Chronic respiratory disease (FS-04)

Mark Elkins (Australia)
Susan Jenkins (Australia)
Judy Bradley (United Kingdom)
Camila Schivinski (Brazil)
Chronic Respiratory Disease

Current high-quality evidence supports greater physiotherapy intervention

Chair: Assoc Professor Mark Elkins, University of Sydney

Speakers: Adj Professor Sue Jenkins, Curtin University

Professor Judy Bradley, University of Ulster

Adj Professor Camila Schivinski, University of S. Catarina
Sue Jenkins
Pulmonary rehabilitation in chronic respiratory diseases

Judy Bradley
Airway clearance techniques

Mark Elkins
Coordinating physiotherapy and medication use

Camila Schivinski
Chronic respiratory diseases in childhood
Background

• Over 400 million people have chronic respiratory disease

• Massive healthcare expenditure

• Third highest cause of premature deaths
Background

• Chronic obstructive pulmonary disease (COPD), asthma, bronchiectasis, cystic fibrosis, lung cancer, interstitial lung disease, bronchopulmonary dysplasia, bronchiolitis obliterans, pulmonary hypertension, primary ciliary dyskinesia, pulmonary hypertension …
Background

• Chronic obstructive pulmonary disease (COPD), asthma, bronchiectasis, cystic fibrosis, lung cancer, interstitial lung disease, bronchopulmonary dysplasia, bronchiolitis obliterans, pulmonary hypertension, primary ciliary dyskinesia, pulmonary hypertension…

• Breathlessness, reduced exercise tolerance, cough, sputum retention, acute exacerbations, wheeze, progressive lung damage, haemoptysis, fatigue, sleep disordered breathing, poor oxygenation, difficulty adhering to chronic therapy, early mortality…
Physiotherapists have many effective interventions
Physiotherapists have many effective interventions.
Physiotherapists have many effective interventions

- 973 trials
- 212 reviews
- 37 guidelines
Background

• Many patients do not receive these interventions

Carson KV, et al. Cochrane DSR 2013; CD001116
Many patients do not receive these interventions

Standards of Care 2008, Cystic Fibrosis Australia
Carson KV, et al. Cochrane DSR 2013; CD001116
Background

- Many patients do not receive these interventions

Carson KV, et al. *Cochrane DSR* 2013; CD001116
Pulmonary Rehabilitation

Sue Jenkins

Institute for Respiratory Health
Sir Charles Gairdner Hospital
Curtin University
Perth, Western Australia
Outline

- Benefits of pulmonary rehabilitation
- Does exercise training need to be supervised?
- Patient selection
- Timing of pulmonary rehabilitation in the disease trajectory
- Access, uptake and completion of pulmonary rehabilitation
- Do clinical programs demonstrate equivalent benefits to clinical trials?
- Conclusions and future directions
Cardiovascular Deconditioning

Fear / Anxiety / Panic

Depression & Social Isolation

The disability spiral

COPD

3rd most common cause of morbidity & mortality globally

High cost

Dyspnoea on exertion

Dyspnoea at lower levels of activity

Muscle deconditioning

Inactivity
Pulmonary Rehabilitation

- Evidence based, comprehensive intervention

  Thorough patient assessment

  Patient-tailored therapies that include, but are not limited to, exercise training, education and behaviour change

- Aim: improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence to health-enhancing behaviours

  (American Thoracic Society/European Respiratory Society 2013)

- Strongly endorsed in clinical management guidelines
Benefits of Pulmonary Rehabilitation

- Improved exercise tolerance
- Decreased symptoms
- Improved quality of life
- Improved mood

- COPD, interstitial lung disease, bronchiectasis, pulmonary arterial hypertension, asthma, lung cancer

- COPD exacerbations: ↓hospitalisations, cost effective

Patient Selection

- Patients with CRD who are limited by breathlessness despite optimal medication
- Willing and able to undertake rehabilitation
- Excl: unsafe to exercise

- COPD – stable and post-acute exacerbation
- Interstitial lung disease
- Bronchiectasis
- Asthma
- Pulmonary arterial hypertension
- Lung cancer
- Following critical lung disease (severe pneumonia)
- Lung volume reduction procedures
- Lung transplantation
Typical Pulmonary Rehabilitation Program

- 8-12 weeks duration
- 2 or 3 supervised sessions / week
- Home exercise program
- Sessions 60-90 min
- Exercise training
  - Walking / cycling
  - Strength
- Self-management education
- Main outcomes: functional exercise capacity, symptoms, HRQoL

(Spruit et al 2014)
Does Exercise Training need to be Supervised?

- Barriers to exercise in people with CRD
- Supervision
  - Safety, reassurance
  - Titrate intensity, modify exercises
  - ↑ Confidence to exercise at higher intensity
- Supervised vs unsupervised walking training
  - Similar ↑ HRQoL
  - Supervised group - greater ↑ ex endurance and physiological changes (Puente-Maestu et al 2000)
- Early introduction of a home exercise program essential
- Role of unsupervised exercise training (Mitchell et al 2015)
Timing of Pulmonary Rehabilitation in the Disease Trajectory

- Moderate – severe disease
- Mild disease
- Very severe / end-stage
  - Supervised home-based programs
  - Exercise training
    - Endurance – interval training
    - Strength
    - Neuromuscular electrical stimulation
  - Wheeled walker / rollator
  - SOB during ADL – Plan, Prepare, Pace, Pause

(Spruit et al 2013, Sillen et al 2014)
Optimising Access, Uptake and Completion of Pulmonary Rehabilitation

Limited resources
Benefits of group training
Exercise training in isolation
Rural and remote locations
Combining patient populations
Exercise Training in Isolation – Stable COPD

- RCTs of exercise only (31 trials) vs ‘exercise + other PR components’ (34 trials) (control=usual care)
  - Similar improvements in HRQoL. No HCU data (McCarthy et al 2015)

- Ex training alone vs exercise training + MDT education
  - Similar improvements in ex tolerance and HRQoL
  - No difference in HCU (Blackstock et al 2014, n=267)

- Experienced healthcare professionals - more than exercise supervision
Walking Training as the only Exercise Modality

“Walking is man’s best medicine” (Hippocrates 460 to 377 BC)

LL endurance training
Adequate dose required
Relevant to ADL
No equipment required
Walking and Feedback Training (WAFT) Trial

- 8 wk RCT
- 143 participants (84 males)
- Moderate to severe COPD
- Age 69 ± 9 yr

- Control
  - Usual medical care
  - No exercise advice

- Supervised walking training
  - 8 weeks, 3 x week
  - High intensity
  - 30 min progressed to 45 min

- Results
  - Clinically significant between group improvements in endurance walking and HRQoL

(Wotton et al 2014)
Increasing the Capacity to Provide Programs in Rural and Remote Regions

Higher rates of CRD
Access to healthcare often poor
Staff require additional training to deliver programs

Including Patients with CHF in Pulmonary Rehabilitation Programs

- COPD and CHF – many features in common, often co-exist
- Existing PR programs – wide range of patient conditions and comorbidities
- Strategy if separate programs are not economically viable

(Evans 2011)
Strategies to Improve Uptake and Completion of Pulmonary Rehabilitation

- Challenges!
- Increase awareness of benefits
- Improve access
  - Transport options
  - Program location and timing
    - community, out-patient
- Extend program - exacerbation / new medical condition
- Supervised water-based training, technology-assisted (telerehab, devices, apps)

(Stickland et al 2011, Holland et al 2013, McNamara et al 2013)
Maintaining the Benefits

- Benefits decline over 6-12 months if no maintenance strategy
- ↓ Adherence to regular exercise
- Exacerbations and disease progression
- Impact of comorbidity

Strategies
- Supervised ex classes
- Regular contact
  - Phone / assessments
- Repeating program
- Individual preference
- Results variable
- Further research

(Cockram et al 2006, Spencer et al 2010, Spruit et al 2013)
Do Clinical Programs Demonstrate the Same Benefits as Clinical Trials?

<table>
<thead>
<tr>
<th>Patients with COPD</th>
<th>Clinical Program Jenkins &amp; Cecins</th>
<th>Clinical Trials Puhan et al 2008*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>150</td>
<td>460</td>
</tr>
<tr>
<td>Males</td>
<td>68% patients</td>
<td>71% patients</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>67 ± 9</td>
<td>69 ± 8</td>
</tr>
<tr>
<td>Lung function (%pred)</td>
<td>38 ± 14</td>
<td>39 ± 14</td>
</tr>
<tr>
<td>Baseline 6MWD (m)</td>
<td>424 ± 110</td>
<td>361 ± 112</td>
</tr>
<tr>
<td>Improved 6MWD &gt;MID</td>
<td>63% patients</td>
<td>51% patients</td>
</tr>
<tr>
<td>Improved HRQoL &gt;MID</td>
<td>69% patients</td>
<td>60% patients</td>
</tr>
</tbody>
</table>

mean ± SD, MID – minimal important difference

*Data from 9 trials - North America, Europe
Conclusions and Future Directions in Pulmonary Rehabilitation

- Sustainable funding models
- Improve access, uptake and completion of pulmonary rehabilitation
- Greater individualisation of program components
- Determine effective approaches for maintaining the benefits of pulmonary rehabilitation
Acknowledgements

- Nola Cecins, Senior Pulmonary Rehabilitation Physiotherapist
- Staff of the Physiotherapy Department, Sir Charles Gairdner Hospital, Perth, Western Australia
- Community Physiotherapy Services
Evidence for Airway Clearance Techniques (ACTs) and Informing Choice

Prof Judy Bradley PhD MCSP

Professor in Physiotherapy
CHaRT, University of Ulster and Respiratory Medicine Belfast Health and Social Care Trust
Co-Lead NICRN (Respiratory Health)

ulster.ac.uk

3rd May 2015
A Summary of ACT Techniques Available

<table>
<thead>
<tr>
<th>Independent techniques</th>
<th>Active cycle breathing techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Autogenic drainage</td>
</tr>
<tr>
<td>Device-dependent</td>
<td>Positive Expiratory Pressure (PEP)/Oscillatory PEP</td>
</tr>
<tr>
<td></td>
<td>High frequency chest wall oscillation</td>
</tr>
<tr>
<td></td>
<td>Intermittent positive pressure breathing</td>
</tr>
<tr>
<td></td>
<td>Non-invasive ventilation</td>
</tr>
<tr>
<td>Assistant components</td>
<td>Manual techniques: chest percussion/clapping/vibrations</td>
</tr>
<tr>
<td></td>
<td>Gravity assisted positioning</td>
</tr>
<tr>
<td></td>
<td>Modified postural drainage</td>
</tr>
<tr>
<td>Adjuncts</td>
<td>Nebulised therapies: B2 agonists/mucolytics/Dnase/saline/hypertonic saline/mannitol</td>
</tr>
</tbody>
</table>

Aims of ACT

- To assist sputum clearance in an attempt to reduce symptoms and improve quality of life
- To slow the decline in lung function
- To reduce exacerbation frequency and hasten the recovery from exacerbations
Measuring the Effectiveness of ACTs

Clinical Endpoints
Detects a tangible benefit for the patient in terms of how a patient feels, functions or survives (Exacerbations, quality of life).

Surrogate
Usually a laboratory measurement used to predict the efficacy of therapy when direct measurement of clinical effect is not feasible or practical (lung function).

Biomarker
Characteristic that is objectively measured and evaluated as an indicator of biologic processes (Sputum weight/volume, rheology).
Factors That Should Influence Choice

• The Evidence
  – Cystic Fibrosis: COPD: Bronchiectasis
### Characteristics of trials in 6 CF Cochrane Reviews (n=70 trials)

<table>
<thead>
<tr>
<th>Study characteristic</th>
<th>N (%)</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel</td>
<td>21 (30%)</td>
<td></td>
</tr>
<tr>
<td>Crossover</td>
<td>49 (70%)</td>
<td></td>
</tr>
<tr>
<td><strong>Sample size</strong></td>
<td></td>
<td>25 (23)</td>
</tr>
<tr>
<td>Participants age</td>
<td></td>
<td>19 (7)</td>
</tr>
<tr>
<td>FEV1 (%)</td>
<td></td>
<td>57 (18%)</td>
</tr>
<tr>
<td><strong>Stable/Acute</strong></td>
<td>53/17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(T6/24)</td>
<td></td>
</tr>
<tr>
<td><strong>Intervention length (days)</strong></td>
<td></td>
<td>96 (190)</td>
</tr>
<tr>
<td>2 interventions</td>
<td>47 (67%)</td>
<td></td>
</tr>
<tr>
<td>3 intervention</td>
<td>13 (19%)</td>
<td></td>
</tr>
<tr>
<td>4 or more</td>
<td>10 (15%)</td>
<td></td>
</tr>
<tr>
<td><strong>Control (10 studies only)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spon coughing</td>
<td>8 (80%)</td>
<td></td>
</tr>
<tr>
<td>Matching coughing</td>
<td>2 (20%)</td>
<td></td>
</tr>
</tbody>
</table>

Bradley, Elkins et al European Respiratory Monograph 2014
Proportion of Trials Reporting Each Outcome Measures in 6 CF Cochrane Review (n=70 trials)

Bradley, Elkins et al European Respiratory Monograph 2014
<table>
<thead>
<tr>
<th>Cochrane Review</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCPT versus no CPT (Warnick et al 2013)</td>
<td>ACT have short term effects on increasing mucous transport</td>
</tr>
<tr>
<td>CCPT versus other ACTs (Main et al 2005)</td>
<td>There is insufficient evidence to show differences</td>
</tr>
<tr>
<td>ACBT versus other ACTs (McKoy et al 2012)</td>
<td>There is insufficient evidence to support or reject the use of ACBT over any other ACTs</td>
</tr>
<tr>
<td>PEP versus other ACTs (Elkins et al 2006)</td>
<td>No clear evidence that PEP is more or less effective than other ACTs</td>
</tr>
<tr>
<td>Oscillating devices versus other ACTs (Morrison et al, 2009)</td>
<td>No clear evidence that oscillation is more or less effective than other ACTs</td>
</tr>
<tr>
<td>Non Invasive ventilation (Moran, Bradley et al 2013)</td>
<td>Very limited evidence from single studies that it may be useful adjunct in specific subgroups</td>
</tr>
</tbody>
</table>
Hazardous Journeys

Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomised controlled trials

*BMJ* 2003; 327 doi
http://dx.doi.org/10.1136/bmj.327.7429.1459 (Published 18 December 2003)
Cite this as: BMJ 2003; 327:1459

KEY FINDING: No Evidence of Effect
Canadian National Airway Clearance Study: Positive Expiratory Pressure Mask versus High Frequency Chest Wall Oscillation

M. McIlwaine¹, J.L. Agnew², N. Alarie³, L.C. Lands³, F. Ratjen², R. Milner¹, A.G.F. Davidson¹, B. Owen²

1. BC Children's Hospital, Vancouver, Canada,
2. Hospital for Sick Children, Toronto, Canada,
3. McGill University Health centre, Montreal, Canada
Kaplan-Meier Plot of Time to First Exacerbation

Recommend that HFCWO is not used as the primary means of airway clearance therapy in the treatment of patients with CF.

More long-term randomized trials are needed to evaluate the difference and efficacy of HFCWO and other ACTs in CF.
### Characteristics Trials in COPD Cochrane Review

<table>
<thead>
<tr>
<th>Study characteristic</th>
<th>N = 28 trials (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel Crossover</td>
<td>13 (46%)</td>
</tr>
<tr>
<td></td>
<td>15 (54%)</td>
</tr>
<tr>
<td>Sample size</td>
<td>36</td>
</tr>
<tr>
<td>Participants age span</td>
<td>45-71</td>
</tr>
<tr>
<td>Stable/Acute</td>
<td>10/18 (36%/64%)</td>
</tr>
<tr>
<td>Intervention length</td>
<td>&lt; 1 month = 17</td>
</tr>
<tr>
<td></td>
<td>1-3 months =3</td>
</tr>
<tr>
<td></td>
<td>&gt;6 months =2</td>
</tr>
<tr>
<td>Control</td>
<td>10</td>
</tr>
<tr>
<td>Standard treatment</td>
<td>8</td>
</tr>
<tr>
<td>Sham ACT</td>
<td>6</td>
</tr>
<tr>
<td>Rest</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
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</table>

### Outcomes Used in COPD Cochrane Review

<table>
<thead>
<tr>
<th>Outcome</th>
<th>N = 28 trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exacerbations</td>
<td>5</td>
</tr>
<tr>
<td>Quality of Life</td>
<td>1</td>
</tr>
<tr>
<td>Time to wean</td>
<td>3</td>
</tr>
<tr>
<td>Spirometry</td>
<td>16</td>
</tr>
<tr>
<td>Radioaerosolised Clearance</td>
<td>4</td>
</tr>
<tr>
<td>Sputum volume/weight</td>
<td>12</td>
</tr>
<tr>
<td>Physiological measures</td>
<td>13</td>
</tr>
<tr>
<td>Symptoms</td>
<td>8</td>
</tr>
<tr>
<td>Exercise</td>
<td>3</td>
</tr>
</tbody>
</table>

Osadnik CR, McDonald CF, Jones AP, Holland AE. Airway clearance techniques for COPD. *Cochrane Database of Systematic Reviews* 2012.
### Acute COPD: ACTs vs no ACTs

#### Length of Hospital Stay (Days)

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>ACTs</th>
<th>Control</th>
<th>Mean Difference</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Total</td>
<td>Mean</td>
</tr>
<tr>
<td><strong>1.8.1 PEP techniques</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vargas 2005</td>
<td>6.8</td>
<td>1</td>
<td>16</td>
<td>7.9</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>6.8</td>
<td>1</td>
<td>16</td>
<td>7.9</td>
</tr>
<tr>
<td>Heterogeneity: Not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 2.73 (P = 0.006)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1.8.2 Non-PEP techniques</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kodric 2009</td>
<td>9.5</td>
<td>3.2</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Newton 1978</td>
<td>9.37</td>
<td>4.47</td>
<td>40</td>
<td>8.94</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>9.67</td>
<td>4.17</td>
<td>70</td>
<td>18.94</td>
</tr>
<tr>
<td>Heterogeneity: Chi² = 0.71, df = 1 (P = 0.40); I² = 0%</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Test for overall effect: Z = 0.16 (P = 0.87)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td></td>
<td></td>
<td>86</td>
<td>85</td>
</tr>
<tr>
<td>Heterogeneity: Chi² = 2.91, df = 2 (P = 0.23); I² = 31%</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Test for overall effect: Z = 2.30 (P = 0.02)</td>
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</tr>
<tr>
<td>Test for subgroup differences: Chi² = 2.20, df = 1 (P = 0.14), I² = 54.6%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Osadnik CR, McDonald CF, Jones AP, Holland AE. Airway clearance techniques for COPD. *Cochrane Database of Systematic Reviews* 2012.
Acute COPD: ACTs vs No ACTs
Duration of Ventilatory Assistance (Day)

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>ACTs</th>
<th>Control</th>
<th>Mean Difference IV, Fixed, 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.6.1 PEP techniques</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bellone 2002</td>
<td>4.9</td>
<td>0.8</td>
<td>13  7  0.7  14  92.5% -2.10 [-2.67, -1.53]</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>13</td>
<td>14</td>
<td>92.5% -2.10 [-2.67, -1.53]</td>
</tr>
<tr>
<td>Heterogeneity: Not applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 7.24 (P &lt; 0.00001)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1.6.2 Non-PEP techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inal-Ince 2004</td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
</tr>
<tr>
<td>Heterogeneity: Not applicable</td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.46 (P = 0.14)</td>
</tr>
</tbody>
</table>

Total (95% CI) 24  30  100.0% -2.05 [-2.60, -1.51]

Heterogeneity: Chi² = 0.33, df = 1 (P = 0.57); I² = 0%
Test for overall effect: Z = 7.36 (P < 0.00001)
Test for subgroup differences: Chi² = 0.33, df = 1 (P = 0.57), I² = 0%

Osadnik CR, McDonald CF, Jones AP, Holland AE. Airway clearance techniques for COPD. Cochrane Database of Systematic Reviews 2012.
### Acute COPD: ACTs vs No ACTs

#### Need for Increased Ventilatory Assistance

<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>ACTs</th>
<th>Control</th>
<th>Odds Ratio</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Events</td>
<td>Total</td>
<td>Events</td>
<td>Total</td>
</tr>
<tr>
<td><strong>1.5.1 PEP techniques</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bellone 2002</td>
<td>0</td>
<td>13</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Vargas 2005</td>
<td>0</td>
<td>16</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>29</td>
<td>31</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total events</strong></td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Heterogeneity: $\chi^2 = 0.67$, df = 1 ($P = 0.41$); $I^2 = 0%$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: $Z = 2.09$ ($P = 0.04$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1.5.2 Non-PEP techniques</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inal-Ince 2004</td>
<td>0</td>
<td>11</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Newton 1978</td>
<td>1</td>
<td>42</td>
<td>2</td>
<td>42</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td>53</td>
<td>58</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total events</strong></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Heterogeneity: $\chi^2 = 0.00$, df = 1 ($P = 0.97$); $I^2 = 0%$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: $Z = 0.75$ ($P = 0.45$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td>82</td>
<td>89</td>
<td>100.0%</td>
<td></td>
</tr>
<tr>
<td><strong>Total events</strong></td>
<td>1</td>
<td>10</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Heterogeneity: $\chi^2 = 1.54$, df = 3 ($P = 0.67$); $I^2 = 0%$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: $Z = 2.19$ ($P = 0.03$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for subgroup differences: $\chi^2 = 1.04$, df = 1 ($P = 0.31$), $I^2 = 4.1%$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Osadnik CR, McDonald CF, Jones AP, Holland AE. Airway clearance techniques for COPD. *Cochrane Database of Systematic Reviews* 2012.
Studies Since this Cochrane Review

• Evaluation of the effectiveness of manual chest physiotherapy techniques (ACBT with percussion and vibrations) versus advice on ACBT alone on quality of life in COPD (MATREX): a randomised controlled equivalence trial

• The primary outcome was a COPD specific quality of life measure, the St Georges Respiratory Questionnaire (SGRQ) at six months post randomisation.

Cross et al 2010: Health Technology assessment; 14: 23; 1-147
## MATREX: Manual Chest Physiotherapy vs Advice

<table>
<thead>
<tr>
<th></th>
<th>Mean Difference</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SGRQ Total</strong></td>
<td>-0.36 -0.02</td>
<td>0.873</td>
</tr>
<tr>
<td><strong>Effect Size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SGRQ Symptoms</strong></td>
<td>0.02 0.00</td>
<td>0.99</td>
</tr>
<tr>
<td><strong>Effect size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SGRQ Activity</strong></td>
<td>-1.5 0.08</td>
<td>0.42</td>
</tr>
<tr>
<td><strong>Effect Size</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SGRQ Impact</strong></td>
<td>-0.07 0.00</td>
<td>0.97</td>
</tr>
<tr>
<td><strong>Effect Size</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Positive expiratory pressure therapy does not improve symptoms, quality of life or incidence of exacerbations in individuals with acute exacerbations of COPD – a multicentre randomised controlled trial

C Osadnik, CF McDonald, BR Miller, C Hill, B Tarrant, R Steward, C Chao, N Stodden, C Oliveira, N Gagliardi, AE Holland
## Results: PEP vs Control

<table>
<thead>
<tr>
<th>Outcome</th>
<th>D/C PEP-control</th>
<th>8/52 PEP-control</th>
<th>6/12 PEP-control</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCSS</td>
<td>0.24 (0.57)</td>
<td>0.22 (0.58)</td>
<td>0.09 (0.60)</td>
<td>0.98</td>
</tr>
<tr>
<td>SGRQ-T</td>
<td>N/A</td>
<td>0.81 (3.80)</td>
<td>1.41 (3.81)</td>
<td>0.87</td>
</tr>
<tr>
<td>BODE</td>
<td>0.54 (0.64)</td>
<td>0.10 (0.71)</td>
<td>0.58 (0.84)</td>
<td>0.61</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td>-2.39 (1.55)</td>
<td>-2.43 (1.66)</td>
<td>-1.25 (1.88)</td>
<td>0.71</td>
</tr>
<tr>
<td>FEV₁,%</td>
<td>-0.32 (2.00)</td>
<td>-0.13 (2.54)</td>
<td>-1.33 (3.06)</td>
<td>0.94</td>
</tr>
<tr>
<td>mMRC</td>
<td>0.40 (0.28)</td>
<td>-0.35 (0.30)</td>
<td>0.52 (0.30)</td>
<td>0.01</td>
</tr>
<tr>
<td>6MWD, m</td>
<td>-26.18 (32.52)</td>
<td>28.06 (34.87)</td>
<td>-4.05 (40.04)</td>
<td>0.052</td>
</tr>
</tbody>
</table>
PEP vs Control: Need for Ventilatory Assistance

Characteristics of Trials in BE Cochrane Review (n=5 trial)

<table>
<thead>
<tr>
<th>Study characteristic</th>
<th>N = 5 trials (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel Crossover</td>
<td>0 5 (100%)</td>
</tr>
<tr>
<td>Sample size</td>
<td>11</td>
</tr>
<tr>
<td>Participants age span</td>
<td>6-73</td>
</tr>
<tr>
<td>Stable/Acute</td>
<td>5/0 (100%/0%)</td>
</tr>
<tr>
<td>Intervention length</td>
<td>3 =short session</td>
</tr>
<tr>
<td></td>
<td>1 3 months</td>
</tr>
<tr>
<td></td>
<td>1 6 months</td>
</tr>
<tr>
<td>Control</td>
<td>1</td>
</tr>
<tr>
<td>Spon coughing</td>
<td>2</td>
</tr>
<tr>
<td>sham</td>
<td>2</td>
</tr>
<tr>
<td>nothing</td>
<td></td>
</tr>
</tbody>
</table>

Outcomes Used in Trials in BE Cochrane Review (n=5 trial)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No of Trials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radioaerosolised Clearance</td>
<td>1</td>
</tr>
<tr>
<td>Sputum volume/weight</td>
<td>4</td>
</tr>
<tr>
<td>Spirometry</td>
<td>4</td>
</tr>
<tr>
<td>Exacerbations</td>
<td>1</td>
</tr>
<tr>
<td>Quality of Life</td>
<td>1</td>
</tr>
</tbody>
</table>
## Results in BE Cochrane Review (n=5 trial)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Assumed Risk</th>
<th>Risk ACT</th>
<th>Relative Risk</th>
<th>No participants</th>
<th>Quality Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exacerbations</td>
<td>35 per 100</td>
<td>25 per 100</td>
<td>RR 0.71 (0.23 to 2.25)</td>
<td>20</td>
<td>low</td>
</tr>
<tr>
<td>SGRQ</td>
<td>-0.7</td>
<td>8.5 higher</td>
<td>-</td>
<td>20</td>
<td>low</td>
</tr>
<tr>
<td>LCQ</td>
<td>0</td>
<td>1.3 higher</td>
<td>-</td>
<td>20</td>
<td>low</td>
</tr>
<tr>
<td>Lung Function</td>
<td>No Difference</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Factors That Should Influence Choice

• The Evidence
  – Cystic Fibrosis: COPD: Bronchiectasis

• The physiological rationale for using ACT/specific ACT
<table>
<thead>
<tr>
<th>Method</th>
<th>Interdependence</th>
<th>Collateral Ventilation</th>
<th>Breath Hold</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACBT</td>
<td>Thoracic expansion utilises interdependence</td>
<td>Thoracic expansion utilises CV</td>
<td>Sometimes used</td>
</tr>
<tr>
<td>AD</td>
<td>No</td>
<td>Yes with breath hold</td>
<td>3 second hold with each breath</td>
</tr>
<tr>
<td>PEP</td>
<td>No</td>
<td>PEP maintained between 12-15 breaths CV is optimised</td>
<td>Not necessary as PEP maintained</td>
</tr>
<tr>
<td>Flutter</td>
<td>No ? Oscillations between 3-5 may have a role but flutter &gt; 5</td>
<td>Yes with breath hold</td>
<td>3 second hold with each breath</td>
</tr>
<tr>
<td>Acapella</td>
<td>No ? Oscillations &gt; 5</td>
<td>PEP maintained between 12-15 breaths CV is optimised</td>
<td>Not necessary as PEP maintained</td>
</tr>
<tr>
<td>HFCWO</td>
<td>No ? Oscillations &gt; 5</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Mc Ilwaine PhD 2014
## Physiological Basis of ACT - Expiratory Airflow

<table>
<thead>
<tr>
<th></th>
<th>Huffing</th>
<th>PEFR/PIFR &gt;1.1</th>
<th>PEFR&gt; 30-60 L/min</th>
<th>Oscillation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACBT</td>
<td>Uses at different levels</td>
<td>Ratio 2.8</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>AD</td>
<td>No</td>
<td>Yes, slow inspiration, increased velocity expiration</td>
<td>Yes, depends on level of breathing</td>
<td>No</td>
</tr>
<tr>
<td>PEP</td>
<td>Uses at end of each cycle</td>
<td>No</td>
<td>No (av 26)</td>
<td>No</td>
</tr>
<tr>
<td>Flutter</td>
<td>Uses at end of each cycle</td>
<td>Ratio 1.15</td>
<td>Yes (av 68)</td>
<td>2-32Hz (most often 6-16Hz)</td>
</tr>
<tr>
<td>Acapella</td>
<td>Uses at end each cycle</td>
<td>No</td>
<td>Yes (av 35+ dependant on secretion viscosity)</td>
<td>10-18 Hz</td>
</tr>
<tr>
<td>HFCWO</td>
<td>Interspersed with HFCWO</td>
<td>Yes</td>
<td>Yes (av 120)</td>
<td>5-25Hz</td>
</tr>
</tbody>
</table>

Mc Ilwaine PhD 2014
Factors That Should Influence Choice

• The Evidence
  – Cystic Fibrosis: COPD: Bronchiectasis
• The physiological rationale for using ACT/specific ACT
• Patient preference
• Therapist choice
• Availability of devices
### Airway Clearance Technique in UK Versus Other Countries

<table>
<thead>
<tr>
<th>Airway clearance techniques:</th>
<th>UK data (n = 6372)</th>
<th>Canada data (n = 2363)</th>
<th>Argentin a data (n = 110)*</th>
<th>US data (n = 204)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postural drainage</td>
<td>4.3%</td>
<td>20%</td>
<td>53.6%</td>
<td>19%</td>
</tr>
<tr>
<td>Forced expiratory techniques</td>
<td>28.1%</td>
<td>28.1%</td>
<td>32.7%</td>
<td>25%</td>
</tr>
<tr>
<td>Oscillating PEP</td>
<td>22.8%</td>
<td>5%</td>
<td>19%</td>
<td>15%</td>
</tr>
<tr>
<td>PEP</td>
<td>15.8%</td>
<td>8%</td>
<td>10.9%$^\psi$</td>
<td>10%</td>
</tr>
<tr>
<td>HFCWO</td>
<td>0.9%</td>
<td>40%</td>
<td>37%</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>1%</td>
<td>3%</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Exercise</td>
<td>15.9%</td>
<td>15.9%</td>
<td>9.7%</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>9.7%</td>
<td>9.7%</td>
<td>9.7%</td>
<td></td>
</tr>
</tbody>
</table>

### Data source
- This analysis
- McIlwaine et al 2008
- Ratto et al 2012
- Sawicki et al 2009

### Data collection method
- UK CF registry database
- Records from 24 CF clinics
- Records from a single CF clinic
- Questionnaire as part of the Project on Adult Care in Cystic Fibrosis study

Empirical to Precision Medicine

<table>
<thead>
<tr>
<th>Heuristic</th>
<th>Empirical</th>
<th>Scientifically-Based</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Efficacy</td>
<td>Treatment Effectiveness</td>
<td>Diseases can be precisely diagnosed</td>
</tr>
<tr>
<td>Low Efficacy</td>
<td>“Pattern recognition” is key element of diagnosis and treatment</td>
<td>Treatment based on rules-based therapies</td>
</tr>
<tr>
<td></td>
<td>Diagnosis made based on symptoms</td>
<td>Outcomes are predictably effective</td>
</tr>
<tr>
<td></td>
<td>Efficacy of treatment outcome is uncertain</td>
<td></td>
</tr>
</tbody>
</table>
Why is Precision Medicine Important? A lot of drugs do not work for patients

<table>
<thead>
<tr>
<th>Disease</th>
<th>Drug</th>
<th>% of patients where drug may be ineffective</th>
</tr>
</thead>
<tbody>
<tr>
<td>High blood pressure</td>
<td>ACE inhibitors</td>
<td>10-30%</td>
</tr>
<tr>
<td>Heart failure</td>
<td>Beta-blockers</td>
<td>15-25%</td>
</tr>
<tr>
<td>Depression</td>
<td>Anti-depressants</td>
<td>20-50%</td>
</tr>
<tr>
<td>High cholesterol</td>
<td>Statins</td>
<td>30-70%</td>
</tr>
</tbody>
</table>

With major consequences:
- Poor outcomes
- Harm
- Wasted resources
Conclusions

• ACT choice should be informed by best evidence, the physiological effect of ACTs, and patient preference. Therapist choice and availability of devices will also impact.

• Systematic reviews provide a useful summary of effect of multiple small studies- be aware of the impact of new high quality RCTs

• Future research trials should consider screening tool to focus on subgroups patients requiring ACT and examining efficacy of treatments on these selected subgroups
... there is still a long way to go

- Right Patient
- Right Time
- Right ACT

Thank-you
Coordinating physical therapies and pharmacological therapies in chronic respiratory disease

Mark Elkins

Senior Research Physiotherapist, Royal Prince Alfred Hospital
Co-Director, Physiotherapy Evidence Database (PEDro)
Scientific Editor, Journal of Physiotherapy
Clinical Associate Professor, Sydney Medical School
COPD

Systematic reviews show benefit in appropriate patients from long-term use of:

• physical interventions
  - Exercise training, McCarthy 2015
  - Airway clearance, Osadnik 2012
  - Tai Chi, Ding 2014
  - Breathing exercises, Holland 2012
  - Non-invasive ventilation, Ram 2004

• inhaled medications
  - Long-acting bronchodilators, Barr 2005
  - Other long-acting inhaled therapies, Kew 2014
  - Inhaled antibiotics as maintenance, Herath 2013
  - Antibiotics during exacerbations, Vollenweider 2012
  - Combined steroid / beta-agonist, Nannini 2012
Cystic Fibrosis

Systematic reviews show benefit in appropriate patients from long-term use of:

• physical interventions
  - Exercise, Bradley 2008
  - Airway clearance, Warnock 2013
  - Non-invasive ventilation, Moran 2013

• inhaled medications
  - Inhaled antibiotics, Ryan 2011
  - Inhaled bronchodilators, Halfhide 2011
  - Hypertonic saline, Wark 2009
  - Dornase alfa, Jones 2010
Asthma

Systematic reviews show benefit in appropriate patients from long-term use of:

• physical interventions
  - Exercise training, Carson 2013
  - Breathing exercises, Freitas 2013

• inhaled medications
  - Inhaled corticosteroids, Edmonds 2012
  - Long-acting beta agonists, Gibson 2005
  - Non-steroidal anti-inflammatories, Weiler 2010
  - Short-acting beta agonists, Walters 2003
Baseline FEV₁ 58% pred

Dolovich et al 2000
Baseline FEV₁ 58% pred

+4 puffs Salbutamol FEV₁ 77% pred
Baseline $FEV_1$ 58% pred

+4 puffs Salbutamol $FEV_1$ 77% pred

Dolovich et al 2000
Asthma

Systematic reviews show benefit in appropriate patients from long-term use of:

• physical interventions
  Exercise training, Carson 2013
  Breathing exercises, Freitas 2013

• inhaled medications
  Short-acting beta agonists, Walters 2003
  Long-acting beta agonists, Gibson 2005
  Inhaled corticosteroids, Edmonds 2012
  Non-steroidal anti-inflammatory, Weiler 2010
Asthma

Children and adults, n = 14

Exercise-induced bronchoconstriction

Randomised, cross-over trial

bronchodilator then exercise

exercise then bronchodilator then exercise

Joseph et al 1976
Asthma

Children and adults, n = 14

Exercise-induced bronchoconstriction

Randomised, cross-over trial

- bronchodilator then exercise
- exercise then bronchodilator then exercise

Peak flow rate 51 versus 74 L/min (p < 0.05)

Joseph et al 1976
<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Mean Difference</th>
<th>SE</th>
<th>Total</th>
<th>Total</th>
<th>Weight</th>
<th>Mean Difference</th>
<th>Mean Difference</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Warmup</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IV, Random</td>
<td>95% CI</td>
</tr>
<tr>
<td>10.6.1 Interval</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>de Bisschop 1999</td>
<td>-12.00</td>
<td>3.04</td>
<td>30</td>
<td>30</td>
<td>29.0%</td>
<td>-12.00 [-17.96, -6.04]</td>
<td></td>
</tr>
<tr>
<td>McKenzie 1994</td>
<td>-4.80</td>
<td>4.41</td>
<td>12</td>
<td>12</td>
<td>22.9%</td>
<td>-4.80 [-13.44, 3.84]</td>
<td></td>
</tr>
<tr>
<td>Mickleborough 2006</td>
<td>-9.15</td>
<td>3.74</td>
<td>8</td>
<td>8</td>
<td>25.8%</td>
<td>-9.15 [-16.48, -1.82]</td>
<td></td>
</tr>
<tr>
<td>Schnall 1980</td>
<td>-16.10</td>
<td>4.56</td>
<td>6</td>
<td>6</td>
<td>22.3%</td>
<td>-16.10 [-25.04, -7.16]</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>-10.61</td>
<td>6.82</td>
<td>56</td>
<td>56</td>
<td>100.0%</td>
<td>-10.61 [-14.69, -6.53]</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 2.71; Chi² = 3.55, df = 3 (P = 0.31); I² = 15%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 5.10 (P &lt; 0.00001)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10.6.2 Continuous: High Intensity
<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Mean Difference</th>
<th>SE</th>
<th>Total</th>
<th>Total</th>
<th>Weight</th>
<th>Mean Difference</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Warmup</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IV, Random</td>
<td>95% CI</td>
</tr>
<tr>
<td>Reiff 1989</td>
<td>-17.57</td>
<td>2.64</td>
<td>7</td>
<td>7</td>
<td>59.5%</td>
<td>-17.57 [-22.74, -12.40]</td>
<td></td>
</tr>
<tr>
<td>Schnall 1980</td>
<td>-0.99</td>
<td>4.89</td>
<td>6</td>
<td>6</td>
<td>40.5%</td>
<td>-0.99 [-10.57, 8.59]</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>-9.79</td>
<td>6.43</td>
<td>13</td>
<td>13</td>
<td>100.0%</td>
<td>-9.79 [-26.01, 6.43]</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 122.01; Chi² = 8.90, df = 1 (P = 0.003); I² = 89%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.18 (P = 0.24)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10.6.3 Continuous: Low Intensity
<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Mean Difference</th>
<th>SE</th>
<th>Total</th>
<th>Total</th>
<th>Weight</th>
<th>Mean Difference</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Warmup</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IV, Random</td>
<td>95% CI</td>
</tr>
<tr>
<td>Morton 1979</td>
<td>0.00</td>
<td>5.80</td>
<td>18</td>
<td>18</td>
<td>39.5%</td>
<td>0.00 [-5.80, 5.80]</td>
<td></td>
</tr>
<tr>
<td>Reiff 1989</td>
<td>-20.57</td>
<td>4.74</td>
<td>7</td>
<td>7</td>
<td>28.9%</td>
<td>-20.57 [-29.86, -11.28]</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>-12.60</td>
<td>1.48</td>
<td>37</td>
<td>37</td>
<td>100.0%</td>
<td>-12.60 [-26.68, 1.48]</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 138.54; Chi² = 19.92, df = 2 (P &lt; 0.0001); I² = 90%</td>
<td></td>
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<td></td>
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<tr>
<td>Test for overall effect: Z = 1.75 (P = 0.08)</td>
<td></td>
<td></td>
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10.6.4 Variable Intensity
<table>
<thead>
<tr>
<th>Study or Subgroup</th>
<th>Mean Difference</th>
<th>SE</th>
<th>Total</th>
<th>Total</th>
<th>Weight</th>
<th>Mean Difference</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Warmup</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>IV, Random</td>
<td>95% CI</td>
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<tr>
<td>Eck 2002</td>
<td>-11.00</td>
<td>1.85</td>
<td>46</td>
<td>46</td>
<td>64.4%</td>
<td>-11.00 [-14.63, -7.37]</td>
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</tr>
<tr>
<td>Schnall 1980</td>
<td>-10.42</td>
<td>5.44</td>
<td>6</td>
<td>6</td>
<td>35.6%</td>
<td>-10.42 [-21.08, 0.24]</td>
<td></td>
</tr>
<tr>
<td>Subtotal (95% CI)</td>
<td>-10.94</td>
<td>7.51</td>
<td>52</td>
<td>52</td>
<td>100.0%</td>
<td>-10.94 [-14.37, -7.51]</td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: Tau² = 0.00; Chi² = 0.01, df = 1 (P = 0.92); I² = 0%</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 6.25 (P &lt; 0.00001)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Some caveats:

- If severe exercise-induced asthma or uncontrolled chronic asthma, warm-up may trigger an attack.

Nevertheless, in many people with mild to moderate exercise-induced asthma, warm-up exercise prevents the fall in FEV₁ during a subsequent exercise period.
Systematic reviews show benefit in appropriate patients from long-term use of:

- **physical interventions**
  - Exercise training, Carson 2013
  - Breathing exercises, Freitas 2013
  - Warm-up before exercise, Stickland 2012

- **inhaled medications**
  - Short-acting beta agonists, Walters 2003
  - Long-acting beta agonists, Gibson 2005
  - Inhaled corticosteroids, Edmonds 2012
  - Non-steroidal anti-inflammatories, Weiler 2010
Systematic reviews show benefit in appropriate patients from long-term use of:

- physical interventions
  - Exercise, Bradley 2008
  - Airway clearance, Warnock 2013
  - Non-invasive ventilation, Moran 2013

- inhaled medications
  - Dornase alfa, Jones 2010
  - Hypertonic saline, Wark 2009
  - Inhaled antibiotics, Ryan 2011
  - Inhaled bronchodilators, Halfhide 2011
Timing of Dornase alfa

Cochrane Systematic Review

4 included studies (all crossover, up to 8 weeks)

Effect on FEV$_1$

![Graph showing the mean difference in FEV$_1$ for different studies.](image)
Timing of hypertonic saline

› Hypertonic saline BEFORE physiotherapy
   - saline clears some mucus, increasing airflow for physiotherapy
   - sustained effect of saline acts during physiotherapy

› Hypertonic saline DURING physiotherapy
   - brief effect of hypertonic saline acts during physiotherapy
   - saves time, but increases treatment complexity

› Hypertonic saline AFTER physiotherapy
   - physiotherapy clears some mucus, improving saline deposition
   - saline deposits on exposed epithelium so less tolerable
Cystic Fibrosis

Deposition of inhaled medication

health

cystic fibrosis

Dolovich et al 2000
Timing of bronchodilator

Used 10 to 60 minutes before hypertonic saline to prevent airway narrowing

Donaldson 2006, Elkins 2006
Timing of bronchodilator

Used 10 to 60 minutes before hypertonic saline to reduce cough severity

% change in cough VAS

Bronchodilator  HS  15-min

Elkins 2006
Cystic Fibrosis

Systematic reviews show benefit in appropriate patients from long-term use of:

• physical interventions
  Exercise, Bradley 2008
  Airway clearance, Warnock 2013
  Non-invasive ventilation, Moran 2013

• inhaled medications
  Inhaled bronchodilators, Halfhide 2011 (no wait time)
  Hypertonic saline, Wark 2009 (before or during ACT)
  Dornase alfa, Jones 2010
  Inhaled antibiotics, Ryan 2011
Exercise to improve deposition in CF

Subjects: adults, CF, FEV$_1$ <40%predicted

Day 1: incremental shuttle walk test with salbutamol before the test

Day 2: incremental shuttle walk test with salbutamol at 2 minutes into the test

Outcomes: incremental shuttle walk distance, change in FEV$_1$, limiting factor
Incremental shuttle walk test

Salbutamol pre-exercise

Salbutamol 2 min into exercise

P = 0.02

Between-group diff = 46m
Change in FEV$_1$ from baseline to post-ex

Change (L)

Salbutamol pre-exercise

Salbutamol 2 min into exercise

$P = 0.02$
Cystic Fibrosis

Systematic reviews show benefit in appropriate patients from long-term use of:

• physical interventions
  - Exercise, Bradley 2008
  - Airway clearance, Warnock 2013
  - Non-invasive ventilation, Moran 2013

• inhaled medications
  - Inhaled bronchodilators, Halfhide 2011 (no wait time)
  - Hypertonic saline, Wark 2009 (before or during ACT)
  - Dornase alfa, Jones 2010
  - Inhaled antibiotics, Ryan 2011
Inhalation during positive expiratory pressure

8 CF adults (FEV₁ 51% pred) Inhalation with PEP v no PEP:
  slight ↑ ratio to peripheral deposition with PEP
  ↓ total dose deposition with PEP (6% vs 11%)

Deposition fraction 6 ± 3 % with PEP,
  11 ± 5 % without PEP ($p < 0.01$).

Not suitable for antibiotics or dornase alfa
  possible for hypertonic saline

Laube 2005
Inhalation with non-invasive ventilation

Randomised crossover trial
18 children and adolescents (FEV₁ 72% pred)
Inhalation with(out) non-invasive ventilation
Significantly faster medication delivery
Significantly higher dose received

Fauroux 2000
Systematic reviews show benefit in appropriate patients from long-term use of:

- **physical interventions**
  - Exercise training, McCarthy 2015
  - Airway clearance, Osadnik 2012
  - Tai Chi, Ding 2014
  - Breathing exercises, Holland 2012
  - Non-invasive ventilation, Ram 2004

- **inhaled medications**
  - Long-acting bronchodilators, Barr 2005
  - Other long-acting inhaled therapies, Kew 2014
  - Inhaled antibiotics as maintenance, Herath 2013
  - Antibiotics during exacerbations, Vollenweider 2012
  - Combined steroid / beta-agonist, Nannini 2012
When oscillating PEP is applied to the nebuliser, drug deposition is equal or better in people with COPD or asthma
Systematic reviews show benefit in appropriate patients from long-term use of:

- **physical interventions**
  - Airway clearance, Jones 2011 and Lee 2013
  - Inspiratory muscle training, Bradley 2002
  - Exercise training, Lee 2014 *

- **inhaled medications**
  - Inhaled steroids, Pizzutto 2010
  - Inhaled osmotic agents, Hart 2014
  - Short-term inhaled antibiotics, Wurzel 2011
  - Long-term inhaled antibiotics, Evans 2011
Questions
Chronic respiratory disease: high-quality evidence supports greater physiotherapy intervention

Camila I. S. Schivinski
First of all...

Thank you!

Camila I. S. Schivinski
Children
Aim of this session

1) Anatomy and respiratory physiology in children. What should we consider?

2) Chronic respiratory diseases in children. What are the indications for respiratory therapy? Is there any evidence?

3) Evidence of pediatric respiratory therapy techniques. What are the future prospects?

4) Motivational strategies in therapy. How to motivate a child with a chronic disease?

5) The relationship between the therapist and the family. How can we educate and improve adherence?
Anatomy and respiratory physiology

- These factors may increase the likelihood of developing respiratory infection, respiratory difficulties and adverse ventilatory effects in some situations.

- Thus, in the presence of chronic respiratory disease these factors can cause more respiratory disfunctions.
### What are chronic respiratory illnesses in children?

<table>
<thead>
<tr>
<th>Chronic obstructive pulmonary diseases in children</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cystic Fibrosis</strong></td>
</tr>
<tr>
<td><strong>Asthma</strong></td>
</tr>
<tr>
<td><strong>Pulmonary hypertension</strong></td>
</tr>
<tr>
<td><strong>Bronchiolitis Obliterans</strong></td>
</tr>
</tbody>
</table>
Evidence of benefit from airway clearance therapy in various pediatric conditions

Clear and proven benefit
Cystic fibrosis

Probable benefit
Neuromuscular disease
Cerebral palsy
Atelectasis in children on mechanical ventilation

Possible benefit
Prevention of post-extubation atelectasis in neonates

Minimal to no benefit
Acute asthma
Bronchiolitis
Hyaline membrane disease
Respiratory failure without atelectasis
Prevention of atelectasis immediately following surgery
Cystic Fibrosis (CF)....

Physiotherapy treatment in cystic fibrosis: airway clearance techniques

Introduction
Looking after the chest and keeping the lungs clear is an extremely important part of the care of cystic fibrosis (CF). Over the years many different treatment techniques have been developed in order to help with this. This fact sheet explains why it is important to keep the lungs clear and the various airway clearance techniques available. There are many other important aspects of physiotherapy in cystic fibrosis and a number of other fact sheets are available from the Cystic Fibrosis Trust which deal with issues such as exercise, and physiotherapy in babies and children.

Written by N. Borrow, Physiotherapist, Cystic Fibrosis Unit, Great Ormond Street Hospital for Children, London and released by members of the Association of Chartered Physiotherapists in Cystic Fibrosis.

Physiotherapy treatment for babies and toddlers

Contents
- How the lungs work
- How CF can affect the lungs
- Keeping the lungs clear
- Do all babies with CF need chest physiotherapy?
- When & how often will chest physiotherapy be needed?
- What kind of chest physiotherapy is given to a baby?
- Product manipulation
- percussion
- Other airway clearance techniques
- Physical activity
- Physiotherapy treatment in toddlers
- Chest physiotherapy
- Physical activity
- Further information

Cystic Fibrosis Foundation Evidence-Based Guidelines for Management of Infants with Cystic Fibrosis

Drucy Borowitz, MD, Karen A. Robinson, PhD, Margaret Rosenfeld, MD, MPH, Stephanie D. Davis, MD, Kathryn A. Sabatock, MPH, Stephanie L. Spear, PhD, Suzanne H. Michel, MPH, RD, LDN, Richard B. Parad, MD, MPH, Terry B. White, PhD, Philip F. Farrell, MD, PhD, Bruce C. Marshall, MD, Frank J. Accurso, MD

DOI: http://dx.doi.org/10.1016/j.jpeds.2009.09.001
Figure 1. Suggestions for optimising airway clearance techniques.


Review

Physiotherapy in cystic fibrosis: optimising techniques to improve outcomes

S. Rand 1,2,*, L. Hill 1, S.A. Prasad 1

Paediatric Respiratory Reviews 14 (2013) 263–269
Physiotherapy and cystic fibrosis: what is the evidence base?

KEY POINTS

- Physiotherapy remains a key component in the treatment of CF.
- Results from four recent long-term randomized controlled trials on airway clearance techniques suggest that ACBT, autogenic drainage, PEP, and oscillating PEP are equally effective. HFCW0 has been associated with an increased frequency of pulmonary exacerbations compared with PEP and a decrease in FEF$_{25-75}$ compared with Flutter and PD&P.
- Exercise guidelines for CF are currently being developed by the European Cystic Fibrosis Society, Exercise Working Group.
- Preliminary evidence may support the use of a specific exercise prescription combined with the forced expiration technique as an alternative airway clearance modality.
- Musculoskeletal issues, such as thoracic kyphosis, pain, urinary incontinence, and bone density need to be addressed early to prevent or delay complications associated with them.

Curr Opin Pulm Med
2014, 20:613–617

Maggie Patricia McIlwaine, Nicole Marie Lee Son, and Melissa Lynn Richmond
The Benefits of Exercise

Improve physical function\(^a\)
Improve cardiovascular performance\(^a\)
Improve muscle strength\(^a\)
Airflow effects (generation of peak expiratory flow bias and shear forces) to facilitate mucociliary clearance\(^b\)
Improve fluid balance and retention of serum electrolytes\(^c\)
Potential to improve bone mineral density\(^d\)
Improve quality of life\(^e\)
Potential to slow the rate of lung function decline\(^f\)
Potential positive effects on CF related diabetes

\(^a\) Bradley and Moran, 2002.
\(^b\) Dwyer et al., 2011.
\(^c\) Schmitt et al., 2011.
\(^d\) Frangiolas et al., 2003.
\(^e\) Orenstein 1989.
\(^f\) Nixon et al., 1992.

(Rand et al, 2012)
What is the best airway clearance technique in cystic fibrosis?

Main E.
Portex Department, 6th Floor, Cardiac Wing, Institute of Child Health, University College London, 30 Guilford Street, London WC1N 1EH. e.main@ucl.ac.uk

Abstract
The global development of airway clearance techniques (ACTs) for cystic fibrosis (CF) and corresponding research spans over four decades. Five Cochrane reviews synthesising the evidence from a plethora of early short and medium term studies have not uncovered any superior method. Four recent long term RCT studies exposed fundamental shortcomings in the standard RCT trial design and the insensitivity of FEV1 in physiotherapy studies. Strong patient preference, lack of blinding and the requirement for effortful and demanding participation over long intervals will continue to derail efforts to find the best ACT for CF, unless they are addressed in future clinical trials.
Patient preference

Evidence for physical therapies (airway clearance and physical training) in cystic fibrosis: An overview of five Cochrane systematic reviews

Judy M. Bradley\textsuperscript{a,b,⁎}, Fidelma M. Moran\textsuperscript{c}, J. Stuart Elborn\textsuperscript{b,d}

Practice points

- Patients tended to prefer techniques that promoted independence to CCPT
Preference and satisfaction in infants.....

We cannot know their preference ....

Positive expiratory pressure/ Baby PEP

Conventional chest physiotherapy

Expiratory flow techniques

Cough stimulation
Preference and satisfaction in infants...

We can check ....

Physical examination

Oximetry

Chest radiography
Preference and satisfaction in infants...

Look at ....

Comfortable (Autogenic Drainage)

Sleep quality

Activity (positioning, stimulations)

Smile after ...

Efficiency (adequate respiratory rate)
Recommendation 1

Directions for future research ...

More studies of airway clearance techniques in infants with chronic respiratory disease are needed.

More high quality studies are necessary to “prove“ the effect of airway clearance technique in children.
The literature provide a lot of evidence about CF.

What is the evidence about the effects of respiratory therapy in other chronic respiratory diseases?
Advanced search form
Therapy: respiratory therapy

Problem: difficulty with sputum clearance
Subdiscipline: paediatrics
Topics: Chronic respiratory disease

Advanced search form
Therapy: respiratory therapy

Problem: impaired ventilation
Subdiscipline: paediatrics
Topics: Chronic respiratory disease

(Date Search: 2015/03/24)
Problem: Difficulty with sputum clearance

1. Asthma
2. Neuromuscular disease
3. Bronchiectasis
4. Primary ciliary dyskinesia
Evidence of benefit from airway clearance therapy in various pediatric conditions

Clear and proven benefit
- Cystic fibrosis

Probable benefit
- Neuromuscular disease
- Cerebral palsy
- Atelectasis in children on mechanical ventilation

Possible benefit
- Prevention of post-extubation atelectasis in neonates

Minimal to no benefit
- Acute asthma
- Bronchiolitis
- Hyaline membrane disease
- Respiratory failure without atelectasis
- Prevention of atelectasis immediately following surgery

1. Asthma
2. Neuromuscular disease
3. Bronchiectasis
4. Primary ciliary dyskinesia

Airway Clearance Applications in Infants and Children
[Respir Care 2007;52(10):1382–1390.
Michael S Schechter MD MPH]
Breathing exercise programmes (including physiotherapist-taught methods) can be offered to people with asthma as an adjuvant to pharmacological treatment to improve quality of life and reduce symptoms.

SIGN 141 • British guideline on the management of asthma

A national clinical guideline

October 2014
Neuromuscular disease...

• Use of airway clearance techniques which increase cough peak flow, as part of a homecare treatment package which includes non-invasive ventilation, is associated with decreased hospital admission for respiratory infection and improved survival (evidence level 3).

• Several airway clearance techniques are available. The most effective method for a particular child depends on the ability of the child to cooperate with treatment and the severity of the child’s weakness (evidence level 3).

Guidelines for respiratory management of children with neuromuscular weakness
British Thoracic Society Respiratory Management of Children with Neuromuscular Weakness Guideline Group

Thorax 2012;67:i1–i40. doi:10.1136/thoraxjnl-2012-201964
Bronchiectasis (non-CF)

- airway clearance techniques are considered safe;
- improvements in sputum expectoration, selected measures of lung function and health-related quality of life;
- clearance techniques in acute exacerbation = unknown;
- necessary investigations about the best technique.
Primary ciliary dyskinesia (PCD)

http://www.ciliajournal.com/

There have been no long-term randomized trials of therapy in PCD, and there is a lack of evidence in the management of this condition.

Many aspects of patient care are empirically based on CF.

*Treatment in 26 European countries.

There is a global attention to the diagnosis of PCD

FUTURE...
Recommendation 2

Directions for future research ...

More studies of airway clearance techniques in other pediatric chronic respiratory diseases are needed.

There is a lack of strong and consistent evidence in these diseases.
Structure and Function of the Mucus Clearance System of the Lung

Brenda M. Button and Brian Button

Cold Spring Harb Perspect Med 2013; doi: 10.1101/cshperspect.a009720 originally published online June 10, 2013

Subject Collection   Cystic Fibrosis

These techniques need to be continuously reevaluated and adapted according to changes in pathophysiology, developmental stages, lifestyle, or other considerations.
Improving the ketchup bottle method with positive expiratory pressure, PEP, in cystic fibrosis

M. Falk, M. Kelstrup, J. B. Andersen, T. Kinoshita, P. Falk, S. Støving & I. Gøthgen

Departments of Physiotherapy, TG, Anesthesia, Radiology, Rigshospitalet Copenhagen, and of Anesthesia and Intensive Care, Herlev Hospital, Denmark


Usually “the ketchup bottle method”, i.e., postural drainage, percussion, vibration and some sort of cough assistance is prescribed (13).

Airway clearance techniques

- PEP
- HFCWO
- Acapella®
- PD&P
- Flutter Device®
- Autogenic Drainage
- ACBT
- Cornet®
Nowadays..

Airway Clearance – Physiological Principles

- Interdependence
- Equal pressure point
- Gravity / positioning
- Two-phase gas liquid flow interactions
- Collateral ventilation
- Reduce mucous viscosity (visco-elasticity)

4 therapeutic principles

Thixotropism
- inhaled therapy
  Drugs:
  - mucolytics
  - Fluidifiers
  - antibiotics
  - antiinflammatories

Detachment
- techniques
  shock waves and vibration
  oscillatory techniques

Displacement
- expiratory airway flow

Removal
- cough
  aspiration

Principles are related.
Ex: oscillatory techniques have effects on thixotropism; cough promotes displacement...
Therapeutic principles

The combination of techniques can assist, enhance and optimize outcomes the effect.
Other approaches...

Handlings

Supports

Movement stimulations
Other approaches...

Positioning

Bubble PEP

Circuits
Advanced search form

Therapy: respiratory therapy

Problem: impaired ventilation

Subdiscipline: paediatrics

Topics: Chronic respiratory disease
<table>
<thead>
<tr>
<th>Study Title</th>
<th>Score</th>
<th>Type</th>
</tr>
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<tbody>
<tr>
<td>Evaluation of a web-based asthma management intervention program for urban teenagers: reaching the hard to reach [with consumer summary]</td>
<td>8/10</td>
<td>clinical trial</td>
</tr>
<tr>
<td>Chest physical therapy is effective in reducing the clinical score in bronchiolitis: randomized controlled trial</td>
<td>8/10</td>
<td>clinical trial</td>
</tr>
<tr>
<td>Effectiveness of personalized written asthma action plans in the management of children with partly controlled asthma in Trinidad: a randomized controlled trial</td>
<td>7/10</td>
<td>clinical trial</td>
</tr>
<tr>
<td>Benefits of combining inspiratory muscle with 'whole muscle' training in children with cystic fibrosis: a randomized controlled trial [with consumer summary]</td>
<td>7/10</td>
<td>clinical trial</td>
</tr>
<tr>
<td>The beneficial effects of physical exercise on antioxidant status in asthmatic children</td>
<td>5/10</td>
<td>clinical trial</td>
</tr>
<tr>
<td>A comparative study of salbutamol efficacy in children -- via the metered-dose inhaler (MDI) with Volumatic spacer and via the dry powder inhaler. Easyhaler, with the nebulizer -- in mild to moderate asthma exacerbation: a multicenter, randomized study</td>
<td>5/10</td>
<td>clinical trial</td>
</tr>
<tr>
<td>Comparison of salbutamol efficacy in children -- via the metered-dose inhaler with Volumatic spacer and via dry powder inhaler, Easyhaler, to nebulization in mild to moderate severity</td>
<td>5/10</td>
<td>clinical trial</td>
</tr>
</tbody>
</table>

**Total = 32 papers**

- **7 guidelines+ systematic reviews**
  - 5 about pediatric chronic respiratory disease
  - 1 got score 8 in Pedro scale
- **25 clinical trials**
  - 64% score < 5 in Pedro scale
Recommendation 3

Directions for future research…

More high quality studies of methods of respiratory therapy management for **impaired ventilation problems** in pediatric chronic respiratory diseases.

More studies about **other approaches** to improve ventilation in pediatric chronic respiratory diseases.
Physiotherapy in infants and young children with cystic fibrosis: current practice and future developments

Louise Lannefors BSc DipPT (resp med)¹ Brenda M Button Dip Phty PhD² Maggie McIlwaine MCSP MCPA³

J R Soc Med 2004;97(Suppl. 4):8-25
Games and activities

Kinesiotherapy, exercises and mobility

(Louise Lannefors – Journal of the Royal Society of Medicine, 2004 ERS School Courses, 2004 Viena, Austria)
Music:

- FUN
- INCREASED BREATH CAPACITY
- ALLEVIATE ANXIETY
- PART OF THERAPY
- GOOD FOR FAMILY

Benefits of Music Therapy as an Adjunct to Chest Physiotherapy in Infants and Toddlers With Cystic Fibrosis

Melissa C. Grasso, MMus,1* Brenda M. Button, PhD,2,3 Dianne J. Allison, MMus,1 and Susan M. Sawyer, MD3,4

Pediatr Pulmonol 2010; 45:371–381.

Children with cystic fibrosis benefit from massage therapy


- Reduction in anxiety of parents and children.
- Improvement in mood of patients and peak flow.

The immediate effect of musculoskeletal physiotherapy techniques and massage on pain and ease of breathing in adults with cystic fibrosis

Annemarie Lee a,*,1, Melissa Holdsworth a, Anne Holland a,b, Brenda Button a

a The Alfred Hospital, Australia
b La Trobe University, Victoria, 3086, Australia

Journal of Cystic Fibrosis 8 (2009) 79 – 81

- Alleviation of pain.
- Improvement in ease of breathing.
Motivational strategies

- Toys
- Music
- Games and activities
- Touch/massage

More studies!
Recommendation 4

Directions for future research…

More investigation about motivational strategies in respiratory therapy for children with chronic respiratory disease.
Video games and online games


http://www.cfvoice.com/index.jsp
“Breathing games” provides assistance to children from local community

BOM DE BOLA (soccer)

BASQUETE (basketball)

- styrofoam
- paper
- popsicle stick
- straw
“Breathing games” provides assistance to children from local community

HISTÓRIAS AO VENTO
(blowing stories)

CENTOPÉIA
(centipede)

COLA FRUTA
(stick the fruit)

CHUÁ-CHUÁ
Adherence affected by multiple factors

**Individual**
- Age
- Gender
- Health literacy
- Disease and treatment knowledge
- Mental health / behavioural problems
- Coping style
- Health beliefs and perceptions

**Family**
- Family structure
- Income / health insurance
- Disease knowledge
- Mental health / behavioural problems
- Coping style
- Health beliefs and perceptions
- Relationship quality
- Involvement in care
Family involvement in care

The challenge for respiratory and physical therapists together with the patient/family is to develop a plan of attack through the use of various airway-clearance therapies. The respiratory and physical therapists are integral in helping patients and families develop airway-clearance routines that aid in the removal of the secretions that cause airway obstruction.

Airway-Clearance Therapy Guidelines and Implementation

Mary K Lester RRT and Patrick A Flume MD

Respiratory Care • June 2009 Vol 54 No 6

There are no ACTs demonstrated to be superior to others, so the prescription of ACTs should be individualized. Aerobic exercise is recommended as an adjunctive therapy for airway clearance and for its additional benefits to overall health. Key words: Cystic Fibrosis Pulmonary Guidelines: Airway Clearance Therapies

Respiratory Care • April 2009 Vol 54 No 4
Recommendation 5

Directions for future research...

More investigation about how to measure adherence in children with chronic respiratory disease. Studies using objective measures may be needed, not just self-reported measures.
Physiotherapy in cystic fibrosis: optimising techniques to improve outcomes

S. Rand¹,²,*, L. Hill¹, S.A. Prasad¹

Physiotherapists need to have a broad understanding of the wide variety of treatment options now available. Physiotherapists also require the knowledge and ability to adapt and change treatments according to individual needs, taking in to consideration factors such as age, the stage of disease and social circumstances.
**Concluding....**

<table>
<thead>
<tr>
<th>Àims:</th>
<th>Consider:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Improve or maintain mobility and functional capacity;</td>
<td>• Considering the age and disease severity, what is better respiratory conduct?</td>
</tr>
<tr>
<td>• airway clearance and ventilation;</td>
<td>• What kind of therapy is right the patient treatment for exacerbation? and for maintenance or prevention?</td>
</tr>
<tr>
<td>• breathlessness management and symptom control.</td>
<td></td>
</tr>
</tbody>
</table>

• These are all fundamental for finding therapies that are effective and appropriate for each patient's unique situation.
Greater physiotherapy intervention

- toys
- music
- touch/massage
- games and activities
- motivation
- affection
- creativity
High-quality evidence

knowledge

experience

evidence

ethics

competence

update

common sense

NuFIPP
Nucléo de Fisiotherapia em Pneumologia Pediátrica

BRINCANDO
de RESPIRAR
OBRIGADA!!
cacaiss@yahoo.com.br
brincandoderespirar@googlegroups.com

BRINCANDO de RESPIRAR

OBRIGADA!!
Discussion
Concluding remarks

Chair: Assoc Professor Mark Elkins, University of Sydney

Speakers: Adj Professor Sue Jenkins, Curtin University

Professor Judy Bradley, University of Ulster

Adj Professor Camila Schivinsksi, University of S. Catarina
In systematic reviews of physiotherapy interventions, Cochrane reviews use more rigorous methods than non-Cochrane reviews.
Cochrane Groups

Airways

Cystic Fibrosis & Genetic Disorders

Lung Cancer

Tobacco Addiction

Infectious Diseases
PEDro, the Physiotherapy Evidence Database, is a free database of randomised trials, systematic reviews and clinical practice guidelines in physiotherapy. You can search the database for bibliographic details, and sometimes full text, of trials, reviews and guidelines using this Advanced Search page or the Simple Search page. PEDro is produced by the Centre for Evidence-Based Physiotherapy at The George Institute for Global Health. For more information please visit the PEDro home-page.

Start Search
Chronic respiratory disease
<table>
<thead>
<tr>
<th>Title</th>
<th>Method</th>
<th>Score (/10)</th>
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<tbody>
<tr>
<td>Pulmonary rehabilitation for chronic obstructive pulmonary disease (Cochrane review) [with consumer summary]</td>
<td>systematic review</td>
<td>N/A</td>
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<tr>
<td>Standard (head-down tilt) versus modified (without head-down tilt) postural drainage in infants and young children with cystic fibrosis (Cochrane review) [with consumer summary]</td>
<td>systematic review</td>
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<tr>
<td>Self-management following an acute exacerbation of COPD: a systematic review</td>
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<td>N/A</td>
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<td>The effects of oscillating positive expiratory pressure therapy in adults with stable non-cystic fibrosis bronchiectasis: a systematic review</td>
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<td>Exercise training combined with psychological interventions for people with chronic obstructive pulmonary disease</td>
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<td>Telehealthcare in COPD: a systematic review and meta-analysis on physical outcomes and dyspnea</td>
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<td>Effect of nocturnal oxygen and acetazolamide on exercise performance in patients with pre-capillary pulmonary hypertension and sleep-disturbed breathing: randomized, double-blind, cross-over trial</td>
<td>clinical trial</td>
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<td>Effects of an educational intervention of physical activity for children and adolescents with cystic fibrosis: a randomized controlled trial</td>
<td>clinical trial</td>
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<td>Effectiveness of a school-based academic asthma health education and counseling program on fostering acceptance of asthma in older school-age students with asthma [with consumer summary]</td>
<td>clinical trial</td>
<td>5/10</td>
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Updates

The latest clinical practice guidelines, systematic reviews and clinical trials for each area of physiotherapy and for selected topics in physiotherapy can be viewed by clicking on the links below. These links are updated once a month, usually on the first Monday of the month. The last update occurred on Monday 27 April 2015.

- Cardiotoracics
- Continence and women's health
- Ergonomics and occupational health
- Gerontology
- Musculoskeletal
- Neurology
- Oncology
- Orthopaedics
- Paediatrics
- Sports
- Chronic pain
- Neurotrauma
- Whiplash

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