Multidimensional assessment of older people with asthma and COPD: clinical management and health status

Vanessa M. McDonald1,2,3, Jodie L. Simpson1,3, Isabel Higgins2, Peter G. Gibson1,3

1School of Medicine and Public Health and 2School of Nursing and Midwifery, The University of Newcastle, Newcastle, NSW, Australia
3Department of Respiratory and Sleep Medicine, John Hunter Hospital, Locked Bag 1 HRMC, Newcastle 2310, Australia

Address of the correspondence to: V. M. McDonald. Tel: (+61) 249213926; Fax: (+61) 249213469. Email: vanessa.mcdonald@hnehealth.nsw.gov.au

Abstract

Background: the diagnosis and management of obstructive airway diseases (OADs) such as asthma and chronic obstructive pulmonary disease (COPD) can be challenging in older people.

Objective: to assess the clinical, functional, biological and behavioural characteristics relevant to the management of older people with OAD.

Methods: a cross-sectional study was conducted in a tertiary teaching hospital. Older people (>55 years) (n = 100) with an OAD underwent a multidimensional assessment (MDA) involving questionnaires, clinical assessments, physiological measurements and biomarkers.

Results: the assessment identified a mean (SD) of 11.3 (2.5) clinical management issues and 3.1 (1.8) comorbid conditions per participant. Common problems were: airways hyper-responsiveness (80%); airway inflammation (74%); activity limitation (74%) and systemic inflammation (60.5%). The number and type of issues were similar irrespective of a diagnosis of asthma or COPD (P = 0.2). The degree of health status impairment correlated significantly with the number of clinical management issues detected (r = 0.59; P < 0.0001).

Conclusions: older people with OAD experience multiple clinical issues that adversely impact their health status. The number and type are similar irrespective of diagnosis. This MDA identifies significant clinical issues that may not be addressed in a diagnosis centred approach suggesting that a multidisciplinary approach is necessary when assessing and managing older people with OAD.

Keywords: asthma, COPD, ageing, health status, elderly

Introduction

Chronic obstructive pulmonary disease (COPD) and asthma are common and associated with an increasing disease burden [1, 2]. They are generally considered distinct conditions, yet in practice they co occur in more than 50% of older patients [3]. Both diseases are also associated with heterogeneity in terms of their clinical, functional and biological outcomes. [4] This heterogeneity may not be sufficiently addressed in current management guidelines, leading to calls to review the classification, diagnosis and assessment of these conditions [5, 6].

Phenotypic heterogeneity and disease overlap make the diagnosis and management of these obstructive airway diseases (OADs), particularly challenging in older people, as does age-related decline in forced expiratory volume in 1 second (FEV1) [7] and the increased risk of co-morbidities associated with chronic systemic inflammation [8, 9]. Most people aged over 65 have at least three chronic conditions [8] that are often unrecognised and untreated. Furthermore, the needs of older people usually require multidisciplinary interventions [10].

Although there is increasing recognition of the difficulties associated with the care of OADs in older people [10,
Materials and methods

Study participants
Older adults with stable OAD were consecutively recruited from the John Hunter Hospital respiratory clinics. The inclusion criteria were airflow obstruction defined by a prebronchodilator forced expiratory ratio (FER) <0.7 and FEV₁ <80% of predicted and age ≥55 years. All participants must have had a prior diagnosis of an OAD either asthma, COPD or an overlapping pattern. Study visits were postponed for at least 4 weeks if participants required antibiotics or oral corticosteroids for an acute exacerbation of their airway disease within the previous 4 weeks or if they were experiencing a current acute illness. All participants had satisfactory written and verbal English language skills. Ethical approval was obtained from the Hunter New England Human Research Ethics Committee and the University of Newcastle Research Ethics Committee. Participants signed an informed consent.

We invited 136 people to participate in the study. One hundred and one participants consented to take part and 100 completed the evaluation, giving consent and a participation rate of 74%. There was one withdrawal due to an exacerbation.

Study design
Participants attended the research unit for three visits to undergo a MDA (Table 1).

Method

Multidimensional assessment
Through a review of clinical practice guidelines [1, 2] and consultation with experts, an MDA and checklist (Table 1) was developed. Each measurement was used to identify relevant clinical management issues. The domains needed to reflect an aspect of clinical management that was relevant to OAD, needed to have the capacity for change and must have been measurable using validated criteria.

Questionnaires
Questionnaires were used to assess anxiety, depression [12], exacerbation management, dysfunctional breathing [13], adherence and dyspnoea [14] (Table 1). We also asked each participant: ‘What is/are the biggest problem/s you experience as a result of your breathing condition?’

Health status was measured using the St George’s Respiratory Questionnaire (SGRQ) [15] and the SF-36. The SGRQ is a self-administered disease-specific health-related quality-of-life (HRQoL) measure, with scores ranging from zero (indicating no impairment) to 100 [15]. The SF-36 is a generic quality-of-life instrument that has two summary measures: the Physical Component Summary (PCS) and the Mental Component Summary (MCS) [16]. Scores range from zero, indicating worse possible impairment, to 100.

Co-morbidities were assessed using a medical history tool examining 14 different body systems. The Charlson Co-morbidity Index (CCI) was calculated using the information collected in the medical history [17].

Clinical assessments

Airflow obstruction and airway hyper-responsiveness (AHR). Spirometry (KoKo K313100 PDS Instrumentation, Louisville, CO, USA) measured pre and postbronchodilator FEV₁, forced vital capacity (FVC) and FER [18]. AHR was assessed using a hypertonic saline (4.5%) bronchial provocation challenge [19] in participants with an FEV₁ > 1.3 l.

Inhalation device competency. Inhaler device technique was assessed through a direct observation by an accredited research officer. Techniques were scored adequate or inadequate using an inhaler device score sheet [20]. Inhaler device polypharmacy (IDP) is the use of multiple different inhaler devices and was assessed by patient report and direct observation [21].

Smoking. Smoking was assessed by self-report and confirmed using an objective measure of exhaled carbon monoxide (piCO Smokerlyzer, Bedfont Scientific Ltd, Kent, UK) and used to classify participants as current, ex or never smokers.

Exercise tolerance. Six-minute walk tests (6MWTs) were performed [22] using a 25 m walk track with two attempts conducted on the same day, at least 30 min apart. Oxygen was used during the test in those prescribed domiciliary oxygen therapy and SpO₂ was recorded at rest and during exercise.

Biomarkers
Airway inflammation was assessed by induced sputum [19]. Hypertonic saline sputum induction was not performed if the participants had FEV₁ < 1.0 l, and where the FEV₁ was <1.3 l, 0.9% saline was administered for the sputum induction. Sputum quantitative and qualitative bacteriology was performed to detect potential respiratory pathogens using induced sputum [23]. Peripheral venous blood was
### Table 1. MDA for the detection of clinical management issues in OAD

<table>
<thead>
<tr>
<th>Clinical management issue</th>
<th>Assessment tool</th>
<th>Guiding principle for identification</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity limitation</td>
<td>Self-report</td>
<td>Defined as self-reported impairment to people lives due to their inability to achieve their activity goals</td>
<td>73 (73.7)</td>
</tr>
<tr>
<td>Airflow obstruction</td>
<td>Spirometry</td>
<td>FEV&lt;sub&gt;1&lt;/sub&gt;/FVC ratio &lt;70%</td>
<td>100 (100)</td>
</tr>
<tr>
<td>AHR</td>
<td>Hypertonic saline bronchial provocation challenge</td>
<td>PD&lt;sub&gt;15&lt;/sub&gt; &lt; 15 ml</td>
<td>52 (80%)</td>
</tr>
<tr>
<td>Airway inflammation and pattern</td>
<td>Induced sputum cell counts</td>
<td>Neutrophils &gt; 61% [29]</td>
<td>35 (39.3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eosinophils &gt; 3%</td>
<td>16 (18)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Paucigranulocytic = neutrophils &lt;61% and eosinophils &lt;3%</td>
<td>23 (25.8)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mixed = neutrophils &gt;61% and eosinophils &gt;3%</td>
<td>14 (16.9)</td>
</tr>
<tr>
<td>Anaemia</td>
<td>Full blood count: haemoglobin</td>
<td>Haemoglobin &lt;115 g/l</td>
<td>9 (12)</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Hospital Anxiety and Depression Scale (HADS) [12]</td>
<td>Anxiety domain score ≥8</td>
<td>36 (36)</td>
</tr>
<tr>
<td>Cardiac dysfunction</td>
<td>NT-pro-BNP</td>
<td>&gt;1000 fmol/ml</td>
<td>11 (13.6)</td>
</tr>
<tr>
<td>Co-morbidity</td>
<td>Medical history tool assessing 14 body systems. The researcher asked each participant if they had any medical conditions relating to each system</td>
<td></td>
<td>3.1 (1.8) per participant</td>
</tr>
<tr>
<td>Depression</td>
<td>HADS [12]</td>
<td>Depression domain score ≥8</td>
<td>26 (26)</td>
</tr>
<tr>
<td>Dysfunctional breathing</td>
<td>Nijmegen questionnaire [13]</td>
<td>Total score ≥23</td>
<td>29 (29)</td>
</tr>
<tr>
<td>Dyspnoea</td>
<td>MMRC dyspnoea scale [14]</td>
<td>Score ≥2</td>
<td>55 (55)</td>
</tr>
<tr>
<td>Exacerbation</td>
<td>Self-report: participants were also asked if they possessed a written action plan (WAP) and whether they used their prescribed plan</td>
<td>When participants did not possess a WAP or did not use the prescribed treatment plans during exacerbations</td>
<td>89 (89)</td>
</tr>
<tr>
<td>Exercise intolerance</td>
<td>6MWT</td>
<td>A distance of less than 350 m</td>
<td>24 (24)</td>
</tr>
<tr>
<td>Frequent chest infection</td>
<td>Self-report: participants were asked how many times in the last 12 months they required a course of antibiotics for an exacerbation of their chest disease</td>
<td>Two or more antibiotic courses in 12 months</td>
<td>45 (46.8)</td>
</tr>
<tr>
<td>Frequent oral corticosteroids (OCS)</td>
<td>Self-report: participants were asked about how many chest exacerbations they experienced and how many courses of OCS prescribed in the previous 12 months</td>
<td>Two or more OCS courses in 12 months</td>
<td>23 (23)</td>
</tr>
<tr>
<td>IDP</td>
<td>Medication review</td>
<td>Prescription of three or more different inhaler devices</td>
<td>50 (50)</td>
</tr>
<tr>
<td>Inhaler device technique</td>
<td>Direct observation and standardised assessment [20]</td>
<td>Technique rated as inadequate</td>
<td>48 (48.5)</td>
</tr>
<tr>
<td>Oxygen desaturation</td>
<td>Resting and exertional SpO₂</td>
<td>SpO₂ &lt; 90% either at rest or during 6MWT</td>
<td>46 (46)</td>
</tr>
<tr>
<td>Mucus hypersecretion</td>
<td>Questionnaire [1]</td>
<td>A volume ≥25 ml of mucus produced every day in the last week in the absence of an infection</td>
<td>35 (35)</td>
</tr>
<tr>
<td>Non-adherence</td>
<td>Self-report by a series of open-ended questions while having the interviewer normalise non-adherence in an effort to gain a true account of treatment</td>
<td>Reported use of &lt;80% of prescribed treatment</td>
<td>20 (20)</td>
</tr>
<tr>
<td>Nutrition</td>
<td>BMI</td>
<td>BMI &lt; 20 kg/m²</td>
<td>6 (6)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BMI between 25 and 30 kg/m²</td>
<td>33 (33)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BMI &gt; 30 kg/m²</td>
<td>42 (42)</td>
</tr>
<tr>
<td>Pathogen colonisation</td>
<td>Sputum culture</td>
<td>Presence of a recognised bacterial pathogen</td>
<td>23 (25)</td>
</tr>
<tr>
<td>Smoking</td>
<td>Self-report and exhaled carbon monoxide (CO)</td>
<td>Admit to smoking and exhaled CO≥10 ppm or deny smoking and show exhaled carbon monoxide ≥10 ppm</td>
<td>6 (6)</td>
</tr>
<tr>
<td>Systemic inflammation</td>
<td>Hs-CRP</td>
<td>&gt;3 mg/l</td>
<td>49 (60.5)</td>
</tr>
</tbody>
</table>
collected for full blood count and high-sensitivity C-reactive protein (hs-CRP) was assessed using a commercial enzyme immunoassay (MP Biomedical, Seven Hills, NSW, Australia). N-terminal Pro-B-type natriuretic peptide (NT-Pro-BNP) was used as a screening biomarker for cardiac dysfunction and assayed in serum using a commercial enzyme immunoassay (Biomedica Medizinprodukte GmbH & Co KG, Wien, Austria).

Analysis

Data were analysed using the STATA 9 (Stata Corporation, College Station, TX, USA) software. Normally distributed data are expressed as mean (SD) and skewed data as median values (interquartile range). Analysis was performed using paired t-test for comparisons of normal distribution and one-way ANOVA or the Kruskal–Wallis test for more than two groups with Bonferroni’s correction. Fisher’s exact test was used to analyse categorical data. Associations were determined using Pearson’s correlation coefficient and simple linear regression. A P-value of less than 0.05 was considered statistically significant.

Results

We evaluated 100 participants aged 55–87 with a mean (SD) age of 69.5 (7.5) years and a mean (SD) FEV1 of 51.8% (18.4) of predicted (Table 2). The MDA (Table 1) identified a mean (SD) of 11.3 (2.5) existing and current disease management issues. Participants had a mean (SD) of 3.13 (1.79) current and significant co-morbidities. The mean (SD) CCI score for the whole group was 3.98 (1.13), and this ranged from 2 to 7. There was no difference in CCI score between the COPD and asthma group (P = 0.11) or the asthma and OAD overlap (P = 0.99) groups.

Table 2. Participant characteristics, clinical assessments and biomarkers by diagnosis

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Asthma</th>
<th>COPD</th>
<th>Asthma, COPD, overlap</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>100</td>
<td>23</td>
<td>40</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Age in years, mean (SD), range</td>
<td>69.5 (7.96), 55–87</td>
<td>66.8 (6.3)</td>
<td>72.8 (6.7)</td>
<td>67.5 (7.9)</td>
<td>Asthma versus COPD, P = 0.06; COPD versus overlap, P = 0.05; asthma versus overlap, P = 1</td>
</tr>
<tr>
<td>Sex, M/F</td>
<td>58</td>
<td>42</td>
<td>7</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>FEV1 % predicted, mean (SD)</td>
<td>51.8 (18.4)</td>
<td>59 (14.1)</td>
<td>45.8 (19.2)</td>
<td>53.8 (18.1)</td>
<td>Asthma versus COPD, P = 0.01; COPD versus overlap, P = 0.1; asthma versus overlap, P = 0.8</td>
</tr>
<tr>
<td>FEV1/VC%, mean (SD)</td>
<td>55.2 (12.7)</td>
<td>61.7 (7.6)</td>
<td>50.7 (12.9)</td>
<td>55.9 (13.2)</td>
<td>Asthma versus COPD, P = 0.002; COPD versus overlap, P = 0.1; asthma versus overlap, P = 0.2</td>
</tr>
<tr>
<td>Smokers: never</td>
<td>ex and current</td>
<td>33</td>
<td>67</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>Smoking pack years, median (IQR)</td>
<td>33.7 (17–51)</td>
<td>1.25 (0.15–10.5)</td>
<td>41.5 (227–70)</td>
<td>32 (19.5–40.5)</td>
<td>Asthma versus COPD, P = 0.03; COPD versus overlap, P = 0.03; asthma versus overlap, P &gt; 0.5</td>
</tr>
<tr>
<td>HRQoL SGRQ, mean (SD)</td>
<td>43.6 (18.5)</td>
<td>32.8 (17.1)</td>
<td>48.3 (18.5)</td>
<td>45.5 (16.7)</td>
<td>Asthma versus COPD, P = 0.003; COPD versus overlap, P = 0.03; asthma versus overlap, P = 0.5</td>
</tr>
<tr>
<td>BMI, mean (SD)</td>
<td>28.9 (6.6)</td>
<td>31.6 (5.9)</td>
<td>28.3 (7.4)</td>
<td>27.8 (5.6)</td>
<td>Asthma versus COPD, P &gt; 0.05; COPD versus overlap, P = 0.03; asthma versus overlap, P = 0.5</td>
</tr>
<tr>
<td>6 min walk distance, mean (SD)</td>
<td>413.8 (111.9)</td>
<td>447 (95.3)</td>
<td>371.8 (115.5)</td>
<td>435.6 (107)</td>
<td>Asthma versus COPD, P = 0.03; COPD versus overlap, P = 0.03; asthma versus overlap, P = 0.5</td>
</tr>
<tr>
<td>Hs-CRP (mg/ml), median (IQR)</td>
<td>4.8 (2.1–10.6)</td>
<td>3.1 (1.5–6.9)</td>
<td>4.1 (0.85–12.2)</td>
<td>8.6 (2.3–12.4)</td>
<td>P = 0.17</td>
</tr>
<tr>
<td>NT-pro-BNP, median (IQR)</td>
<td>49 (60.5)</td>
<td>10/20 (50)</td>
<td>19/31 (61)</td>
<td>20/30 (66.6)</td>
<td>P = 0.5</td>
</tr>
<tr>
<td>Interleukin 6 pg/ml, median (IQR)</td>
<td>756.0 (590.9–740.9)</td>
<td>584.2 (504.9–941.7)</td>
<td>554.3 (440.3–655.1)</td>
<td>595.6 (429.4–803.2)</td>
<td>P = 0.2</td>
</tr>
<tr>
<td>Sputum eosinophils, median (IQR)</td>
<td>2.58 (1.5–4.8)</td>
<td>2.0 (1.1–3.79)</td>
<td>3.2 (1.9–4.9)</td>
<td>2.5 (1.4–5.1)</td>
<td>P = 0.09</td>
</tr>
<tr>
<td>Sputum neutrophils, median (IQR)</td>
<td>1.25 (0.5–3.3)</td>
<td>2 (0.75–5)</td>
<td>1.25 (0.5–2.75)</td>
<td>1.25 (0.25–5.5)</td>
<td>P = 0.4</td>
</tr>
<tr>
<td>Sputum neutrophils, median (IQR)</td>
<td>65 (44.7–83.3)</td>
<td>56 (32.5–79.2)</td>
<td>66.2 (49.7–80.2)</td>
<td>77 (45.5–88.25)</td>
<td>P = 0.2</td>
</tr>
</tbody>
</table>
The treating doctor’s diagnosis was asthma in 23% of participants and COPD in 40%. The remaining 37% were diagnosed with an overlap OAD pattern.

The most common disease management issues that were identified were: AHR (80%); airway inflammation (74%), activity limitation (74%), systemic inflammation (60.5%), dyspnoea (55%), IDP (50%), inadequate inhaler technique (48.5%) and hypoxemia during exercise (46%). Obesity was found in 42% of participants and another 33% were classified as overweight but not obese. Only 6% were underweight. Of all participants, 58% stated they had a written action plan; however, only 11% reported the use of their prescribed plan (Table 1).

Health status was impaired. The mean (SD) overall SGRQ score was 44.0 (18.1). The domain showing the greatest impairment was activity 60.32 (22.14) followed by symptoms 48.9 (22.9) and impact 33.1 (19.1). The mean (SD) SF-36 PCS and the SF-36 MCS scores were 48.5 (11.3) and 36 (10.6), respectively. The degree of health status impairment correlated significantly and positively with the number of clinical management problems. For the total SGRQ and the number of problems, Pearson’s $r = 0.59; P < 0.0001$ (Figure 1). Similarly, the SF-36 PCS ($r = -0.44; P < 0.0001$) and MCS ($r = -0.34; P = 0.0014$) correlated significantly with the number of problems (Figure 1). Regression modelling identified that the number of identified clinical problems accounted for 35% of the disease-specific HRQoL impairment in this group and that each additional problem was associated with a clinically significant 4.2 unit decrement in SGRQ ($P < 0.0001$). The number of clinical management issues also significantly correlated with FEV$_1$ ($r = -0.30; P = 0.002$). The age of the participant did not correlate with either HRQoL ($r = 0.1554; P = 0.12$) or the number of problems ($r = 0.0008; P = 0.99$).

The asthma group had better lung function ($P = 0.01$), 6 min walk distance ($P = 0.03$) and quality of life ($P < 0.0003$) than the COPD group (Table 2). No differences in these measures were seen when overlap was compared with asthma or COPD. Airway and systemic inflammatory biomarkers and the number of clinical management issues were similar across all three phenotypes (Table 2). A mean (SD) of 10.3 (1.9) clinical management issues were identified in the asthma group and 11.3 (2.8) and 11.8 (2.6) issues were identified in the COPD and overlap groups respectively. Only three issues showed a statistically significant difference when compared this way. Hypoxia ($P = 0.001$) and pathogen colonisation ($P = 0.001$) were both more prevalent in the COPD phenotype compared with asthma but not different when COPD or asthma alone were compared with overlap OAD. Written action plans were more common in asthma than COPD ($P = 0.001$) or overlap OAD ($P = 0.004$).

Airway inflammation was present in 66 (74%) of participants. The subtypes of airway inflammation were neutrophilic 35 (39%), paucigranulocytic 23 (26%), eosinophilic 16 (18%) and a mixed pattern of eosinophilic and neutrophilic inflammation 15 (17%). The presence of airway inflammation was not related to the diagnosis phenotype ($P = 0.5$) nor was the airway inflammatory subtype ($P = 0.23$). Similarly, systemic inflammation was present in 49 (60.5%) participants and this was not associated with diagnosis ($P = 0.5$).

Participants were asked: ‘What do you see as your biggest problem as a result of your breathing condition?’ The most frequent responses were activity limitation (74%), social limitation (23%), breathlessness (17%), cough (10%), frequent exacerbations (5%), sexual activity (6%) and fear (4%).

**Discussion**

Older people with OAD who undergo an MDA have multiple clinical management issues that adversely affect their quality of life. These issues are similar irrespective of their
poor inhaler technique. Several recent reviews have recommended the need for a global MDA of COPD [9–11] and asthma in older people. [24] Our study is one of few that have comprehensively applied an MDA of clinical, functional, biological and behavioural self-management measures to a large representative sample of older patients with asthma and COPD. We found the most common management issues were activity limitation, airway inflammation, AHR, systemic inflammation and deficits in the area of self-management skills.

Poor HRQoL has previously been related to acute exacerbations and hospital admission, co-morbidity, gender, airflow limitation and the use of oxygen therapy [25, 26].

We found a positive relationship between HRQoL and the number of clinical management issues, and for each additional issue that was identified, there was a clinically significant decrement in HRQoL. Additionally, our study shows that poor self-management skills, systemic consequences, symptoms and participant-reported problems also contribute to the reduction in HRQoL and that these can have a cumulative effect. Many of these problems can be improved, suggesting that a comprehensive and multidisciplinary approach is necessary for identifying the needs of older people with OAD and this may have a positive effect on HRQoL. This approach is necessary to overcome some of the limitations of single interventions, such as written action plans, that alone have a limited effect, but can be an important part of a combined self-management programme.

MDA strategies have been developed and tailored to older populations with other diseases and shown to be a cost-effective approach to improving health status [27]. The most effective way to implement the MDA and related intervention programme warrants consideration. Many of the assessment items are covered in COPD guidelines, but older patients with asthma or overlap syndrome who have the same problem profile are not covered by these recommendations. Asthma and COPD guidelines could be modified to cater specifically for older adults with OAD. Since the assessments require a structured approach to data collection, a case management approach could be adopted. This has proven beneficial in COPD, [28] but has yet to be evaluated in older adults with asthma or overlap syndrome.

The MDA described in this paper extends other COPD assessment procedures to include the assessment of airway and systemic inflammation, as well as patient-centred outcomes. Together, these considerations indicate a rich opportunity to refocus efforts to multidimensional nature of OAD in older adults and to redesign management programmes to address these issues consistently and effectively.

Activity limitation was common, and we identified that the known contributing conditions were also prevalent, i.e. airflow obstruction, systemic inflammation and left ventricular dysfunction [30]. In addition, we identified other factors that could contribute to activity limitation such as dysfunctional breathing, AHR and inadequate bronchoprotection from poor inhaler technique.

Airway inflammation and systemic inflammation were also common, and the inflammatory phenotypes observed by Simpson et al. [30] in asthma were observed to occur in COPD and overlap OAD as well.

Some elements of the MDA warrant further consideration. Although sputum induction is a useful technique to assess airway inflammation, and this study suggests that it is safe in this age group, more assessment is needed regarding its tolerability and utility in older patients with OADs. BNP can screen but not diagnose cardiac dysfunction, and patients with a highly elevated BNP require additional examination. The subjects we studied were older adults referred by general practitioners (GPs) to specialist clinics for further assessment. While they are likely to represent a more severe or problematic group of patients, they identify an important target group, namely those older patients with OAD for whom the GP is not certain what to do next. The MDA approach described in this paper identifies that many potentially treatable management issues can be identified using a structured assessment approach, and these appear to be clinically important because of their relationship with QoL.

In summary, MDA can establish the prevalence of clinical management issues experienced by older people with asthma and COPD. We found that older people with asthma, COPD and overlap OAD experience multiple clinical problems that adversely impact their quality of life. Since many of these issues can be improved, there is a need to identify and effectively manage this array of problems in clinical practice.

Key points

- Older people with asthma and COPD experience multiple clinical management problems.
- These problems may not be addressed using the current management guidelines.
- The clinical management issues experienced by older people are similar irrespective of a diagnosis of asthma or COPD.
- Management of older people with these conditions requires MDA.

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Conflicts of interest

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V. M. McDonald et al.

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Nicole L. Baker1, Michael N. Cook1, H. Michael Arrighi2, Roger Bullock3

1Wyeth, a Pfizer Company—Epidemiology, Collegeville, PA, USA
2JANSSEN Alzheimer Immunotherapy Research & Development, LLC—Epidemiology, South San Francisco, CA, USA
3Kingshill Research Centre, Victoria Centre, Swindon, UK

Address correspondence to: Nicole L. Baker. Email: nicole.l.baker@pfizer.com

Abstract

Background: Hip fractures result in a significant burden to the patient, their caregivers and the health care system. Patients with Alzheimer’s disease (AD) have a higher incidence of hip fracture compared with other older people without AD, although it is not clear if AD is an independent risk factor for hip fracture.

Methods: A retrospective cohort study was conducted using anonymised electronic medical records from primary care practices in the United Kingdom. Proportional hazards regression modelling with adjustment for potential confounders was used to evaluate AD as an independent risk factor for predicting hip fractures.

Results: The incidence of hip fracture among patients with and without AD was 17.4 (95% CI, 15.7–19.2) and 6.6 (95% CI, 5.8–7.6) per 1,000 person years, respectively. Patients with AD had a hazard that was 3.2 (95% CI, 2.4–4.2) times that of non-AD patients after controlling for potential confounders. AD patients who experienced a hip fracture also had an increased mortality rate compared with non-AD patients who experienced a hip fracture (hazard ratio = 1.5; 95% CI, 1.1–1.9).

Conclusion: Patients with AD and their caregivers should be advised on how to prevent hip fractures and more attention should be given to AD patients who are undergoing rehabilitation following a hip fracture.

Keywords: Hip fracture, Alzheimer’s disease, epidemiology, elderly

Introduction

Alzheimer’s disease (AD) is a neurodegenerative disorder characterised by a progressive loss of memory and cognitive function, often accompanied by neuropsychiatric symptoms. Because of the insidious, progressive nature of AD, patients typically require assistance for many years, often beginning in the community with family members and/or formal caregivers (e.g. social services) and ending up in residential care.

Hip fractures are also a major cause of disability among older people and result in significant clinical and economic burden and loss of life. Hip fractures account for 20% of orthopaedic bed occupancies in the United Kingdom [1] and the total cost of hip fractures to society is estimated to be £726 million per annum (2000 estimates) [2].