RESUME JURNAL

MODUL KARDIOPULMONAL

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FAKULTAS KESEHATAN

S1 FISIOTERAPI

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RESUME JURNAL 1

PENATALAKSANAAN FISIOTERAPI PADA KONDISI TUBERKULOSIS PARU DENGAN MODALITAS INFRARED DAN SIKLUS AKTIF TEKNIK PERNAPASAN (ACBT) DI BBKPM SURAKARTA

Tuberkulosis adalah penyakit menular dan ditularkan secara langsung maupun tidak langsung oleh sebab itu Mycobacterium tuberculosa ditularkan melalui udara saat penderita tuberculosis batuk dan semprotan air liur yang mengandung bakteri tersebut dihirup oleh orang lain sambal bernapas dan melalui air liur pake camp hari ini makan / minum sama dengan penderitanya. Bakteri ini merupakan bakteri aerob mampu hidup diprik yang memiliki tekanan parsial oksigen tinggi. Masalah yang terjadi pada pasien dengan TBC paru yaituseperti batuk berdahak, mengi, sesak nafas, pernafasan, penurunan kandang thorkas dan penurunan aktivitas fungsional. Pengelolaan fisioterapi di RS Kondisi tuberkulosis paru dapat ditatalaksana dengan menggunakan modalitas infra merah dan aktif teknik pernapasan aktif . Metode penelitian yang penulis gunakan adalah studi kasus. Menurut World Health Organization benua Asia menyumbang 56% jumlah penderita paru didunia pada tahun 2013, Afrika 29%, Eropa 4% dan yang paling kecil beban penderita TB adalah wilayah Amerika 3% dari jumlah total penderita TB paru didunia. Penderita TB paru terbanyak pada lima Negara di dunia yaitu India, China, Afrika Selatan, Indonesia dan Nigeria. Di Indonesia penyakit TB mencapai 25% diseluruh kematian yang sebenarnya dapat dicegah dan 75% penderita TB adalah kelompok usia produktif yaitu berkisar dari umur 15-50 tahun. Sejak tahun 2000, Indonesia telah berhasil mencapai dan mempertahankan angka kesembuhan sesuai dengan target global yaitu minimal 85% penemuan kasus TB di Indonesia pada tahun 2006 adalah 76% . Infrared atau IR yang menjadi salah satu modalitas yang digunakan dalam penanganan kasus TB paru ini memberikan efek pemanasan dari panjang gelombang lebih panjang dari cahaya tampak, tetapi lebih pendek dari radiasi gelombang radio. Metode terapi menggunakan inframerah bertujuan untuk melancarkan sirkulasi pernafasan menjadi lebih baik, mengurangi spasme otot pernafasan karena adanya vasodilatasi pada jaringan yang terkena sinar inframerah. Active cyrcle of breathing technique merupakan suatu siklus gabungan dari deep breathing exercise, Huffing, dan breathing control.

Pada penatalaksanaan fisioterapi yang diberikan pada kasus tuberkulosis paru dengan menggunakan modalitas *infrared* dan *active cycle of breathing technique* dapat disimpulkan sebagai berikut :

1. Pemberian *active cycle of breathing technique* dapat mengurangi sputum dan mengurangi sesak nafas
2. Pemberian *infrared* dapat menurunkan spasme
3. Pemberian *infrared* dan *active cycle of breathing technique* dapat meningkatkan ekspansi sangkar thoraks
4. Pemberian *infrared*dan *active cycle of breathing technique* dapat meningkatkan aktivitas fungsional pada penderita Tuberculosis Paru

RESUME JURNAL 2

FISIOTERAPI DADA PADA ANAK DENGAN BAKTERI AKUT RADANG PARU-PARU

Pneumonia adalah infeksi saluran pernapasan akut yang ditandai dengan nyeri saat bernapas dan terbatas asupan oksigen akibat cairan dan nanah di alveoli . Risiko gejala sisa pernapasan jangka panjang setelah pneumonia pada masa kanak-kanak adalah 5,5%, dengan penyakit paru restriktif menjadi yang paling umum . Kelompok ini pasien dilaporkan memiliki risiko tiga kali lebih besar untuk gejala sisa pneumonia yang lebih parah . Perawatan standar untuk pasien dengan pneumonia adalah pengobatan antibiotik dan terapi simtomatik, termasuk dukungan oksigen, terapi cairan, dan fisioterapi dada dan / atau penyedotan untuk mengeluarkan lendir dari saluran udara, perbaiki ventilasi dan kurangi kerja pernapasan .

Ada berbagai jenis modalitas fisioterapi dada. Namun, tidak ada bukti untuk penggunaan ini teknik untuk mengeluarkan lendir dari paru-paru perifer wilayah dan beberapa kejadian buruk yang serius telah terjadi dilaporkan . Penerapan AD mengharuskan pasien untuk bernapas dengan volume paru-paru yang berbeda menciptakan aliran udara yang optimal dalam beberapa generasi saluran napas paru-paru, untuk meningkatkan mobilisasi sekresi dari perifer ke saluran udara sentral . Fisioterapi dada mungkin cocok alat untuk membantu pembersihan jalan napas pada pasien ini dan oleh karena itu sering diresepkan pada pasien pneumonia.

Sebuah sistematis review tentang fisioterapi dada pada orang dewasa dengan pneumonia. menyimpulkan bahwa dalam populasi ini, dada fisioterapi tidak boleh diberikan selain standar pengobatan karena ada bukti terbatas bahwa teknik diselidiki dalam ulasan miliki efek positif pada angka kematian, durasi rawat inap, angka kesembuhan dan kecepatan perbaikan rontgen dada. termasuk artikel tentang kontinu tekanan saluran napas positif yang tidak akan kami klasifikasikan sebagai teknik fisioterapi dada. Selanjutnya, tidak diacak studi pada populasi anak menyarankan manfaat dari penggunaan fisioterapi dada, menggunakan teknik peningkatan aliran ekspirasi', pada 123 anak dengan radang paru-paru. Studi terakhir menunjukkan hal yang signifikan perbaikan saturasi oksigen perifer segera setelah

pengobatan, yang dipertahankan setelah 20 menit istirahat . Oleh karena itu, tinjauan ini ditujukan untuk menyelidiki efek dari fisioterapi dada yang berbeda teknik, dibandingkan dengan tanpa fisioterapi atau tipuan fisioterapi, pada anak rawat inap dengan bakteri akut radang paru-paru. Teknik fisioterapi dada apa pun, sebagai teknik tunggal atau dalam kombinasi dengan yang lain, dulu dibandingkan dengan tidak ada fisioterapi, fisioterapi palsu atau terapi alternatif. Satu studi membandingkan pengobatan standar untuk pneumonia dengan perawatan standar dengan tambahan konvensional fisioterapi dada , sedangkan yang lainnya studi membandingkan lateral non-wajib yang direkomendasikan posisi, batuk dan pernapasan diafragma dengan fisioterapi dada konvensional yang dikombinasikan dengan PEP pada semua anak dan FET pada anak lebih dari 5 tahun lama . Tidak jelas apakah dan bagaimana diafragma pernapasan dicapai dengan bayi muda yang tidak kooperatif dan anak-anak. Fisioterapi dada tidak terbukti mempengaruhi durasi rawat inap atas dasar kedua studi yang disertakan. Itu penelitian ini mungkin kurang kuat untuk mendeteksi a perbedaan yang signifikan antara kedua kelompok. Yang lain ukuran hasil dari tinjauan ini tidak dinilai dalam studi yang disertakan, oleh karena itu kami tidak dapat berkomentar efektivitas fisioterapi dada terkait hal ini

Fisioterapi dada konvensional tidak ditemukan memiliki pengaruh waktu hingga resolusi klinis. Ada juga tidak pengaruh kombinasi fisioterapi dada konvensional dengan PEP aktif penurunan laju pernapasan dan skor keparahan penyakit . melaporkan meningkatkan 'gejala pernafasan yang menetap' dalam kelompok menerima fisioterapi konvensional dengan durasi lebih lama batuk dan rhonchi pada kelompok ini dibandingkan dengan kelompok kontrol. Disana ada informasi yang tersedia tidak memadai untuk menghilangkan potensi lain ancaman terkait validitas studi. Tidak semua tujuan tinjauan saat ini bisa tercapai ditangani, karena penelitian tidak mengomentari hal yang merugikan peristiwa atau kematian dan kami tidak dapat membandingkan satu teknik fisioterapi dada dengan fisioterapi palsu atau modalitas fisioterapi dada lainnya. Keduanya studi menggabungkan beberapa teknik perawatan fisioterapi dada dalam intervensi mereka, yang membuatnya tidak mungkin untuk menggambar kesimpulan tentang teknik individu. Sayangnya, karena kurangnya data yang sebanding, tidak ada meta-analisis yang mungkin dalam tinjauan ini. Lebih lanjut, satu studi menggambarkan kondisi tersebut sebagai 'pneumonia akut' , sedangkan penelitian lainnya menggambarkannya sebagai 'pneumonia yang didapat dari komunitas'. Meskipun dua studi

terkontrol non-acak menunjukkan efek positif dari fisioterapi dada , ulasan yang baru-baru ini diterbitkan tentang fisioterapi dada untuk pneumonia pada anak-anak menyimpulkan bahwa, meskipun beberapa perbaikan kecil dapat ditemukan pada anak-anak yang menerima fisioterapi dada, mereka tidak mampu untuk mengumpulkan data dan membuat kesimpulan yang dapat digeneralisasikan. Review kami juga bisa untuk mengidentifikasi uji coba penelitian baru yang sedang berlangsung, meskipun sudah dilakukan oleh penulis saat ini, yang mungkin membuat penelusuran menjadi bias strategi. Namun, kesimpulan keseluruhan adalah bahwa tidak ada cukup bukti untuk mendukung penggunaan fisioterapi dada pada orang dewasa dengan radang paru-paru. Ulasan kami terbatas pada enam database, clinicaltrial.gov, pactr.org dan daftar referensi yang disertakan artikel. Kami mungkin telah melewatkan studi yang disajikan dalam jurnal atau database non-peer-review, atau studi yang dipresentasikan di konferensi lokal, yang mungkin telah menimbulkan bias.

RESUME JURNAL 3

Program Pelatihan Ulang Pernapasan, Dikirimkan Baik Melalui DVD Atau Tatap Muka, Meningkatkan Kualitas Yang Berhubungan Dengan Kesehatan Kehidupan Pada Penderita Asma

Asma adalah kondisi heterogen yang mempengaruhi banyak orang Kondisi ketika saluran udara meradang, sempit dan membengkak, dan menghasilkan lendir berlebih sehingga menyulitkan bernapas. Asma bisa ringan atau bisa juga mengganggu aktivitas sehari-hari. Dalam beberapa kasus, kondisi ini dapat menyebabkan serangan yang mengancam jiwa. Asma dapat menyebabkan kesulitan bernapas, nyeri dada, batuk, dan napas berbunyi. hal itu merusak kualitas hidup mereka. Meskipun pengobatan farmakologis efektif, kebanyakan orang terus menjalani pengobatan gejala dan gangguan kualitas hidup. Beberapa non-farmakologis intervensi telah disarankan untuk orang dengan asma, 1 tetapi data berkaitan dengan keefektifannya tidak meyakinkan. Latihan pernapasan telah direkomendasikan untuk orang-orang yang tidak memiliki gejala dikontrol secara adekuat oleh pengobatan farmakologis Studi oleh Bruton dkk bertujuan untuk mengevaluasi apakah bernafas pelatihan ulang disampaikan baik secara tatap muka atau melalui audiovisual digital dan program mandiri (grup DVD) memperbaiki terkait asma kualitas hidup dibandingkan dengan perawatan biasa. : Uji coba terkontrol secara acak dengan alokasi tersembunyi dan penilaian hasil yang dibutakan. Pengaturan: Dalam rumah peserta, Southampton, Inggris Raya. Peserta: Orang dewasa dengan asma ringan dan sedang (didiagnosis oleh dokter), yang telah diresepkan setidaknya satu obat asma sebelumnya tahun, dan memiliki skor pada Kuesioner Kualitas Hidup dibutakan. Pengaturan: Dalam rumah peserta, Southampton, Inggris Raya. Peserta: Orang dewasa dengan asma ringan dan sedang (didiagnosis oleh dokter), yang telah diresepkan setidaknya satu obat asma sebelumnya tahun, dan memiliki skor pada Kuesioner Kualitas Hidup Asma, 5,5. Kriteria eksklusi adalah diagnosis bersamaan dari obstruktif kronik penyakit paru dengan volume ekspirasi paksa dalam satu detik, 60% dari prediksi. Pengacakan (2: 1: 2) dari 655 peserta dialokasikan 261 ke grup program digital, audiovisual, dan panduan mandiri (disebut sebagai Grup DVD), 132 ke grup tatap muka, dan 262 ke grup kontrol. Intervensi: Kelompok DVD diberikan DVD dan buklet itu termasuk penjelasan tentang bagaimana menyelesaikan pernapasan latihan ulang (mis., pernapasan diafragma, pernapasan hidung, lambat pernapasan, menahan napas terkontrol, dan latihan relaksasi sederhana), komponen motivasi (misalnya, alasan latihan dan umum kekhawatiran) serta fitur pendukung seperti agenda harian dan grafik

kemajuan. Kelompok tatap muka diberikan buklet dan menjalani latihan pernapasan selama tiga 40 menit satu lawan satu sesi dengan fisioterapis setiap 2 minggu setelah pengacakan. Kelompok kontrol menerima perawatan medis biasa. Ukuran hasil: Hasil utama adalah kualitas hidup yang berhubungan dengan kesehatan, diukur dengan Kuesioner Kualitas Hidup Asma pada 12 bulan. Hasil: A total 598 peserta menyelesaikan penilaian 12 bulan (230 di Kelompok DVD, 122 di kelompok tatap muka, dan 246 di kelompok kontrol). Di 12 bulan, dibandingkan dengan grup kontrol, baik grup DVD maupun grup kelompok tatap muka memiliki skor yang lebih baik pada Asma Quality of Life Kuesioner (MD 0,28, 95% CI 0,11 hingga 0,44; dan 0,24, 95% CI 0,04 hingga 0,44, masing-masing). Tidak ada perbedaan antara kedua intervensi tersebut kelompok (MD 0,04, 95% CI -0,16 hingga 0,24). Kesimpulan: Latihan pernapasan program, disampaikan sebagai program mandiri, digital dan audiovisual atau program tatap muka, menghasilkan peningkatan serupa dalam kualitas hidup terkait asma untuk orang dengan asma yang terkontrol sebagian.

PENATALAKSANAAN FISIOTERAPI PADA KONDISI TUBERKULOSIS PARU DENGAN MODALITAS *INFRARED* DAN *ACTIVE CYCLE OF BREATHING TECHNIQUE* (ACBT) DI BBKPM SURAKARTA

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ABSTRACT

Tuberculosis is an infectious disease and transmitted directly or indirectly caused by Mycobacterium tuberculosa transmitted through the air when a tuberculosis patient coughs and spray saliva containing the bacteria are inhaled by another person while breathing and through the saliva of using camp today eat / drink The same as the sufferer. This bacteria is an aerobic bacteria capable of diprik living that has high oxygen partial pressure. Problems that occur in patients with pulmonary tuberculosis yaituseperti cough with phlegm, wheezing, shortness of breath, breathing, decreased thorkas cage and decreased functional activity.Management of physiotherapy in the condition of pulmonary tuberculosis can be administered by using the modality infrared and active breathing techniques active (ACBT). The research method used by the writer is using case study. After treatment was 5 times the results (1) decrease the breath of T1: 3 to T5: 0, (2) decrease in sputum of T1: ++ (ronkhi loud voice) into T5: + (sound ronkhi downhill), (3) decrease in muscle spasm of T1 results: 1 (no spasm) into T5: 0 (no spasm), (4) an increase in the expansion of the thoracic cage, (5) an increased functional activity.From the results already obtained, it can be concluded that physiotherapy treatment on the condition of pulmonary tuberculosis by using infrared modalities and active cycle of breathing techniques (ACBT) can help reduce problems arising on the condition of pulmonary tuberculosis.

Keywords: Pulmonary Tuberculosis, Infrared, Active Cycle of Breathing Technique

PENDAHULUAN

Tuberkulosis merupakan suatu penyakit infeksi dan menular secara langsung ataupun tidak langsung yang disebabkan oleh *Mycobacterium tuberculosa* yang ditularkan melalui udara saat seorang pasien tuberculosis batuk dan percikan ludah yang mengandung bakteri tersebut terhirup oleh orang lain saat bernapas serta melalui cairan dengan terkena ludah dari penderita ketika menggunakan peralatan makan/minum yang sama dengan penderita (Mardiono,2013).

Menurut *World Health Organization* (2014) benua Asia menyumbang 56% jumlah penderita paru didunia pada tahun 2013, Afrika 29%, Eropa 4% dan yang paling kecil beban penderita TB adalah wilayah Amerika 3% dari jumlah total penderita TB paru didunia. Penderita TB paru terbanyak pada lima Negara di dunia yaitu India,

China, Afrika Selatan, Indonesia dan Nigeria.

Di Indonesia penyakit TB mencapai 25% diseluruh kematian yang sebenarnya dapat dicegah dan 75% penderita TB adalah kelompok usia produktif yaitu berkisar dari umur 15-50 tahun. Sejak tahun 2000, Indonesia telah berhasil mencapai dan mempertahankan angka kesembuhan sesuai dengan target global yaitu minimal 85% penemuan kasus TB di Indonesia pada tahun 2006 adalah 76% (Pranowo, 2014).

Problematika yang timbul pada penderita tuberkulosis paru berupa batuk berdahak selama 2-3 minggu yang diikuti dengan gejala tambahan yaitu dahak bercampur darah, batuk darah, sesak nafas,nafsu makan dan berat badan menurun, malaise, berkeringat malam hari tanpa kegiatan fisik, demam meriang lebih dari satu bulan.

Fisioterapi berperan dalam penyembuhan kasus ini karena fisioterapi salah satu bentuk pelayanan kesehatan yang ditujukan untuk individu dan atau kelompok dalam upaya mengembangkan, memelihara, dan memulihkan gerak dan fungsi sepanjang daur kehidupan menggunakan modalitas, mekanis, gerak dan komunikasi. Modalitas yang dapat digunakan dalam menyelesaikan problematika pada penderita tuberkulosis diantaranya menggunakan *Infrared* dan *Active Cycle Of Breathing Technique* (ACBT)

Infrared atau IR yang menjadi salah satu modalitas yang digunakan dalam penanganan kasus TB paru ini memberikan efek pemanasan dari panjang gelombang lebih panjang dari cahaya tampak, tetapi lebih pendek dari radiasi gelombang radio.

Metode terapi menggunakan inframerah bertujuan untuk melancarkan sirkulasi pernafasan menjadi lebih baik, mengurangi spasme otot pernafasan karena adanya vasodilatasi pada jaringan yang terkena sinar inframerah.

Active cyrcle of breathing technique (ACBT) merupakan suatu siklus gabungan dari *deep breathing exercise, Huffing,* dan *breathing control.* Penggabungan latihan tersebut pada penderita TB paru dapat mengurangi sputum, mengurangi sesak nafas, meningkatkan ekspansi sangkar thoraks dan meningkatkan aktivitas fungsional.

Dari penelitian studi yang dilakukan oleh Mckoy yang telah diidentifikasi dimana berkisar antara 7 sampai 65 peserta lebih efektif menggunakan *active cycle breathing technique* karena memiliki teknik yang lebih nyaman dalam melakukannya gunauntuk membersihkan mucus dibandingkan dengan menggunakan chest fisioterapi dan *positive expiratory pressure.* Pemberian *active cycle breathing technique* menunjukkan adanya peningkatan sputum yang telah dikeluarkan dari tubuh hingga

1 jam pasca diberikan ACBT sehingga sputum dalam tubuh berkurang (Mckoy,2012).

Penelitian ini bertujuan untuk :

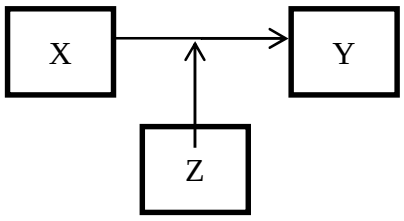
1) Mengidentifikasi pemberian *Active Cycle of Breathing Technique (ACBT)* dapat mengurangi sputum dan mengurangi sesak nafas pada kondisi Tuberkulosis Paru,
2) Mengidentifikasi pemberian *Infrared*dapat menurunkan spasme otot bantu pernafasan pada kondisi Tuberkulosis Paru.
3) Mengidentifikasi pemberian *Infrared* dan *Active Cycle of Breathing Technique (ACBT)*dapat meningkatkan ekspansi thoraks pada penderita Tuberkulosis Paru
4) Mengidentifikasi pemberian *Infrared* dan *Active Cycle of Breathing Technique (ACBT)* dapat meningkatkan aktivitas fungsional pada penderita Tuberkulosis Paru.

METODOLOGI PENELITIAN

Penelitian ini menggunakan metode deskriptif analitik untuk mengetahui assesmen dan perubahan yang dapat diketahui. Rancangan penelitian yang digunakan adalah rancangan studi kasus.

Pada seorang pasien secara langsung yang dilakukan di poli TB BBKPM Surakarta.

Gambaran desain penelitian sebagai berikut :



Keterangan:

X : Keadaan pasien sebelum diberikan program fisioterapi
Y : Keadaan pasien setelah diberikan program fisioterapi
Z : Program fisioterapi

Problematika yang muncul pada kasus ini meliputi adanya sputum, sesak nafas, spasme otot bantu pernafasan, penurunan ekspansi sangkar thorak dan aktivitas fungsional. sebelumnya pasien dilakukan pemeriksaan fisioterapi berupa pemeriksaan sputum dengan auskultasi, sesak nafas dengan skala MRC (Medical Research Council), ekspansi sangkar thora dengan *Midline*, dan aktivitas fungsional dengan *The London Chest Activity Of Daily Living Scale*.

Instrumen Penelitian

1. Sputum dengan Auskultasi

   Auskultasi paru dilaksanakan secara *indirect* yaitu dengan memakai stetoskop yang bertujuan untuk mengetahui letak dari sputum dan banyak tidaknya sputum yang ada.

2. Sesak Nafas dengan skala MRC (*Medical Research Council*)

   Dengan skala penilaian yaitu : 0 = Tidak ada sesak kecuali dengan aktivitas berat, 1= Sesak mulai timbul bila berjalan cepat atau naik tangga 1 tingkat, 2 = Berjalan lebih lambat karena merasa sesak, 3 = Sesak timbul bila berjalan 100 m atau setelah beberapa menit, 4 = Sesak bila mandi atau berpakaian.

3. Spasme Otot dengan Palpasi

   Mengukur Spasme otot pernafasan dapat dilakukan dengan cara palpasi yaitu : dengan jalan menekan dan memegang bagian tubuh pasien untuk mengetahui kelenturan otot, misal terasa kaku, tegang atau lunak. Kreteria peniliannya : Nilai 0 adalah tidak ada spasme,nilai 1 adalah ada spasme.

4. Ekspansi Sangkar Thoraks dengan Midline

   Pemeriksaan mobilisasi sangkar thorak pada kondisi kasus respirasi bertujuan untuk mengetahui seberapa besar kemampuan paru-paru dapat mengembang pada fase inspirasi dan ekspirasi, dimana pemeriksaan ini bertujuan untuk mengetahui selisih antara fase inspirasi dan ekspirasi dengan pengukuran menggunakan midline.

5. Aktivitas Fungsional dengan *The London Chest Activity Of Daily Living Scale.*

   Untuk mengetahui adanya permasalahan pada aktivitas fungsional dapat dilakukan pemeriksaan dengan skala LCADL.

Prosedur Pengambilan Data

1. Data Primer
   a. Pemeriksaan Fisik

      Bertujuan untuk mengetahui keadaan fisik pasien, keadaan fisik terdiri dari vital sign, inspeksi, palpasi, perkusi dan auskultasi.

   b. Interview

      Metode ini digunakan untuk mengumpulkan data dengan cara tanya jawab antara terapis dengan sumber data / pasien, yaitu dengan auto anamnesis.

   c. Observasi

      Dilakukan untuk mengamati perkembangan pasien sebelum terapi, selama terapi dan sesudah diberikan terapi

2. Data Sekunder
   a. Studi Dokumentasi

      Penulis mengamati dan mempelajari data-data medis dan fisioterapi dari awal sampai akhir.

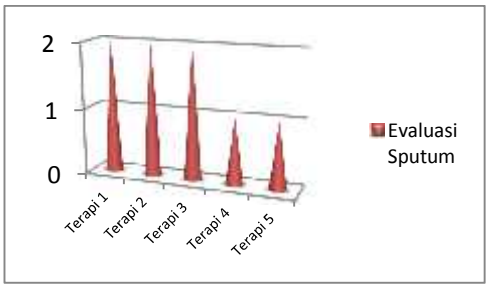
   b. Studi Pustaka

      Sumber-sumber diambil dari buku, jurnal/internet, yang berkaitan dengan kondisi penyakit Tuberkulosis Paru.

HASIL DAN PEMBAHASAN

Evaluasi Sputum maupun Pengeluaran Sputum

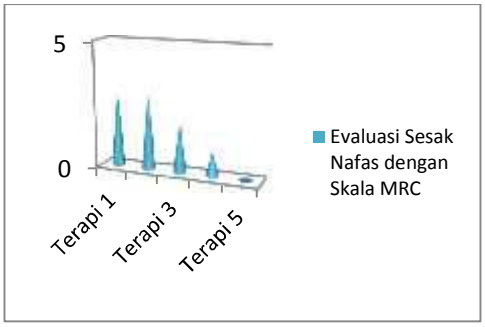
Evaluasi pemeriksaan sputum menggunakan auskultasi dari mulai terapi ke satu sampai ke lima.



Pada terapi 1 hasil yang diperoleh yaitu (++) atau nilai 2 yaitu suara ronchi keras, pada terapi ke-2 dan ke-3 belum terdengar adanya perubahan, pada terapi ke-4 dan ke-5 hasil yang diperoleh yaitu (+) atau dinai 1 dimana suara ronchi menurun.

Dalam hal ini ACBT dapat berperan dalam mengurangi sputum dimana dengan latihan huffing dapat meningkatkan tidal volume dan membuka system collateral saluran nafas sehingga sputum mudah dikeluarkan.

Evaluasi Sesak Nafas dengan skala MRC

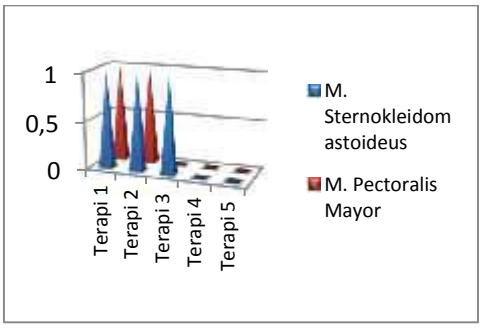


Pada pertemuan terapi 1 dan 2 didapatkan hasil skala sesak dengan nilai 3, kemudian pada terapi ke 3 didapatkan penurunan nilai skala sesak yaitu 2, terapi ke 4 kembali adanya penurunan nilai skala sesak yaitu 1, selanjutnya pada terapi ke 5 didapatkan penurunan lagi pada nilai skala sesak yaitu 0.

Sesak nafas dapat berkurang dengan diberikannya ACBT, dimana dengan latihan ACBT dapat meminimalkan kelelahan ketika bernafas dan menjadikan pola nafas menjadi tenang sehingga pasien terbiasa dengan pernafasan teratur ketika serangan sesak nafas

Evaluasi Spasme Otot dengan Palpasi

Pemeriksaan spasme dilakukan dengan penilaian 0 = tidak ada spasme dan 1 = ada spasme. Dari terapi 1 sampai terapi 5 pemeriksaan spasme didapatkan hasil adanya penurunan spasme pada otot m. sternokleidomastoideus dan m. pectoralis mayor pada terapi ke 4.

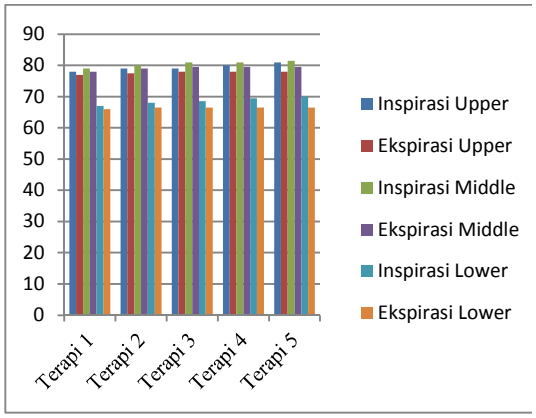


Pemberian *infrared* dapat menurunkan tingkat spasme karena efek termal yang ditimbulkan akan membantu proses rileksasi otot dan

menimbulkan vasodilatasi pada jaringan sehingga oksigen dan nutrisi berjalan dengan baik dan spasme dapat berkurang.

Perubahan Nilai Ekspansi Sangkar Thoraks

Pemeriksaan sangkar thoraks adalah untuk mengetahui kemampuan inspirasi dan ekspirasi maksimal pasien saat bernafas. Dengan pengukuran menggunakan midline.



Dalam hal ini *infrared* dan ACBT dapat berperan dalam meningkatkan ekspansi sangkar thoraks. Dengan pemberian *infrared* efek yang ditimbulkan akan membantu proses rileksasi dan meningkatkan konraksi otot, dengan adanya hal tersebut memberikan dampak pada kenyamanan pasien dalam bernafas sehingga ekspansi thoraks meningkat. Pada pemberian ACBT yang terdiri atas *breathing control*, *deep breathing exc* dan *huffing* akan meningkatkan fungsi paru dan menambah jumlah udara yang dapat dipompakan oleh paru sehingga dapat menjaga kinerja otot-otot bantu pernafasan, hal ini efektif untuk meningkatkan ekspansi sangkar thoraks.

Evaluasi Aktivitas Fungsional dengan skala LCADL

PERAWATAN DIRI	T1	T2	T3	T4	T5
Mencuci tubuh	1	1	1	1	1
[illegible]	1	1	1	1	1
Melatihkan sepatu/baju/ sakit	0	0	0	0	0
Mencuci rambut	1	1	1	1	1
AKTIVITAS RUMAH TANGGA					
Merapikan tempat tidur	1	1	1	1	1
Menyapu lantai	2	2	1	1	1
Mencuci jendela/lantai	0	0	0	0	0
Membersihkan [illegible]	1	1	2	2	1
Mencuci	2	2	2	2	1
Menyapu	2	2	1	1	1
FISIK					
Berjalan mondar-mandir	3	3	3	2	2
Membungkuk	2	1	1	1	1
WAKTU LUANG					
Berjalan didalam rumah	2	2	2	1	1
[illegible]	2	2	1	1	1
Melakukan pembicaraan dengan orang lain/ mengobrol	2	2	1	1	1

Pemeriksaan Aktivitas Fungsional dengan menggunakan skala LCADL dapat dilihat dari 4 item dimana item 1 terdiri dari 4 sub item, item 2 terdiri dari 6 sub item, item ke-3 terdiri dari 2 sub item dan item ke-4 terdiri dari 3 sub item.

Aktivitas fungsional dapat ditingkatkan dengan dibantu oleh peran dari modalitas infrared dan ACBT

SIMPULAN

Pada penatalaksanaan fisioterapi yang diberikan pada kasus tuberkulosis paru dengan menggunakan modalitas *infrared* dan *active cycle of breathing technique* dapat disimpulkan sebagai berikut :

1) Pemberian *active cycle of breathing technique* dapat mengurangi sputum dan mengurangi sesak nafas
2) Pemberian *infrared* dapat menurunkan spasme
3) Pemberian *infrared* dan *active cycle of breathing technique* dapat meningkatkan ekspansi sangkar thoraks
4) Pemberian *infrared*dan *active cycle of breathing technique* dapat meningkatkan aktivitas fungsional pada penderita Tuberculosis Paru

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Chest physiotherapy in children with acute bacterial pneumonia

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Background: Pneumonia is the single leading cause of death in children younger than 5 years of age. Chest physiotherapy is often prescribed as an additional therapy in children with pneumonia. Different chest physiotherapy techniques are available that aim to improve airway clearance, gas exchange and reduce the work of breathing. However, it is unclear if these techniques are effective in this population.

Objective: The present review aimed to determine the efficacy of different chest physiotherapy techniques compared with no physiotherapy or other chest physiotherapy treatments in hospitalised children with bacterial pneumonia.

Method: Six electronic databases (PubMed, Medline, Cochrane Library, PEDro, CINAHL and Africa-wide information), clinicaltrials.gov and pactr.org were searched for eligible studies.

Results: Two randomised controlled trials and one ongoing study were identified. Neither completed trial reported differences between the control and intervention groups, although one study reported a longer duration of coughing ($p = 0.04$) and rhonchi ($p = 0.03$) in the intervention group.

Conclusion: Because of the limited number of included articles and different presentations of outcome measures, we could not reject or accept chest physiotherapy as either an effective or harmful treatment option in this population.

Introduction

Description of the condition

Pneumonia is an acute respiratory infection, characterised by painful breathing and limited oxygen intake as a result of fluid and pus in the alveoli (World Health Organization [WHO] 2012; WHO/UNICEF 2009). In children less than 5 years of age, pneumonia is the single leading cause of mortality, with a mortality rate of 18% globally (Mathers, Boerma & Ma Fat 2008; WHO 2012). Treatment of pneumonia consists of interventions in 3 domains: (1) protection for example, breastfeeding during the first 6 months of life, (2) prevention by vaccination and (3) appropriate antibiotic and/or symptomatic treatment (WHO 2012; WHO/UNICEF 2006, 2009). The risk of long-term respiratory sequelae after childhood pneumonia is 5.5%, with restrictive lung diseases being the most common (Edmond *et al.* 2012). However, children infected with adenovirus pneumonia can suffer from chronic obstructive lung disease as a consequence of the acute infection (Edmond *et al.* 2012). Bronchiectasis has been reported in children following hospitalisation with pneumonia (Edmond *et al.* 2012). This group of patients are reported to have three times greater risk of more severe sequelae of pneumonia (Edmond *et al.* 2012).

Description of the intervention

In respiratory diseases such as pneumonia, increased volume and viscosity of pulmonary secretions, ciliary dyskinesia and ineffective cough may lead to reduced clearance of pulmonary secretions (Fink 2007); this predisposes to airway obstruction, inhomogeneity of ventilation, superadded infection and ultimately chronic disease such as bronchiectasis (Hardy 1994). Bacterial pneumonia may lead to mucociliary dysfunction by influencing the ciliary beat frequency (Salathé, O'Riordan & Wanner 1997); this may be a result of leukocyte production owing to host defence responses and/or bacterial products that directly or indirectly influence the ciliary beat frequency (Salathé *et al.* 1997). Standard care for patients with pneumonia is antibiotic treatment and symptomatic therapy, including oxygen support, fluid therapy, and chest physiotherapy and/or suctioning to evacuate mucus from the airways, improve ventilation and reduce the work of breathing (Principi & Esposito 2011; Wallis & Prasad 1999).

There are different types of chest physiotherapy modalities. Conventional chest physiotherapy techniques consist of positioning or postural drainage (PD), which uses gravity to eliminate mucus from the lungs (Blake 1983; Wong *et al.* 1977) and can be combined with percussions and/or vibrations on the thoracic wall to loosen secretions in the lungs; chest wall shaking; huffing and coughing (Hardy 1994; Yang, Yuping & Yin 2010). However, there is no evidence for the use of these techniques to evacuate mucus from the peripheral lung regions (Eid *et al.* 1991; Van der Schans, Piers & Postma 1986; Wong *et al.* 1977) and some serious adverse events have been reported (Button *et al.* 1997; Campbell, O'Connell & Wilson 1975; Chalumeau *et al.* 2002; Giles *et al.* 1995; Gosselink & Decramer 2001; Naylor *et al.* 2005; Selsby 1989). Newer airway clearance techniques, such as the forced expiratory technique (FET), active cycle of breathing technique (ACBT), positive expiratory pressure (PEP) technique (with or without oscillation) and autogenic drainage (AD), were developed in response to these adverse events and may promote clearance from the lungs in different ways. FET uses one or two huffs followed by a period of relaxation and controlled diaphragmatic breathing (Hardy 1994; McIlwaine 2007). The ACBT uses cycles of breathing control, thoracic expansion exercises and FET to remove secretions from the airways (Hardy 1994; Pryor 1999). During PEP therapy, positive pressure is created in the airways by breathing out against a resistance (Hardy 1994); this theoretically allows air to accumulate distally to obstructive secretions, via collateral ventilation channels (Hardy 1994). The application of AD requires patients to breathe at different lung volumes to create optimal airflow in multiple airway generations of the lung, in order to enhance secretion mobilisation from the peripheral to central airways (Chevailler 1984).

Significance of this review

Pneumonia is the most important respiratory disease in developing countries, with an incidence of approximately 0.29 episodes per child-year in children less than 5 years of age (Rudan *et al.* 2008). Chest physiotherapy may be an appropriate tool to help airway clearance in these patients and is therefore often prescribed in patients with pneumonia. A systematic review on chest physiotherapy in adults with pneumonia (Yang *et al.* 2010) concluded that in this population, chest physiotherapy should not be given in addition to standard treatment as there is limited evidence that the techniques investigated in the review (conventional chest physiotherapy, PEP, ACBT and osteopathic manipulative techniques) have positive effects on mortality rate, duration of hospitalisation, cure rate and rate of chest X-ray improvement. A recent systematic review on chest physiotherapy in children with pneumonia (Chaves *et al.* 2013) also concluded that there was insufficient evidence to make a clear conclusion supporting or refuting chest physiotherapy in paediatric pneumonia; however, Chaves *et al.* included an article on continuous positive airway pressure which we would not classify as being a chest physiotherapy technique. Further, a non-randomised study in the paediatric population (Santos *et al.* 2009) suggested benefit from the use of chest physiotherapy, using the 'expiratory flow increase technique', in 123 children with pneumonia. The latter study showed a significant improvement in peripheral oxygen saturation immediately after treatment, which was maintained after 20 minutes of rest (Santos *et al.* 2009). The present review therefore aimed to investigate the effects of different chest physiotherapy techniques, compared with no physiotherapy or sham physiotherapy, in hospitalised children with acute bacterial pneumonia.

Methods

This review used the Cochrane methodology for systematic reviews (Higgins & Green 2009).

Criteria for considering studies for the present review

We included randomised and quasi-randomised controlled trials on children under the age of 16 hospitalised with acute bacterial pneumonia. Any chest physiotherapeutic technique, as a single technique or in combination with others, was compared with no physiotherapy, sham physiotherapy or alternative therapy.

Articles were included if they were written in English, Dutch, French, German or Afrikaans. Other languages were excluded. There was no date limitation, and cross-over trials were excluded. The primary outcome measures of the present review were duration of hospital stay (days), and oxygen saturation measured before and after intervention. Secondary outcome measures were respiratory rate measured before and after intervention; duration of oxygen supplementation; lung function tests (vital capacity, forced vital capacity, forced expiratory volume in one second, peak expiratory flow, maximal inspiratory pressure and maximal expiratory pressure); any adverse effects; and mortality.

Search methods for identification of studies

Online database searches of PubMed, Medline, Cochrane Library, PEDro, Africa-wide information and CINAHL were conducted using the following terms: (chest physiotherapy *or* chest physical therapy *or* airway clearance technique* *or* airway clearance therapy *or* breathing therapy *or* respiratory physical therapy *or* respiratory physiotherapy) *and* (child *or* children *or* infant* *or* baby *or* babies *or* toddler* *or* paediatric *or* paediatric) *and* (pneumonia *or* lung infection *or* lower respiratory tract infection *or* chest infection *or* pulmonary infection). These search terms were also translated into the different included languages by the authors.

Reference lists of the identified articles were manually checked by one of the authors (L.C.). Ongoing research was identified by exploring the clinicaltrial.gov registry and Pan African Clinical Trials registry (pactr.org). We did not search grey literature because it is very difficult to undertake a proper systematic search of the grey literature (Mahood, Van Eerd & Irvin 2014). Therefore, reproducibility of this search is challenging.

Data collection and analysis

Selection of studies and data extraction

One reviewer (L.C.) searched the databases and collected relevant articles based on title and abstract; these were reviewed independently by a second reviewer (B.M.) to identify articles for full text review. Full text articles were also reviewed independently by both researchers for inclusion eligibility. Any disagreement was resolved by discussion and consensus.

Data extraction was done by two independent reviewers (L.C. and B.M.) using a pre-structured data extraction form, which included information on the participants (age, gender, condition, severity of symptoms, inclusion/exclusion criteria, comorbid conditions, setting, number randomised, number lost to follow-up); interventions (type of intervention, duration, frequency, intensity, compliance); outcome measurements; results (point estimates, precision, measures of variability, frequency counts for dichotomous variables, number of participants in each group) and study design (randomisation, allocation concealment, blinding). The data extraction form used in the present review was set up by using Chapter 8 of the Cochrane handbook: Assessing risk of bias (Higgins, Altman & Sterne 2011), the evaluation form for randomised controlled trials, and the evaluation form for systematic reviews of randomised controlled trials as found on http://dcc.cochrane.org/beoordelingsformulieren-en-andere-downloads.

Assessing risk of bias in included studies

One reviewer (L.C.) assessed the following methodological characteristics, which were confirmed by a second reviewer (B.M.).

Generation of sequence: This was considered as having low risk of bias if a random number table, computer-generated list of random numbers or any other valid method of randomisation was used. Studies were considered to have a high risk of bias when invalid methods of sequence generation were used, such as date of birth or allocation by the physiotherapist or physician. When allocation sequence generation method was not identified, bias was judged as being unclear.

Allocation concealment: Low risk was considered when investigators were blinded to group allocation, by the use of coded, opaque and sealed envelopes, on-site locked computer files or similar valid means. When the investigator was able to predict allocation, for example by the use of date of birth, the study was classified as having high risk of bias. When concealment details were not identified, risk of bias was considered unclear.

Blinding: It is generally impossible to blind the participant or clinician to most physiotherapy treatment modalities, but the physician and the data analyser could be blinded. Therefore we judged studies as having low risk of selection bias if the investigator and data analyst were blinded to treatment method. High risk of bias was considered when no blinding or a limited form of blinding was applied. Unclear risk was considered when no information on blinding was available.

Incomplete data outcome and intention-to-treat analysis: Low risk of bias was considered when an appropriate intention-to-treat analysis was performed on incomplete data. When no intention-to-treat analysis was conducted, data were considered as having a high risk of bias. Risk of bias was considered unclear if no information about intention-to-treat was given.

Selective outcome reporting: When primary and secondary outcome measures were reported, the study was considered to have low risk of bias. When no pre-specified outcome measures were identified, the risk of bias was considered high. If insufficient information was available to consider the study at high or low risk of bias, it was classified as having an unclear risk of bias.

Other potential threats to validity: Studies free from other threats, such as baseline imbalance or design-specific risk of bias, were considered to have low risk of bias. High risk of bias was deemed if a potential threat to validity was identified. Unclear risk of bias was deemed when insufficient information was available to determine risk of bias.

Measures of treatment effect

It was intended that continuous outcomes would be reported using the mean difference (or standardised mean differences) and a 95% confidence interval (CI). Where insufficient data were provided, or nonparametric measures were reported, the authors were contacted to try to obtain means (95% CI). Where this was not possible, data were reported as in the source article. Risk ratio and a 95% CI were used to report dichotomous outcomes, where possible.

Results

Results of the search

A description of the included studies is presented in Table 1. Electronic database searches (July 2014) identified 164 articles with duplicates (45 in PubMed, 46 in Medline, 25 in PEDro, 28 in the Cochrane Library, 14 in CINAHL and 6 in Africa-wide information) (Figure 1). After removal of duplicates, 108 articles remained for further investigation. After inspection of titles and abstracts, 6 titles were considered potentially relevant and were selected for full text review. However, only 2 articles met the inclusion criteria (Lukrafka *et al.* 2012; Paludo *et al.* 2008). One ongoing randomised clinical trial was identified on pactr.org and could be included in future reviews (Appendix 1).

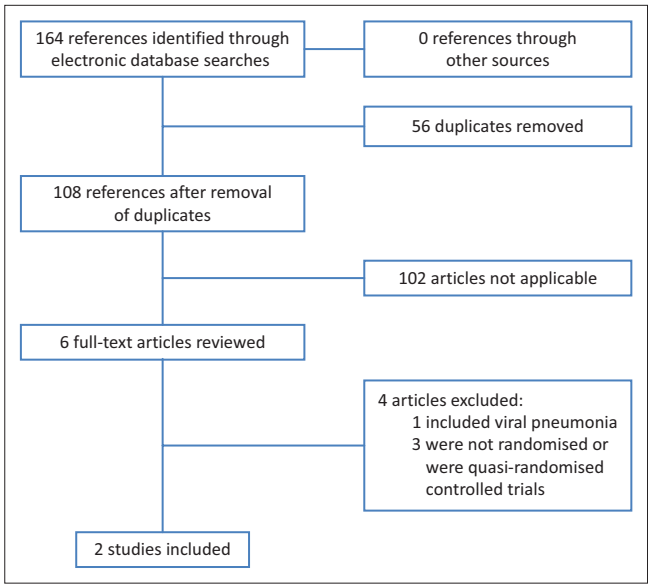
Included studies

Both studies included in the present review were randomised controlled trials conducted in a hospital

TABLE 1: Characteristics of included studies.

Characteristics	Specific characteristics	Paludo *et al.* (2008)	Lukrafka *et al.* (2012)
Methods	Study design	Randomised controlled trial	Randomised controlled trial
	Withdrawal/drop-outs	9	7
Participants	Country	Brazil	Brazil
	Research setting	Hospital	Hospital
	Health condition	Acute pneumonia	Acute CAP
	Severity of symptoms	Mild to moderate	Mild to moderate
	Total sample enrolled	98	79
	Total sample analysed	89	72
	Age range	29 days – 12 years	1–12 years
	Inclusion criteria	Acute pneumonia with: presence of cough and/or fever; tachypnoea; consolidations and/or infiltrates on CXR between 29 days and 12 years old	Hospitalised with acute CAP (clinically and radiologically diagnosed), age 1–12 years
	Exclusion criteria	Chest drain; haemodynamic instability (ND); bone fragility or rib fractures; any other contra-indication to chest physiotherapy (ND)	Severely ill patients (ICU); chest drain; atelectasis detected by CXR; history of pneumonia or pleural effusion in previous 6 months; other pulmonary disease; heart disease; CP or immune deficiency
Interventions: Intervention group	Treatment description	Standard treatment and chest physiotherapy: PD, thoracic squeezing, percussions, vibrations, cough stimulation + aspiration/suctioning when necessary. PD positions guided by CXR	< 5 years: positioned in high side lying or high sitting, manual thoracic vibrations, thoracic compressions, PEP + artificially stimulated cough or suctioning > 5 years: same as above + breathing exercises and FET
	Duration of treatment	About 30 minutes per treatment session	10–12 minutes per treatment session
	Frequency of treatment	Twice a day until discharge	Three times a day until discharge
	Intensity of treatment	Unclear	Unclear
	Compliance to treatment	Unclear	Unclear
Interventions: Control group	Treatment description	Standard treatment: antibiotics, fluid therapy and oxygen therapy as needed	Recommended non-mandatory request: lateral positioning, cough, perform diaphragmatic breathing
	Duration of treatment	Information not available	5 minutes (not mandatory)
	Frequency of treatment	Information not available	Once a day (not mandatory)
	Intensity of treatment	Unclear	Unclear
	Compliance to treatment	Unclear	Unclear
Outcomes	Primary outcomes	Time to clinical resolution	Severity score and respiratory rate
	Secondary outcomes	Length of hospital stay, persistence of respiratory symptoms and signs	Duration of hospitalisation

Note: Please see the full reference list of the article, Corten, L., Jelsma, J. & Morrow, B.M., 2015, 'Chest physiotherapy in children with acute bacterial pneumonia', *South African Journal of Physiotherapy* 71(1), Art. #256, 10 pages. http://dx.doi.org/10.4102/sajp.v71i1.256, for more information.
CAP, community-acquired pneumonia; CXR, chest X-ray; ND, not defined; ICU, intensive care unit; CP, cerebral palsy; PD, postural drainage; PEP, positive expiratory pressure; FET, forced expiratory technique.



Source: Modified PRISMA study flow diagram. Moher, D., Liberati, A., Tetzlaff, J. & Altman, D.G., 2009, 'Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement', *PLoS Med* 6(6), e1000097. http://dx.doi.org/10.1371/journal.pmed1000097, available from: http://www.prisma-statement.org

FIGURE 1: Study flow diagram.

setting in Brazil (Lukrafka *et al.* 2012; Paludo *et al.* 2008). Both articles were written in English (Lukrafka *et al.* 2012; Paludo *et al.* 2008).

Participants

In total, 177 participants between the age of 29 days and 12 years were enrolled in the two trials. Sixteen were lost to follow-up, and therefore 161 participants were analysed (95 male and 66 female), with 82 participants in the intervention groups and 79 in the control groups. One study (Lukrafka *et al.* 2012) divided the participants into two age groups: children younger than 5 years of age and children older than 5 years. The latter study included participants with acute community-acquired pneumonia (Lukrafka *et al.* 2012) whilst the other study did not specify acquisition site (Paludo *et al.* 2008). Both studies included participants with mild to moderate disease, but only one study clearly indicated disease severity (Lukrafka *et al.* 2012). In the other study, disease severity can be deduced as mild to moderate from the baseline characteristics of participants, as mean oxygen saturation was above 95% and mean respiratory rate at baseline was above 45 breaths per minute (Paludo *et al.* 2008) (Table 2).

Intervention

One trial (Paludo *et al.* 2008) compared standard treatment, consisting of antibiotic treatment, fluid therapy and oxygen therapy when needed, with standard treatment combined with chest physiotherapy, which included chest X-ray

TABLE 2: Baseline characteristics of included studies.

Characteristics	Paludo *et al.* (2008)		Lukrafka *et al.* (2012)	
	Intervention	Control	Intervention	Control
Analysed (*n*)	47	42	35	37
Male (*n*)	29	24	20	22
Female (*n*)	18	18	15	15
Age (*n*)	Mean = 44 months (95% CI 31.6–56.4)	Mean = 32.2 months (95% CI 22.5–41.9)	12–59 months: 25 (71.4%)	12–59 months: 28 (75.7%)
	-	-	5–12 years: 10 (28.6%)	5–12 years: 9 (24.3%)
Respiratory rate: mean ± s.d. (95% CI)	45 BPM ± 14.33 (40.9–49.1)	45.8 BPM ± 14.19 (41.6–50.1)	39.1 BPM ± 9.9 (35.82–42.38)	38.3 BPM ± 9.9 (35.11–41.49)
Fever (*n*) (%)	45 (95.7%)	37 (90.2%)	7 (20.0%)	8 (21.6%)
SaO2: mean ± s.d. (95% CI)	95.0 ± 2.47 (94.3–95.7)	95.7 ± 2.33 (95.0–96.4)	96.5 ± 2.5 (95.67–97.33)	97.1 ± 2.1 (96.42–97.78)
Pleural effusion (*n*) (%)	5/45 (11.1%)	6/39 (15.4%)	10 (28.6%)	4 (10.8%)

Note: Please see the full reference list of the article, Corten, L., Jelsma, J. & Morrow, B.M., 2015, 'Chest physiotherapy in children with acute bacterial pneumonia', *South African Journal of Physiotherapy* 71(1), Art. #256, 10 pages. http://dx.doi.org/10.4102/sajp.v71i1.256, for more information.
95% CI, 95% confidence interval; s.d., standard deviation; BPM, breaths per minute; SaO2, oxygen saturation.

TABLE 3: Risk of bias.

Category of bias	Paludo *et al.* (2008)		Lukrafka *et al.* (2012)	
	Authors' judgement	Support for judgement	Authors' judgement	Support for judgement
Generation of sequence	Low risk	• Simple randomisation • Table of random numbers	Low risk	Computerised random number generator to select blocks of 3 and 4
Allocation concealment	Unclear risk	No specifications on concealment	Low risk	Use of sequentially numbered opaque envelopes
Blinding:				
Participants	High risk	Participants knew in which group they were assigned	High risk	Participants knew in which group they were assigned
Outcome assessor	Low risk	Investigators, nurses and physicians were blinded	Low risk	Study radiologist and epidemiologist blinded
Data analysts	Unclear risk	No information on data analysts	Low risk	Data analysts are blinded
Incomplete data	Low risk	• Intention-to-treat principle applied • Number lost to follow-up and reason for loss to follow-up similar for both groups	Low risk	• Intention-to-treat analyses • Number lost to follow-up and reason for loss to follow-up similar for both groups
Selective outcome reporting	Low risk	Primary and secondary outcome measures reported	Low risk	Primary and secondary outcome measures reported
Other potential threats	Unclear risk	• Baseline characteristics similar • Groups treated equally, except for treatment • No other information available	Unclear risk	• Baseline: tendency for more children with pleural effusion in intervention group • Groups treated equally, except for treatment • No other information available

Note: Please see the full reference list of the article, Corten, L., Jelsma, J. & Morrow, B.M., 2015, 'Chest physiotherapy in children with acute bacterial pneumonia', *South African Journal of Physiotherapy* 71(1), Art. #256, 10 pages. http://dx.doi.org/10.4102/sajp.v71i1.256, for more information.

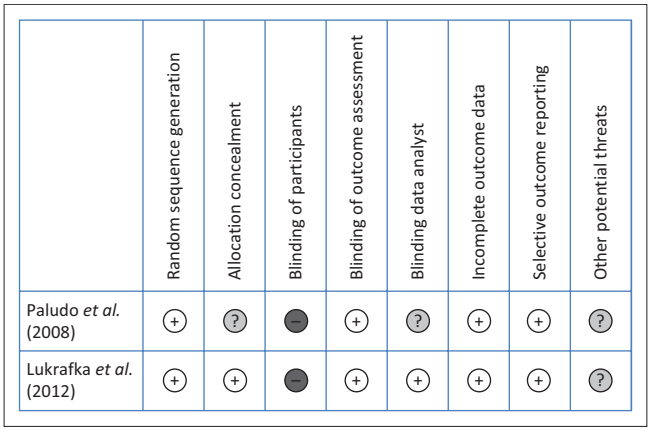
guided PD positioning, thoracic squeezing, percussions, vibrations, cough stimulation and aspiration/suctioning when necessary. Chest physiotherapy was given bi-daily for an average of 30 minutes per session. The other trial (Lukrafka *et al.* 2012) compared recommended non-mandatory lateral positioning, cough and the performance of diaphragmatic breathing for 5 minutes per day in the control group, with chest physiotherapy in the intervention group. In the intervention group, treatment depended on the child's age. Participants younger than 5 years were positioned in high side lying or high sitting positions, and manual thoracic vibrations, thoracic compressions, PEP technique and artificially stimulated cough or suctioning were performed. For participants older than 5 years, the same treatment was applied with the addition of breathing exercises and FET. Treatment was given three times a day for 10–12 minutes. It is unclear how diaphragmatic breathing was taught or administered in the younger children.

Excluded studies

Four articles did not meet the inclusion criteria for the present review. One article was excluded because participants included 55 children with presumed viral pneumonia (Levine 1978). The other three articles were excluded because the type of research was not a randomised or quasi-randomised controlled trial (Gilchrist 2008; Lisy 2014; Stapleton 1985). Stapleton (1985) described a case series of 55 children in which 34 children with acute uncomplicated respiratory tract infections received chest physiotherapy whereas 21 children with this disease did not receive chest physiotherapy and of whom 26 were diagnosed with pneumonia, 9 with bronchitis and 20 with bronchiolitis. Gilchrist (2008), on the other hand, performed a database search of the Cochrane Library, PubMed and PEDro for an answer to the structured clinical question, 'In a child with community-acquired pneumonia, does chest physiotherapy reduce the length of hospital admission?' Finally, Lisy (2014) presented a summary of the review by Chaves *et al.* (2013).

Risk of bias in included studies

A detailed risk of bias analysis is presented in Table 3. A summary of the findings appears in Figure 2. For both studies (Lukrafka *et al.* 2012; Paludo *et al.* 2008), low risk of bias was found with regard to generation of sequence, blinding of outcome assessors, incomplete data outcome and selective outcome reporting. As it is nearly impossible



Source: Modified risk of bias summary table as produced by Review Manager 5.3
Black = high risk of bias, grey = unclear risk of bias, and white = low risk of bias.

FIGURE 2: Risk of bias summary: review of authors' judgements about each risk of bias item for each included study.

to blind participants for treatment when performing chest physiotherapy, it follows that both studies have a high inherent risk of bias. Neither study commented on other potential threats to validity. Paludo *et al.* (2008) did not discuss allocation concealment or data analyst blinding.

Effects of intervention

No analysis of heterogeneity, meta-analysis or pooling of data was possible owing to different outcome measures presented in the two included studies. Duration of hospital stay data, whilst common to both included studies, could also not be pooled owing to different data presentation.

Primary outcomes

Both included studies reported length of hospital stay as a secondary outcome measure. In both studies, median number of days in hospital was reported and no significant difference between the groups was found (p = 0.76 and p = 0.11). In one study (Paludo *et al.* 2008), the reported median hospital stay was 6 days for both groups but, after we consulted the authors, the following additional information was made available: mean duration of stay for the intervention group was 7.8 days with a 95% CI of 6.6–9.0 days and a mean of 6.8 days for the control group with a 95% CI of 5.9–7.7 days. The other trial (Lukrafka *et al.* 2012) reported a median of 8 days in hospital for the intervention group (95% CI 5.1–10.9 days) and 6 days for the control group (95% CI 5.1–6.9 days). We were unable to obtain mean values of duration of hospitalisation for this latter trial, therefore we were unable to pool data or perform a meta-analysis.

The other primary outcome measure of the present review (oxygen saturation measured before and after intervention) was not reported in either of the included studies.

Secondary outcomes

Neither study reported data on any of the present review's secondary outcome measures, namely: respiratory rate measured before and after intervention, duration of oxygen supplementation, lung function tests, adverse effects and mortality.

Other outcome measures

One of the studies reported time to clinical resolution, expressed in days, as their primary outcome measure (Paludo *et al.* 2008). No significant difference was seen between the intervention and control groups (p = 0.8). The median time to clinical resolution was 4 days in both groups, with an interquartile range of 2.0–7.0 in the intervention group and 3.0–6.0 in the control group. After consulting the authors, mean values and 95% CIs were made available. The mean time to clinical resolution in the intervention group was 4.4 days, with a 95% CI of 3.3–5.6 and 4.3 days in the control group, with a 95% CI of 3.4–5.4 (Table 4).

The other study (Lukrafka *et al.* 2012) used reduction of respiratory rate and illness severity score, comparing baseline and discharge results, as primary outcome measures. Both groups showed a significant improvement in outcomes between baseline and discharge (p < 0.001), but there were no significant differences between the groups for these outcome measures (Table 4; at discharge, p = 0.7 for reduction in respiratory rate, and p = 0.6 for severity score).

Paludo *et al.* (2008) reported persistence of respiratory symptoms, expressed in days, as a secondary outcome measure. No significant difference between the intervention and control groups was reported (Table 4), except for a longer duration of coughing (p = 0.04) and a longer duration of rhonchi (p = 0.03) in the intervention group. The median (interquartile range) duration of coughing was 5 (4.0–8.0) days in the intervention group and 4 (3.0–6.0) days in the control group. Mean (95% CI) values for this outcome measure were 6.1 (5.1–7.1) days for the intervention group and 4.7 (3.9–5.6) days for the control group. Comparing the duration of rhonchi, the intervention group had a median (interquartile range) duration of 2 (0–4.0) days and the control group 0.5 (0–2.0) days. The authors reported a mean (95% CI) duration of 2.8 (1.8–3.8) days for the intervention group and 1.2 (0.5–1.9) days for the control group.

Potential bias in the review process

We searched six different databases, checked the reference lists of all relevant articles and searched the clinicaltrial.gov and pactr.gov registry to identify potential studies for the present review. We contacted the authors of identified articles to obtain additional or missing data, but only those of one study (Paludo *et al.* 2008) replied. No date limitation was set and no articles were excluded owing to language, which reduces the risk of selective reporting. We might have missed studies reported in grey literature, non-peer-reviewed journals or databases, as well as studies presented at local conferences, which may lead to a potential bias. One important potential bias is the identification of the ongoing

TABLE 4: Other outcome measures.

Outcome	Study (*n*)	Outcome measure	Data presentation	Intervention	Control	*p*
Primary outcomes	Paludo *et al.* (2008), *n* = 89	Time to clinical resolution in days	Median (IQR)	4.0 (2.0–7.0)	4.0 (3.0–6.0)	0.8
			Mean (95% CI)	4.4 (3.3–5.6)	4.3 (3.4–5.4)	n/a
	Lukrafka *et al.* (2012), *n* = 72	Reduction of respiratory rate	Mean ± s.d. (95% CI) at baseline	39.1 ± 9.9 (35.82–42.38)	38.4 ± 9.8 (35.24–41.56)	0.9
			Mean ± s.d. (95% CI) at discharge	31.6 ± 6.9 (29.31–33.89)	32.5 ± 8.3 (29.83–35.17)	0.7
			p value within group	$p < 0.001$	$p < 0.001$	-
	Lukrafka *et al.* (2012), *n* = 72	Score of severity	Mean ± s.d. (95% CI) at baseline	2.11 ± 1.6 (1.58–2.64)	1.78 ± 1.1 (1.43–2.13)	0.2
			Mean ± s.d. (95% CI) at discharge	0.57 ± 0.8 (0.31–0.84)	0.41 ± 0.6 (0.22–0.60)	0.6
			p value within group	$p < 0.001$	$p < 0.001$	-
Secondary outcomes	Paludo *et al.* (2008), *n* = 89	Persistence of respiratory symptoms in days	-	-	-	-
		1. Time to normal respiratory rate	Median (IQR)	3.0 (0–7.0)	3.0 (1.0–6.0)	0.75
			Mean (95% CI)	3.6 (2.4–4.8)	3.3 (2.2–4.4)	n/a
		2. Time to normal arterial SaO2	Median (IQR)	1.0 (0–2.0)	0.5 (0–2.0)	0.98
			Mean (95% CI)	1.0 (0.5–1.4)	0.8 (0.4–1.3)	n/a
		3. Time to normal lung auscultation	Median (IQR)	4.0 (3.0–6.0)	4.0 (2.0–6.0)	0.28
			Mean (95% CI)	4.7 (3.5–5.9)	4.1 (3.1–5.0)	n/a
		4. Duration of fever	Median (IQR)	2.0 (0–2.0)	1.0 (0–3.0)	0.78
			Mean (95% CI)	1.4 (0.8–1.9)	1.5 (0.7–2.3)	n/a
		5. Duration of coughing	Median (IQR)	5.0 (4.0–8.0)	4.0 (3.0–6.0)	0.04
			Mean (95% CI)	6.1 (5.1–7.1)	4.7 (3.9–5.6)	n/a
		6. Duration of parent's reported wheezing	Median (IQR)	1.5 (0–5.0)	1.0 (0–3.5)	0.29
			Mean (95% CI)	2.9 (2.0–3.9)	1.7 (1.0–2.4)	n/a
		7. Duration of fine crackles	Median (IQR)	0 (0–2.0)	0 (0–2.0)	0.72
			Mean (95% CI)	1.1 (0.6–1.6)	1.2 (0.5–1.8)	n/a
		8. Duration of coarse crackles	Median (IQR)	2.0 (0–4.0)	1.0 (0–3.0)	0.83
			Mean (95% CI)	2.1 (1.3–2.7)	2.0 (1.1–2.8)	n/a
		9. Duration of wheezes	Median (IQR)	0 (0–5.0)	0 (0–4.0)	0.62
			Mean (95% CI)	1.7 (1.0–2.5)	1.8 (0.8–2.7)	n/a
		10. Duration of rhonchi	Median (IQR)	2.0 (0–4.0)	0.5 (0–2.0)	0.03
			Mean (95% CI)	2.8 (1.8–3.8)	1.2 (0.5–1.9)	n/a
		11. Duration of chest indrawing	Median (IQR)	2.0 (0–3.0)	2.0 (0–3.0)	0.75
			Mean (95% CI)	1.8 (1.3–2.4)	2.0 (1.2–2.8)	n/a

Note: Please see the full reference list of the article, Corten, L., Jelsma, J. & Morrow, B.M., 2015, 'Chest physiotherapy in children with acute bacterial pneumonia', *South African Journal of Physiotherapy* 71(1), Art. #256, 10 pages. http://dx.doi.org/10.4102/sajp.v71i1.256, for more information.
IQR, interquartile range; 95 % CI, 95% confidence interval; s.d., standard deviation; n/a, not available.

clinical trial identified through pactr.gov, as the authors of this randomised controlled trial are the same as those of the present review.

Discussion

The present review included two randomised controlled trials of 161 participants, neither of which compared chest physiotherapy with sham physiotherapy. One study compared standard treatment for pneumonia with standard treatment with additional conventional chest physiotherapy (Paludo *et al.* 2008), whilst the other study compared recommended non-mandatory lateral positioning, cough and diaphragmatic breathing with conventional chest physiotherapy combined with PEP in all children and the FET in children more than 5 years old (Lukrafka *et al.* 2012). The latter study (Lukrafka *et al.* 2012) did not distinguish between the two age categories (younger and older than 5 years) regarding control group intervention. It is unclear whether and how diaphragmatic breathing was achieved with unco-operative young infants and children.

Chest physiotherapy was not shown to influence the duration of hospitalisation (primary outcome of the present review) on the basis of both included studies. However, Lukrafka *et al.* (2012) did report a 2-day difference between the intervention and control groups, with a longer duration of hospitalisation for the intervention group. The present study might have been underpowered to detect a significant difference between the two groups. The other outcome measures of the present review were not assessed in the included studies, therefore we cannot comment on the effectiveness of chest physiotherapy regarding these measures. Conventional chest physiotherapy was not found to have an influence on time to clinical resolution (number of days for the participant to reach afebrile state, absence of severe signs, normal respiratory rate and arterial oxygen saturation ≥ 95%) (Paludo *et al.* 2008). There was also no influence of conventional chest physiotherapy combined with PEP (and FET in children more than 5 years old) on the reduction of respiratory rate and illness severity score (Lukrafka *et al.* 2012). Paludo *et al.* (2008) reported an increased 'persistence of respiratory symptoms' in the group receiving conventional physiotherapy with a longer duration

of coughing and rhonchi in this group compared with the control group. The clinical relevance of this 'persistence' is not clear.

Risk of bias was present in both studies. Only one study reported the method of allocation concealment (Lukrafka *et al.* 2012) and a lack of blinding was found in both studies. Owing to the nature of the intervention, it is impossible to blind the participants of the research, therefore neither study commented on this factor. Although the outcome assessors were blinded in both trials, only one study (Lukrafka *et al.* 2012) reported blinding of the data analyst. There was inadequate information available to eliminate other potential threats regarding study validity.

Not all of the present review's objectives were able to be addressed, as the studies did not comment on adverse events or mortality and we were unable to compare one chest physiotherapy technique with sham physiotherapy or another chest physiotherapy modality. Both studies combined several chest physiotherapy treatment techniques in their intervention, which makes it impossible to draw conclusions regarding individual techniques. As different outcome measures were used in the studies with different presentation of results, it was not possible to pool and compare all the data. Lukrafka *et al.* (2012) used severity scores to express baseline and discharge symptoms, but no separate reporting of the individual symptoms, such as oxygen saturation and fever, were available for analysis. Paludo *et al.* (2008) reported the duration of symptoms as median and interquartile ranges in the article but made the means and 95% CIs available for inclusion in the present review. Unfortunately, owing to the lack of comparable data, no meta-analysis was possible in the present review. Further, one study described the condition as 'acute pneumonia' (Paludo *et al.* 2008), whilst the other study (Lukrafka *et al.* 2012) described it as 'community-acquired pneumonia'. It is therefore unclear whether the studies described exactly the same condition. Lastly, both studies were conducted in Brazil, which limits the generalisability of the findings.

Although two non-randomised controlled studies showed positive effects of chest physiotherapy (one within a population of children with community-acquired pneumonia [Santos *et al.* 2009] and one within the population of HIV-positive children on antiretroviral therapy [Plebani *et al.* 1997]), a recently published review on chest physiotherapy for pneumonia in children (Chaves *et al.* 2013) concluded that, although some minor improvements could be found in children receiving chest physiotherapy, they were unable to pool the data and make generalisable conclusions. However, the review by Chaves *et al.* (2013) differs from our review regarding the included types of pneumonia and the definition of chest physiotherapy: they included a study of nasal continuous positive airway pressure (CPAP), which we view as a form of non-invasive ventilation and not a chest physiotherapy modality. Our review was also able to identify a new, ongoing research trial, albeit conducted by the current authors, that might have biased the search strategy. Another published review on chest physiotherapy in adults with pneumonia (Yang *et al.* 2010) included six trials and concluded that osteopathic manipulations and PEP could reduce the length of hospitalisation; PEP might reduce the duration of fever; and osteopathic manipulations could reduce duration of antibiotic treatment. However, the overall conclusion was that there was insufficient evidence to support the use of chest physiotherapy in adults with pneumonia. Our review was limited to six databases, clinicaltrial.gov, pactr.org and reference lists of the included articles. We might have missed studies presented in non-peer-reviewed journals or databases, or studies presented at local conferences, which might have introduced bias.

Conclusion

Owing to the limited number of included articles and the inability to pool data, it is not possible to make clear, justified recommendations for clinical practice. Therefore we cannot reject or accept chest physiotherapy as a standard treatment option in children with pneumonia. More randomised controlled trials in this field of research are urgently needed. We recommend research with adequate sample sizes (which could allow sub-analysis of different severity levels of pneumonia, age groups, etc.); single, standardised chest physiotherapy techniques; clear standardised control interventions; appropriate outcome parameters; and analysis of adverse events and mortality.

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Competing interests

The authors declare that they have no financial or personal relationships which may have inappropriately influenced them in writing this article.

Authors' contributions

All authors were involved in setting up the present review's protocol. L.C. (University of Cape Town) conducted the database and the manual reference list searches, and listed the titles and abstracts found in these searches. L.C and B.M.M. (University of Cape Town) identified eligible articles from this list, did the data extraction of the eligible articles and analysed the data. All authors were involved in the writing of this review.

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Appendix 1

TABLE 1-A1: Characteristics of ongoing studies.

PACTR201404000706382	Description
Public trial name or title	The use of chest physiotherapy in children hospitalised with pneumonia
Scientific name or title	The use of assisted autogenic drainage in children with acute respiratory disease in a developing country
Methods	Randomised controlled trial
Participants	98 children between the age of 1 month and 8 years hospitalised with pneumonia
Interventions	Comparison of standard nursing care with standard nursing care + assisted autogenic drainage bi-daily
Outcome measures	Primary: duration of hospitalisation Secondary: duration of fever; respiratory rate at admission, before, immediately after, 1 hr post-treatment and at discharge; lung function test at admission and discharge if the child is older than 5 years of age; oxygen saturation at admission, before, during, after, 1 hr post-treatment and at discharge; duration of oxygen supplementation; atelectasis/collapse; progression of respiratory support; and mortality rate
Research setting	Red Cross War Memorial Children's Hospital, Cape Town, South Africa
Starting date	24 March 2014
Contact information	Lieselotte Corten and Brenda Morrow. CRTLIE001@myuct.ac.za or Brenda.morrow@uct.ac.za

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Appraisal

Critically appraised paper: Breathing retraining programs, delivered either via a DVD or face-to-face, improve health-related quality of life in people with asthma

Synopsis

Summary of: Bruton A, Lee A, Yardley L, Raftery J, Arden-Close E, Kirby S, et al. Physiotherapy breathing retraining for asthma: a randomised controlled trial. *Lancet Respir Med* 2018;6:19–28.

Question: For people with asthma, is breathing retraining delivered via a digital, audiovisual and self-guided program more effective than usual care, and as effective as face-to-face breathing retraining, at improving asthma-related quality of life? ***Design***: Randomised controlled trial with concealed allocation and blinded outcome assessment. ***Setting***: In participants' homes, Southampton, United Kingdom. ***Participants***: Adults with mild and moderate asthma (diagnosed by a physician), who had been prescribed at least one asthma medication in the previous year, and had a score on the Asthma Quality of Life Questionnaire < 5.5. Exclusion criteria were concomitant diagnosis of chronic obstructive pulmonary disease with a forced expiratory volume in one second $<$ 60% of predicted. Randomisation (2:1:2) of 655 participants allocated 261 to a digital, audiovisual, self-guided program group (referred to as DVD group), 132 to a face-to-face group, and 262 to a control group. ***Interventions***: The DVD group were provided with a DVD and booklet that included an explanation of how to complete the breathing retraining exercises (eg, diaphragmatic breathing, nasal breathing, slow breathing, controlled breath holds, and simple relaxation exercises), motivational components (eg, rationale for exercises and common concerns) as well as supportive features such as a daily planner and progress charts. The face-to-face group were provided with the booklet and underwent breathing retraining for three 40-minute one-on-one sessions with a physiotherapist once every 2 weeks after randomisation. The control group received usual medical care. ***Outcome measures***: The primary outcome was health-related quality of life, measured with the Asthma Quality of Life Questionnaire at 12 months. ***Results***: A total of 598 participants completed the 12-month assessment (230 in the DVD group, 122 in the face-to-face group, and 246 in the control group). At 12 months, compared with the control group, both the DVD group and the face-to-face group had a better score on the Asthma Quality of Life Questionnaire (MD 0.28, 95% CI 0.11 to 0.44; and 0.24, 95% CI 0.04 to 0.44, respectively). There was no difference between the two intervention groups (MD 0.04, 95% CI –0.16 to 0.24). ***Conclusion***: A breathing retraining program, delivered as either a self-guided, digital and audiovisual program or a face-to-face program, produces similar improvements in asthma-related quality of life for people with partially controlled asthma.

Provenance: Invited. Not peer reviewed.

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Commentary

Asthma is a heterogeneous condition that affects people in many ways; most importantly, it impairs their quality of life. Although pharmacological treatment is effective, most people continue to have ongoing symptoms and quality of life impairment. Several non-pharmacological interventions have been suggested for people with asthma,[1] but data pertaining to their effectiveness is inconclusive. Breathing retraining exercises have been recommended for people whose symptoms are not adequately controlled by pharmacological treatment.[2]

The study by Bruton et al aimed to evaluate whether breathing retraining delivered either face-to-face or via a digital, audiovisual and self-guided program (DVD group) improves asthma-related quality of life compared with usual care. The authors should be commended on the methodological quality of their study, which included: recruiting the largest number of participants from all studies that aimed to evaluate the effect of non-pharmacological interventions in people with asthma; conducting a pragmatic trial, which assessed the real-world effectiveness of an intervention, using minimal exclusion criteria; incorporating clinical and pathophysiological outcomes; performing a cost-effectiveness analysis; and having a 12-month follow-up assessment.

This well conducted and relevant study demonstrated that, after 12 months, participants in the face-to-face group and those in the DVD group had similar quality of life, which was better than the quality of life of participants who received usual care. In addition, both interventions were cost-effective. However, breathing retraining did not improve pathophysiological outcomes such as clinical control, airway inflammation (exhaled nitric oxide), lung function or psychosocial comorbidities (ie, anxiety and depression symptoms). It is impressive how well-developed interventions that include as little as three face-to-face, one-to-one sessions (40 minutes each) or a self-guided DVD, which can both be easily incorporated into clinical practice, produce such substantial improvement in asthma-related quality of life in people with incompletely controlled asthma.

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