Trends in bronchiectasis mortality in England and Wales

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KEYWORDS
Bronchiectasis; Mortality; Burden of disease

Summary
Background: To provide information on the burden of bronchiectasis in England and Wales, we have examined trends in mortality using death certificate data available from the Office of National Statistics.

Methods: We extracted data on deaths due to non-cystic fibrosis bronchiectasis for 2001–2007 inclusive and stratified deaths by sex and age group. We used Poisson regression to compare mortality rates.

Results: Between 2001 and 2007, 5745 bronchiectasis related deaths were registered in England and Wales. When standardized to the 2007 population, this showed a rise in absolute numbers from 797 (2001) to 908 (2007). Statistical analyses suggested that the mortality rate is currently increasing at 3%/year (p < 0.001). Mortality rates were similar between men and women but there was a strong statistical interaction between age group and year (p < 0.001) Rates were increasing in the two oldest age groups but falling in the three youngest groups.

Discussion: Currently just under 1000 people die from bronchiectasis each year in England and Wales. We found the number of deaths to be increasing at 3% per year. Although overall mortality was increasing, rates were increasing in older groups but falling in the younger groups.

These mortality rates may underestimate the burden of disease from bronchiectasis as lack of knowledge about the disease may lead to underreporting. These are also mortality rather than incidence data and may reflect improvements in treatment.

Bronchiectasis therefore remains a significant concern. Clinical provision will potentially need to increase in order to care for this patient group.

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Introduction

Bronchiectasis is a common problem in respiratory clinics but historically has received little research interest. With the introduction of better antibiotic therapy, particularly in early life, the disease has traditionally been thought to be in decline.

However, there are no data to support this view and there has previously been little information on the burden of disease or how it is changing. Recently, Kelly MG et al found that 410 patients with bronchiectasis had attended the respiratory clinic in a 6 month period in a department run by 4 respiratory physicians. The 100 randomly chosen studied patients made 321 clinic attendances, with 39 attending on 4 or more occasions.1

Using mortality data is an established method of looking at disease burden and has historically been used in other disease processes. For example, Hubbard et al. used mortality data to look at trends in mortality in cryptogenic fibrosing alveolitis in seven countries in 1996.2

Therefore, in this study we have examined trends in bronchiectasis mortality in England and Wales by gender and by age group using data available from the Office of National Statistics (ONS), in an attempt to quantify some of the burden of disease due to bronchiectasis and determine whether this is changing over time.

Methods

Annual mortality statistics are published by the Office of National Statistics and are freely available. They present mortality statistics on the cause of deaths registered in England and Wales in a given year. Details are collected when a death is certified and then registered and are classified by selected information, which includes age and sex. We extracted data on deaths registered due to non-cystic fibrosis bronchiectasis in England and Wales3–5 for years 2001–2007 inclusive. These dates were chosen because 2001 was the first year in which the ICD 10 (International Classification of Disease) code was used to identify cause of death. In the ICD 10, code J47 identifies bronchiectasis related deaths and excludes deaths due to congenital bronchiectasis. Prior to 2001, the ICD 9 code (494) included all bronchiectasis deaths.

We stratified bronchiectasis related deaths by sex and age group. Age groups used were as follows:0–14; 15–44; 45–64; 65–74; 75 and over. These age groups band together narrower groups used by the ONS so that the data can easily be transferred but a broader age range used. We also recorded the total population for each sex and age group for each year. The data were standardized to the 2007 population. Standardisation uses the age group and sex specific disease rates from each year and applies them to the 2007 population. This tells us the number of deaths that would be expected in each year if the make up of the population in that year was the same as the population in 2007. Therefore this allows us to compare death rates across different years (i.e. looking for a trend), whilst allowing for differences in sex and age structures of the population at different times.

The interpolated mean age of death from bronchiectasis in each year group was also calculated, using the number of deaths in each age group and the mid point of that age range. Using the idea that all patients in that age group died at the age of the mid point of the age range allowed us to calculate an interpolated mean age of death for each year. The upper age limit for the final group is assumed to be 95 as the ONS statistics use the range 95 and over for that group.

For our statistical analyses to compared mortality rates, we used Poisson regression (Stata version 7.0). For these analyses we used the stratum specific deaths as the numerator and stratum specific population for the denominator. Initially we looked at the effects of sex, age and year in a series of univariate analyses, and then fitted a multivariate model with all three variables simultaneously. Finally we looked for evidence of interaction between year and both sex and age group using multiplicative interaction terms.

Results

Between 2001 and 2007, 5745 deaths due to bronchiectasis were registered in England and Wales, rising from 727 deaths in 2001 to 908 deaths in 2007. The male: female ratio was 1: 1.34. The overall mean age of death from bronchiectasis was 74.4 years, which has risen from 72.8 in 2001 to 75.7 in 2007.

When standardized to the 2007 population (to allow for differences in sex and age structures of the population), the number of deaths is 797 in 2001 and 908 in 2007. This represents a total of 1.68 deaths from bronchiectasis per 100,000 population in 2007, which is 0.18% of all deaths. Fig. 1 shows the bronchiectasis mortality rate for each year, when standardized to the 2007 population, as described above, and also the division by sex.

The results of our univariate analyses suggested that the crude death rates from bronchiectasis were higher in females and older people and had increased year on year.
(Table 1). Our statistical analyses suggested that the effect of year was linear and so we also modelled year as a continuous variable and this analysis suggested that the mortality rate from bronchiectasis is currently increasing at the rate of 3% per year (univariate rate ratio 1.03, 95% confidence interval 1.02 to 1.05, \( p < 0.001 \)).

However, the results of the multivariate analyses (allowing for the effects of age and year) show that the mortality rates are actually very similar between men and women, whilst the effects of age group and year were virtually unchanged. The adjusted year on year increase in bronchiectasis mortality rate was again 3% (adjusted rate ratio 1.03, 95% confidence interval 1.02 to 1.04, \( p < 0.001 \)). We found evidence of a strong statistical interaction between age group and year (\( p < 0.001 \)) such that the mortality rates were increasing over time in the two oldest age groups but falling in the three youngest age groups. Figs. 2 and 3 show the standardized mortality by age group in males and females respectively. There was no evidence of interaction between sex and year.

### Discussion

We found that the total number of deaths from bronchiectasis in England and Wales is increasing at a rate of approximately 3% per year to 908 in 2007 (1.68 per 100,000 population). This compares, for example to a mortality rate (2007) in asthma of

![Figure 2](image-url)  
**Figure 2** Male bronchiectasis mortality rate (standardized to 2007 population) with division by age group.

### Table 1 Results of univariate and multivariate analyses.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number of deaths</th>
<th>Total population</th>
<th>Univariate Rate Ratio</th>
<th>95% CI</th>
<th>( P ) value</th>
<th>Mutually adjusted rate ratio</th>
<th>95% CI</th>
<th>( P ) value</th>
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<td></td>
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<td>0.78</td>
<td>0.74 to 0.82</td>
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<td>1.03</td>
<td>0.97 to 1.08</td>
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<td>1.16</td>
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<td>1.20</td>
<td>1.09 to 1.33</td>
<td>&lt;0.001</td>
<td>1.18</td>
<td>1.07 to 1.30</td>
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</table>

Bronchiectasis mortality
3.76 per 100 000 or 3.44 per 100 000 in mesothelioma. Rates are similar between men and women but have risen in older age groups and fallen in younger groups.

Our data show trends in bronchiectasis mortality with time. We have been able to use univariate and multivariate analysis to look at the effects of sex, age and year on all bronchiectasis deaths between 2001 and 2007.

Mortality rates in bronchiectasis may well underestimate the problem. The information is, of course, dependent on the correct reporting of the cause of death and lack of knowledge about bronchiectasis may well lead to underreporting it as the cause of death. Also there may have been some diagnostic transfer to cystic fibrosis, particularly among the younger groups, therefore affecting the mortality rate in these groups. These are also mortality rather than incidence data, and therefore may reflect recent improvement in awareness and treatment of bronchiectasis.

The increase in mortality rate could be ascribed to increased recognition and reporting, or to the ready availability of CT, now commonly used for diagnosis. However, if this were the case, an increase in mortality would be expected in all age groups, which is not the case with our study.

There is little other data showing mortality in bronchiectasis in England and Wales. New Zealand figures published in 1995 (using data obtained from the National Health Statistics Center) suggested a very high rate in the Maori population, with an annual mortality of 10 per 100 000 population in those aged between 35 and 29 years. High rates of hospitalization were also found, with between 30 and 50/100,000 per year being attributable to bronchiectasis. Another New Zealand study found that 307 admissions occurred in a one year period in 152 patients studied. Dupont et al. found a 1 year mortality of 40% in patients with bronchiectasis following an ICU stay. Age >65 and prior use of Long Term Oxygen Therapy were associated with reduced survival. A Finnish study found prognosis in bronchiectasis to be better than for COPD in matched patients, but worse than for asthma. A recent European study showed 4 year survival of 58% in a prospective study of 98 outpatients with bronchiectasis. Another UK study found mortality from bronchiectasis to be 68% at 12 years. Factors independently associated with mortality were age, St George’s Respiratory Questionnaire activity score, infection with Pseudomonas aeruginosa, Total Lung Capacity (TLC), Residual volume/TLC and transfer factor coefficient.

Our study suggests that contrary to traditional views, bronchiectasis is still a significant problem, with increasing, rather than decreasing mortality. Whilst the increase is in older age groups, and may eventually start to decrease with time, for the moment it is still of significant concern and clinical provision for patients with bronchiectasis will need to continue and potentially increase.

Conflict of interest

All authors declare that there is no financial, personal, academic or intellectual conflict of interest. The study received no sponsorship.

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References


