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Adherence to treatment in bronchiectasis: a challenge that physiotherapists can't ignore

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Summary

The purpose of this article is to highlight the importance for physiotherapists of patient adherence to treatment in bronchiectasis. This review provides evidence that adherence is important in bronchiectasis as it is low and affects health outcomes. We also show that there are a number of potentially modifiable factors that affect adherence that could be targeted through adherence interventions. The most effective methods of measuring adherence or interventions to enhance adherence are not known for bronchiectasis. Therefore, future research should focus on developing accurate and simple methods of adherence

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measurement for bronchiectasis that could be used in clinical practice, as well as, developing interventions to enhance adherence that are theoretically derived and able to be implemented as part of routine clinical practice.

Introduction

Patients with bronchiectasis are prescribed a complex treatment regimen that can include airway clearance techniques (ACTs) and inhaled, nebulised and oral medication. The British Thoracic Society (BTS) guidelines for non-cystic fibrosis (CF) bronchiectasis recommend that patients with bronchiectasis and a productive cough should be taught an ACT for routine use and those with a non-productive cough should be taught an ACT for use during an exacerbation (Pasteur et al 2010). Medications such as oral and inhaled antibiotics, hypertonic saline and β_2 agonists are also recommended for use in this population (Pasteur et al 2010), despite there being no licensed medications for



this condition. Inhaled corticosteroids are not recommended for use (Pasteur et al 2010) but approximately 80% of patients are prescribed this treatment (Hill et al 2012). Evidence for the efficacy of these recommended treatment interventions is lacking and recommendations are mostly based on data from other conditions and low quality data in bronchiectasis. ACTs are considered a 'cornerstone of therapy' (De Soyza et al 2012) but evidence of long-term effectiveness of this treatment is not available. A recent review of studies on ACTs concluded that ACTs were safe in patients with bronchiectasis but that the low quality of the five included studies meant that definite conclusions about long-term effectiveness could not be drawn (Lee et al 2013). The superiority of one ACT over another is unclear, but there appears to be a patient preference for oscillating devices compared to active cycle of breathing technique (ACBT) (with and without postural drainage) (Eaton et al 2007; Patterson et al 2005) and this may be due to the potentially reduced burden of treatment associated with the use of these adjuncts.

Determining the most effective management strategies in bronchiectasis is a key research priority for this patient population (De Soyza et al 2012). The interest in development of new medical therapies for bronchiectasis is growing and studies exploring new treatments have been recently published (Altenburg et al 2013; Bilton et al 2013; Haworth et al 2014; Serisier et al 2013; Wilson et al 2013), indicating that new medical therapies could be on the horizon for this population. To ensure that potential benefits of new and existing treatments are gained, we need to have an understanding of adherence to treatment.

At present, there are no high quality data on adherence to treatment in bronchiectasis. However, we know that approximately 50% of patients are adherent to treatments for CF, asthma and chronic obstructive pulmonary disease (COPD) (Eakin et al 2011; Gamble et al 2009; Krigsman et al 2007). Adherence rates for ACTs can often be the lowest of any prescribed

treatment in CF and this may be due to the high burden of this treatment (George et al 2010). It has been shown that the prescription of two or more nebulised therapies and ACT of greater than 30 minutes is associated with higher treatment burden in CF (Sawicki et al 2009). In bronchiectasis, a treatment regimen may involve pre-treatment with an inhaled or nebulised bronchodilator and/or nebulised hypertonic saline, and/or an ACT and/or nebulised therapies such as, inhaled antibiotics and/or inhalers. This regimen including preparation and cleaning of equipment is time-consuming, taking a minimum of 45 minutes which may have to be repeated twice daily and thus, may make adherence to these treatments difficult. Low adherence is known to be linked with poorer health outcomes for patients with CF (Quittner et al 2014), COPD (van Boven et al 2014) and asthma (Gamble et al 2009) and can be influenced by a number of factors including the burden of treatment (George et al 2010) and beliefs about the need for treatment (Bucks et al 2009). The purpose of this review article was to highlight the importance for physiotherapists of patient adherence to treatment in bronchiectasis. Specifically this review explored if adherence is important in bronchiectasis, how to measure adherence, what the predictors of adherence are, how adherence can be improved and what future research is needed. The clinical implications and current challenges facing clinicians when managing adherence are also addressed.

Why is adherence important in bronchiectasis?

A search on Medline using the search terms 'bronchiectasis' and 'adherence' demonstrates that there are two published studies that measure adherence to inhaled antibiotics in bronchiectasis (Gulini et al 2012; McCullough et al 2014a). Gulini et al (2012) reported that 73% of the 22 included patients were adherent to inhaled antibiotics. However, the study was very small and only explored adherence to one treatment type. We recently



completed a large, high quality study in which we monitored patients' adherence to airway clearance, inhaled antibiotics and other respiratory medicines for bronchiectasis for one year (McCullough et al 2014a). We found that only 41% were adherent to ACT, 53% were adherent to inhaled antibiotics, 53% were adherent to other respiratory medicines (i.e. oral, nebulised and inhaled therapies) over the course of a year and that only 16% of patients were adherent to all prescribed treatments (McCullough et al 2014a). Adherence to ACTs was measured using self-report, which is known to over-estimate adherence (Quittner et al 2008; Horne & Weinman 2002) and therefore, even fewer patients are likely to be adherent than reported.

Low adherence is known to be linked to poorer health outcomes in other respiratory disease populations (Quittner et al 2014; van Boven et al 2014). Our recent data show that adherence to ACT is associated with better Physical Functioning as measured by the Quality of Life Questionnaire-Bronchiectasis (QOL-B) (McCullough et al 2013; Quittner et al 2014). Therefore, adherence to ACT may be important in maintaining patients' level of physical functioning. Furthermore, those who were adherent to inhaled antibiotics had nearly half as many pulmonary exacerbations annually compared to non-adherers (McCullough et al 2014a). There was no effect of adherence on pulmonary function (McCullough et al 2014a).

Clinical implications

Adherence monitoring is not part of routine care for patients with bronchiectasis. However, the low level of adherence demonstrated and the negative impacts of non-adherence on health outcomes in this patient population indicate that there is an urgent need for adherence to treatment to be a priority during clinical interactions with patients with bronchiectasis as it could be low adherence, rather than treatment failure, that could be leading to disease progression. By not considering adherence fully in our interactions

with patients, we may prescribe increasingly escalating therapies which may lead to a greater burden of treatment, more non-adherence and worse outcomes for patients. Clinicians need to understand how to measure adherence, be aware of who is at risk of non-adherence and how to enhance adherence in this population.

How do we measure adherence in bronchiectasis?

There is presently no 'gold standard' measure of treatment adherence (Hughes 2004) and no detail in the literature on what can be used to measure adherence in bronchiectasis. Patient self-report is commonly used to measure adherence in clinical practice usually via questions such as 'are there any problems with your treatment?' However, this type of questioning is not likely to elicit a true representation of patients' adherence to treatment. Our data shows that more patients self-reported adherence to inhaled antibiotics and other respiratory medicines compared to a more objective measure of adherence (McCullough et al 2014a). These data support findings in CF, in which, self-reported adherence elicited via questions such as the one above or via a validated self-report questionnaire are consistently shown to over-estimate adherence due to patients feeling 'social pressure' to please their healthcare professional (Daniels et al 2011; Quittner et al 2008; Horne & Weinman 2002).

The ideal measure to monitor adherence would be accurate, allow the calculation of adherence on a continuous scale and in real time without its presence altering adherence behaviour. Electronic monitoring of adherence to airway clearance, nebulisers or inhalers using chipped Acapella® devices, inhalers and nebulisers appears to be the ideal measure. New technologies are being developed and existing technology is evolving quickly to allow detailed monitoring of adherence. There are currently no chipped Acapella® devices on the market for use in research or clinical practice but this



is likely to be an area for future development. I-neb® nebuliser devices measure the amount of medication inhaled each time the device is used and can give long-term adherence data which can be downloaded directly by the clinician. These devices are currently used in CF for the inhalation of colistin and are able to accurately measure adherence to treatment for these patients in routine clinical practice (Daniels et al 2011). However, the lack of evidence for and current cost of this device preclude its use in most bronchiectasis services. Sophisticated inhaler devices are in development which monitor adherence to inhaler technique as well as the frequency of medication usage (Costello & Reilly 2013) but are not yet available in clinical practice.

Medication possession ratios (MPR) offer a potential solution for adherence monitoring for medication that balances objectivity with ease of use in clinical practice. MPRs are calculated using data that is already available through patients' general practitioners (GP) or pharmacists. The calculation is completed by totalling up the amount of medication that a patient was dispensed (either from their GP or pharmacy) over a period of time divided by the amount that should have been collected over that time period and multiplying it by 100 to give a percentage rate (Hess et al 2006). This approach does not prove ingestion or inhalation of medication (Osterberg & Blaschke 2005) but it does provide a maximum level of adherence that patients could achieve based on how much they had collected. These data are already being collected as part of routine care, meaning that this approach could be used to monitor adherence to medication in bronchiectasis. We have used this method to calculate adherence to inhaled antibiotics and other respiratory medicines in bronchiectasis (McCullough et al 2014a) and although completed as part of a research project, it would be a feasible and useful method for routine clinical practice.

Clinical implications

Self-reported adherence using traditional clinical questioning skills is likely to lead to an under-estimation of the non-adherence problem for these patients. This could have subsequent effects on treatment burden and adherence due to escalating treatments as described above. Thus, there is a need for clinicians to be able to question patients about their adherence in a way that allows patients to be honest about their adherence and it may be better for clinicians to ask patients about their views on treatment and barriers to adherence rather than specifically ask about the level of adherence. Given the effect of adherence on health outcomes we have reported, monitoring of clinical end-points such as frequency of pulmonary exacerbations along with MPR could be used by clinicians to identify issues with adherence and to instigate a discussion about adherence. Challenging patients about their adherence may have implications for clinical relationships between patients and healthcare professionals if undertaken in a way that is confrontational. Therefore, clinicians may require training on how to question about adherence and work with patients to overcome barriers to adherence.

What are the predictors of non-adherence?

There is no published data on predictors of non-adherence in bronchiectasis. However, we recently determined that beliefs about treatment were the strongest predictors of adherence to treatment (McCullough et al 2013), with patients who did not believe their ACT was necessary less likely to be adherent. Patients who were concerned about the side-effects or long-term effects of medicines were less likely to be adherent to those treatments. These data were supported in a study in which we asked patients about what affected their decisions about adherence in bronchiectasis (McCullough et al 2014b). In both studies, beliefs about treatment were consistent



factors affecting adherence (McCullough et al 2013; McCullough et al 2014b); yet, these are not something that are routinely explored in clinical interactions. To be able to assess beliefs about treatment in bronchiectasis, we may need to consider the use of an assessment tool such as the Beliefs about Medicines Questionnaire (Horne et al 1999) prior to and following prescription of treatment, as a lack of perceived necessity or high concerns about a treatment may indicate a risk of non-adherence.

Age is also an independent predictor of adherence in bronchiectasis (McCullough et al 2013) and this finding was potentially explained in the qualitative findings, in which, patients recognised that younger age was associated with more family and work commitments and also, patients tended to have less problematic symptoms (McCullough et al 2014b). Younger patients could therefore be at risk of low adherence, in particular, for treatments that are time-consuming such as airway clearance. This finding may also indicate that different barriers to adherence exist for younger patients, meaning that any strategies to overcome adherence may need to be tailored specifically for these patients.

Treatment burden as measured by the number of prescribed medications predicted adherence to inhaled antibiotics, (McCullough et al 2013) and therefore, may be an indicator of risk of non-adherence to these treatments. Patients prescribed more medications may be more at risk of non-adherence which may provide a rationale for medication review for these patients prior to the prescription of new therapies or as part of a strategy to enhance adherence to existing treatments.

Clinical implications

Clinicians can use these predictors along with the measurement of adherence to highlight those patients who might be at risk of non-adherence and thus, who to specifically target to explore their adherence or who

may require more frequent monitoring. For example, a young patient who is prescribed many treatments and doesn't believe their airway clearance is necessary is less likely to be adherent compared to an older patient with few treatments and a strong belief about the need for airway clearance. Therefore, clinicians could prioritise the patient who is less likely to adhere to prevent long-term impact on this patient's health outcomes and escalation of prescribed therapies. This prioritisation of patients will also allow clinicians to target adherence within their existing workload and clinic format.

How can we improve adherence in bronchiectasis?

There are no bronchiectasis-specific interventions with the primary aim of enhancing adherence. In other chronic respiratory diseases, a multitude of interventions have been tested including education-based interventions, self-management interventions, pharmaceutical care and telemedicine interventions (McCullough et al 2014c). There does not appear to be any consistent effect of any particular type of intervention on adherence and health outcomes in chronic respiratory disease which may reflect a lack of high quality studies, adherence frequently being measured as self-report and also a diverse range of poorly defined, non-theoretically-based interventions being tested (McCullough et al 2014c). However, there is some evidence that interventions that can be tailored to the individual, such as shared decision-making and cognitive behavioural therapy are effective in asthma (Gamble et al 2011; Wilson et al 2010). Clinicians are already using strategies such as feeding back to patients about their lung function to reinforce adherence behaviour, using patient peer support in pulmonary rehabilitation to reinforce positive adherence behaviours, giving patients self-management action plans, using cognitive behavioural therapy and shared decision-making strategies to enhance adherence. Current guidance



states that for behaviour change interventions to be effective, they should be theoretically-based and developed using input from all relevant stakeholders including patients and clinicians (Medical Research Council 2008). Therefore, this would be important to do for bronchiectasis rather than incorporating strategies which may or may not be effective. We have recently explored the barriers and motivators to adherence in bronchiectasis and some of the factors affecting adherence decision-making in bronchiectasis that we have described such as beliefs about treatment, lack of disease knowledge, low self-efficacy and having a good relationship with healthcare professionals are potentially modifiable factors affecting adherence that could be targeted through a bronchiectasis specific intervention (McCullough et al 2014b). These factors affecting adherence could be used to direct the choice of behaviour change techniques that may act directly on these barriers to adherence behaviour and thus, potentially enhance adherence (Michie et al 2011). However, prior to strategies to enhance adherence being recommended for use in clinical practice for bronchiectasis, these should undergo pilot/feasibility testing and be subject to evaluation in a rigorous randomised controlled trial. This will ensure that ineffective and burdensome intervention and strategies are not implemented into clinical practice.

Clinical implications

Clinicians should identify patients' specific barriers to adherence and use these to choose strategies to enhance adherence to treatment. There is some evidence that individualised strategies which elicit patients' specific barriers to adherence and tailor strategies to this may be useful to enhance adherence (Gamble et al 2011; Wilson et al 2010) and could be used in clinical practice during routine interactions with patients. However, implementation of strategies to enhance adherence may have potential implications for clinician workload and training needs, as some strategies such as shared decision-making can be time-consuming

and may require extra training.

Conclusion

This review provides evidence that adherence is important in bronchiectasis as it is low and affects health outcomes but that there are a number of potentially modifiable factors that affect adherence that could be targeted through adherence interventions (McCullough et al 2013; McCullough et al 2014b; McCullough et al 2014c). However, the most effective methods of measuring adherence or interventions to enhance adherence are not known for bronchiectasis. Patients with bronchiectasis are already burdened with treatments; therefore, implementing ineffective adherence measurement strategies or interventions may further add to this management burden. Therefore, it will be important to implement strategies that are proven to be effective.

What future research is needed?

Future research should focus on developing accurate and simple methods of adherence measurement for bronchiectasis that could be used in clinical practice, as well as, developing interventions to enhance adherence that are theoretically derived and able to be implemented as part of routine clinical practice. To be able to do this, clinicians need to lobby for research into adherence in bronchiectasis to be prioritised, as in CF (Bradley et al 2012), and for financial investments in this area of research.

Key points

- Adherence is a huge problem in bronchiectasis which may lead to escalating therapies and greater management burden for patients and clinicians.
- Measurement of adherence is not routine in clinical practice but could be implemented by questioning patients about their beliefs about treatment. Additionally, for inhaled,



nebulised and oral medications existing data collected about dispensed medications could be used.

- Predictors of adherence could be used by clinicians to target those who might be at risk of non-adherence.
- Factors affecting adherence could be used by clinicians to choose strategies to enhance adherence to treatment but the most effective strategies are not currently known.
- Clinicians need to lobby for research into adherence to be prioritised and for financial investment in this research area.

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