High frequency chest wall oscillation in cystic fibrosis

Judy M Bradley

Airway clearance is considered an integral component of the management of cystic fibrosis (CF). Recent CF pulmonary guidelines made recommendations using the US Preventative Service task force (USPSTF) grading scheme (a system which provides a mechanism to weigh the quality of evidence and the potential harms and benefits) on airway clearance.\(^1\)\(^2\) These guidelines recommended that airway clearance should be provided to all patients with CF (grade B recommendation: high certainty that the net benefit is moderate and at least moderate certainty that the net benefit is moderate to substantial).\(^1\) They also summarise the evidence for the efficacy of one airway clearance regime versus another and recommend (grade B) that no airway clearance regime has been shown to be superior to others although they recognise that, for any individual, one airway clearance regime may be superior. They advocate that patients should be able to choose, in collaboration with the therapist, which airway clearance regime/ regimes they wish to use. Other guidelines and systematic reviews as well as many primary trials agree that there is no clear advantage of one particular airway clearance regime over another.\(^3\)

The active cycle of breathing techniques (ACBT) is the standard airway clearance regime in the UK, although in the last few years other forms of airway clearance (eg, autogenic drainage) as well as a range of adjuncts have become popular (eg, positive expiratory pressure (PEP) mask, flutter and Acapella). These adjuncts are often provided “free” at the point of delivery to the patient within the current healthcare system. In the USA, high frequency chest wall oscillation (HFCWO; known as the Vest) is widely used and is purchased for patients under various insurance schemes. HFCWO is not widely provided to patients with CF in the UK or the Republic of Ireland, and patients who currently use it have often purchased it themselves. The UK and the Republic of Ireland have experienced a huge move by patients to have HFCWO. These adjuncts are often experienced a huge move by patients to have HFCWO. At present, patient choice to use HFCWO is set against its significant cost (around £8000 per Vest), and there is a lack of sound evidence on its superiority or on equivalence to other much less expensive treatments that are currently part of standard treatment for CF.

The CF pulmonary guidelines have summarised the evidence available for HFCWO compared with other forms of airway clearance. Studies (n=10) comparing HFCWO with other forms of airway clearance were mostly limited to very short studies comparing one session or a number of days of treatment. Some of the studies have compared HFCWO with conventional chest physiotherapy (CCPT) and there is a lack of sound evidence on its superiority or on equivalence to other much less expensive treatments that are currently part of standard treatment for CF.

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deliver a definitive trial examining the efficacy of HFCWO. There is unlikely ever to be a perfect airway clearance regime. Decisions regarding the optimal airway clearance regime for patients are not easy, and are complicated by the various clinical phenotypes of patients with CF and the number of options available. It is probable that all airway clearance regimes work by different mechanisms to enhance airflow and reduce mucus viscosity, both of which are important for optimal airway clearance.19 Before new devices become available, research needs to provide clear evidence that the new device can achieve enhanced airflow and changes in viscosity required for optimal airway clearance. Research also needs to focus on the role of devices in specific subgroups of patients (eg, patients with large sputum volumes or non-productive of sputum) or in specific situations (eg, in stable disease or during an exacerbation). There is a high demand on patients with CF to take part in both pharmaceutical and non-pharmaceutical studies so, in order for these physiotherapy trials to be prioritised in terms of funding and patient recruitment, the physiotherapy community needs consensus on what is the best study design to provide these sources of evidence, what sample sizes are required, how long these studies need to be and which outcome measures are appropriate. Lung function has been traditionally accepted as the primary outcome in airway clearance trials. However, the rate of change in lung function is slowing so much and is now as low as 1% so, it is unlikely that future airway clearance trials will be able to show any clear benefit in terms of lung function. This has been highlighted in a recent European Cystic Fibrosis Society (ECFS) consensus conference report on clinical trials which stated that new alternative outcomes need to be used.20 Physiological measures such as lung clearance index, cough monitors and sputum viscosity show promise as outcome measures, although consensus is needed on standardising the methodology for these outcomes. Data are also needed on what magnitude of change is needed in these outcomes to translate into an important change in a clinical outcome. More emphasis needs to be put on how best to capture patients’ experiences of different treatments in trials (both positive and negative), and data on adherence will be particularly important.

In conclusion, appropriately designed trials of adequate size using new alternative outcomes will ensure that future airway clearance trials provide us with the information we need to make informed decisions on the options for effective airways clearance techniques.

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REFERENCES


Novel pulmonary biomarkers in the diagnosis of VAP

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Ventilator-associated pneumonia (VAP) is reported to occur in up to 20–27% of mechanically ventilated patients, and impacts healthcare in terms of patient morbidity, mortality and expenditure.1–3 The concept of VAP seems straightforward—that is, alveolar inflammation due to an infectious agent that was not present at the time of initiation of mechanical ventilation. However, the diagnosis remains difficult. Importantly, this difficulty in diagnosis of VAP leads to potential over-/underprescription of antibiotics and misguided treatment.

The American Thoracic Society guidelines of 2005 suggest that the use of readily available clinical data is adequate to inform the diagnosis of VAP. However, while such an approach has the advantage of being straightforward to apply, when compared with postmortem histological specimens the resultant sensitivity and
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