

A retrospective audit of polypharmacy and medication regimen complexity and their association with exacerbations in patients with bronchiectasis

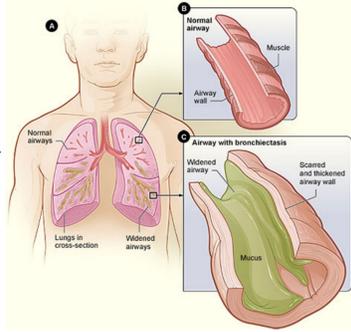


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Background

- Bronchiectasis is a chronic and progressive condition in which the airways become permanently dilated.¹
- Pulmonary exacerbations are common in patients with bronchiectasis and can have a considerable impact on quality-of-life and disease progression.
- Polypharmacy and highly complex medication regimens contribute to the treatment burden experienced by patients with chronic conditions.²



Aim

This study aimed to determine the extent of polypharmacy and medication regimen complexity in a sample of patients with bronchiectasis, and to explore associations between polypharmacy and exacerbations.

Method

This study was a retrospective audit of the **number** and **complexity** of medicines prescribed for a sample population of patients with bronchiectasis at Belfast City Hospital (BCH).

Sample population

- Consecutive sampling was used to select a target sample size of approximately 100 patients from the bimonthly bronchiectasis clinic at BCH.
- **Inclusion criteria:** Patients aged 18 years or older and who had been diagnosed with bronchiectasis by computed tomography (CT) or high resolution CT (HRCT) were included in the audit.
- **Exclusion criteria:** Patients who did not have a record of a CT- or HRCT-confirmed diagnosis of bronchiectasis and patients with cystic fibrosis were excluded from the audit.

Data collection

- Demographic (age, gender, comorbidities) and disease-related data (aetiology, FEV₁, sputum microbiology) were extracted from patients' Electronic Care Records (ECRs), together with information about all medicines prescribed in primary care (i.e., GP repeat medication lists).
- Patients' medication counts were used to identify whether or not three different thresholds for polypharmacy had been exceeded. These thresholds were 'four or more medicines', '10 or more medicines' and '15 or more medicines'.
- Medication Regimen Complexity Index (MRCI) scores were calculated using a validated scoring system.³
- ECRs contain information about all medicines prescribed acutely (within the past six months). The number of courses of oral antibiotics prescribed for respiratory infections in the past six months was used as a proxy measure for exacerbations experienced during that time.

Data analysis

- Categorical data were summarised as numbers and proportions. Mean and standard deviation (SD) for normally distributed data, and median and IQR (interquartile range) for non-normally distributed data were used to summarise continuous data.
- Comparisons between patients below and exceeding the three polypharmacy thresholds, in terms of the number of exacerbations, were made using a Mann Whitney U-test (significance level $p < 0.05$).
- Effect sizes were calculated to determine the magnitude of any significant differences.
- The correlation between exacerbations and MRCI was investigated using Spearman rank-order correlation coefficient (Spearman's correlation, r_s) for non-normally distributed data.

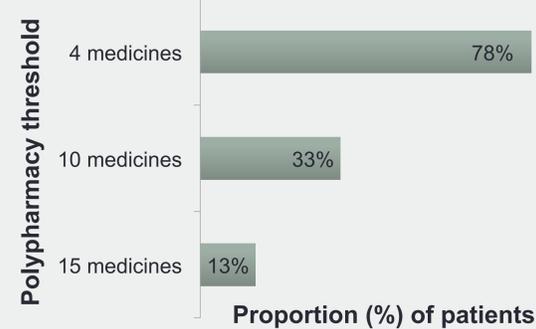
References

1. Murray MP, Hill AT. Non-cystic fibrosis bronchiectasis. *Clin Med* 2009;9:164–9.
2. Sav A, King MA, Whitty JA, Kendall E, McMillan SS, Kelly F, Hunter B, Wheeler AJ. Burden of treatment for chronic illness: a concept analysis and review of the literature. *Health Expectations* 2013;18:312–324.
3. George J, Phun Y, Bailey MJ, Kong DCM, Stewart K. Development and validation of the medication regimen complexity index. *Ann Pharmacother* 2004;38:1369–76.

Results

- Between 17th June 2016 and 4th October 2016 there were a total of 139 appointments attended by 128 different patients at the BCH bimonthly bronchiectasis clinic.
- Of the 95 eligible patients sampled, 68.4% were female (n=65). Mean age was 62.6 (SD 14.8) years. Median number of comorbidities was 2 (IQR 0–2).
- For most patients (n=78; 82.1%), the aetiology of bronchiectasis was either unknown or not documented.
- Mean FEV₁ (% predicted) for patients in whom a measurement was recorded (n=53) was 80.9% (SD 53.85).
- Sputum samples from 17 (17.9%) patients tested positive for the bacteria *Pseudomonas aeruginosa*.

Polypharmacy



Most patients (78%) were prescribed four or more medicines, whereas only 13% exceeded the "15 or more medicines" threshold (see Figure 1, left).

Figure 1 Proportion of patients above the three polypharmacy thresholds investigated (four, 10 and 15 medicines)

Medication regimen complexity

- Total MRCI scores ranged from 0 to 68.5 and the median MRCI score was 26 (IQR 13.3–36.1).

Exacerbations

- Most patients (n = 57; 60%) experienced at least one exacerbation in the past six months.
- There was a median of one exacerbation per patient (IQR 0–2).

Association between polypharmacy and exacerbations

- Patients who were prescribed four or more medicines had **more exacerbations** compared with patients prescribed less than four medicines.
- Patients who were prescribed 10 or more medicines had **more exacerbations** compared with patients prescribed less than 10 medicines.
- There was **no difference in exacerbations** above and below the 15 or more medicines threshold (See Table 1, below).

Table 1 Comparison of exacerbations above and below the three polypharmacy thresholds investigated (four, 10 and 15 medicines)

Polypharmacy threshold	Effect size	Significance
≥4 medicines	0.36	0.000
≥10 medicines	0.24	0.019
≥15 medicines	0.07	0.494

Association between medication regimen complexity and exacerbations

- There was a significant positive correlation between MRCI and exacerbations (Spearman's correlation, $r_s = 0.318$; $p = 0.003$).
- As per reference standards, this finding suggests there is a **moderate correlation** between MRCI and exacerbations.

Discussion

- Patients experience more exacerbations, when four or more medicines i.e., polypharmacy are prescribed for patients with bronchiectasis.
- Management of bronchiectasis should consider the burden of treatment when reviewing outcomes, particularly frequency of exacerbations.
- A limitation of this study was the restriction in the information available on antibiotics prescribed in primary care; indications for antibiotics were rarely specified on prescriptions and only six months' data was available.