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Randomised controlled trial of the effect, cost and acceptability of a bronchiectasis self-management intervention.

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1 **Abstract**

2

3 Background: Patient self-management plans (PSMP) are advised for bronchiectasis but  
4 their efficacy is not established. We aimed to determine whether, in people with  
5 bronchiectasis, the use of our bronchiectasis PSMP - Bronchiectasis Empowerment Tool  
6 (BET), compared to standard care, would improve self-efficacy.

7

8 Methods: In a multi-centre mixed-methods randomised controlled parallel study, 220  
9 patients with bronchiectasis were randomised to receive standard care with or without the  
10 addition of our BET plus education sessions explaining its use. BET comprised an action  
11 plan, indicating when to seek medical help based on pictorial represented indications for  
12 antibiotic therapy, and four educational support sections. At baseline and after 12 months,  
13 patients completed the Self-Efficacy to Manage Chronic Disease Scale (SEMCD), St  
14 George's Respiratory Questionnaire (SGRQ), EQ-5D-3L (to calculate Quality Adjusted Life  
15 Years (QALYs) and cost questionnaires. Qualitative data were obtained by focus groups.

16

17 Results: The recruitment to the study was high (63% of eligible patients agreeing to  
18 participate) however completion rate was low (57%). BET had no effect on SEMCD (mean  
19 difference (0.14 (95% confidence interval (95%CI) -0.37 to 0.64),  $p=0.59$ ) or SGRQ,  
20 exacerbation rates, overall cost to the NHS or QALYs. Most had developed their own  
21 techniques for monitoring their condition and they did not find BET useful as it was difficult  
22 to complete. Participant knowledge was good in both groups.

23

24 Conclusion: The demand for patient support in bronchiectasis was high suggesting a clinical  
25 need. However, the BET did not improve self-efficacy, health related quality of life, costs or  
26 clinically relevant outcome measures. BET needs to be modified to be less onerous for users

1 and implemented within a wider package of care. Further studies, particularly those  
2 evaluating people newly diagnosed with bronchiectasis, are required and should allow for  
3 50% withdrawal rate or utilise less burdensome outcome measures.

4

5 Clinical trials registration: ISRCTN ISRCTN 18400127. Registered 24 June 2015.

6 Retrospectively Registered

7

8 **Key words**

9 Bronchiectasis, mixed-methods, patient self-management plans, Self-Efficacy to Manage  
10 Chronic Disease Scale, St George's Respiratory Questionnaire,

11

12

## 1 **Background**

2 Bronchiectasis, a chronic lung disease characterised by chronic purulent sputum production,  
3 breathlessness and cough, is managed with airway clearance techniques, airway  
4 pharmacotherapy and appropriate use of antibiotics, along with patient education and  
5 disease monitoring(1). People with bronchiectasis often have impaired health related quality  
6 of life (HRQOL) (2); and can experience repeated exacerbations due to lung infection  
7 resulting in deterioration in symptoms and increased hospital bed days and costs(3).

8

9 Living with bronchiectasis results in considerable burden for patients, therefore methods of  
10 improving patient centered care are required to improve patient empowerment(4). Patient  
11 Self-Management Plans (PSMP) aim to do this and have been shown to improve health  
12 outcomes for adults with asthma(5) and to be cost-effective(6). Indeed the recent European  
13 Multicentre Bronchiectasis Audit and Research Collaboration (EMBARC) consensus  
14 statement about research priorities highlighted the need for studies to determine the  
15 effectiveness of PSMP in bronchiectasis(7). A recently published systematic review  
16 concluded that there was insufficient evidence to determine whether self-management  
17 interventions are beneficial for people with bronchiectasis(8).

18

19 We developed a self-management intervention for bronchiectasis (the Bronchiectasis  
20 Empowerment Tool (BET)) which was based on British Thoracic Society Guidelines, patient  
21 consultation and available literature on the patient perspective and needs for bronchiectasis  
22 self-management(9). It contained a 1 page action plan (which advises on actions depending  
23 on different circumstances) consisting of 3 action points, as is recommended(10), embedded  
24 in a document with written information and was supported by one to one education.

25

1 The study aimed to test whether, in people with bronchiectasis, the use of BET, compared  
2 to standard care, would improve self-efficacy using the Self-Efficacy to Manage Chronic  
3 Disease Scale (SEMCD)(11), as this is a fundamental aspect of self-managment(12).  
4 Secondary aims were to assess the effect of BET on HRQOL and disease-related  
5 knowledge and to determine whether it was cost effective. We also aimed to explore the  
6 participants' acceptability of BET.

7

## 8 **METHODS**

### 9 **Design**

10 This was a multi-centre parallel randomised controlled mixed-methods parallel study of BET  
11 in people with bronchiectasis over a 12 month period. Participants from six hospitals (one  
12 bronchiectasis specialist centre, four local hospitals with specialist respiratory nursing  
13 support and one community hospital) in East Anglia, UK were recruited from May 2013 to  
14 April 2015. The study was conducted in accordance with Good Clinical Practice and all  
15 participants gave written informed consent. It had ethical approval (13/SC/0140) and was  
16 registered on a trials database (ISRCTN 18400127).

17

### 18 **Participants**

19 Patients, of either gender, were included if they were older than 18 years, had a diagnosis  
20 of bronchiectasis confirmed on high resolution computed tomography (HRCT) and at least  
21 one exacerbation within the previous 12 months requiring treatment with antibiotics. Patients  
22 with cystic fibrosis or traction bronchiectasis, severe or uncontrolled co-morbid disease,  
23 impairment in cognitive functioning or did not speak English language were excluded.  
24 Patients currently using a written patient self-management plan or involved in the design of  
25 BET were also excluded.

26

1 **Randomisation**

2 Eligible participants were randomised to the intervention or control groups, after completion  
3 of the baseline assessments, on a 1:1 basis using a computer generated code created by  
4 the study statistician with stratification according to hospital centre and severity of disease  
5 (four or more exacerbations in the last 12 months versus less than four) with code  
6 concealment in sequential opaque envelopes. Treatment allocation was undertaken by an  
7 unblinded researcher. All eligible participants received the contemporaneous British Lung  
8 Foundation Bronchiectasis Patient Information Sheet and Bronchiectasis Patient  
9 Information Leaflet from the British Thoracic Society/Association of Chartered  
10 Physiotherapists Respiratory Care Guidelines (13).

11

12 **Intervention**

13 Participants randomised to the intervention group received the BET document plus  
14 education sessions about its use. BET is a 48 page A5 booklet and comprises an action  
15 plan, four educational support sections each with notepads to assist in keeping track of their  
16 health, and links to on-line resources. The action plan is based on the indications for  
17 antibiotic therapy from the BTS bronchiectasis guidelines (sputum purulence, sputum  
18 volume and cough/wheeze/breathlessness) and pictorially represents easily recognisable  
19 health changes indicating when to seek medical help, to minimise barriers of health literacy.  
20 The educational support sections comprise information about general health, sputum  
21 clearance techniques and medication. There is a section for recording each course of  
22 antibiotic and date of sputum microbiology.

23

24 An un-blinded researcher (CB), previously a respiratory nurse, provided education about  
25 BET via four brief telephone conversations (lasting on average 10, 7, 5 and 2 minutes)  
26 delivered on consecutive days at the beginning of the study; these covered the use of the

1 action plan and the information, monitoring and reference sections. Participants were given  
2 the opportunity to ask questions and to practice using the tool. Patients were provided with  
3 a contact number for information about the study and use of BET (but not for clinical queries).  
4 Participants' healthcare providers were provided with brief information about BET in a letter.

5

## 6 **Control**

7 Participants within the control group received standard care whereby patients attended  
8 routine appointment and were guided on their management according to current practice as  
9 per the BTS bronchiectasis guidelines.

10

## 11 **Measurements**

12 Patients received the six item SEMCD to assess self-efficacy as it is a valid, responsive tool  
13 with high internal consistency in chronic disease, ranging between 1 and 10 with 10 scoring  
14 total confidence in managing disease(11) and used to evaluate self-management  
15 programmes(14); the St George's Respiratory Questionnaire (SGRQ)(15) to assess disease  
16 HRQOL as it has been validated for use in bronchiectasis(16); the EuroQol-5D 3 level  
17 version (EQ-5D-3L)(17) to assess HRQOL; and cost questionnaires at baseline and every  
18 3 months by post in a reply paid envelope. The Lung Information Needs Questionnaire  
19 (LINQ)(18), which assesses knowledge and behaviour is validated in patients with chronic  
20 obstructive pulmonary disease but is easily transferable to bronchiectasis was completed at  
21 baseline and after 12 months. As no appropriate validated questionnaire existed which  
22 addressed the participants' knowledge and confidence about bronchiectasis a new  
23 questionnaire was created in consultation with the research team and lay advisors was  
24 completed after 12 months by participants.. Patients who failed to return the questionnaires  
25 were sent a reminder questionnaire by post. The number of exacerbations of

1 bronchiectasis(19), medical contacts and sputum microbiology requests were obtained from  
2 cost questionnaires and hospital records.

3  
4 Two focus groups, comprising 4 participants each, purposively sampled to include patients  
5 with mild and severe disease from the intervention group, were facilitated by CB under  
6 supervision of AS (qualitative research expert) using a semi-structured interviewing  
7 technique, to explore participants' perceptions of BET.

8

### 9 **Analysis**

10 The primary outcome was the change from baseline in SEMCD. A sample size of 154  
11 patients has 80% power to detect a treatment difference (two sided 5% significance) of 1  
12 unit (10% of maximum score) of the SEMCD with a standard deviation of 2.2 units(20). We  
13 expected a withdrawal of 30% based study in chronic obstructive pulmonary disease with  
14 similar questionnaire burden(21), and therefore 220 patients were entered into the study. All  
15 data were double entered and discrepancies resolved by re-examining the source data.  
16 LINQ was analysed using the LINQ Scoring Tool ([www.linq.org.uk](http://www.linq.org.uk)). The Bronchiectasis  
17 Aetiology Comorbidity Index was calculated from clinical data(22).

18

19 The analysis was based on an intention-to-treat approach. Change from baseline for primary  
20 and secondary endpoints was compared between groups using a general linear model  
21 adjusted for baseline severity. Total exacerbations and unscheduled care were both  
22 compared using negative binomial regression and reported as the incidence rate ratio which  
23 is the ratio of the event rates between the study arms. Adjusted analyses were conducted  
24 by additionally including the baseline value in the model as a covariate, e.g. for the SEMCD  
25 outcome we adjusted for the baseline measure of SEMCD. Data are presented as mean  
26 and standard deviation. The analysis was undertaken using Stata 16.1/SE.



1

2 Recordings of the focus groups were transcribed and a review of the data generated initial  
3 codes. Data from the focus groups were analysed in parallel to increase rigour(23). We used  
4 Microsoft Office Excel and computer assisted qualitative data analysis software (Nvivo11)  
5 to perform an inductive thematic analysis where patterns and clusters of linked data were  
6 organised into themes(24, 25). In the results section we show selected quotes to illustrate  
7 the participants' experience of using BET.

8

### 9 **Economic evaluation**

10 Costs were estimated from the perspective of the NHS. The intervention costs were for a  
11 specialist nurse to arrange and conduct telephone education sessions, who would require 2  
12 hour 1:1 training, and BET booklet printing. In the cost questionnaires, participants reported  
13 both hospital and community health visits. Unit costs were assigned to all items of resource  
14 use (£GBP (\$USD) for the 2014-15 financial year)(26, 27).

15

16 Responses to the EQ-5D-3L were converted into utility scores(28) using the UK York A1  
17 tariff(29). Quality Adjusted Life Year (QALY) scores were subsequently calculated using the  
18 area under the curve approach(30). Multiple imputation was performed to account for  
19 missing cost and outcome data(31). Regression analysis(32) was subsequently used to  
20 estimate the mean incremental cost (mean difference in cost) and effect (QALY gain)  
21 between the two groups and the incremental cost-effectiveness ratio (ICER)(33). The cost  
22 effectiveness acceptability curve (CEAC), which estimates the probability of the intervention  
23 being cost-effective(34), was estimated at a value of £20,000 (\$26,400) per QALY.

24

## 25 **RESULTS**

1 The intention-to-treat analysis included 220 randomised patients, of which 155 (69%) were  
2 female, which represented 63.2% of eligible individuals (Figure 1). They had a mean  
3 (standard deviation) age of 66.9 (12.0) years, FEV1 1.84 (0.69) L, SEMCD 7.02 (2.0), total  
4 SGRQ 42.4 (19.1) and a median (inter quartile range) time from diagnosis of 5 (2 - 14) years.  
5 The two groups were well balanced at baseline and hence no adjustment to the analysis  
6 was required to account for baseline factors (Table 1). The withdrawal rate was higher than  
7 expected with only 127 individuals (57%) returning the primary outcome questionnaire at 12  
8 months. There was no difference in the change in SEMCD between the two study arms.  
9 The data were very slightly negatively skewed, but re-analysis using the bootstrap with 1,000  
10 iterations gave similar results particularly for the adjusted analysis (unadjusted  $p=0.96$ ,  
11 adjusted  $p=0.60$ ) so that the results are not sensitive to the violation of the assumptions of  
12 the t-test. There were no significant differences between intervention and control for change  
13 in SGRQ, exacerbation rate, LINQ score or sputum microbiology requests (Table 2). In  
14 addition there were no differences between the intervention and control at any of the three  
15 month time points for any of the variables. Both groups were confident in managing their  
16 condition at the end of the study (Table 3).

17  
18 Within the focus groups three participants out of 8 had fully utilised the BET tool. Seven out  
19 of eight, felt the need for support with bronchiectasis, but not necessarily in the form of BET.  
20 Most participants of the focus group had already developed their own techniques for  
21 monitoring their condition. One of them said '*A lot of the things in there I already knew, but*  
22 *not everybody would, particularly the newly diagnosed wouldn't*'. Another one said that

23  
24 *'...what I would do is make it slightly simpler, I felt that sometimes I was*  
25 *repeating things. When you are filling it in, you are not well at the time and that*

1           *makes it more difficult. I think that if someone could have reviewed my progress*  
2           *with me and guided me it might have been even more successful'. 1105*

3  
4   However, those that did use BET reported having gained a clearer and better insight into  
5   the presentation and duration of their symptoms.

6  
7           *“Without that [BET] I would have been lost. Because I was able to take the BET*  
8           *booklet with me to appointments and let them know what worked effectively and*  
9           *what wasn't for instance when I went to the hospital I was able to say Meropenem*  
10           *and Tobramycin IVs to Dr R.” 1056*

11  
12   The aspect that was mentioned most was the improved interaction and  
13   communication with healthcare professionals and secondly the self-care behaviours  
14   e.g. sputum testing and airway clearance. Emerging themes ranged from impact of  
15   the disease on social interactions; embarrassment, change of role and isolation, to  
16   the challenges of taking antibiotics influenced by side-effects, media messages and  
17   the complexities of intravenous self-administration (see appendix). An overarching  
18   theme was the need for informed guidance and support illustrated by the following  
19   extracts

20           *“From a personal basis not being able to pick up a phone and say to somebody*  
21           *do you think that it is alright? Do you think that I can do something to improve*  
22           *things? If you know someone who knows a lot about it that would be wonderful.*  
23           *A nurse to talk to.” 1044*

1 “It was nice as I mentioned earlier to speak to a GP who was knowledgeable  
2 and knew exactly what I was saying. I do remember it was a yippee moment.  
3 But sadly that person is leaving”. 1091

4  
5 “There is no easy flow of information or updates to patients, they get  
6 nothing]...[For a majority of my housebound patients they do not get regularly  
7 reviewed by either a GP or a hospital consultant.” 2001

8  
9 The intervention was estimated to be £40.11 (\$52.95) per participant: 15 minutes per  
10 participant to arrange the phone calls, 24 minutes for the education sessions, £176  
11 (\$232.32) for staff training and £245 (\$323.40) for printing BET. Table 4 summarizes the  
12 mean QALY scores. The mean incremental cost was estimated for the intervention group,  
13 compared to the control group, to be £355.94 (\$469.85) (95% confidence interval (CI) –  
14 £444.97 to £1156.85 (-\$587.36 to \$1527.04) and the mean QALY score to be 0.006 higher  
15 (95% CI –0.042 to 0.053). This resulted in an ICER of £64,223 (\$84,774). According to the  
16 CEAC there was a 36.3% probability that the intervention was cost-effective at a  $\lambda$  of £20,000  
17 (\$26,400) per QALY.

## 18 19 **DISCUSSION**

20  
21 We did not show that the use of BET had a beneficial effect in terms of self-efficacy, HRQOL  
22 or clinically relevant disease outcome measures such as exacerbations or hospitalisations  
23 or costs. The uptake into the study was high reflecting patients desire to be involved with  
24 and assist initiatives to increase their education and support for their condition. However,  
25 participants did not find the self-management tool to be valuable as, although the action plan  
26 was brief, overall BET was too onerous to complete and few participants used it. The

1 participants did not feel more informed about their condition and there was no change in  
2 their behaviour. None of the participants were newly diagnosed and many had developed  
3 their own techniques to monitor and manage their disease. This was despite the involvement  
4 of patients with bronchiectasis in the development of BET although they were possibly self-  
5 selected in terms of their enthusiasm for the intervention.

6  
7 Unfortunately the patient withdrawal was higher than we expected and therefore our study  
8 was underpowered. This may be due to the lack of study visits, and face-to-face contact with  
9 researchers, or to the burden of literacy represented by the intervention and patient reported  
10 outcome and cost measures. The low intensity nature of the study visits but relatively high  
11 questionnaire burden may have resulted in disengagement with the study. Also the BET tool  
12 was not evaluated within a larger process of care and it could not be modified by the clinical  
13 team or patient. It is likely that if the healthcare professionals involved had been regularly  
14 reviewing and updating the action plan or educational material or notepads contained within  
15 BET, it would have been used more. Although the separate elements of a care bundle need  
16 to be individually assessed(35), action plans are more effective if integrated within  
17 healthcare(36); and lack of review of asthma self-management plans by healthcare  
18 professionals leads to lack of interest by patients(37).

19  
20 The action plan in BET was accompanied by brief written and one-to-one patient education  
21 as we envisaged that would be the case in clinical practice. This was delivered by phone as  
22 this was more convenient, permitted standardised training throughout a multi-centre study  
23 and was preferred by the patients. Many people in the focus groups liked the telephone  
24 education and indeed structured telephone support has been shown to be beneficial for  
25 people with chronic heart failure(38). However, a more intensive programme or one  
26 integrated within the practice and championed by healthcare providers may have had

1 greater uptake and benefit(39). We did not include training on skills such as problem solving,  
2 decision-making, goal setting and emotional management. Diabetes standards suggest  
3 greater than 10 hours of support are required for implementation of self-management  
4 plans(40).

5  
6 We had broad inclusion criteria for this study, only requiring documented evidence of  
7 diagnosis and one exacerbation in the previous year, to maximise generalizability. However  
8 our participants had less impaired HRQOL compared to other trials(41) (but similar to  
9 observational studies(16)) and the majority of individuals felt confident about bronchiectasis  
10 in both groups at the end of the study. It is possible that the reason for lack of detectable  
11 benefit is that the patients had relatively mild disease of long duration (average more than a  
12 decade) and had already developed mechanisms for managing their disease so did not  
13 benefit from this alternative tool. Indeed, it was suggested in the focus groups that  
14 individuals with newly diagnosed disease would find the tool more beneficial but we did not  
15 purposively sample those with a good response for the focus groups

## 17 **Conclusion**

18 We have shown that BET did not improve outcomes. Many participants had mild disease,  
19 already developed self-management techniques and/or considered themselves confident  
20 with their condition. The telephone education was appreciated by participants and could be  
21 utilised to a greater extent in the future. BET should not be used as it stands but a simplified  
22 version should be evaluated in newly diagnosed patients, probably in the context of a wider  
23 care package with more intensive support. Recruitment into the study was high suggesting  
24 a clinical need but future studies should allow for up to 50% withdrawal rate or utilise less  
25 burdensome outcome measures, perhaps capturing patients ability to communicate with  
26 healthcare professionals or bronchiectasis specific HRQOL.

1

2

1 **Abbreviations**

2	BET	Bronchiectasis Empowerment Tool
3	CEAC	Cost effectiveness acceptability ratio
4	CI	Confidence Interval
5	EQ-5D-3L	EuroQol-5D 3 level version
6	FEV1	Forced Expiratory Value in one second
7	GBP	Great British Pound
8	HRCT	High resolution computed tomography
9	ICER	Incremental cost-effectiveness ratio
10	ISRCTN	International Standard Randomised Controlled Trials Number
11	LINQ	Lung Information Needs Questionnaire
12	$\lambda$	Maximum acceptable ratio relating to CEAC
13	n	Number with data available
14	NHS	National Health System
15	NICE	National Institute for Health and Care Excellence
16	p	Probability value
17	QALY	Quality Adjusted Life Year
18	SGRQ	St George's Respiratory Questionnaire
19	SEMCD	Self-Efficacy to Manage Chronic Disease Scale
20	SD	Standard Deviation

21

22 **Ethics approval and consent to participate**

23 The study was conducted in accordance with Good Clinical Practice and all participants  
24 gave written informed consent to participate. It had ethical approval from NRES Committee  
25 South Central – Berkshire (13/SC/0140) and was registered on a trials database (ISRCTN  
26 18400127).



1

2 **Consent for publication**

3 Not applicable

4

5 **Availability of Data and Materials**

6 The datasets used and analysed during the current study are available from the  
7 corresponding author on reasonable request

8

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14

15 **Authors' contributions**

16 AMW was the chief investigator for the study and prepared the manuscript. All authors  
17 contributed to the design of the intervention and the design, delivery and interpretation of  
18 the trial; and approved the final version of the manuscript. CB and AS undertook the  
19 qualitative analysis, AC undertook the statistical analysis and GB undertook the health  
20 economic analysis. CB also delivered the intervention and undertook the data collection  
21 (including focus groups) which contributed towards her doctoral thesis.

22

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- 24

25

1 Table 1 Summary of baseline characteristics for all individuals

2

Factor	Control	Intervention
Age (years)	66.3 (13.4)	67.4 (10.5)
Gender		
f	78 (70.3%)	73(67.0%)
m	33 (29.7%)	36 (33.0%)
Smoking status		
Current smoker	7 (6.5%)	1 (1.0%)
Ex-smoker	45 (41.7%)	47 (44.8%)
Never smoked	56 (51.9%)	57 (54.3%)
FEV1 (L)	1.9 (0.8)	1.8 (0.6)
%,	82.3 (25.5)	75.4 (21.7)
FVC (L)	2.8 (0.9)	2.8 (0.9)
%,	96.4 (20.9)	91.0 (21.5)
Exacerbations		
>=4/year	40 (36.0%)	41 (37.6%)
<4/year	71 (64.0%)	68 (62.4%)
Exacerbations,	2.6 (3.0)	3.1 (3.0)
SEMCD score,	6.8 (2.1)	7.2 (1.9)
SGRQ total,	42.7 (21.1)	42.1 (17.0)
SGRQ symptoms,	55.9 (25.3)	57.1 (23.2)
SGRQ activity,	50.1 (27.8)	50.0 (23.0)
SGRQ impact,	34.2 (19.9)	32.1 (15.8)

Microbiology data (year before consent)		
Pseudomonas organism		
None	64 (72.73)	70 (77.78)
One	12 (13.64)	11 (12.22)
Two or more	12 (13.64)	9 (10.00)
Haemophilus organism		
None	77 (87.50)	75 (83.33)
One	7 (7.95)	6 (6.67)
Two or more	4 (4.55)	9 (10.00)
BACI score		
None or one	72 (64.9)	50 (45.9)
Two or three	21 (18.9)	37 (33.9)
Four or more	18 (16.2)	22 (20.2)
Median, IQR	0 (0-3)	3 (0-3)
LINQ score,	12.75 (2.50)	12.58 (2.40)
Disease knowledge	3.04 (0.73)	2.99 (0.70)
Medicines	2.34 (0.67)	2.37 (0.66)
Self-management	3.51 (1.53)	3.42 (1.60)
Smoking	0.14 (0.61)	0.00 (0.00)
Exercise	2.33 (1.06)	2.18 (1.13)
Number of sputum samples	1.82 (2.17)	2.25 (2.89)

1 FEV1: Forced expiratory volume in 1 second, FVC: forced vital capacity, SEMCD: Self-  
2 Efficacy to Manage Chronic Disease Scale, SGRQ: St George's Respiratory  
3 Questionnaire, LINQ: lung information needs questionnaire; BACI: Bronchiectasis  
4 Aetiology Comorbidity Index. Other than gender and smoking status, where data are  
5 represented as number and percentage, all data are represented as mean and standard  
6 deviation.  
7

1

2 Table 2 Change in outcome measures from baseline to 12 months follow-up.

3

		Control		Intervention	Mean difference (Intervention - Control)	p-value	Mean difference (adjusted for baseline values). (Intervention - Control)	p- value
	n	Mean (SD)	n	Mean (SD)	Mean (95% CI)		Mean (95% CI)	
SEMCD	67	-0.2 (1.6)	60	-0.2 (1.4)	0.01 (-0.51,0.53)	0.96	0.14 (-0.37,0.64)	0.59
SGRQ								
Total	61	1.3 (11.7)	54	1.6 (11.5)	0.27 (-3.98,4.52)	0.9	0.24 (-4.01,4.49)	0.91
Activity	63	4.7 (17.8)	56	4.1 (14.3)	-0.60 (-6.48,5.27)	0.84	-0.73 (-6.49,5.02)	0.8
Impact	66	-1.0 (11.9)	59	0.1 (12.0)	1.21 (-2.95,5.37)	0.57	1.16 (-3.00,5.32)	0.59
Symptoms	68	0.6 (18.8)	60	-1.0 (21.2)	-1.54 (-8.48,5.39)	0.66	-1.47 (-8.03,5.09)	0.66
LINQ	57	12.18 (2.73)	49	11.45 (2.19)	-0.75 (-1.71,0.21)	0.124	-0.48 (-1.32,0.37)	0.265
Disease knowledge	50	-0.12 (0.92)	44	-0.14 (0.90)		0.894		



Medicines	47	-0.15 (0.62)	40	-0.30 (0.72)		0.303		
Self-management	47	-0.28 (1.36)	40	-0.10 (1.57)		0.854		
Smoking	52	0 (0.0)	42	0 (0.0)		NA		
Exercise	54	-0.07 (0.87)	44	0.18 (1.26)		0.238		
Sputum samples provided	93	1.48 (2.52)	95	2.09 (3.10)	1.54 (1.00,2.35)	0.048	1.29 (0.88,1.89)	0.197
Exacerbations					IRR (Intervention / control) (95% CI)		Adjusted IRR (95% CI)	
Exacerbations 0-12mths	34	3.6 (4.8)	21	6.3 (8.4)	1.64 (0.87,3.07)	0.12	1.57 (0.85,2.87)	0.15
Hospital admissions or A&E attendances	84	0.73 (1.12)	87	1.07 (1.84)	1.36 (0.85,2.18)	0.206	-	-

1

2 SEMCD: Self-Efficacy to Manage Chronic Disease Scale, SGRQ: St George's Respiratory Questionnaire, LINQ: lung information needs  
3 questionnaire, A&E: accident and emergency. Intention to treat analysis. IRR: incidence rate ratio (intervention/control) ASD: Standard  
4 Deviation. CI: confidence interval. n: number with data available for analysis.

5

1 Table 3 Patients self-evaluation of their knowledge and confidence about bronchiectasis.

		Control		Intervention	
	Total number	Number (percentage)	Total number	Number (percentage)	P
I do NOT feel confident in deciding when I need treatment	53	5 (9.4)	43	3 (7.0)	0.727*
I know which bacteria grows in my sputum/phlegm	48	18 (37.5)	41	15 (36.6)	0.929+
Sputum sample sent for testing...	50		41		0.111*
..when I last had a flare up		25 (50)		28 (68.3)	
..within the last 6 months		3 (6)		0 (0)	
..within last 12 months		22 (44)		13 (31.7)	
Home supply of antibiotics	48		41		0.969*
I have a home supply & know when to use them		38 (79.2)		32 (78.1)	
I have a home supply but I don't feel confident starting them		3 (6.3)		2 (4.9)	

I <b>don't</b> have a home supply but would like to have some.		3 (6.3)		4 (9.8)	
I <b>don't</b> have a home supply but I don't want the responsibility		4 (8.3)		3 (7.3)	
I <b>feel confident</b> that I understand my condition, how to get it treated when necessary and explaining it to family or friends.	41	37 (90.2)	29	29 (96.6)	0.395*

1

2 The analysis was conducted by \* Chi-squared test and + Fisher's exact test.

3

4

1

2 Table 4 – Quality adjusted life years score for intervention and control groups.

3

		Control		Intervention
	n	mean (SD)	n	mean (SD)
Baseline EQ-5D-3L	103	0.709 (0.297)	101	0.716 (0.278)
3 month EQ5D-3L	73	0.724 (0.285)	60	0.751 (0.251)
6 month EQ5D-3L	58	0.704 (0.300)	48	0.701 (0.319)
9 month EQ5D-3L	62	0.655 (0.323)	53	0.691 (0.319)
12 month EQ5D-3L	65	0.737 (0.270)	58	0.689 (0.306)
QALY	63	0.723 (0.263)	57	0.709 (0.285)

1

2 There was no difference in the QALY score between the two groups. n=Number for whom data were available; SD=standard deviation;

3 QALY=Quality Adjusted Life Years over 12 months

4

1 **Figure Legends**

2 Figure 1 Disposition of patients

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