



**BTS National Audit Report:**  
**Adult and Paediatric Bronchiectasis Audits 2017**  
National Audit Period: 1 October – 30 November 2017  
Professor Adam Hill

Number of participating institutions and records submitted:

Adult Bronchiectasis Part 1: 4845 clinical records from 105 hospitals (90 trusts)  
Adult Bronchiectasis Part 2: 98 organisational records from 98 hospitals (86 trusts)

Paediatric Bronchiectasis Part 1: 280 records from 34 hospitals (34 trusts)  
Paediatric Bronchiectasis Part 2: 33 records from 33 hospitals (33 trusts)

### **Summary/Abstract**

The 2017 British Thoracic Society Paediatric and Adult Bronchiectasis Audits were carried out simultaneously and allowed comparison between paediatric and adult practices. These were large audits involving 34 hospitals and 280 records for the paediatric audit and 105 hospitals with 4,845 records for the adult audit. The audits focused on diagnosis and management of bronchiectasis and explored hospital services available for bronchiectasis patients.

### **National Improvement Objectives:**

1. Over 85% of paediatric and adult patients with bronchiectasis should have the following investigations for allergic bronchopulmonary aspergillosis (ABPA):
  - Full blood count
  - Total IgE
  - IgE to aspergillus or skin prick test to aspergillus
  - Up to date Chest X-ray or CT chest
2. Over 85% of paediatric and adult patients with bronchiectasis should have IgA, IgG, IgM investigations for common variable immunodeficiency. If IgG, IgA or IgM are raised, over 90% should have protein electrophoresis.
3. Over 90% of paediatric and adult patients with bronchiectasis should be taught chest clearance techniques by a specialist respiratory physiotherapist.
4. In adult patients with bronchiectasis with chronic sputum production, over 90% should have sputum or an appropriate sample be sent for routine microbiological testing annually whilst clinically stable.

**Timeframe: to be achieved by the time of re-audit in 3 years**

### **Key findings**

1. Confirmation of bronchiectasis was carried out by CT scan of the chest in paediatric and adult patients in most cases (>90%).
2. Aetiological investigations were sought more frequently in paediatric compared with adult patients.
3. Co-existing asthma was common in both paediatric and adult patients (around 30%).
4. Co-existing COPD was common in adult patients (around 24%).

5. Despite being secondary care audits, in both paediatric and adult audits, about 20% had no exacerbations in the last 12 months and over half the patients had fewer than 3 exacerbations in the last 12 months. In both paediatric and adult patients, about 25% had three or more exacerbations in the last 12 months.
6. Despite the importance of microbial stewardship, only about 50% of the paediatric patients and 40% of adults had sputum or appropriate samples sent for microbial culture prior to starting antibiotics for an exacerbation and about 60% being sent for routine microbial culture when stable in the past 12 months.
7. The paediatric population were less infected with *Ps. aeruginosa*, MRSA, enteric Gram-negative organisms (less than 5%) compared with adult patients with bronchiectasis (around 21%).
8. In paediatric and adult audits, there is heterogeneity in the duration of antibiotic used in both paediatric and adult audits for exacerbations requiring intravenous antibiotic therapy. Previous guidelines recommended 14 days but between 14-31% had 7 days or less.
9. In paediatric and adult audits, less than 10% were on long term nebulised antibiotics and the most frequently used agent was nebulised Colomycin. In paediatric patients around 59% were on a long term oral antibiotic compared with around 30% in adult patients. The most frequently used agent was azithromycin and the majority received continuous antibiotics without a drug free period.
10. There was infrequent use of written self-management plans in both paediatric and adult audits (around 40%).

### **Standards/guidelines/evidence base**

The standards for both audits were derived from the 2010 BTS Guideline for non-CF Bronchiectasis<sup>1</sup> (the BTS Guideline). The adult audit also used standards derived from the 2012 BTS Quality Standards for Clinically Significant Bronchiectasis in Adults<sup>2</sup> (the Quality Standards).

### **Background**

The BTS bronchiectasis audits started as a combined adult and paediatric audit which ran in 2010 and 2011. Since the introduction of the Quality Standards for Adults, the audit has been split into dedicated adult and paediatric audits which first ran in 2012 and 2013 respectively. The 2017 audits are the second round of separate national audits for adult and paediatric bronchiectasis. Participation has increased year on year as set out in Table 1.

<b>2010</b>	<b>2011</b>	<b>2012 (adults)</b>	<b>2017 (adults)</b>	<b>2013 (paeds)</b>	<b>2017 (paeds)</b>
1501 records	2404 records	3147 records	4845 records	260 records	280 records
59 hospitals	93 hospitals	98 hospitals	105 hospitals	31 hospitals	34 hospitals

Table 1: participation

The paediatric audit has shown a small rise in participation from 2013 to 2017 but there has been a major increase in participation in the adult National Audit since 2010 with more hospitals taking part and records soaring from 1,501 in 2010 to 4,845 in 2017.

### **Aims and objectives**

The aims of the national paediatric and adult audits were to compare investigation, diagnosis and management practices and compare these with the BTS Guideline and Quality Standards for.

## **Methodology**

Both audits applied to patients who had a follow-up or review outpatient appointment for bronchiectasis during the audit period (1 Oct – 30 Nov 2017). Subsequent appointments that fell during the audit period were not audited. The audit excluded cystic fibrosis patients.

The distinction between whether a patient should be entered in the audit or paediatric audit depended on whether they were under the care of a paediatrician, rather than a fixed age. Children under 1 were also excluded.

The audit could be conducted prospectively or retrospectively. Data were collected from patient notes relating to the outpatient appointment and any previous treatments and investigations, and entered onto the secure BTS audit website. Participants were able to download data exports and reports comparing their data against the national aggregated data.

Participants were asked to enter all eligible cases, or where this was not possible due to very large numbers, to take care to avoid bias in case selection e.g. by including consecutive cases.

## **Results**

### **Patient Characteristics**

The adult cohort had a mean age of 67.6 years and two thirds of patients were over 65 years old; there was a predominance of female cases (62%). The paediatric cohort had a mean age of 10.5 years and only 14.6% of cases were 5 years or under; there were slightly more female cases (53%).

### **Diagnosis of bronchiectasis**

Confirmation of bronchiectasis was carried out by CT scan of the chest in paediatric and adult patients in most patients (>90%) (see Table 2).

	<b>Paediatric</b>	<b>Adult</b>
<b>Chest CT</b>	92.5%	94.5%
<b>Clinical alone</b>	3.6%	1.4%
<b>Chest X-ray alone</b>	1.8%	0.6%
<b>Bronchogram</b>	0%	0.3%
<b>Not known</b>	2.1%	3.2%

Table 2: diagnosis of bronchiectasis

### **Investigations for bronchiectasis**

The BTS Guideline recommends investigations that would alter the management of patients with bronchiectasis.<sup>1</sup> Aetiological investigations were sought more frequently in paediatric compared with adult patients but investigations remain low (see Table 3). There is sub-optimal measurement of immunoglobulins and functional antibodies, tests that can help guide who may benefit from immunoglobulin replacement therapy. There were sub-optimal investigations for ABPA, patients that may benefit from treatment with oral corticosteroids and/or intraconazole therapy. Testing for cystic fibrosis was low – it was indicated in the audit that it was deemed not clinically indicated in 14.6% of the paediatric and 60.8% of adult patients. Testing for primary ciliary dyskinesia was low – it was indicated in the audit that it was deemed not clinically indicated in 8.9% of paediatric and 62.1% of adult cases. In those that were tested, nasal nitric oxide was used in 41.5% of paediatric and 50% of adult cases, and ciliary beat frequency testing and electron microscopy was used in 79.2% of the paediatric and 56.4% of adult cases. Testing for recurrent pulmonary aspiration was low – it was indicated in the audit that it was deemed not clinically indicated in 19.3% and 59.6% of the paediatric and adult audits respectively.

	<b>Paediatric</b>	<b>Adult</b>
<b>IgG, IgA and IgM</b>	80%	75.7%
<b>Protein electrophoresis</b>	40%	61.3%
<b>Functional antibody response</b>	76.8%	40.1%
<b>IgE</b>	67.9%	69.6%
<b>Aspergillus fumigatus RAST or skin prick test for Aspergillus funigatus</b>	31.1%	63.1%
<b>Sweat test analysis</b>	67.1%	4.1%
<b>CF Cytogenetics</b>	23.9%	5.8%
<b>Tests for recurrent pulmonary aspiration</b>	30.7%	3.2%
<b>Tests for primary ciliary dyskinesia</b>	56.8%	2.1%

Table 3: investigations carried out for bronchiectasis

### Co-existing airways disease

Co-existing asthma and COPD were common (see Table 4).

<b>Airways disease</b>	<b>Paediatric</b>	<b>Adult</b>
<b>Asthma- Yes</b>	33.9%	29.8%
<b>Asthma- No</b>	65.7%	69%
<b>Asthma- No data</b>	0.4%	1.3%
<b>COPD- Yes</b>	N/A	23.7%
<b>COPD- No</b>	N/A	74.6%
<b>COPD- No Data</b>	N/A	1.8%

Table 4: co-existing asthma and COPD N/A= not applicable

### Number of exacerbations

Table 5 highlights the number of exacerbations in the last 12 months. Despite being secondary care audits, in both the paediatric and adult audits, about 20% had no exacerbations in the last 12 months and over half the patients had fewer than 3 exacerbations in the last 12 months. In both paediatric and adult patients, about 25% had three or more exacerbations in the last 12 months.

<b>Airways disease</b>	<b>Paediatric</b>	<b>Adult</b>
<b>0</b>	21.4%	20.5%
<b>1-2</b>	42.9%	35.2%
<b>3 or more</b>	28.6%	25.7%
<b>No Data</b>	7.1%	18.6%

Table 5: number of exacerbations in the last 12 months

### Sputum microbiology testing

Despite the importance of microbial stewardship, only about 50% of the paediatric patients and 40% of adults had sputum or appropriate samples sent for microbial culture prior to starting antibiotics for an exacerbation and about 60% being sent for routine microbial culture when stable in the past 12 months (see Table 6).

Sputum microbiology testing	Paediatric	Adult
<b>Exacerbation- yes</b>	53.9%	38%
<b>Exacerbation- no</b>	18.6%	28.2%
<b>Exacerbation- No data</b>	27.5%	33.8%
<b>Stable in last 12m- Yes</b>	61.4%	55.6%
<b>Stable in last 12m- No</b>	20.7%	28.4%
<b>Stable in last 12m-Not applicable</b>	11.1%	7.3%
<b>Stable in last 12m- No Data</b>	6.8%	8.8%

Table 6: sputum microbiology testing

#### ***Ps. aeruginosa, MRSA, enteric Gram-negative organisms or environmental mycobacteria (NTM) isolation 2 or more occasions in the last 12m***

The paediatric population were less infected with *Ps. aeruginosa*, MRSA, enteric Gram-negative organisms (less than 5%) compared with adult patients with bronchiectasis (around 21%) (see Table 7).

Pathogen	Paediatric	Adult
<b>Yes</b>	4.3%	21.4%
<b>No</b>	93.9%	71.8%
<b>No Data</b>	1.8%	6.7%

Table 7: pathogen isolation of *Ps. aeruginosa*, MRSA, enteric Gram-negative organisms or environmental mycobacteria (NTM) isolation 2 or more occasions in the last 12m.

#### **Antibiotics**

The frequency and duration of intravenous antibiotics for exacerbations is shown in Table 8. The duration recommended in BTS Guideline<sup>1</sup> is 14 days.

Intravenous antibiotics	Paediatric	Adult
<b>Yes</b>	30.4%	14%
<b>No</b>	68.2%	82.1%
<b>No Data</b>	1.4%	3.9%
<b>1-7 days</b>	14.3%	31.6%
<b>8-14 days</b>	71.4%	57.4%
<b>&gt;14 days</b>	14.3%	11%

Table 8: frequency and duration of intravenous antibiotics

In paediatric and adult audits, less than 10% were on long term nebulised antibiotics and the agent used most frequently was nebulised Colomycin. In paediatric patients around 59% were on a long term oral antibiotic compared with around 30% in adult patients (Table 9). The most frequently used agent was azithromycin and the majority received continuous antibiotics without a drug free period (in the adult cohort 70.3% had continuous treatment, 17.1% were allowed a drug free period, 4.7% were 'other' and there were no data in 7.9%). In the adult cohort the majority received a single continuous antibiotic (87.3%) as opposed to rotating between different antibiotics.

Long term antibiotics more than 28d	Paediatric	Adult
Nebulised antibiotics	8.2%	9.3%
Commonest nebulised antibiotic- Colomycin	95.7%	84%
Oral antibiotic	59.3%	30%
Commonest oral antibiotic- azithromycin	71.1%	75.6%

Table 9: Long term antibiotics (more than 28 days)

### Chest clearance advice and self-management plans

There was suboptimal assessment by a respiratory physiotherapist and use of self-management plans as recommended by the BTS Guideline<sup>1</sup> (see Table 10). In the adult cohort 36.2% had breathlessness affecting their activities of daily living. Of which, 42.8% attended a pulmonary rehabilitation programme, 35.4% did not and 21.7% were not known. Of those that did not, the patient refused in 21.6% of cases.

	Paediatric	Adult
Seen a respiratory physiotherapist- yes	70.7%	73.8%
Seen a respiratory physiotherapist- no	22.1%	14.1%
Seen a respiratory physiotherapist- no data	7.1%	12.1%
Self-management plan- yes	41.4%	40.9%
Self-management plan- no	23.6%	32.6%
Self-management plan- not known	35%	26.4%

Table 10: Assessment by a respiratory physiotherapist and self-management plans

### Institutional data

Bronchiectasis patients had access to either a flutter®, acapella® or other positive expiratory pressure device in 100% of paediatric and 92.9% of adult institutions. Home nebulised prophylactic antibiotics for suitable patients supervised by a respiratory specialist were available in 84.8% and 93.9% of paediatric and adult institutions respectively. The hospital service could provide home intravenous antibiotic therapy for exacerbations in selected patients in 93.9% and 88.8% of paediatric and adult institutions respectively.

### Comparison with previous audits

There has been little improvement since the audit in 2012. To highlight the lack of change, for example, in 2012 16-68% had tests for allergic bronchopulmonary aspergillosis, common variable immunodeficiency and cystic fibrosis. In the 2012 audit, 78% were assessed by a respiratory physiotherapist for advice on airways clearance techniques and 33% had a self-management plan.

## **Conclusions/Observations**

There has been excellent uptake in the National Bronchiectasis Audit with an increase in number of institutions and number of cases entered.

There is good use of CT scanning for confirmation of the diagnosis of bronchiectasis. The case mix is interesting and the audit has observed significant co-existing disease with both asthma and COPD. Another important feature is that the exacerbation frequency is highly variable, with only about 1 in 4 patients having 3 or more exacerbations per year. This is the threshold we use in practice to consider escalating therapies, including long term antibiotic therapy.

The institutional data was strong and showed good access for positive expiratory pressure devices, home nebulised antibiotics and domiciliary intravenous antibiotic therapy.

There are a number of areas for improvement, but in the first instance the areas we should target include: the assessment of aetiology of bronchiectasis, particularly as the investigations recommended would alter clinical management; increased sputum being sent for microbial testing in the stable state and in exacerbations, again which would directly alter management; increased number of patients being taught airways clearance techniques by a respiratory physiotherapist.

## **References**

1. Pasteur MC, Bilton D, Hill AT on behalf of the British Thoracic Society Bronchiectasis non-CF guideline group. Guideline for non-CF bronchiectasis. *Thorax*. 2010;65 Suppl 1:i1-58. <https://www.brit-thoracic.org.uk/document-library/clinical-information/bronchiectasis/bts-guideline-for-non-cf-bronchiectasis/>
2. Hill AT on behalf of the British Thoracic Society. Quality Standards for clinically significant bronchiectasis in adults. 2012;4(1). <https://www.brit-thoracic.org.uk/document-library/clinical-information/bronchiectasis/bts-quality-standards-for-clinically-significant-bronchiectasis-in-adults/>

26 July 2018

## Clinical Audit Action Plan

<b>Project title</b>	Bronchiectasis Audit Action Plan for Paediatric and Adult Patients		
<b>Action plan lead</b>	Name:	Title:	Contact:

Ensure that the recommendations detailed in the action plan mirror those recorded in the “Recommendations” section of the report. The “Actions required” should specifically state what needs to be done to achieve the recommendation.

<b>Recommendation</b>	<b>Actions required (specify “None”, if none required)</b>	<b>Action by date</b>	<b>Person responsible (Name and grade)</b>	<b>Evidence required to show recommendation has been implemented</b> (Training log, minutes, new documentation)
Over 85% of paediatric and adult patients with bronchiectasis should have the following investigations for allergic bronchopulmonary aspergillosis (ABPA):  Full blood count  Total IgE  IgE to aspergillus or skin prick test to aspergillus  Up to date Chest X-ray or CT chest				
Over 85% of paediatric and adult patients with bronchiectasis should have IgA, IgG, IgM investigations for common variable immunodeficiency.  If IgG, IgA or IgM are raised, over 90% should have protein electrophoresis.				
Over 90% of paediatric and adult patients with bronchiectasis should be taught chest clearance techniques by a specialist respiratory physiotherapist.				
In adult patients with bronchiectasis with chronic sputum production, over 90% should have sputum or an appropriate sample be sent for routine microbiological testing annually whilst clinically stable.				