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Baishnab E, Karner C

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DOI: 10.1002/14651858.CD003533.pub2.

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[Intervention Review]

Primary care based clinics for asthma

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Editorial group: Cochrane Airways Group.
Publication status and date: New search for studies and content updated (no change to conclusions), published in Issue 4, 2012.

Citation: Baishnab E, Karner C. Primary care based clinics for asthma. *Cochrane Database of Systematic Reviews* 2012, Issue 4. Art. No.: CD003533. DOI: 10.1002/14651858.CD003533.pub2.

ABSTRACT

Background

Asthma is defined as the presence of variable airflow obstruction with symptoms (more than one of wheeze, breathlessness, chest tightness, cough). It is becoming increasingly common worldwide and this is especially true in higher income countries. In several of these countries there has been a move towards delivery of asthma care via primary care based asthma clinics. Such clinics deliver proactive asthma care sited within primary care, via regular, dedicated sessions which are usually nurse led and doctor supported. They include organised recall of patients on an asthma register and care usually comprises education, symptom review and guideline-based management. Despite the proliferation of such clinics, especially in countries such as the United Kingdom (UK), there is a paucity of evidence to support their use. This review sets out to look at the evidence for the effectiveness of asthma clinics.

Objectives

To determine the effectiveness of organised asthma care delivered via primary care based asthma clinics.

Search methods

We searched the Cochrane Airways Group Specialised Register of trials (last search December 2011) and reviewed reference lists of all primary studies for additional references.

Selection criteria

We included randomised controlled trials of primary care based asthma clinics with a parallel group design, where clinics took place within dedicated time slots and included face-to-face interaction with doctor or nurse and control groups received usual clinical practice care by a general practitioner.

Data collection and analysis

Two review authors independently assessed the trials for inclusion and conducted all data extraction and analysis. All disagreements were resolved by discussion.

Main results

A total of three studies involving 466 participants were included. There was no statistically significant difference between the asthma clinic group and the control group for most outcomes (primary outcomes: asthma exacerbations leading to hospitalisation or accident and emergency (A&E) visit, use of reliever and preventer medication, quality of life; secondary outcomes: symptoms, time lost from work and withdrawals from the intervention or usual care). However, the confidence intervals were wide for all outcomes and there was substantial heterogeneity between the studies for both A&E visits and time lost from work. One study (101 patients) looked at nocturnal awakenings due to asthma and found a statistically significant reduction in the number of patients reporting this symptom in the asthma clinic group

compared to the usual care group (OR 0.31; 95% CI 0.12 to 0.77). There were no studies looking at the secondary outcome of exacerbations requiring oral steroids.

Authors' conclusions

There is limited evidence of efficacy for primary care based asthma clinics, and firm conclusions cannot be formed until more good quality trials have been carried out.

PLAIN LANGUAGE SUMMARY

Primary care based clinics for asthma

Asthma is a common illness causing wheezing, coughing and difficulty with breathing in adults and children. Asthma is becoming increasingly common worldwide and this is especially true in higher income countries. There has been a move towards delivery of asthma care via primary care based asthma clinics in such countries. Such clinics comprise organised routine asthma care within a dedicated, regular time slot; these are usually nurse led and supported by doctors. However it is not yet known whether these clinics are effective.

This review aimed to explore this question and included three studies with a total of 466 participants. These studies did not find any overall difference between asthma clinic and usual clinical practice care by a general practitioner for the following outcomes: A&E department visits for asthma, use of reliever or preventer medication for asthma and quality of life measures, but there was considerable uncertainty about these results. One study found that there was a reduction in nocturnal awakening due to asthma in the asthma clinic group compared to control but no difference in other symptom outcomes reported. Given the limited evidence found in this review, we believe that there is a need for further evidence in order to assess the effectiveness of asthma clinics.

Summary of findings for the main comparison. Asthma Clinics (Intervention) versus Controls for asthma

Asthma Clinics (Intervention) versus Controls for asthma

Patient or population: patients with asthma
Settings: Asthma clinics in 2 countries (UK and Australia)
Intervention: Asthma clinics (intervention) versus controls

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Control	Asthma Clinics (Intervention) versus Controls				
A&E visits Number of people experiencing one or more A&E visit Follow-up: 6 months	**17 per 1000**	**18 per 1000** (4 to 82)	**OR 1.03** (0.21 to 5.15)	344 (2 studies)	⊕⊖⊖⊖ **very low** [1,2]	
Quality of life Follow-up: 4 to 6 months	See comment	See comment	Not estimable	271 (2 studies)	See comment	One study reported a median and the other reported mean difference therefore we could not pool this outcome or grade the evidence
Hospital admissions Number of people experiencing one or more hospitalisations Follow-up: 6 months	**40 per 1000**	**13 per 1000** (4 to 48)	**OR 0.32** (0.09 to 1.21)	344 (2 studies)	⊕⊕⊖⊖ **low** [2]	
Days lost from work Number of people reporting one or more instances of time off work or school Follow-up: 6 months	See comment	See comment	Not estimable	263 (2 studies)	See comment	We did not pool the data due to the high level of heterogeneity

*The basis for the **assumed risk** (e.g. the median control group risk across studies) is provided in footnotes. The **corresponding risk** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).
CI: Confidence interval; **OR:** Odds ratio;

GRADE Working Group grades of evidence
High quality: Further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.

---

[1] Downgrade 1 point: there was substantial heterogeneity between studies
[2] Downgrade 2 points: there were few events leading to uncertainty and wide confidence intervals

BACKGROUND

Description of the condition

Asthma is defined as the presence of variable airflow obstruction and symptoms (more than one of wheeze, breathlessness, chest tightness, cough) (British Guideline on the Management of Asthma 2008). The global burden of asthma is significant, estimated to affect 300 million people of all ages worldwide (GINA 2008) with a prevalence which has been increasing over the past 35 years and which is higher in more economically developed countries (Masoli 2004). The monetary costs of asthma are substantial, resulting from both direct medical costs via routine and urgent healthcare, and the costs of work absence. Optimal asthma management aims to control symptoms and morbidity as well as preventing exacerbations and mortality, whilst maintaining normal activity and avoiding medication-related adverse effects (GINA 2008). Almost all such routine asthma management is provided by primary care.

Description of the intervention

Whilst no specific definition of an asthma clinic exists, for the purposes of this review an asthma clinic describes a pro-active system of care sited in primary care (e.g. GP clinic) which occupies a defined and often regular clinical session for the routine review of patients with asthma. Such clinics tend to be nurse led and doctor supported, with organised recall of patients on an asthma register. The content of sessions may vary but usually includes education drawing on a variety of models, symptom review and ongoing management according to prespecified guidelines. More recently, the use of written action plans and guided self-management have been advocated.

Asthma clinics are increasingly being used as a means to deliver routine asthma care in high income countries such as the UK, USA and Australia. The Global Initiative for Asthma (GINA) emphasises the need for monitoring of asthma control and a multifaceted approach, including education, self-monitoring and possession of a written action plan as part of regular reviews (GINA 2008). GINA also acknowledges the differing health priorities that exist in low and middle income countries where other respiratory conditions such as tuberculosis (TB) and pneumonia supercede asthma in terms of public health importance and where resource availability, infrastructure and cultural issues act as barriers to the delivery of routine asthma care. As a result asthma clinics to date have largely taken place in higher income settings, following the lead of dedicated chronic disease management clinics for conditions such as diabetes and hypertension.

Much of the move toward the use of asthma clinics stems historically from the uptake of these in the UK, where they are now almost universal. UK guidance recommends the structured and proactive review of patients with asthma (British Guideline on the Management of Asthma 2008) and suggests asthma clinics in primary care may be a convenient way of delivering care. In the UK these were introduced in 1990 when funding was made available for health promotion clinics. This was further endorsed by the General Medical Services Contract in 2003 (GMS 2003) which remunerates practices for providing proactive regular reviews for patients with asthma.

Despite the proliferation of primary care based asthma clinics in high income settings, there has been remarkably little published on the effectiveness of this system of care. Whilst guidance acknowledges the benefits to structured proactive review and suggests asthma clinics as a means of delivering this, it also acknowledges that there is limited evidence that asthma clinics themselves improve outcomes (British Guideline on the Management of Asthma 2008). It has been shown that self-management education improves short- and medium-term outcomes such as healthcare utilisation and quality of life (Gibson 2002), however, there is a paucity of information looking at longer-term outcomes. Much of this data relates to patients with moderate and severe asthma and there remains uncertainty as to how evidence applies to relatively low risk individuals seen more commonly in primary care (Pinnock 2010). "Guided self-management" (GINA 2008) where self-management education is combined with structured review has shown favourable health outcomes (Gibson 2002) but it can be argued whether these results are applicable to all patients with asthma in primary care (Fay 2000) and how much this effect is only true for the interested minority that respond to invitations to participate.

Why it is important to do this review

Nine out of ten patients with asthma are treated in primary care (Asthma UK 2001) and integrated care for patients with moderately severe asthma has been shown to be at least as effective as conventional hospital care (Drummond 1994). Whilst there is some evidence looking separately at various components of asthma review, there is little evidence focusing on the structure within which this is delivered. To date there has been one systematic review exploring this question originally published in 2002 (Jones 2002), which contained one study and concluded that there was limited evidence of benefit for primary care based asthma clinics; this is an update of the same review to encompass any new available data.

Despite the limited evidence, asthma clinics have become almost universal in the UK and commonplace in other higher income countries. Although this may offer some pragmatic support for efficacy it also poses challenges in designing future controlled studies. It is still not known how best to manage patients with asthma in primary care: in organised asthma clinics; planned reviews within normal surgery; or opportunistically. It is likely that evidence looking at this question will have important resource and therefore, cost implications. This review sets out to gather evidence on the effectiveness of organised care via asthma clinics in primary care. This is not a review of the effectiveness of various educational processes in asthma care which have been covered in other reviews within the Cochrane Airways Group (Gibson 2003; Powell 2003; Welsh 2011; Wolf 2003).

OBJECTIVES

To determine the effectiveness of organised asthma care via primary care based asthma clinics.

METHODS

Criteria for considering studies for this review

Types of studies

Only randomised parallel controlled trials of any duration were considered for inclusion.

Types of participants

We included patients with a diagnosis of asthma of any age, registered with a general practitioner (GP).

Types of interventions

We included studies looking at primary care based practices offering a proactive system of care by organised asthma clinics within the primary care setting. We included asthma clinics that took place within a regular dedicated time slot with face-to-face contact with doctor or nurse. Practices that undertook shared care with hospital services were also considered for inclusion. We included studies where comparisons were made between primary care based asthma clinics and different types of care e.g. non-organised or best clinical practice or alternative methods of primary care led structured care process where this was not another form of asthma clinic.

Types of outcome measures

Primary outcomes

1. Exacerbations leading to A&E department attendances
2. Use of reliever medication
3. Use of preventer medication
4. Quality of life using a validated method

Secondary outcomes

1. Exacerbations requiring oral steroids
2. Exacerbations leading to hospitalisations
3. Symptoms
4. Time lost from work/school
5. Withdrawal from interventions or usual care

Search methods for identification of studies

Electronic searches

We identified trials using the Cochrane Airways Group Specialised Register of trials, which is derived from systematic searches of bibliographic databases including the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, CINAHL, AMED, and PsycINFO, and handsearching of respiratory journals and meeting abstracts (see Appendix 1 for further details). We searched all records in the Specialised Register coded as 'asthma' using the following terms:

("primary care" OR "primary health" OR "PCT" OR "general pract*" OR "GP" OR "family pract*" OR "family doctor" OR "patient-cent*" OR "patient cent*")

AND

("clinic" OR "clinics" OR "nurse" OR "based")

The database was searched from inception to the present and there was no restriction on the language of publication. The original search was conducted in November 2001 (Appendix 2). The search strategy was updated and the latest search was carried out in December 2011.

Searching other resources

We reviewed reference lists of all primary studies and review articles for additional references.

Data collection and analysis

Selection of studies

Two review authors (EB and CK) independently assessed the relevance of trials from titles and abstracts obtained from the search. Once an agreement had been reached on the studies to be considered for inclusion, full text articles were retrieved, and each study was assessed based on the criteria for study design and intervention with Chris Cates (CC) from the editorial team, adjudicating to resolve any disagreements.

Data extraction and management

We extracted information from each study for the following characteristics:

1. Design (design, study duration, number of primary care clinics and location, date of study).
2. Participants (number (N), mean age, age range, gender, asthma severity, diagnostic criteria, baseline lung function, smoking history, employment rate, inclusion criteria, exclusion criteria)
3. Interventions (description of intervention and control: structure, setting, doctor and/or nurse led, number of reviews, time span of intervention, content and length of each review)
4. Outcomes (primary and secondary outcomes reported and collected, time points reported, withdrawals)

Two authors (EB and CK) extracted data from the studies. We discussed and resolved any discrepancies in the data, consulting a third person (CC) where necessary. We transferred data from data collection forms into Review Manager 5.1.

Assessment of risk of bias in included studies

We assessed the risk of bias in included studies as high, low or unclear using the Cochrane Collaboration's 'Risk of bias' tool (Higgins 2009) for the following items:

1. Allocation: sequence generation
2. Allocation: sequence concealment
3. Performance: blinding during study
4. Detection: blind outcome assessment
5. Attrition: incomplete outcome data
6. Reporting: unreported outcomes
7. Other bias

Measures of treatment effect

We combined dichotomous data using the Mantel-Haenszel fixed-effect odds ratio (OR) using 95% confidence intervals. Where the event rate was low, we used Peto OR to analyse the data since this does not require a continuity correction for zero cells. We analysed

continuous outcome data as fixed-effect mean difference (MD) with a 95% confidence interval.

We used intention-to-treat (ITT) analyses to measure treatment effect.

Unit of analysis issues

Analyses based on change scores were preferred for continuous data, but we used final values if change scores were not available. For dichotomous data, we reported the proportion of participants contributing to each outcome in comparison to the total number randomised.

Dealing with missing data

We requested additional data including missing numerical data and information required for the 'Risk of bias' assessment from trialists.

Assessment of heterogeneity

For pooled effects, we carried out tests for heterogeneity (visually and I^2 statistic). Where there was significant heterogeneity (I^2 > 30%), we compared the results of fixed-effect and random-effects models where possible.

Assessment of reporting biases

We planned to examine reporting bias by inspecting funnel plots if there had been sufficient data.

Data synthesis

We have presented our findings in a Summary of findings for the main comparison generated using Grade Pro software and recommendations in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2009). For outcomes where meta-analyses were not undertaken, we reported data from individual studies.

Subgroup analysis and investigation of heterogeneity

- Adults (older than 18 years) versus children (under 18 years)
- Asthma severity (using hospital admissions as a surrogate marker for disease severity)
- Duration of intervention (e.g. short term (less than or equal to six months), versus long term (longer than six months))

Sensitivity analysis

We planned to assess the sensitivity of our primary outcomes to the degree of bias by comparing the overall results with those exclusively from trials assessed as being low risk of bias. We also planned to carry out subgroup analyses as above.

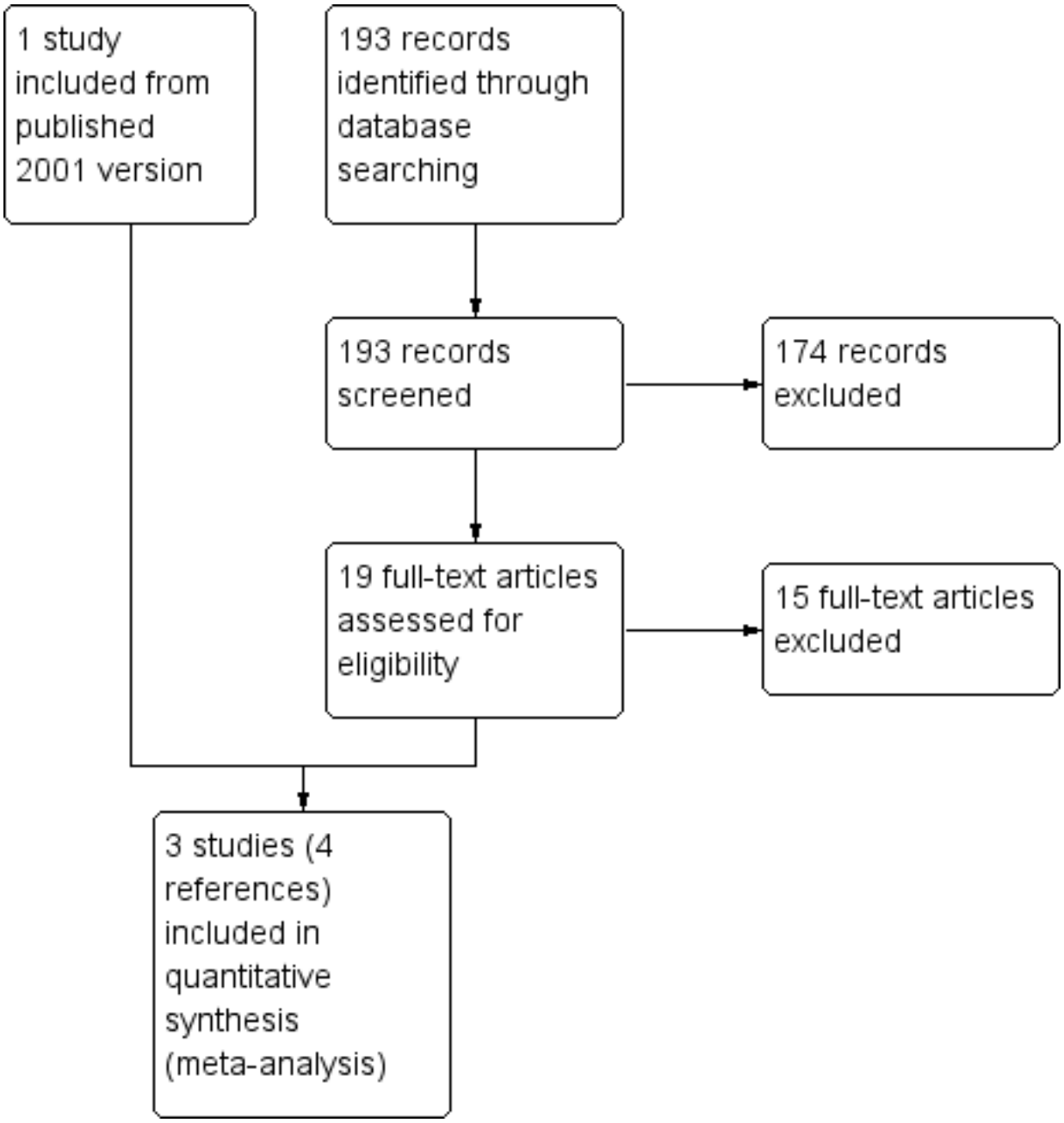
RESULTS

Description of studies

Results of the search

For the initial review two review authors independently searched electronic databases and selected 23 studies of which full text articles were obtained; of these, the original review authors identified one study which met the inclusion criteria (Heard 1999).The search of the Airways Group Register for the update (December 2011) returned 193 references (Figure 1). We identified 19 of these as potentially relevant, which we then obtained in full text to examine further. Of these, three were eligible of which one was a commentary paper on a trial in the original review (Heard 1999).

Figure 1. Study flow diagram



Included studies

For this update, we included three randomised controlled trials reporting data on asthma clinics (Heard 1999; Kernick 2002; Pilotto 2004), with a total of 466 participants. Full details can be found in Characteristics of included studies.

Setting and populations

Two studies took place in Australia (Heard 1999; Pilotto 2004) and one in the UK (Kernick 2002). Two studies (Heard 1999; Pilotto 2004) were carried out in multiple practices, 8 and 11 practices respectively, whereas the remaining study (Kernick 2002) took place in one practice only. The studies varied in size from 101 participants (Kernick 2002) to 195 participants (Heard 1999). All the studies recruited participants with a recorded asthma diagnosis but there were slight differences in the recruitment criteria. One study sought consent from all patients attending the practice with asthma during a three-month recruitment period (Heard 1999); another study invited all patients who had attended the practices for asthma within the previous nine months (Pilotto 2004). The remaining study recruited patients who were registered on the asthma database but had not been seen in the asthma clinic (Kernick 2002). The mean age was 26.3 years (asthma clinic) and 27.5 years (control) in Heard 1999 which included children and adults (5 to 64 years). The other two studies only included adults. In Pilotto 2004 (> 18 years), the mean age was 46.8 years (asthma clinic) and 49.7 years (control). Kernick 2002 (18 to 55 years) reported a median age of 35.0 years (asthma clinic) and 37.0 years

(control). There were comparable proportions of male patients in Heard 1999 (42% asthma clinic, 45% control) and Pilotto 2004 (45 % asthma clinic, 48% control), however, there was baseline imbalance in gender in Kernick 2002 (56% asthma clinic, 33% control).

Interventions

All included studies looked at nurse led asthma clinics with varying levels of doctor participation. One intervention comprised registered nurses with extensive experience in respiratory care delivering education followed by a general practitioner (GP) consultation (Heard 1999). In the second study, participants received assessment, education and management from one of the practice nurses who had been trained in asthma care, with doctors signing prescriptions provided they conformed to British Thoracic Society guidelines (British Guideline on the Management of Asthma 2008) (Kernick 2002). The remaining study delivered joint care with trained respiratory nurses delivering spirometry, review and education with a GP consultation at the end of initial and follow up visits (Pilotto 2004).

Pilotto 2004 and Heard 1999 specified patients were to attend three asthma clinics during the course of the study whereas Kernick 2002 did not pre-specify an minimum number of reviews. The studies varied from four to six months in the duration of the asthma clinic with follow-up either at intervention end (Kernick 2002; Heard 1999) or between six and nine months after baseline (Pilotto 2004).

Control group

The control groups all comprised usual GP care.

Outcomes

The primary outcome in Kernick 2002 and Pilotto 2004 was quality of life, although using different instruments. In Heard 1999 the authors did not specify primary and secondary outcomes but reported a number of "main outcome measures" listed in Characteristics of included studies.

Funding

Heard 1999 was funded by the Department of Human Services in Adelaide, South Australia. Pilotto 2004 was funded by the Commonwealth Government of Australia under the Divisions of General Practice Program. Kernick 2002 did not declare sources of funding.

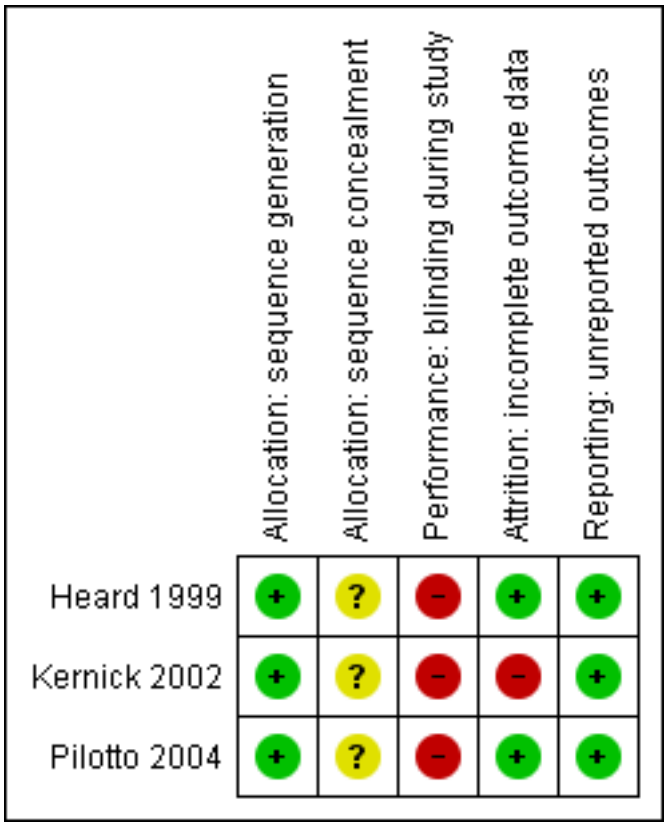
Excluded studies

We excluded 36 studies with reasons (Characteristics of excluded studies). Two studies were not randomised controlled trials (Cave 2001; Lukacs 2002). One study described an audit rather than a trial (Hoskins 1999). One study involved an asthma clinic sited in secondary care; this was kindly confirmed by the author on further correspondence (Bergstrom 2010). Five studies involved an intervention which was not carried out in a dedicated asthma clinic (Beilby 2006; Calder 2004; Glasgow 2003; Mitchell 2005; Moudgil 2000). One study compared nurse versus doctor delivered asthma care rather than comparing asthma clinic against control (Lenz 2004). A further study compared nurse, doctor and paediatric care rather than comparing asthma clinic against control (Kuethe 2010). One study looked at an intervention where the asthma clinic was part of a wider and more complex intervention (Lozano 2004). Another study looked at a liaison model of care with specialist nurses based in secondary care (Griffiths 2004). We were unable to retrieve the abstract or full paper for one further study (Rollins 2004a).

Risk of bias in included studies

Full details of risk of bias judgements can be found in Characteristics of included studies. An overview of the 'Risk of bias' findings can be found in Figure 2.

Figure 2. Risk of bias summary: review authors' judgements about each risk of bias item for each included study.



Allocation

All three studies reported adequate sequence generation. Heard 1999 and Kernick 2002 were randomised by patient and Pilotto 2004 randomised by practice. Allocation was not described as well concealed in any of the studies.

Blinding

Given the nature of the intervention, blinding of patients and clinicians was not possible. However, it would be possible to blind outcome assessors, although this would be easy to break. There was no blinding of outcome assessors in Heard 1999 and this was not described in Kernick 2002 and Pilotto 2004.

Incomplete outcome data

Kernick 2002 suffered from high attrition rates where 21 out of 55 patients allocated to the asthma clinic group did not take up a first appointment. Further to this, there was a high withdrawal from both asthma clinic (15/34) and control (25/46) groups after the initial appointment. In Heard 1999 and in Pilotto 2004 attrition was low and fairly comparable between the groups.

Selective reporting

All three studies adequately reported outcome data for all primary and secondary outcomes as listed in the methods, although we were unable to obtain published protocols for each study.

Other potential sources of bias

Heard 1999 discussed the possibility of bias being introduced in this study as participants were randomised into treatment groups before the baseline interview; the authors felt that as some participants may have been aware of their treatment status at the baseline interview, this may have contributed to an observed lack of treatment effect.

Effects of interventions

See: **Summary of findings for the main comparison** Asthma Clinics (Intervention) versus Controls for asthma

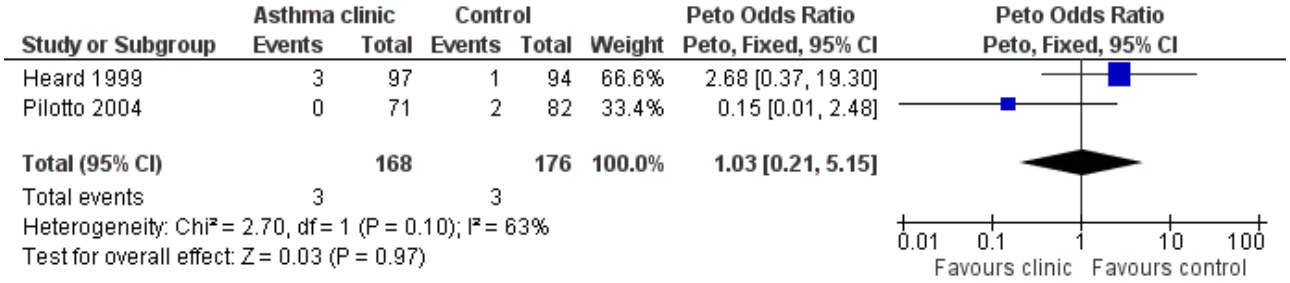
We presented data for all primary outcomes as well as hospitalisations and time lost from work as these were felt to represent clinically and economically significant outcomes. We did not carry out subgroup analyses due to the low number of eligible studies. We have presented data in a 'Summary of findings' table (Summary of findings for the main comparison).

Primary Outcomes

A&E attendances

Two studies on 344 participants reported the number of patients who had one or more A&E attendances during the study period (Heard 1999; Pilotto 2004). Overall there was no statistically significant difference between the asthma clinic and control groups for this outcome (Analysis 1.1). There was a low event rate in both studies (3/168 visited the emergency department (ED) with an asthma clinic and 3/176 control) which contributed to the high degree of uncertainty (Peto OR 1.03; 95% CI 0.21 to 5.15) and there was also significant heterogeneity between the studies (I^2 = 63%) (Figure 3).

Figure 3. Forest plot of comparison: 1 Asthma Clinics (Intervention) versus Controls, outcome: 1.1 Accident & Emergency department attendance.



Use of reliever medication

A single study involving 191 participants reported the use of reliever medication, defined as taking reliever medication in the previous six months (Heard 1999). There was a considerable amount of uncertainty and no statistically significant difference between the asthma clinic and control groups (OR 0.61; 95% CI 0.14 to 2.61).

Use of preventer medication

A single study involving 191 participants showed no statistically significant difference in the use of preventer medication (defined as taking preventer medication in the previous six months) between the two groups (OR 1.20; 95% CI 0.57 to 2.55; Heard 1999). No other study looked at this variable.

Quality of life

Two studies looked at quality of life, Pilotto 2004 using the St George's Respiratory Questionnaire (SGRQ 1991) and Kernick 2002 using both the Asthma Quality of Life Questionnaire (Juniper 1992) and EuroQol 1990. Quality of life data from Pilotto 2004 (170 participants) expressed as mean difference (MD) in SGRQ score, where a reduction of four points meets the threshold for clinical significance, did not demonstrate a statistically significant difference between the asthma clinic and control groups (MD -0.50; 95% CI -4.00 to 3.00). Regression analyses had been performed on this data with adjustment for baseline SGRQ value and allowance for clustering by practice. Quality of life change scores from both instruments in Kernick 2002 (101 participants) were expressed as median and interquartile ranges (IQR), which meant that we were not able to pool the data with Pilotto 2004. The tests showed no change in asthma quality of life score between the asthma clinic group and the control group (Juniper 1992 median 0, (IQR:0.0 to 0.09) asthma clinic, 0 (0.0 to 0.012) control, EuroQol 1990: 0 (0.0 to 1.0) asthma clinic, 0 (0.0 to 0) control). Kernick 2002 also reported numbers of participants with a clinically important improvement in quality of life score (Juniper 1992 > 0.5 points). However, as the equivalent number of participants with a decrease in quality of life score were not reported, we did not analyse or report this data

Secondary Outcomes

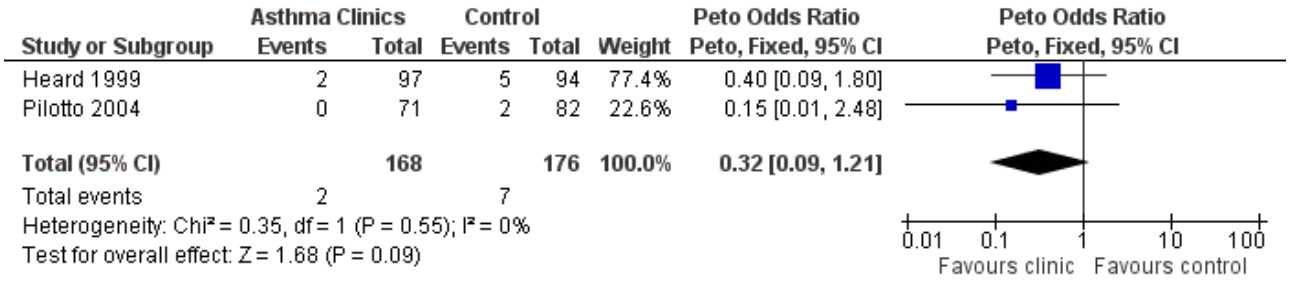
Exacerbations requiring oral steroids

There were no studies looking at this prespecified outcome.

Hospitalisations

Two studies on 344 participants reported the number of patients with one or more hospitalisations (Heard 1999; Pilotto 2004). Heard 1999 reported all-cause hospitalisations and Pilotto 2004 reported only those related to asthma. Event rates were relatively low in both intervention and control groups (2/168 asthma clinics, 7/176 control). There was no heterogeneity between studies and no statistically significant difference between asthma clinic and control groups (Peto OR 0.32; 95% CI 0.09 to 1.21; Figure 4) although the confidence intervals were wide.

Figure 4. Forest plot of comparison: 1 Asthma Clinics (Intervention) versus Controls, outcome: 1.2 Hospital admissions.



Symptoms

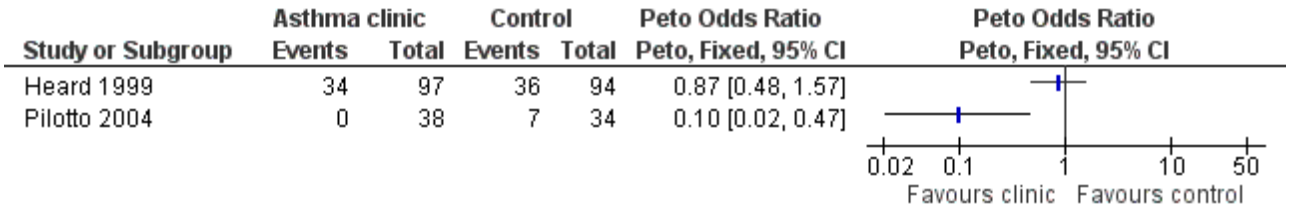
Only one study on 191 participants looked at symptoms as a specified outcome (Heard 1999); whereas symptom data were presented in the other two studies (Kernick 2002; Pilotto 2004) as scores within composite symptom domains of the respective quality of life instruments. Heard 1999 collected data pertaining to morning and nocturnal awakening due to asthma, wheeze or

cough, as the proportion of patients waking with such symptoms at least weekly. There was no statistically significant difference between intervention and control groups in terms of morning awakenings due to asthma (OR 0.56; 95% CI 0.29 to 1.07). There were, however, fewer patients reporting at least weekly nocturnal awakenings due to asthma in the asthma clinic group compared with control (OR 0.31; 95% CI 0.12 to 0.77). Pilotto 2004 (170 participants) reported change scores in the SGRQ symptoms component and this showed no statistically significant difference between asthma clinic and control groups (MD -2.70; 95% CI -6.70 to 1.30). These data were adjusted for baseline and for practice clustering. Kernick 2002 looked at symptoms within one quality of life instrument and expressed data as median and interquartile ranges. Kernick 2002 reported no statistically significant change in the symptom domain of asthma quality of life between asthma clinic and control groups (Juniper 1992: median, (IQR) 0, (0.0 to 0.08) asthma clinic, 0 (0.0 to 0.00) control.

Time lost from work/school

Two studies on 365 participants reported time lost from work or school (Heard 1999; Pilotto 2004). Heard 1999 reported number of people reporting any time lost from work or school during the six months of the study, whereas Pilotto 2004 reported number of patients having one or more days off work due to asthma during the six months of the study. The event rate was expressed out of the entire group in Heard 1999 whereas in Pilotto 2004 it was expressed using those in occupation as the denominator. In Heard 1999 there were relatively high numbers of people reporting time lost from work but no statistically significant difference between the groups (34/97 asthma clinic, 36/94 control) (OR 0.87; 95% CI 0.48 to 1.57). In Pilotto 2004 there were fewer patients losing time from work in both groups than in Heard 1999 and there was less time lost from work in the asthma clinic group compared with the control group (0/38 asthma clinic, 7/34 control) (OR 0.10; 95% CI 0.02 to 0.47) (Figure 5). Due to the high level of heterogeneity between the studies (I^2 = 85%), we did not pool the data.

Figure 5. Forest plot of comparison: 1 Asthma Clinics (Intervention) versus Controls, outcome: 1.3 Number of people reporting time lost from work.

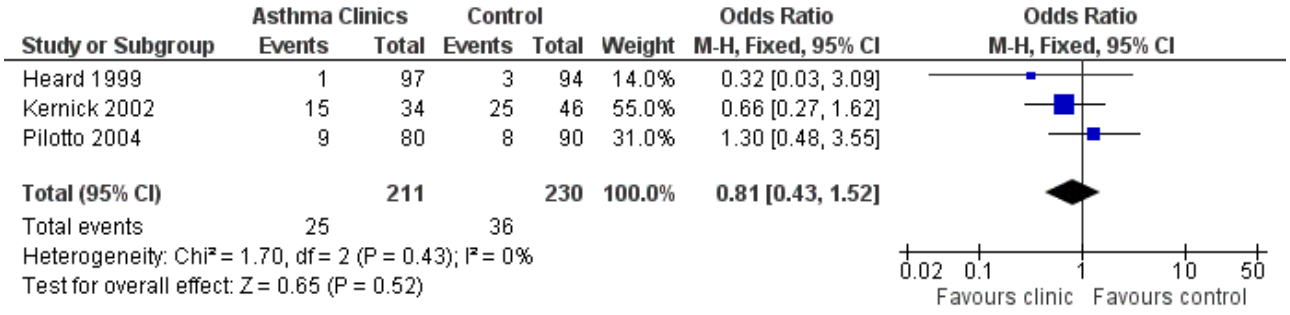


Attrition

Heard 1999 and Pilotto 2004 collected outcome data for all participants that attended at least one asthma clinic, although a significant proportion of patients did not complete the full intervention (i.e. three clinic attendances over the study period, see Table 1). In both these studies all randomised participants attended at least one asthma clinic. Kernick 2002 also collected outcome data for participants that attended at least one asthma clinic but a large proportion of patients randomised did not take up a first clinic appointment (21/55). The authors did not pre specify the number of clinic attendances required for the intervention group.

The number of patients lost to follow up in Heard 1999 and Pilotto 2004 was low and relatively even between the groups (1/97 asthma clinic, 3/94 control and 9/80 asthma clinic, 8/90 control, respectively). Kernick 2002 reported high numbers lost to follow up at the end of the study period in both the asthma clinic group and control group (15/34 asthma clinic, 25/46 control). The pooled result showed no statistically significant difference between the number of patients lost to follow up in the two groups (OR 0.81; 95% CI 0.43 to 1.52) (Figure 6).

Figure 6. Forest plot of comparison: 1 Asthma Clinics (Intervention) versus Controls, outcome: 1.4 Attrition.



DISCUSSION

Summary of main results

This review set out to investigate the effectiveness of asthma clinics in primary care and it is an update of the original review which contained one study (Heard 1999). In this update,we identified and included two further studies (Kernick 2002; Pilotto 2004). The number of included studies was low and number of participants (466) also small, therefore, the data for analysis were limited. We have presented data in the Summary of findings for the main comparison.

There were wide confidence intervals and no statistically significant difference between the asthma clinic group and the control group for the following outcomes: A&E attendances, hospitalisations, use of reliever and preventer medication and quality of life. Of these outcomes, there was there was significant statistical heterogeneity between studies for A&E attendance. One study looked at nocturnal awakenings due to asthma and found a significant reduction in patients reporting this symptom in the asthma clinic group compared with the control group. There was no statistically significant difference and wide confidence intervals between the two groups for other symptom outcomes: morning awakening and symptoms domain scores within differing quality of life instruments. Of the two studies reporting time lost from work/ school, one study showed a statistically significant reduction in this outcome for the asthma clinic group compared with control, whereas the other showed no difference between the two groups. All studies reported attrition and showed no statistically significant difference in the number of patients who were lost to follow up between asthma clinic and control groups. None of the included studies reported upon the outcome of exacerbations requiring oral steroids.

Overall, our review demonstrated limited evidence of efficacy or harm for asthma clinics compared to usual care apart from a single study showing some evidence of symptomatic benefit (nocturnal awakening).

Overall completeness and applicability of evidence

There was substantial heterogeneity between the studies for both A&E attendance and time lost from work. Differences between the studies that may account for the heterogeneity include differences in outcome definitions. Heard 1999 reported time off work or school for any reason and all-cause hospitalisations and A&E attendances, whereas Pilotto 2004 reported time off work, hospitalisations and A&E attendances due to asthma. Furthermore, Heard 1999 included children and adults (aged 5 to 65 years) within the study, whereas Pilotto 2004 looked at participants over 18 years. Children are more likely to have time off school than adults time off work, which may account for the higher rates of absence in Heard 1999. Both studies excluded participants in retirement, Heard 1999 by excluding those over 64, and Pilotto 2004 by including only those in employment in the analyses.

The high attrition rate in Kernick 2002 may have affected the results for quality of life and symptoms. Many participants in this study did not attend a first appointment and a significant number subsequently dropped out. This may have been because there was a pre-existing asthma clinic in the practice and the trialists had to invite people who had already refused prior invitation to the clinic previously - this means drawing participants from a pool of people who may be poor attenders. We are uncertain why this group are poor attenders and they may not therefore be representative of the general asthmatic population. The high attrition in this study means results are difficult to interpret meaningfully as we do not know what happened to the majority of the participants who enrolled in the study. Furthermore, in the other two studies there was incomplete participation in the full intervention (three asthma clinic visits over the study period). This may have led to a conservative estimation of asthma clinic efficacy although may reflect real-life attrition. The premise for asthma clinics is to optimise asthma control and education within a routine appointment so as to avert urgent care, thus reducing morbidity and cost. Asthma clinics aim to focus on asthma control in dedicated clinician time, rather than opportunistically, where other pressures may compete. However, the poor attendance of asthma clinics may represent issues with feasibility of the intervention as patients may often be asymptomatic and, therefore, may be unwilling to take up appointments when they feel well. There may also be added inconvenience through holding a regular fixed asthma clinic which may not allow as much patient flexibility as when booking routine appointments.

Only one study Heard 1999 looked at two of this review's primary outcomes: use of reliever and preventer medication, however, it dichotomised this outcome into "at least weekly" and "less frequently/ never". Whilst this allowed there to be sufficient numbers of participants in each group for analysis, it means the data are less meaningful to interpret. Use of reliever medication at least weekly does not necessarily signify poor control, but will include those with very poor control (e.g. several times daily) in the same category as those with adequate control (e.g. only once a week). Likewise, use of preventer medication at least weekly may represent patients with poor compliance (e.g. only once a week) along with those that use their preventers regularly (e.g. twice daily) as prescribed.

A further limitation of the included studies relates to their length, with studies varying from four to six months in intervention duration. It is difficult to know whether this is a sufficient length of time to observe effect, especially for outcomes where events are rare. Furthermore, as asthma symptoms are affected by seasonal variation in climate and environment, it may be more representative for study periods to run for at least a full year to take account of this. Where event rates are low, larger, as well as longer studies may be able to show whether effects are significant.

Two studies (Heard 1999; Pilotto 2004) were set in Australia and Kernick 2002 was set in the UK. These are both counties which have a significant and growing asthma prevalence. It is known that the rate of asthma increases as communities adopt western lifestyles and become urbanised (Beasley 1998) and asthma clinics tend to be more concentrated in Western, predominantly high income settings. With the projected increase in the world's urban populations, the burden of asthma is expected to grow. Whilst there is growing recognition of the significant burden of asthma worldwide, it is debatable as to how well methods of asthma care developed in high income settings will transfer to lower income settings. Geography, infrastructure, culture, education and resources will all pose significant barriers to delivery of asthma clinics in alternative settings. Furthermore, asthma care may be

seen as a lesser public health priority where other respiratory illnesses e.g. pneumonia, tuberculosis, take precedence.

Quality of the evidence

Both Heard 1999 and Pilotto 2004 were of good methodological quality, whereas Kernick 2002 was a "pragmatic" study. This latter study was sited within an existing asthma clinic rather than starting a clinic de novo, hence there were inherent limits in methodology. Participants recruited to the study were adult patients who had not already attended the practice's existing asthma clinic, therefore, may have been previously invited and not attended for unknown reasons, hence these patients may not be representative of the general asthmatic population. Due to the nature of the asthma clinic intervention it was not possible to blind participants or personnel, however, it is not clear that all attempts were made in the studies to conceal allocation of either practice or patient to the intervention or control arm, as this was not adequately described.

Heard 1999 and Kernick 2002 were randomised by patient and Pilotto 2004 randomised by practice which may have created differences between the studies. As Heard 1999 was randomised within the practice, clinicians saw both clinic and control patients, unblinded to their allocation. This may have led to contamination of clinical practice across groups where clinicians having been trained up to deliver asthma care as part of the clinic may also have treated patients with asthma presenting in routine care in a similar way. In Heard 1999, we used raw data in analysis as we were unable to use calculated odds ratios adjusted for clustering by GP. In Pilotto 2004, we were able to use data where clustering for practice had been adjusted for in our analysis. This gave us greater confidence that any difference in the results between the asthma clinic and control groups was not attributable to practice differences. For example, practice differences in A&E attendances may relate to practice processes and practice location (e.g. proximity to secondary care).

Potential biases in the review process

As there was no prior accepted definition of an asthma clinic a pragmatic definition was used for the purposes of this review which is open to criticism. Furthermore, despite attempts to apply a systematic process in selecting studies for inclusion or exclusion, the final decisions are subject to a level of interpretation. We attempted to minimise clinical heterogeneity by excluding trials where the asthma clinic was part of a more complex intervention (e.g. peer leader education alongside an asthma clinic) and where the intervention did not clearly fulfil important aspects of our definition, e.g. dedicated, regular time slot (see Characteristics of excluded studies)

The issue of large and/or uneven attrition, as mentioned above, will, even if addressed, possibly introduce bias as there is uncertainty as to how to handle participants for whom no data are available.

Agreements and disagreements with other studies or reviews

We have found no previous reviews addressing the efficacy of asthma clinics but there have been other randomised controlled trials (RCTs) looking at interventions where proactive, routine asthma care have taken place although not sited within a dedicated asthma clinic. Glasgow 2003 (174 participants) looked at proactive asthma care in childhood whereby a "3+plan" was instituted for participating families. This comprised three or more visits with prespecified content and active recall of patients to optimise attendance. The authors found a non-statistically significant reduction in emergency department attendance rates in the intervention group compared with control (OR 0.4; 95% CI 0.2 to 1.04) and no statistically significant differences in number of days absent from school or symptom-free day scores. Mitchell 2005 (270 general practitioners and 771 admissions for asthma) evaluated the effect of implementing an asthma clinical pathway for children in general practice where intervention clinicians received training on the protocol-based management of acute and recurrent asthma. The authors found reduced hospital admissions in the intervention group but no evidence of lower morbidity.

Lozano 2004 (638 children) assessed a complex intervention including peer leader education as well as organised care, and found reductions in annual symptom days. We cannot comment on which part of this complex intervention was responsible for observed improvements. Another study focusing on primary care based asthma clinics employed a pre and post experimental study design (Cave 2001, 129 participants). This found a significant fall in the time lost from work/school and nocturnal awakening as well as a significant reduction in the use of oral steroids and rescue bronchodilator use. The design, however, was not randomised and therefore, subject to selection bias. A further Swedish cross-sectional survey (Lisspers 2010) compared outcomes for practices with asthma clinics to those without (1477 participants) and found that although the asthma clinic patients had improved knowledge, there was no difference in asthma control and quality of life. Overall, there have been few studies, they have shown inconsistent results when evaluating organised care and it is difficult to tease out the many factors (structural, clinical, educational) factors leading to any observed benefit.

A systematic review has shown that despite comparable asthma frequency between ethnic groups, South Asian and black people had a higher risk of admission for asthma than white people (Netuveli 2005). The aetiology of this effect is unknown, whether this is due to ethnic variations in asthma severity, or whether language or culture impact on health-seeking behaviour and access to healthcare. Certainly further research will need to examine delivery of asthma care with particular attention to these factors.

Few studies have explored reasons for poor attendance at asthma clinics, however Jones 1995 looked at patients' views of asthma clinics. They reported that patients did not regard attendance at practice-based asthma clinics as being of potential benefit to them, with many reporting that "their" asthma was not deemed to be the variety that "kills". This issue, therefore, needs to be addressed in future research through further exploration of patients' views and reasons for non-attendance as well as looking at more convenient forms of asthma care e.g. telephone or internet-based review, which may increase patient participation.

There have been various computations of organised routine asthma care, some focusing on delivery e.g. via nurse, doctor, pharmacist and lay person, or route e.g. face-to-face, telephone and web-based. These may be explored in other reviews but were felt too heterogenous to fall under the remit of this review.

AUTHORS' CONCLUSIONS

Implications for practice

There is no conclusive evidence in this review to support or refute primary care based clinics for asthma in terms of exacerbations, symptoms and quality of life, because the evidence was limited by the small number of included studies and number of participants in them. There was also statistical heterogeneity between the studies for some of the outcomes.

The underpinning hypothesis in support of asthma clinics is that routine care, including education and clinical review, leads to better controlled asthma and reduced urgent care need. However, there is cost to consider in delivering asthma clinics as well as the feasibility of such clinics to patients themselves. On balance, it is unclear as to whether asthma clinics are effective, and whilst they do not appear harmful, whether they are cost effective and acceptable.

Implications for research

Going forward it will be less feasible to conduct further controlled studies in countries such as the UK and Australia where asthma clinics are already widespread. With the growing burden of asthma worldwide, however, it will be important to explore the delivery of asthma care whether via dedicated asthma clinics or alternative models in different income and cultural settings.

Moreover, further research to tease out the relative effects of structure and content of asthma clinic reviews would bring clarity, as well as further exploration as to the acceptability of such clinics to patients.

ACKNOWLEDGEMENTS

The authors of the original review (Jones 2002) would like to thank the following people for their help: Karen Blackhall, Steve Milan and Paul Jones ; Staff of the Post-Graduate Library, Morriston Hospital, Swansea; Members of the Department of General Practice, UWCM (Mike Robling, Rhiannedd Tudor Jones and Kerry Hood).

For the update the authors would like to thank Emma Welsh, Liz Stovold and Chris Cates.

We acknowledge the contribution of the previous lead author, Felix Ram, and the review team comprising Jeannie Fay and Arthur Jones, to writing the original version of this review.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Heard 1999

Methods	Randomised open trial in eight general practices.
Participants	195 patients with asthma age range 5-64 years (mean 26-27 yrs) registered with general practices in South Australia. 191 patients completed the trial (97 in the clinic group and 94 in the control group).
Interventions	Each general practice operated one three-hour asthma clinic session per week. Each intervention patient was asked to attend three asthma clinic sessions over six months involving nurse counselling, education about asthma management, spirometry and consultation with the general practitioner. Nurses were practicing registered nurses with extensive experience in respiratory care.
Outcomes	A telephone interview was conducted at the beginning and end of the study using adapted questions from the Southampton Morbidity Index and questions relating to clinical practice. Outcome measures included days lost from work/school, triggers discussed with doctor, action plans received, reliever medication use, having a peak flow meter, smokers, waking in the morning or night, hospital admission, emergency department (ED) visits, doctor home visits.
Notes	Participants were individually randomised within practices into intervention and control group, hence not cluster randomised across practices.

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation: sequence generation	Low risk	A randomisation chart was set up for each participating practice at Asthma South Australia. There was no statistically significant difference between the clinic and control group at baseline for dichotomous study variables and this was felt to provide evidence for effective randomisation.
Allocation: sequence concealment	Unclear risk	Not described.
Performance: blinding during study All outcomes	High risk	Patients and doctors were not blinded as to who had received the intervention and who were controls. General practitioners and the asthma educators were informed of a participant's treatment allocation before the baseline interview.

Heard 1999 *(Continued)*

Attrition: incomplete outcome data All outcomes	Low risk	There was a small number of withdrawals (1/97 intervention group and 1/94 control group) and low numbers lost to follow-up (0/97 intervention group and 2/94 control group).
Reporting: unreported outcomes	Low risk	Outcomes are reported as per outlined in the methods.

Kernick 2002

Methods	Randomised controlled trial in one general practice.
Participants	101 patients were recruited between the ages of 18 and 55 years.These were patients registered on the asthma database of one practice in the UK, who had not already been seen in the asthma clinic. 55 patients entered the intervention group, of which 19 completed the trial and 46 patients entered the control group, of which 21 completed the trial.
Interventions	Patients were invited to attend the asthma clinic where they received assessment, education and management from a practice nurse trained in asthma care and British Thoracic Society guidelines. Doctors would sign prescriptions if they conformed to the recommended guidelines. They were followed up over a four-month period.
Outcomes	Asthma-related quality of life as measured by the Juniper Quality of Life Instrument (Juniper 1992). Secondary outcome measure: the EQ4D generic quality of life score (EuroQol 1990). Outcomes were assessed at baseline and four months.
Notes	

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation: sequence generation	Low risk	Patients were randomised into control and intervention groups using computer-generated random numbers.
Allocation: sequence concealment	Unclear risk	The randomisation was undertaken by the study co-ordinator who was not blinded to the patient groups.
Performance: blinding during study All outcomes	High risk	Unblinded due to nature of intervention.
Attrition: incomplete outcome data All outcomes	High risk	There was significant attrition within the study, which was uneven between groups (21/55 intervention group did not want a first appointment, and 15/34 intervention, 25/46 control were lost to follow-up).
Reporting: unreported outcomes	Low risk	Results for all listed primary and secondary outcomes reported.

Pilotto 2004

Methods	Randomised controlled trial in 11 general practices.

Pilotto 2004 *(Continued)*

Participants	There were 80 asthma clinic participants and 90 usual care participants aged 18 years and older registered at practices in Adelaide, Australia.
Interventions	The asthma clinics were conducted by two trained respiratory nurses and included spirometry, asthma review and education. Each intervention participant was invited to attend an initial visit, a two-week follow-up visit and a third visit within three months; on each visit they saw a nurse and also the GP.
Outcomes	The primary outcome variable was quality of life measured by the SGRQ, Secondary outcome measures were lung function (FEV_1), asthma-related health service utilisation, number of days off work because of asthma, design and use of written asthma action plan and smoking cessation. Participants were contacted at baseline and then at between six and nine months to arrange collection of outcome data.
Notes	Randomisation occurred at practice level so the clustering effect of having participants within practices was allowed for in analyses.

Risk of bias

Bias	Authors' judgement	Support for judgement
Allocation: sequence generation	Low risk	Computer-generated random numbers to allocate practices to intervention or control.
Allocation: sequence concealment	Unclear risk	Not described.
Performance: blinding during study All outcomes	High risk	Unblinded due to nature of intervention.
Attrition: incomplete outcome data All outcomes	Low risk	There was comparable loss to follow-up from each group (9/80 intervention and 8/90 control). Baseline characteristics of those lost to follow-up did not differ from those who completed the study. It is noted that there are incomplete outcome data for the control group with respect to post bronchodilator spirometry although this is not explained.
Reporting: unreported outcomes	Low risk	Results for all listed primary and secondary outcomes reported.

SGRQ: St George's Respiratory Questionnaire

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Abdulwadud 1999	Cross-sectional survey.
Baldwin 1997	Comparison of different forms of patient management within GP asthma clinic; not comparison of patients in GP clinic, with patients receiving "usual care".
Beilby 2006	Intervention did not take place within a dedicated asthma clinic.
Bergstrom 2010	Intervention asthma clinic took place within secondary care as kindly confirmed by the author.
Bramson 1996	Commentary on Lahdesuo's paper (BMJ 1996;312:48-52) comparing guided self-management with traditional asthma care.

Study	Reason for exclusion
Bryce 1995	Study did not use asthma clinics as their intervention.
Buchner 1998	Not a randomised controlled trial (RCT).
Calder 2004	Intervention did not take place within a dedicated asthma clinic.
Cave 2001	Not an RCT.
Cimas 1997	Descriptive cross-over study comparing patients cared for by family doctors and pneumology specialists.
Dickinson 1997	Not an RCT.
Dickinson 1998	Not an RCT.
Drummond 1994	Comparison of hospital asthma clinics with hospital + GP clinics; not GP clinics with usual GP care.
Evans 1997	Not an RCT of asthma clinics. Intervention was to train clinic staff and to observe the effect of this training on patient outcomes, no intervention with patients as such
Forsch 1996	Commentary on Sherestha's paper (Chest 1996; 110:42-7) comparing nebulization with albuterol.
Glasgow 2003	Intervention did not take place within a dedicated asthma clinic.
Griffiths 2004	Asthma clinic is only part of a larger more complex intervention including educational outreach and ongoing clinical support.
Groban 1998	Not an RCT.
Gruffydd-Jones 1999	Results of telephone questionnaire administered to asthma clinic non-attenders.
Hoskins 1999	Not an RCT.
Jones 1995	Comparison of one practice with an asthma clinic, with the asthmatic patients in a general practice without an asthma clinic i.e. not randomised.
Kuethe 2010	Comparison of nurse, doctor and paediatric care rather than comparing asthma clinic against control.
Lenz 2004	Comparison of nurse versus doctor delivered asthma care rather than comparing asthma clinic against control.
Lozano 2004	Intervention did not take place within a dedicated asthma clinic.
Lukacs 2002	Not an RCT.
Mitchell 2005	Intervention did not take place within a dedicated asthma clinic.
Moudgil 2000	Intervention did not take place within a dedicated asthma clinic.
Neville 1996	Not an RCT.
Premaratne 1999	Not an RCT of asthma clinics but rather a project to facilitate practice nurses' provision of asthma services.

Study	Reason for exclusion
See Tai 1999	Evaluation of the asthma clinic computer template - not of the clinic itself.
Stalsby Lundborg1999	Concerning educational interventions effect on prescribing practices - not on clinic care.
Szilagyi 1999	Not an RCT.
Thapar 1994	Comparison of individual patient education with small group education.
White 1989	Comparison of the effect of education programmes delivered to GPs.

Characteristics of studies awaiting assessment *[ordered by study ID]*

Rollins 2004

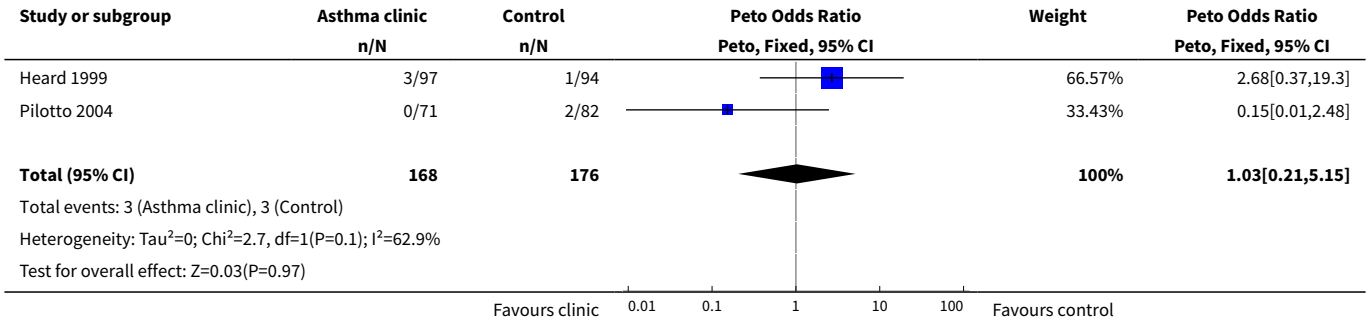
Methods	Not known; unable to obtain abstract and full paper.
Participants	No further information except involved paediatric care.
Interventions	New model of paediatric care; no further details available.
Outcomes	Not known.
Notes	We contacted the author for further information but did not receive a response.

DATA AND ANALYSES

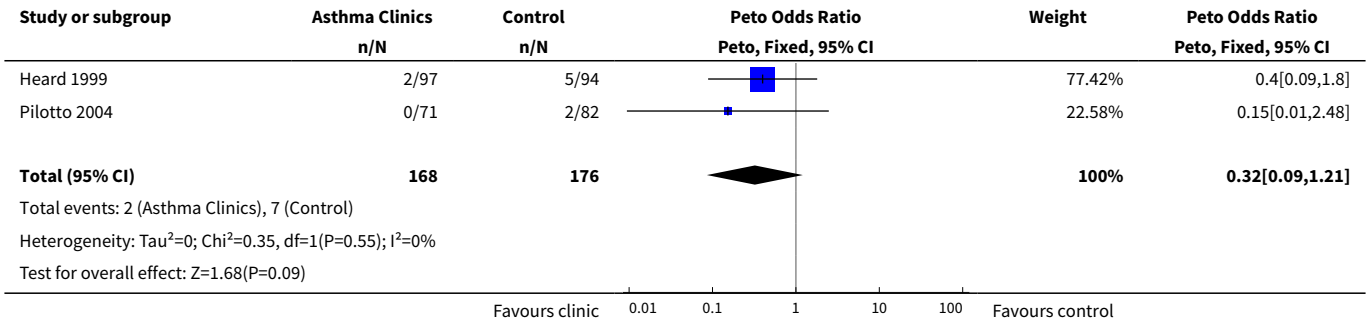
Comparison 1. Asthma clinic versus control

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1 Accident & Emergency department attendance	2	344	Peto Odds Ratio (Peto, Fixed, 95% CI)	1.03 [0.21, 5.15]
2 Hospital admissions	2	344	Peto Odds Ratio (Peto, Fixed, 95% CI)	0.32 [0.09, 1.21]
3 Number of people reporting time lost from work	2		Peto Odds Ratio (Peto, Fixed, 95% CI)	Totals not selected
4 Attrition	3	441	Odds Ratio (M-H, Fixed, 95% CI)	0.81 [0.43, 1.52]

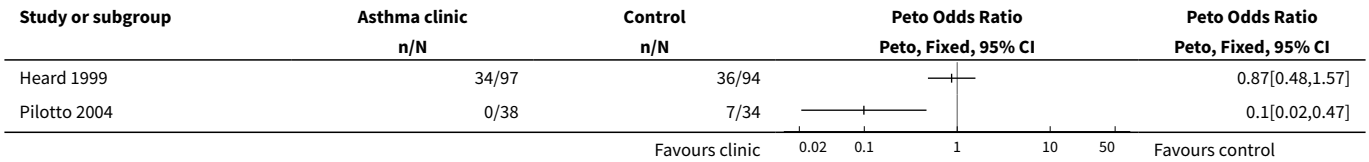
Analysis 1.1. Comparison 1 Asthma clinic versus control, Outcome 1 Accident & Emergency department attendance.



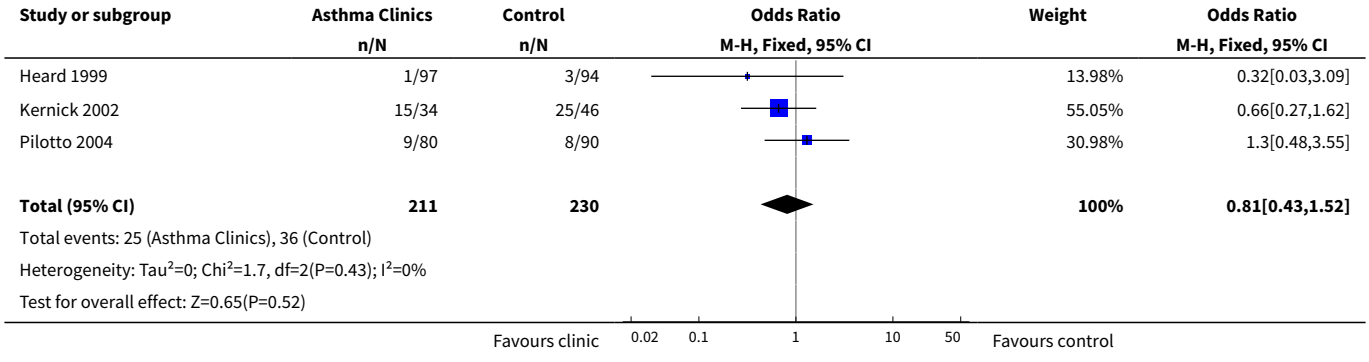
Analysis 1.2. Comparison 1 Asthma clinic versus control, Outcome 2 Hospital admissions.



Analysis 1.3. Comparison 1 Asthma clinic versus control, Outcome 3 Number of people reporting time lost from work.



Analysis 1.4. Comparison 1 Asthma clinic versus control, Outcome 4 Attrition.



ADDITIONAL TABLES

Table 1. Attrition

	Randomised to clinic	Attended ≥1 clinic	Completed all clinics	Lost to follow up	Completed trial
Heard 1999	98	98	67	1/98	97
Kernick 2002	55	34	not reported	15/34	19
Pilotto 2004	80	80	34	9/80	71

APPENDICES

Appendix 1. Sources and search methods for the Cochrane Airways Group Specialised Register (CAGR)

Electronic searches: core databases

Database	Frequency of search
MEDLINE (Ovid)	Weekly
EMBASE (Ovid)	Weekly
CENTRAL (*The Cochrane Library*)	Quarterly
PsycINFO (Ovid)	Monthly
CINAHL (EBSCO)	Monthly
AMED (EBSCO)	Monthly

Handsearches: core respiratory conference abstracts

Conference	Years searched
American Academy of Allergy, Asthma and Immunology (AAAAI)	2001 onwards
American Thoracic Society (ATS)	2001 onwards
Asia Pacific Society of Respirology (APSR)	2004 onwards
British Thoracic Society Winter Meeting (BTS)	2000 onwards
Chest Meeting	2003 onwards

(Continued)

European Respiratory Society (ERS)	1992, 1994, 2000 onwards
International Primary Care Respiratory Group Congress (IPCRG)	2002 onwards
Thoracic Society of Australia and New Zealand (TSANZ)	1999 onwards

MEDLINE search strategy used to identify trials for the CAGR

Asthma search

1. exp Asthma/
2. asthma$.mp.
3. (antiasthma$ or anti-asthma$).mp.
4. Respiratory Sounds/
5. wheez$.mp.
6. Bronchial Spasm/
7. bronchospas$.mp.
8. (bronch$ adj3 spasm$).mp.
9. bronchoconstrict$.mp.
10. exp Bronchoconstriction/
11. (bronch$ adj3 constrict$).mp.
12. Bronchial Hyperreactivity/
13. Respiratory Hypersensitivity/
14. ((bronchial$ or respiratory or airway$ or lung$) adj3 (hypersensitiv$ or hyperreactiv$ or allerg$ or insufficiency)).mp.
15. ((dust or mite$) adj3 (allerg$ or hypersensitiv$)).mp.
16. or/1-15

Filter to identify RCTs

1. exp "clinical trial [publication type]"/
2. (randomised or randomised).ab,ti.
3. placebo.ab,ti.
4. dt.fs.
5. randomly.ab,ti.
6. trial.ab,ti.
7. groups.ab,ti.
8. or/1-7
9. Animals/
10. Humans/

11. 9 not (9 and 10)

12. 8 not 11

The MEDLINE strategy and RCT filter are adapted to identify trials in other electronic databases

Appendix 2. Search methods from 2001 version

"A search of the Cochrane Airways Group register and Cochrane Controlled Trials Register using the following search strategy:

clinic* OR general pract* OR family pract* or primary care"

WHAT'S NEW

Date	Event	Description
1 December 2011	New citation required but conclusions have not changed	Two new studies added. Conclusion unchanged.
1 December 2011	New search has been performed	New literature search run.

HISTORY

Protocol first published: Issue 2, 1996
Review first published: Issue 2, 2002

Date	Event	Description
18 August 2008	Amended	Converted to new review format.
26 November 2001	New citation required and conclusions have changed	Substantive amendment

CONTRIBUTIONS OF AUTHORS

CK: Screening search results, data extraction, data entry and drafting review.

EB: Screening search results, data extraction, data entry and drafting review.

DECLARATIONS OF INTEREST

There are no known conflicts of interest.

SOURCES OF SUPPORT

Internal sources

- Department of General Practice, University of Wales College of Medicine, UK.
- NHS Research and Development, UK.

External sources

- Welsh Office of Research and Development for Health and Social Care, The National Assembly for Wales, UK.
- Garfield Weston Foundation, UK.

INDEX TERMS

Medical Subject Headings (MeSH)

*Practice Patterns, Nurses'; Asthma [*therapy]; Delivery of Health Care, Integrated [*organization & administration]; Disease Progression; Outcome Assessment, Health Care; Primary Health Care [*organization & administration]; Randomized Controlled Trials as Topic

MeSH check words

Adolescent; Adult; Child; Child, Preschool; Humans; Middle Aged; Young Adult