *Medwave* or to contact the authors through email if they find new evidence and the summary should be updated earlier. After creating an account in Epistemonikos, users will be able to save the matrixes and to receive automated notifications any time new evidence potentially relevant for the question appears.

The details about the methods used to produce these summaries are described here <http://dx.doi.org/10.5867/medwave.2014.06.5997>.

Epistemonikos foundation is a non-for-profit organization aiming to bring information closer to health decision-makers with technology. Its main development is Epistemonikos database (www.epistemonikos.org).

These summaries follow a rigorous process of internal peer review.

Conflicts of interest

The authors do not have relevant interests to declare.

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