Intervention

Educational intervention for older people with asthma: A randomised controlled trial

Dianne Goeman a,b,* , Christine Jenkins c , Melanie Crane c , Eldho Paul d , Jo Douglass e,f

a RDNS Institute, Royal District Nursing Service, St Kilda, Australia
b Central Clinical School, Monash University, Melbourne, Australia
c Airways Group, Woolcock Institute of Medical Research, Glebe, Australia
d Department of Epidemiology and Preventive Medicine, School of Public Health and Preventive Medicine, Monash University, Melbourne, Australia
e Department of Clinical Immunology and Allergy, The Royal Melbourne Hospital, Parkville 3050, Australia
f The University of Melbourne, Parkville, Australia

ARTICLE INFO

Article history:
Received 5 January 2013
Received in revised form 15 July 2013
Accepted 11 August 2013

Keywords:
Asthma education
Older people
RCT
Adherence
Person-centred care

ABSTRACT

Objectives: To improve the asthma control and adherence to asthma preventer medication of older people using the Patient Asthma Concerns Tool (PACT) to identify and address unmet needs and patient concerns.

Methods: Community dwelling adults over 55 years, living in Victoria or New South Wales were recruited into a single-blind, parallel design, randomised-controlled trial comparing person-centred education including device technique, versus written information-only education. Fifty-eight participants randomised to the intervention group and 56 to the control completed participation. Outcome measures: asthma control, adherence to preventer medication, asthma related quality of life, asthma exacerbations and written action plan ownership were assessed at baseline, and 3 and 12 months post intervention.

Results: Intervention participants experienced improvements in asthma control, adherence to asthma preventer medication, reduced exacerbations, improved quality of life and an increase in asthma action plan ownership at 3 and 12 months.

Conclusion: Asthma outcomes in older people can be significantly improved by delivering tailored education that identifies specific patient concerns and unmet needs.

Practical implications: Use of the PACT to identify patient concerns and unmet needs will assist health professionals to improve the health literacy of patients by addressing gaps in their knowledge and perceptions of asthma control.

© 2013 Elsevier Ireland Ltd. All rights reserved.

1. Introduction

Asthma is a common chronic disease and a worldwide public health issue. Its impact increases with advancing age [1,2]. Under diagnosis and under treatment of asthma is high in older adults [3], consequently, the majority of asthma related mortality and a high level of morbidity is now experienced by those over 50 years of age. As the burden of illness from asthma in older people is expected to increase there has been a recent call for a refocus of the research agenda to improve the understanding and management of asthma and airway disease in older people [3] as well as education specifically tailored to meet the needs of this group [4].

Asthma patients have been shown to benefit by appropriate self-management strategies, regular medical review and a written asthma management plan [5,6]. By contrast poorer asthma outcomes and acute use of health services in repeat emergency department (ED) attendees have been attributed to low asthma related health literacy [7,8], and lack of a written action plan [9,10]. Research investigating factors associated with hospitalisation for asthma in the United States revealed that 40% of older people with asthma reported that they did not know everything they needed to know to manage flare ups, adjust their medications or avoid asthma triggers [11]. Our work has also shown that older people’s asthma associated health literacy is commonly derived from their beliefs at the time of their asthma onset [8]. Tools or systems to assist in the delivery of guideline based care and address poor
asthma related health literacy are urgently needed to improve outcomes in this group [12].

Health literacy in this context is ‘the cognitive and social skills that determine the motivation and ability of individuals to gain access to, understand and use information to promote and maintain good health’ in relation to asthma self-management [13]. Our program therefore included an explanation of asthma and its diagnosis, asthma treatments and their use as rescue medication and/or prevention of inflammation, asthma management strategies including the importance of an asthma action plan and demonstration of correct inhaler device technique. We also designed and validated a Patient Asthma Concerns Tool (PACT) [14] to identify any unmet needs and specific concerns of older people with asthma and tailor asthma education accordingly. This paper reports on a trial utilising the PACT as an instrument to tailor education to improve asthma related health literacy and address patient concerns and unmet needs.

2. Methods

2.1. Study design and participants

2.1.1. Trial design

We undertook a single-blind, parallel group randomised controlled trial that compared:

- face-to-face asthma education, inhaler device technique instruction and addressed any patient concerns
- to usual care and brochure-only-information (see Fig. 1).

2.1.2. Participants

People age 55 years or greater with asthma were recruited using personal contact, community groups, media advertisements or from fliers placed in emergency departments, GP clinics and pharmacies. Baseline lung function test results were interpreted by

---

Please cite this article in press as: Goeman D, et al. Educational intervention for older people with asthma: A randomised controlled trial. Patient Educ Couns (2013), http://dx.doi.org/10.1016/j.pec.2013.08.014
a respiratory physician to confirm a diagnosis of asthma. Individuals with COPD were excluded as determined by fixed airflow obstruction together with a post-bronchodilator FEV1 or FER of <70% predicted together with a smoking history of greater than 10 pack-years. Those with an inability to participate in an interactive educational session by virtue of language or cognitive issues were also excluded. Statistically significant differences between the groups at baseline were adjusted for in the data analysis. Three participants died, one after randomisation but prior to the intervention and two after commencing the intervention. All three were excluded from analysis. Consenting participants’ asthma education and assessments were undertaken by DG and MC. Both were experienced asthma educators and members of the Australian Asthma and Respiratory Educators Association.

Participant visits were conducted at either the participant’s home or at the Alfred Hospital, Melbourne, Victoria or the Woolcock Institute, Sydney, New South Wales between February 2009 and June 2011.

### 2.2. Hypothesis

Asthma control in older people can be improved by asthma education tailored to address specific concerns identified using the newly developed Patient Assessment and Concerns Tool (PACT).

---

1) **In the last month, have you experienced?** (Please tick all that apply)

- Shortness of breath during strenuous activity (eg. walking quickly, carrying heavy loads, climbing a flight of stairs)
- Shortness of breath during usual activities (eg. walking, housework, shopping)
- Cough
- Coughing up sputum (phlegm)
- Chest tightness
- Wheeze
- Waking at night with asthma
- None
- Other (please specify)

2) **How would you rate your asthma symptoms over the last month?**

- Extremely Severe
- Severe
- Moderate
- Slight
- None at all

3) **How well do you think your asthma has been controlled over the last month?**

- Perfectly
- Very Well
- Fair
- Poorly
- Not at all

4) **How much do you feel your asthma restricts you from living your everyday life?**

- Extremely
- Moderately
- Slightly
- Not at all

5) **How worried are you about side effects from your asthma medication(s)?**

- Extremely
- Moderately
- Slightly
- Not at all

6) **How scared are you that you could have a bad asthma attack?**

- Extremely
- Moderately
- Slightly
- Not at all

7) **How worried are you about dying from asthma?**

- Extremely
- Moderately
- Slightly
- Not at all

8) **How confident are you that you know what to do if you have an asthma attack?**

- Extremely
- Moderately
- Slightly
- Not at all

9) **How well do you think you understand what you are supposed to do to properly manage your asthma?**

- Extremely
- Moderately
- Slightly
- Not at all

10) **How well do you think you understand your different types of asthma treatments?**

- Extremely
- Moderately
- Slightly
- Not at all

**Fig. 2.** Patient Asthma Concerns Tool (PACT).
11) Can you access medical care for your asthma when you need to?

<table>
<thead>
<tr>
<th>Always</th>
<th>Most of the time</th>
<th>Not often when needed</th>
<th>Never when its needed</th>
</tr>
</thead>
</table>

12) How often do you forget to take your asthma medication?

<table>
<thead>
<tr>
<th>Every day</th>
<th>More than once a week, but less than once a day</th>
<th>Once a week</th>
<th>Less than once a week</th>
<th>Never</th>
<th>NA</th>
</tr>
</thead>
</table>

13) Do you ever decide not to take any of your asthma preventer medication?

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>NA</th>
<th>(If No or NA, skip to Q14)</th>
</tr>
</thead>
</table>

b) Why do you choose not to take your asthma medication? (Please tick all that apply)

- You already have side effects
- You worry about possible side effects from long term use
- You should try to manage your asthma without treatment if possible
- You don’t always need to take it
- The asthma treatment doesn’t work
- The medication costs too much
- Other reason(s) (Please specify) __________________________________________________________________________________________

14) When your asthma is ‘out of control’, what do you usually do? (You may tick more than one box)

- Call an ambulance
- Visit the nearest emergency department
- Call your GP
- Visit your GP
- Call your specialist
- Take extra medication
- Follow the steps in your written action plan
- Rest
- Use breathing exercises/techniques
- Nothing
- Never out of control
- Other (Please specify) __________________________________________________________________________________________

15) Is there anything else about your asthma and asthma medication which concerns you which you would like to discuss with your Doctor?

__________________________________________________________________________________________________________________________________

Fig. 2. (Continued).

2.3. Interventions

2.3.1. Brochure only information (control group)

Brochure-only information was provided using an Australian Asthma Foundation ‘Asthma in the Over 50s’ brochure and device use pamphlets. Turbuhaler use pamphlets were provided by Astra-Zeneca and metered dose inhaler (MDI) and Accuhaler use pamphlets provided by Glaxo-Smith Kline.

2.3.2. Face-to-face education (intervention group)

Person-centred education was tailored to address issues raised by the participants’ responses to the PACT (see Fig. 2). Further education was delivered according to a self-management checklist (see Fig. 3) adapted from the National Asthma Council of Australia (NACA) Handbook 2006 [15]. Device technique was taught according to an adapted version of the NACA ‘Inhaler technique in adults with asthma or COPD’ checklist (2008).

Following recruitment, baseline measurements of asthma control, asthma symptoms, lung function and device technique were obtained and any concerns, recent exacerbations and action plan ownership noted. Demographic information including age, marital status, income, education level, ethnicity, health insurance/health care card status, other medical conditions and smoking history was also collected (see Table 1). Participants then undertook a two-week run-in period using an electronic inhaler monitoring device (Smartinhaler tracking device, Nexus 6 Ltd., Auckland, New Zealand) that recorded time and number of actuations. Data was stored in real time by a miniature electronic chip and tracking devices were collected after two weeks for downloading. The number of actuations on the inhaler dose-counter was also recorded to verify the electronic recording. After the two-week run-in period, participants were visited in their homes or a mutually agreed location and provided with either face-to-face asthma education tailored to address needs or
What is asthma?

- Asthma is an inflammatory disease
- The underlying condition or tendency remains even when symptoms are absent
- In people with asthma the airways narrow or don’t function normally when exposed to a trigger factor. Triggers can be hard to identify (refer to p.2 in Over 50s Brochure)
- During an asthma episode, a combination of factors causes airway narrowing:
  - inside lining of the airways becomes red and swollen, extra mucus (sticky fluid) may be produced, the muscle around the airways tightens (bronchoconstriction)

How asthma is treated?

- Reliever medication – bronchodilators (open up the airways)
- Preventer medication – anti-inflammatory agents (prevent/control inflammation)
- Combination medication preventer plus long acting reliever medication
- Common side effects and how to cope with them
- Emphasise difference between preventers and relievers:
  - Preventers must be taken regularly, irrespective of symptoms
  - Relievers – rescue medication
- Common side effects – how to cope with these eg. Use of spacer, rinsing/gargling after preventer, important to spit out not swallow.
- Correct device use – check technique
- Care of the device and spacer

Plan of care

- Reinforce the need for long term adherence to preventer therapy
- Asthma treatment is usually long term
- Discourage the notion that treatment can be discontinued when symptoms resolve
- Emphasis the importance of attending a GP for regular review of asthma and the current management plan
- Discuss obtaining a Written Asthma Action Plan from their GP

Monitoring and managing the symptoms and signs of asthma

- How to recognise deteriorating asthma (peak flow or symptom based). Discuss identifying worsening asthma & demonstrate peak flow meter in conjunction with written asthma action plan
- Steps to take if asthma control deteriorates including:
  - when to increase each medication and by how much
  - when and how to seek medical treatment

How to avoid asthma exacerbation?

- Recognising and avoiding triggers – provide examples of triggers
  (refer to Over 50s brochure p.2)
- Smoking cessation and avoiding other peoples smoke
  (where to obtain assistance to Quit)
- Respiratory Tract Infections – impact on asthma:
  - Importance of annual Flu and regular Pneumococcal vaccines
  - Ways to avoid RTIs – regular hand washing – avoiding touching T Zone area

Fig. 3. Asthma self management education checklist.
Table 1

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Intervention</th>
<th>Control</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years) ± std dev</td>
<td>n = 65 (%)</td>
<td>n = 58 (%)</td>
<td>0.68</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>16 (25)</td>
<td>18 (31)</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>49 (75)</td>
<td>40 (69)</td>
</tr>
<tr>
<td>Marital status</td>
<td>Married/defacto</td>
<td>41 (63)</td>
<td>40 (69)</td>
</tr>
<tr>
<td></td>
<td>Divorced/separated/widowed</td>
<td>24 (37)</td>
<td>18 (31)</td>
</tr>
<tr>
<td>Highest education level</td>
<td>University</td>
<td>25 (39)</td>
<td>21 (36)</td>
</tr>
<tr>
<td></td>
<td>Diploma</td>
<td>11 (17)</td>
<td>12 (21)</td>
</tr>
<tr>
<td></td>
<td>High school</td>
<td>27 (41)</td>
<td>24 (41)</td>
</tr>
<tr>
<td></td>
<td>Primary school</td>
<td>2 (3)</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Employment status</td>
<td>Currently employed</td>
<td>22 (34)</td>
<td>23 (40)</td>
</tr>
<tr>
<td></td>
<td>Retired/unemployed</td>
<td>43 (66)</td>
<td>35 (60)</td>
</tr>
<tr>
<td>Income $ per week</td>
<td>Less than $280</td>
<td>8 (12)</td>
<td>7 (12)</td>
</tr>
<tr>
<td></td>
<td>$281–$499</td>
<td>9 (14)</td>
<td>10 (17)</td>
</tr>
<tr>
<td></td>
<td>$500–$749</td>
<td>12 (19)</td>
<td>8 (14)</td>
</tr>
<tr>
<td></td>
<td>$750–$999</td>
<td>2 (3)</td>
<td>6 (10)</td>
</tr>
<tr>
<td></td>
<td>More than $1000</td>
<td>8 (12)</td>
<td>7 (12)</td>
</tr>
<tr>
<td></td>
<td>Unknown</td>
<td>26 (40)</td>
<td>20 (35)</td>
</tr>
<tr>
<td></td>
<td>Has private health insurance - yes</td>
<td>44 (68)</td>
<td>44 (76)</td>
</tr>
<tr>
<td>Owns health care card</td>
<td>37 (57)</td>
<td>33 (57)</td>
<td></td>
</tr>
<tr>
<td>Socio-economic index for areas (SEIFA)</td>
<td>1072.1 ± 78.9</td>
<td>1074.9 ± 76.9</td>
<td>0.84</td>
</tr>
</tbody>
</table>

Data are mean ± standard deviation or number (percentage). Missing data excluded (FEV1 % predicted, n = 1 and years with asthma, n = 1).

a FEV1 = forced expiratory volume in 1 s.
b NHANES III reference values.
c Patients unable to complete lung function tests or questionnaires at either visit were excluded from this analysis.

Concerns identified by use of the PACT, or passive education provided by a brochure according to randomisation. One hour was allocated for the face-to-face educational intervention and 15 min for the passive education.

Participants undertook two further visits at 3 months and 12 months when device technique was again assessed and follow-up measurements made. Asthma control, asthma symptoms, lung function, recent exacerbations, health service utilisation, action plan ownership, medication use and any changes to medication, smoking behaviour or concerns were assessed.

All participants continued to receive their current asthma care as prescribed by their general practitioner, unless this was felt to be clinically inappropriate when patients were referred back to their GP by the asthma educators. Participants allocated to the brochure-only arm of the study were offered face-to-face asthma education after they had completed their study participation.

2.4. Determination of adherence

Objective measures of participants’ preventer medication use were obtained covertly using electronic monitoring confirmed by dose counter information. Data were collected over three two-week periods, to ascertain baseline, three month and twelve month measurements. Receipt of medication was calculated as the overall or under-use versus prescribed number of half daily doses taken over the 14 days. Good adherence was defined as >80% use of the prescribed dose [16] with allowance made for participants titrating medication in accordance with a prescribed SMART regimen or written asthma action plan.

2.5. Outcome measures

2.5.1. Primary outcomes

Asthma control measured by the Asthma Control Questionnaire including lung function (ACQ7) [17]. The second primary outcome was adherence monitored by tracking device.

2.5.2. Secondary outcomes

Quality of Life measured by the Asthma-Related Quality of Life questionnaire (AQOL) [18], asthma exacerbations measured by β2 agonist and oral corticosteroid use, and written Asthma Action Plan ownership.

2.6. Sample size

The sample size was calculated to detect the minimum clinically important difference (MCID) of 0.5 in the ACQ between those randomised to the intervention and control groups. Assuming a conservative standard deviation of 0.66 [19], in order to detect an MCID of 0.5 in ACQ with a power of 95% and a type 1 error rate of 0.05 we needed a sample size of 46 participants in each arm. This was inflated to 60 to account for dropouts.

2.7. Random allocation and masking

Following the initial two week run-in period, participants were randomly allocated to either the comprehensive educational intervention or the brochure-only arm using computer generated stratified randomisation based on age and prevernter medication ownership [20]. The researchers who delivered the education were blinded to this randomisation process and a colleague provided them sealed envelopes with participants’ allocation details. Study participants were informed they would be randomised into a study comparing different types of asthma education but they were blinded to the purpose of this and how the results would be used.

2.8. Lung function

Pre- and post-bronchodilator spirometry was performed according to American Thoracic Society (ATS) criteria [21] and interpreted using NHANES III reference values [22]. Post-bronchodilator spirometry was performed approximately 15 min after three puffs of bronchodilator was administered via a disposable e-chamber spacer device.

Please cite this article in press as: Goeman D, et al. Educational intervention for older people with asthma: A randomised controlled trial. Patient Educ Couns (2013), http://dx.doi.org/10.1016/j.pec.2013.08.014
2.9. Qualitative data – fieldnotes

Field notes, detailing each participant visit were recorded in a researcher journal at the completion of each participant visit. A qualitative review of these field notes was conducted to illustrate participant’s satisfaction with the intervention.

2.10. Statistical analysis

Analysis was performed using SAS version 9.2 (SAS Institute Inc., Cary, NC, USA) and SPSS version 15 (SPSS Inc, Chicago, Illinois). The primary outcome ACQ7 scores followed a roughly normal distribution whilst the secondary outcome AQOL followed a normal distribution after logarithmic transformation. To account for repeat measures, data were analysed using the PROC MIXED procedure in SAS with each patient treated as a random effect. Models were fitted using main effects for group (intervention versus control) and time (baseline, 3 months and 12 months) and an interaction between group and time to ascertain if the two groups behaved differently over time. Post hoc comparisons were performed using Bonferroni adjustment for multiple comparisons. Adherence monitored by tracking device was analysed as change from baseline percentages as these differences in percentages followed an approximate Gaussian distribution. Results from the mixed effects models are presented as parameter estimates ± standard errors or geometric means (95% confidence intervals) as appropriate. Comparisons of proportions were performed using chi-square tests for equal proportion or Fisher’s exact tests where numbers were small. Baseline comparison of continuous normally distributed variables was performed using Student’s t tests and results are presented as means ± standard deviations. Within group comparison of proportions was performed using the McNemar chi-square test. Statistical significance was set at a two-sided p value of 0.05.

2.11. Ethics approval

The study was approved by the Human Research Ethics Committees of The Alfred Hospital (project 317/08) and The University of Sydney (project X09-0146). Informed consent was obtained from all participants.

3. Results

The CONSORT flow diagram shows 124 participants (89 F 34 M) enrolled in the study (see Fig. 4). Sixty-six participants were randomised to receive the face-to-face educational intervention and 58 to usual care plus brochure-only information. Fifty-eight of those allocated to the face-to-face education group and 56 to the brochure-only group completed all stages of the intervention. The primary analysis included 123 subjects (1 participant died prior to receiving the intervention). There were no statistically significant differences between the demographic characteristics or smoking status of the two groups (Table 1).

3.1. Primary outcomes

3.1.1. Asthma control

Table 2 presents the mean ACQ scores at baseline, three and 12 months in the study groups. There was a progressive reduction in average ACQ in the intervention group, but no change was observed in the control group. The change in ACQ score in the intervention group was 0.3 [95% CI:0.1–0.5]; p = 0.02] at 3 months and 0.5 [95% CI: 0.3–0.7]; p < 0.001] at 12 months.

The baseline average ACQ was 1.6 ± 0.1 in the intervention group and 1.1 ± 0.1 in the control group. After accounting for difference in baseline ACQ scores, the intervention group had better asthma control (1.1 ± 0.1) than that of the control group (1.3 ± 0.1).

---

Please cite this article in press as: Goeman D, et al. Educational intervention for older people with asthma: A randomised controlled trial. Patient Educ Couns (2013), http://dx.doi.org/10.1016/j.ped.2013.08.014
Table 2
Comparison of outcome measures of asthma control, adherence to preventer medication and asthma related quality of life at baseline and 3 and 12 months following the intervention.

| Measure                              | Intervention | Control | DIFF | DIFF (95% CI)*
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base 3 months 12 months</td>
<td>Base 3 months 12 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asthma control (mean (SE))</td>
<td>1.6 ± 0.1 1.3 ± 0.1 1.1 ± 0.1</td>
<td>0.5 (0.3–0.7)</td>
<td>0.01 (0.01–0.02)</td>
<td></td>
</tr>
<tr>
<td>Adherence (tracking device)</td>
<td>11.2% ± 6.1%</td>
<td>19.3% ± 6.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asthma related quality of life (%)</td>
<td>0.8 (0.5–1.0) 0.6 (0.5–0.7) 0.3 (0.3–0.6)</td>
<td>0.5 (0.3–0.7) 0.6 (0.5–0.8) 0.6 (0.4–0.7) 0.1 (0.16–0.24)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total participants</td>
<td>65 61 58</td>
<td>58 56 56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The purpose of the grey shading is to highlight intervention group outcomes.

* Within group difference from baseline to 12 months, CI = confidence interval.

b Lower scores are more favourable.

c Score of >80% is considered adherent to preventer medication. Values are change in adherence from baseline.

d Values are geometric mean (95% CI) with difference reported as ratio (95% CI).

Table 3
Comparison of asthma exacerbations requiring Prednisolone and written action plan ownership at baseline (in the last 12 months) and 12 months following the intervention.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Intervention baseline</th>
<th>Intervention 12 months</th>
<th>DIFF (95% CI)*</th>
<th>Control base</th>
<th>Control 12 months</th>
<th>Difference (95% CI)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Prednisolone in the last 12 months</td>
<td>12 (20.7%)</td>
<td>9 (15.5%)</td>
<td>5.2% (–9.6% to 19.9%)</td>
<td>15 (26.8%)</td>
<td>13 (23.2%)</td>
<td>3.6% (–11.3% to 18.4%)</td>
</tr>
<tr>
<td>Action plan ownership</td>
<td>11 (18.6%)</td>
<td>36 (61%)</td>
<td>42.4% (28.1%–56.7%)</td>
<td>18 (32.1%)</td>
<td>21 (37.5%)</td>
<td>5.4% (–13% to 2.3%)</td>
</tr>
</tbody>
</table>

The purpose of the grey shading is to highlight intervention group outcomes.

* Within group difference from baseline to 12 months, CI = confidence interval.

b n = 58 and n = 56 in intervention and control groups respectively.

c n = 59 and n = 56 in intervention and control groups respectively.

Difference between groups at 12 months was 0.3 [95% CI: 0.06–0.5]; p = 0.01.

3.1.2. Adherence

The baseline adherence was 70 ± 4.8% in the intervention group and 69.2 ± 4.8% in the control group. There was a statistically significant improvement in intervention participants’ adherence to their preventer medication measured by tracking device monitors but not that of the control group. Although the adherence of both groups improved, only the intervention group achieved the goal of 80% adherence at 3 months, which continued to improve and was maintained at 12 months (see Table 2). The between group difference was not significant at twelve months (p = 0.17).

3.2. Secondary outcomes

3.2.1. Quality of life

AQLQ improved significantly (0.8–0.3) in the intervention but not the control group participants (see Table 2). Between group difference at 12 months remained significant after adjusting for differences in baseline AQLQ scores (p = 0.01).

3.2.2. Asthma exacerbations

Participants’ exacerbation history measured by oral corticosteroid courses in the preceding 12 months revealed a decrease in the number of exacerbations experienced by intervention participants. Intervention participants’ oral corticosteroid use decrease from 21% at baseline to 15% (5.2%) at 12 months while oral steroid use in the last 12 months decreased by only 3.6% in the control group (see Table 2). This difference was not statistically significant.

3.2.3. Action plan ownership

At baseline there was no statistically significant difference in Asthma Action Plan ownership between the two groups with 11 (18%) of the intervention and 18 (32%) of the control group reporting that they owned one (Fishers exact, p = 0.13). At 12 months there was a statistically significant difference in action plan ownership, however, with 36 (61%) of the intervention group owning one compared to 21 (37%) of the control group (Fisher’s exact, p = 0.015) (see Table 3).

3.2.4. Participant feedback

Participants in the intervention group who received the face-to-face education frequently voiced their delight about how much their knowledge about asthma and asthma medication had improved as a result of their participation in the study:

‘Thank you for teaching me far more than any GP ever did!’ (59 year old female)

‘No one has ever shown me that (spacer use) before’ (64 year old male)

Participants also reported examples of how their increase in knowledge motivated behaviour change that led to a reduction in asthma symptoms and consequently an improvement in their quality of life. One 57 year old female participant who used reliever medication excessively reported that the doctor had never explained the role of preventer medicine to her. She recalled that after taking her asthma preventer medication regularly she ‘felt no shortness of breath when exercising’ and also needed no time off work for the first time ever. Another participant, a 64 year old female, wrote a note to the research team thanking them for including her in the study:

‘I was very interested in the decline in my breathing during the months my preventer was not used. I’ve made extra effort to be more diligent (for my own sake) in the last two weeks only missing one application when I was sick one morning. My specialist review last week was very encouraging.’

4. Discussion and conclusion

4.1. Discussion

Our study is the first study to identify and address both the specific barriers to older peoples’ asthma self-management and

Please cite this article in press as: Goeman D, et al. Educational intervention for older people with asthma: A randomised controlled trial. Patient Educ Couns (2013), http://dx.doi.org/10.1016/j.pec.2013.08.014
care delivery failures through the delivery of person-centred asthma education utilising a tool specifically designed to tailor education to include addressing any unmet needs and concerns. Adherence was determined using objective measures and did not rely on self-report. The twelve month follow up period and randomisation allowed for seasonal variations due to allergies, sensitivities to the cold, periods of high respiratory tract infection, and peaks in hospitalisations in the over 65 year olds during winter and spring [1].

While the participants were blinded to purpose of the comparison of verbal versus brochure interventions, and the researchers who delivered the asthma education were blinded to the randomisation of participants they were not blinded to the participants’ status when delivering asthma education. As all study participants received either written or verbal education and were aware they that they would be followed up, a Hawthorne effect is likely to have improved adherence in both groups and therefore lessened the effect size of the intervention. Our study did not include participants with moderate to severe cognitive issues or those who required an interpreter.

Interventions designed to improve GPs knowledge and confidence to manage asthma and develop techniques to arrive at shared asthma goals with their patients [23,24], have been successful in improving patient outcomes in the primary care setting [24,25]. In older adults however, previous interventions have not translated to an improvement in patient outcomes [23]. A search of PubMed and Medline for articles on educational interventions in older people with asthma up to March 2013, as well as a search of reference lists of relevant articles, review articles and the Cochrane Library of systematic reviews, identified three previous educational interventions in older people with asthma.

The first of these interventions was by Patel et al., trialling a telephone intervention targeting fifty-two disadvantaged elderly people who had required rescue inhalers and attended either an emergency department or sought emergency care [26], the second an intervention by Huang et al., comparing education in asthma self-care (n = 58) and asthma self-care including peak flow monitoring (n = 57) compared with usual care (n = 58) [27] and the third an intervention by Buist et al., comparing symptom versus peak flow monitoring when delivered in combination with self-management education [28].

Patel and colleagues’ intervention proved successful in decreasing the number of emergency department visits and increasing the use of inhaled corticosteroids in this group [26]. Huang et al., concluded that older patients with moderate-to-severe asthma receiving individualised education can enhance their self-care behaviours, manage their disease and increase their quality of life [27]. Buist et al., reported no significant difference between those allocated to the symptom versus peak flow monitoring group, with both groups achieving significant improvements in quality of life scores and lung function [28].

Our study differed from these studies in so far as it was not limited to those with moderate to severe asthma, who sought emergency treatment or who had bronchodilator reversibility >8% of baseline. As the eligibility criteria for the Buist study was moderate to severe asthma and the mean lung function of participants at baseline was 58.5 and 59.4 with 16% and 17% reversibility there was considerable opportunity for improvement. By contrast our intervention did not exclude participants with mild asthma, and the baseline FEV1 of 71% and 76% respectively meant improvement in lung function would be more difficult to achieve. Our educational intervention trialling the use of the Patient Asthma Concerns Tool (PACT) is the first trial of an educational program specifically designed for use in older people with asthma irrespective of their asthma severity. Our study also monitored adherence to asthma medication using objective monitoring in addition to self-report and follow up occurred at both 3 and 12 months to allow for seasonal variations.

4.2. Conclusion

Our trial, utilising the newly developed PACT to assist in delivery of both guideline based and tailored person-centred care as well as addressing unmet needs and patient concerns, demonstrates asthma control in older people can be improved by enhancing asthma related health literacy through tailored education to address specific concerns and provision of information on asthma diagnosis, treatment and device technique. In addition, to significant improvements in the primary outcome measure of asthma control, there were improvements in adherence to preventer medication and the secondary measures of asthma related quality of life, reduction in asthma exacerbations and an increase in action plan ownership of this group.

4.3. Practical implications

The Global Initiative for Asthma Guidelines suggest that patient education including self-management skills should be an integral part of all interactions between health care professionals and all asthma patients [4]. In the United Kingdom and Australia, increasingly health policy emphasises the need for the delivery of person-centred care to improve health outcomes, particularly in the management of long term conditions such as asthma. Despite the promotion of these goals, neither a person-centred approach [29] or the regular application of international asthma guidelines have been successfully translated into daily clinical practice [30,8]. Barriers to the delivery of guideline based care have been identified as a lack of accessible, relevant education for GPs including structural barriers to the delivery of such care including time and cost [31]. Barriers to the delivery of person-centred care include insufficient training in eliciting shared goals with patients [29].

Our educational intervention utilising the newly developed Patient Assessment and Concerns Tool (PACT), improved older people's asthma related health literacy through the provision of information on asthma, asthma diagnosis, treatment and device technique and addressing specific concerns has demonstrated improvement in older people's asthma control, adherence to preventer medication, quality of life and action plan ownership can be achieved through specifically targeted education.

The use of the PACT with older people living in the community, has provided a tool to assist health professionals to identify gaps in their patient's knowledge and perceptions of asthma control, and therefore the ability, to deliver guideline-based and person-centred care through specifically tailored education. A trial of the utility of the PACT in the frail elderly population should now be undertaken.

Competing interests

None declared.

Funding

This study was funded by the Co-operative Research Centre for Asthma and Airways.

Contributions

DG, JD and CJ initiated the study. DG and MC undertook the data collection and provided the educational intervention. DG and EP performed the data analysis. DG prepared the manuscript, and all authors contributed to the final version. All authors have read and
approved the final manuscript. DG will act as guarantor for the paper.

Permissions

All patient/personal identifiers have been removed or disguised so the patients/persons described are not identifiable and cannot be identified.

Acknowledgements

Elizabeth Juniper gave permission for the use of the Asthma Control Questionnaire.

References