Indigenous healthcare worker involvement for Indigenous adults and children with asthma (Review)

Chang AB, Taylor B, Masters IB, Lafoo Y, Brown ADH

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Indigenous healthcare worker involvement for Indigenous adults and children with asthma

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ABSTRACT

Background

Asthma education is regarded as an important step in the management of asthma in national guidelines. Racial and socio-economic factors are associated with markers of asthma severity, including recurrent acute presentations to emergency health facilities. Worldwide, indigenous groups are disproportionately represented in the severe end of the asthma spectrum. Appropriate models of care are important in the successful delivery of services, and are likely contributors to improved outcomes for people with asthma.

Objectives

To determine whether involvement of an indigenous healthcare worker (IHW) in comparison to absence of an IHW in asthma education programmes, improves asthma related outcomes in indigenous children and adults with asthma.

Search strategy

We searched the Cochrane Central Register of Controlled Trials (CENTRAL), the Cochrane Airways Group Specialised Register, MEDLINE and EMBASE databases, review articles and reference lists of relevant articles. The latest search was in December 2008.

Selection criteria

All randomised controlled trials comparing involvement of an indigenous healthcare worker (IHW) in comparison to absence of an IHW in asthma education programmes for indigenous people with asthma.

Data collection and analysis

Two independent review authors selected data for inclusion, a single author extracted the data. Both review authors independently assessed study quality. We contacted authors for further information. As it was not possible to analyse data as “intention-to-treat”, we analysed data as “treatment received”.

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Main results

Only a single study was applicable for this review, and included 24 children randomised to an asthma education programme involving an IHW, compared to a similar intervention without an IHW. Twenty two of these children completed the trial. Only one outcome (asthma knowledge in children, mean difference of 3.30 units, 95% CI 1.07 to 5.53) significantly favoured the IHW involvement group. However, although not statistically significant, all the outcomes favoured the group that had IHW involvement in the asthma education program. There were no studies in adults.

Authors’ conclusions

The involvement of IHW in asthma programs targeted for their own ethnic group in one small trial was beneficial for some but not all asthma outcomes. Thus there is insufficient data to be confident that the involvement of IHW is beneficial in all settings. Nevertheless, given the complexity of health outcomes and culture as well as the importance of self-determination for indigenous peoples, the practice of including IHW in asthma education programs for indigenous children and adults with asthma is justified, but should be subject to further randomised controlled trials.

PLAIN LANGUAGE SUMMARY

Indigenous healthcare worker involvement for indigenous adults and children with asthma

World-wide indigenous people with asthma are disproportionately represented in the severe end of the disease spectrum. Appropriate models of care are important in the successful delivery of services, and are likely contributors to improved outcomes for people with asthma. In this review, we examined if involvement of an indigenous healthcare worker (IHW) (when compared to absence of an IHW) in asthma education programmes improves asthma related outcomes in Indigenous children and adults with asthma. There was only one relevant study with 24 children eligible for inclusion, and the involvement of an IHW, specifically targeting clients of the same ethnic group, was beneficial in one, but not all, asthma-related outcomes. There is insufficient data to be absolutely confident that the involvement of IHW is beneficial in all like settings. Nevertheless, given the complexity of health outcomes and culture as well as the importance of self-determination for indigenous peoples, the practice of including IHW in asthma education programs for indigenous children and adults with asthma is justified unless new research data show otherwise. More studies are clearly required to address this question so to inform relevant clinical practice and health policy.

BACKGROUND

Asthma education for people with asthma is regarded as an important step in the management of asthma in national asthma guidelines (Coughlan 2000; BTS 2005). Asthma education, defined as the provision of disease related and management information on asthma, encompasses various formats that includes face-to-face encounters, group sessions, outreach and home visits, provision of asthma action plans, education of recognition of loss of asthma control and self management skills (BTS 2005). Most of these are addressed (or being addressed) in other Cochrane reviews (Gibson 2002a; Gibson 2002b; Powell 2002; Wolf 2002; Toelle 2004) and a protocol (Bailey 2009) from the Cochrane Airways Group.

Racial and socio-economic factors are associated with asthma severity and recurrent acute presentations to emergency health facilities (de Oliveira 1999; Sin 2002). The reasons for this are unclear; contributing factors are arguably likely to include broad service delivery issues rather than a reflection of intrinsic asthma severity (Enarson 1999; Chang 2000b). Other cultural influences on the management of asthma include symptom perception and understanding of disease and self management (Enarson 1999). Appropriate models of care are important in the successful delivery of healthcare services, and contribute to improved care of people with asthma (Partridge 2000; Chang 2002). Models of care should be culture appropriate (Enarson 1999). As outlined by Swartz and Dick, the World Health Organisation model of healthcare for chronic diseases in low-income settings recognises that “health care should facilitate an ongoing relationship between provider and patient and help patients to make full use of their own and their community’s resources for health” (Swartz 2002). Not surprisingly, in the health literature for indigenous groups, the model of care for chronic diseases in indigenous people in-
cludes the involvement of indigenous healthcare workers (IHWs) (Hamdorf 1996; NHMRC 2005; Chino 2006). Amongst other factors, involvement of IHWs would facilitate this relationship between patient and the provider. Furthermore, involvement of IHWs could reduce the prejudices and inequities that exist in some sections of healthcare systems (Eades 2000) and contribute to capacity building of the local community, a key component of the Ottawa Charter for Health Promotion (WHO 1986). However, while this is indisputably culturally important, the additional human resources involve a cost for the health system. This cost must be weighed against the available evidence of benefits to patients, their communities and the broader healthcare system.

The definition, background training and tasks performed by IHWs varies from state to state and country to country. Country specific definitions of ‘indigenous’ status also vary from country to country. These terms are not always universally accepted or used, and in fact, remain a highly contested term (Nettelton 2007). "In Australia, accepted terminology for indigenous peoples includes ‘Australian Aboriginal and Torres Strait Islander Peoples’, in the USA and Canada the term ‘First Nations’ is used to describe the Indian, Métis, and Inuit populations” (Cunningham 2003). “In Hawaii, native Hawaiian finds favour” and “the Maori of New Zealand use ‘Tangata Whenua’ or ‘people of the land’ in preference to Maori” (Cunningham 2003). Although cognisant of the various preferences by different groups, an encompassing term is required for this review. We have chosen the term ‘indigenous’ which is defined in recognition of “the experiences shared by a group of people who have inhabited a country for thousands of years, which often contrast with those of other groups of people who reside in the same country for a few hundred years” (Cunningham 2003).

Outcomes of asthma education programmes can be variably defined. Arguably the most important asthma education outcome is the provision of self management so as to prevent death and morbidity from acute exacerbations. Other outcomes are reduction of day to day morbidity from asthma-related symptoms and objective measurements of asthma severity (BTS 2005).

A systematic review to determine whether involvement of an indigenous healthcare worker (IHW) improves asthma related outcomes in Indigenous children and adults with asthma, will be useful to guide clinical practice and health policy.

**OBJECTIVES**

To determine whether involvement of an indigenous healthcare worker (IHW) in comparison to absence of an IHW in asthma education programmes, improves asthma related outcomes in Indigenous children and adults with asthma.

**METHODS**

**Criteria for considering studies for this review**

**Types of studies**

All randomised controlled trials comparing involvement of an indigenous healthcare worker (IHW) in comparison to absence of an IHW in asthma education programmes for indigenous people with asthma.

**Types of participants**

Indigenous children and adults with classical asthma (recurrent wheeze, dyspnoea or bronchodilator responsiveness) that responds to beta2 agonists

Exclusion criteria: eosinophilic bronchitis, asthma related to an underlying lung disease such as bronchiectasis and chronic obstructive airway disease, or diagnostic categories such as ‘cough variant asthma’ and ‘wheezy bronchitis’ if controversies exist.

**Types of interventions**

All randomised controlled studies involving comparisons of IHW versus no IHW in asthma education programmes. It was planned that trials that included the use of other education and other interventions would have been included if all participants had equal access to such interventions. An education programme is defined as a programme which transfers information about asthma in any form.

**Types of outcome measures**

**Primary outcomes**

Proportion of participants who had asthma exacerbations during follow up

**Secondary outcomes**

1. Proportions of participants not substantially improved at follow up,
2. Mean difference in asthma related outcome measures
3. Proportions experiencing adverse effects (from medications, etc)
4. Adherence outcomes
5. Asthma knowledge factors
6. Economic data
It was planned that for the proportions of participants, the mean clinical improvement would have been determined using the following hierarchy of assessment measures (i.e. if two or more assessment measures are reported in the same study, the outcome measure that is listed first in the hierarchy would have been used).

i) Death, hospitalisation, acute presentations to an emergency facility for asthma
ii) Rescue courses of oral corticosteroids
iii) Symptomatic (Quality of life, Likert scale, asthma diary, visual analogue scale, asthma control scores) - assessed by the patient
adult or child
iv) Symptomatic (Quality of life, Likert scale, asthma diary, visual analogue scale, asthma control scores) - assessed by the parents/carers.

Search methods for identification of studies

We used the following topic search strategy to identify the relevant randomised controlled trials listed on the electronic databases: “asthma”, all as (textword) or (MeSH) AND “indigenous” OR “aboriginal” OR “minority groups” AND “education” OR “self management” OR “self-management” For the full strategies for each database please see Appendix 1. We identified trials from the following sources.

1. The Cochrane Central Register of Controlled Trials (CENTRAL).
2. The Cochrane Airways Group Specialised Trials Register.
3. MEDLINE (1966 to December 2008). Topic search strategy combined with the RCT search filter as outlined in the Airways Group module.
4. OLDMEDLINE (1950 to 65). Topic search strategy combined with the RCT search filter as outlined in the Airways Group module.
5. EMBASE (1980 to Dec 2008). Topic search strategy combined with the RCT search filter as outlined in the Airways Group module.
6. The list of references in relevant publications.
7. Written communication with the authors of trials included in the review.

Data collection and analysis

Selection of studies

Retrieval of studies: From the title, abstract, or descriptors, two review authors (AC, AB) independently reviewed literature searches to identify potentially relevant trials for full review. Searches of bibliographies and texts were conducted to identify additional studies. From the full text using specific criteria, both review authors independently selected trials for inclusion. Any disagreement would have been resolved by consensus.

Data extraction and management

We reviewed trials that satisfied the inclusion criteria and recorded the following information: study setting, year of study, source of funding, patient recruitment details (including number of eligible participants), inclusion and exclusion criteria, other symptoms, randomisation and allocation concealment method, numbers of participants randomised, blinding (masking) of participants, care providers and outcome assessors, type of education, dose and type of intervention, duration of therapy, co-interventions, numbers of patients not followed up, reasons for withdrawals from study protocol (clinical, side effects, refusal and other), details on side effects of therapy, and whether intention-to-treat analyses were possible. A single author (AC) extracted data and entered this into RevMan for meta-analysis. We requested further information from the authors if required.

Assessment of risk of bias in included studies

We assessed the quality of the study included in the review considering four components.

1. Allocation concealment. Trials scored as: Grade A: Adequate concealment, Grade B: Unclear, Grade C: Clearly inadequate concealment. (Grade A = high quality).
2. Blinding. Trials will be scored as: Grade A: Participant and care provider blinded, Grade B: Outcome assessor blinded, Grade C: Unclear, Grade D: No blinding of outcome assessor (Grade A, B = high quality).
3. Reporting of participants by allocated group. Trials will be scored as: Grade A: The progress of all randomised participants in each group described, Grade B: Unclear or no mention of withdrawals or dropouts, Grade C: The progress of all randomised participants in each group clearly not described. (Grade A = high quality).
4. Follow up. Trials scored as: Grade A: Outcomes measured in > 90% (if withdrawals due to complications and side-effects are categorised as treatment failures), Grade B: Outcomes measured in 80 to 90%, Grade C: Unclear, Grade D: Outcomes measured in < 80%. (Grade A = high quality).

While only the allocation concealment quality assessment will be displayed in the meta-analysis figures, all assessments will be included in the “Characteristics of included studies” table. Inter-review author reliability for the identification of high quality studies for each component was measured using the Kappa statistic.
Data synthesis

It was planned that for the dichotomous outcome variables of each individual study, relative and absolute risk reductions would have been calculated using a modified intention-to-treat analysis. This analysis assumes that participants not available for outcome assessment have not improved (and probably represents a conservative estimate of effect). It was also planned that an initial qualitative comparison of all the individually analysed studies examine whether pooling of results (meta-analysis) would be reasonable. This would have taken into account differences in study populations, inclusion/exclusion criteria, interventions, outcome assessment, and estimated effect size.

The results from studies that met the inclusion criteria and reported any of the outcomes of interest will be included in any future meta-analyses. The summary weighted risk ratio and 95% confidence interval (fixed-effect model) was calculated (Cochrane statistical package, RevMan version 4.3). For cross-over studies, only data from the first arm would have been included in meta analysis (thus essentially treated as a parallel study). Numbers needed to treat to benefit NNTB) would have been calculated from the pooled OR and its 95% CI applied to a specified baseline risk using an online calculator (Cates 2003). The outcome indices would have assumed to be normally distributed continuous variables so the mean difference in outcomes can be estimated (weighted mean difference). If studies report outcomes using different measurement scales, the standardised mean difference would have been estimated. Any heterogeneity between the study results would have been described and tested to see if it reached statistical significance using a chi-squared test. We will include the 95% confidence interval estimated using a random-effects model whenever there are concerns about statistical heterogeneity.

Subgroup analysis and investigation of heterogeneity

An a priori sub-group analysis was planned for:
- a) adults versus children;
- b) different types of education;
- c) different settings (rural versus non-rural, wealthy countries versus low-income countries).

Results of the search

The Airways Group search identified 114 potentially relevant titles. After assessing the abstracts, 13 papers were retrieved and 11 potential studies were considered (see ‘Characteristics of excluded studies’ table) of which two (Drotar DD, Rand CSa) of these were potential on-going studies identified from trial registers. In updated searches (9 in 2007 and 5 in 2008), no new studies were included but on-going studies were identified.

Included studies

Only one study (La Roche 2006) partially (see below) fulfilled the study eligibility criteria as the corresponding author (Dr La Roche) provided additional information. La Roche 2006 study included involvement by African-American and Hispanic healthcare providers in the intervention group (MFA T group described in the ‘Included table’ and hereby termed ‘IHW involvement’) of children who were of African-American or Hispanic ethnicity. Thus strictly speaking, children were not indigenous (to the country where the study was carried out) and this study only partially fulfils our predefined eligibility criteria. There were no eligible studies in adults.

The intervention details in the ‘IHW involvement’ group versus ‘no IHW involvement’ group is described in the ‘Characteristics of included studies’ table. La Roche 2006 also included a third group which was not randomised; in this group, no additional intervention was given. As this group was not randomised, this group was not included in the analysis. The study was a parallel study and outcomes were collected at baseline and at one year after intervention.

Risk of bias in included studies

The quality score of the single study was ‘A’ for allocation concealment, ‘B and D’ for blinding, ‘A for reporting of participants by allocated group and ‘A’ for follow up. The randomisation and allocation method was not fully described in the paper and additional information were sought from the Dr La Roche. The primary outcome (asthma exacerbation resulting in Emergency Department visit) was single blinded (assessor blind) but the other outcomes (asthma knowledge and asthma skill scores) were not.
Effects of interventions

The single study included 24 randomised children with 22 completing the trial. Available outcomes are presented below.

1. Asthma exacerbation (Comparison 01)

(a) The mean number of acute presentations to an emergency facility for asthma in the year following intervention (Outcome 01)

There was no significant difference between the groups (mean difference of -0.50, 95% CI -1.64 to 0.64, Analysis 1.1) although the direction of effect was in favour of the ‘IHW involvement’ group.

(b) Reduction in the mean number of acute presentations to an emergency facility for asthma in the year following intervention compared to pre-intervention (Outcome 02)

There was no significant difference between the groups (mean difference of -1.40, 95% CI -2.91 to 0.11) although the direction of effect again favoured the ‘IHW involvement’ group. Other outcomes relating to asthma exacerbations (hospitalisations etc) were not reported.

2. Asthma knowledge factors (Comparison 02)

These outcomes were derived from the Asthma Behavioural Assessment Questionnaire

(a) Mean score for asthma knowledge (Outcome 01)

In the children’s score, those in the ‘IHW involvement’ group were significantly better than those in the ‘no IHW involvement’ group (mean difference of 3.30, 95% CI 1.07 to 5.53). There was no significant difference between the groups in the parents’ score (weighted mean difference of 1.90, 95% CI -0.04 to 3.84) although the direction of effect was favoured the ‘IHW involvement’ group.

(b) Mean score for asthma skills (Outcome 02)

In this outcome, there was no significant difference between groups; children’s score (mean difference of 1.20, 95% CI -6.73 to 9.13) and parents’ score (mean difference of 1.5, 95% CI -5.32 to 8.32).

3. Other outcomes

La Roche 2006 also described a cost savings of more than 50% in the ‘IHW involvement’ group from reduced ED visits. The cost savings from the ‘no IHW involvement’ group was not given. No other outcome data were available from this single study and sub-group analysis and sensitivity analysis were not applicable.

Discussion

We identified a single randomised controlled trial comparing IHW with no IHW involvement for asthma education program in children. The children were not strictly all indigenous to the place where the study was conducted, but were included on the basis that they were of an ethnic minority group, and the trial intervention arm included same-ethnicity healthcare workers. The study was very small with only 11 children in each group. Of all the outcomes presented in the MetaView, only one (asthma knowledge in children) significantly favoured the IHW involvement group. However, although not significant, in all the outcomes the direction of effect was in favour of the group that had IHW involvement in the asthma education program. The authors (La Roche 2006) also described a significant cost saving of > 50% in the IHW group in the post intervention phase compared to the pre intervention phase.

This review is considerably limited by the very small sample size and the presence of only one study. There is also no data relevant to adults.

Authors’ Conclusions

Implications for practice

The involvement of IHW in asthma programs targeted for their own ethnic group was beneficial in one small trial for some but not all asthma outcomes. Thus there is insufficient data to be absolutely confident that the involvement of IHW is beneficial in all like settings. Nevertheless, given the complexity of health outcomes and culture as well as the importance of self-determination for indigenous peoples, the practice of including IHW in asthma education programs for indigenous children and adults with asthma is justified, unless new data suggests otherwise.

Implications for research

Additional randomised controlled trials of IHW involvement in asthma education programs are clearly needed. Trials should be parallel studies and assessor blinded if possible. Outcome measures for asthma should include asthma exacerbation indices, patient-relevant factors (asthma control or quality of life or both) supported by objective data if possible. Inclusion of the cost effectiveness of the intervention would also be useful.
ACKNOWLEDGEMENTS

We thank Dr Chris Cates and Toby Lasserson for their advice and support. We also thank Liz Arnold and Susan Hansen for performing the searchers and obtaining the relevant articles. We are grateful to Dr. La Roche, Professor Butz, Prof Bruzzese and Prof Byrant-Stephens for responding to our correspondence regarding their studies.

REFERENCES

References to studies included in this review

La Roche 2006 (published and unpublished data)

References to studies excluded from this review

Anderson 2004 (published data only)

Beasley 1993 (published data only)

Blixen 2001 (published data only)

Bruzzese 2008 (published data only (unpublished sought but not used))

Butz (published data only (unpublished sought but not used))
Butz A. Improving asthma communication in minority families. [Clinicaltrials.gov/ct/show/NCT00133666 2005. [: Clinicaltrials.gov Identifier NCT00133666]

Byrant 2008 (published data only (unpublished sought but not used))

D’Souza 1994 (published data only)

D’Souza 1998 (published data only)

Evans 1997 (published data only)

Kelso 1995 (published data only)

Moudgil 2000 (published data only)

Ratima 1999 (published data only)

References to studies awaiting assessment

Drotar DD (published data only)
Rand CS (published data only)

References to ongoing studies

Valery 2008 (published and unpublished data)

Additional references
Indigenous healthcare worker involvement for Indigenous adults and children with asthma (Review)

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

<table>
<thead>
<tr>
<th>Study</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>La Roche 2006</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Methods</strong></td>
<td>Randomised single blind, parallel comparison of 2 types of interventions: Multifamily asthma group treatment (MFAGT = IHW involvement) vs Standard Psycho-educational Asthma Intervention (SPAI = no IHW involvement) in children with asthma. These two interventions were also compared to controls (no additional education) that were randomly selected from pool of patients with asthma. Potential participants invited to participate in MFAT or SPAI. Patients completed 2 assessments (see outcome measures); one at enrolment and the 2nd was one year following intervention. Randomisation and allocation method not described. All completed trial but 2 did not complete 2nd evaluation. These 2 families were omitted from analysis in the published paper. Quality score: Allocation concealment-B; Blinding-C; Reporting of participants by allocated group-A; Follow up-B.</td>
</tr>
<tr>
<td><strong>Participants</strong></td>
<td>24 families randomised from 47 families screened; 22 completed the study. 16 (73%) were Hispanic and 6 (27%) were African-American. Families with children with asthma were enrolled from Martha Eliot Health Centre, an inner-city community health centre which is part of the Boston's Children Hospital. Mean age of children randomised was 10.2, 13 (59%) were boys and 9 (41%) girls. The control group had 11 families and were matched to the intervention group by ethnicity, age and sex. All children were from low socio-economic background. Inclusion: African-American or Hispanic descent, aged 7-13 years with asthma diagnosed by primary care physician. Exclusion: None described.</td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
<td>MFAT is based on allocentric self-orientation and socio-economic context of ethnic minorities. Program delivery included a Hispanic and African-American educator/psychologist. MFAT also emphasised relational and collaborative asthma management among children, family, their primary physician, and mental health specialist (as opposed to learning in isolation from others). The program framed asthma symptoms and problems within a historical and socioeconomic context. It also uses a manual that has 3 modules, each taught in an hour on different days: 1. Identifying and monitoring asthma symptoms and learning to effectively use medical/contextual resources (peak flow, medications) to control symptoms 2. Identifying and preventing asthma triggers 3. Preventing and coping with an asthma attack (eg asthma plans). SPAI: has the same 3 modules above but followed a structured teaching approach without seeing asthma symptoms within the socioeconomic or cultural context. Thus this asthma education/management strategies did not include contingency plans that emphasised cultural resources. For the analysis MFAT group is surmised as IHW involved and SPAI as no IHW involved.</td>
</tr>
<tr>
<td><strong>Outcomes</strong></td>
<td>1. Number of asthma related ED visits 2. Individualism-Collectivism scale 3. Asthma Behavioural Assessment which consists of Asthma Knowledge (AK) and Asthma Skills (AS), both in parents and children. AK scores range from 0 to 12 and AS range from 17 to 85.</td>
</tr>
<tr>
<td><strong>Notes</strong></td>
<td>Paper provided data that compared MFAT to SPAI and to controls. However, as the control group was</td>
</tr>
</tbody>
</table>
La Roche 2006  (Continued)

not randomised, control group data was not included in analysis

### Risk of bias

<table>
<thead>
<tr>
<th>Item</th>
<th>Authors' judgement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allocation concealment?</td>
<td>Unclear</td>
<td>Third party allocation</td>
</tr>
</tbody>
</table>

ED: Emergency Department; IHW: Indigenous healthcare worker; MFAGT/MFAT: Multifamily asthma group treatment; SPAI: Standard Psycho-educational Asthma Intervention

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

<table>
<thead>
<tr>
<th>Study</th>
<th>Reason for exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anderson 2004</td>
<td>Case control study (non randomised). Study on minority children with persistent asthma. The school program improved asthma control and reduced disease severity in the intervention group compared to controls</td>
</tr>
<tr>
<td>Beasley 1993</td>
<td>Non randomised study. Cohort study utilising a programme of Maori-based asthma clinics, and the partnership between the researchers and the Maori community groups</td>
</tr>
<tr>
<td>Blixen 2001</td>
<td>RCT on culturally appropriate in-patient asthma education program for African-Americans. Intervention was by a trained nurse educator and it is uncertain if the program specifically included an Indigenous person. Corresponding author contacted via email (26th Feb 2007) with no response. Hence the study was excluded</td>
</tr>
<tr>
<td>Bruzzese 2008</td>
<td>RCT on a school-based intervention for adolescents with asthma and their caregivers. While staff were trained to be culturally sensitive and investigators tried as much as possible to match to ethnic group, indigeneity was not the main factor used (correspondence from principal investigator)</td>
</tr>
<tr>
<td>Butz</td>
<td>RCT on nurse lead program for minority families. No Indigenous health worker involvement in the study (correspondence from principal investigator)</td>
</tr>
<tr>
<td>Bryant 2008</td>
<td>RCT examining the efficacy of a low-cost approach to improve control of asthma symptoms in an urban population through lay educators who promote a generalized approach to asthma trigger avoidance in the bedrooms of children with asthma. Local ethnic-specific asthma educator was used. However the main protocol difference between observation and intervention groups was additional interventions for asthma triggers and allergy control, and not based on involvement of health worker. (correspondence from principal investigator)</td>
</tr>
<tr>
<td>D’Souza 1994</td>
<td>Non randomised study. Same study as Beasley 1993. Study reported improved asthma outcomes</td>
</tr>
<tr>
<td>D’Souza 1998</td>
<td>Non randomised study. Follow-up study on Beasley 1993; 2 yrs after completing the 6 month asthma programme, improved asthma outcomes reported</td>
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<table>
<thead>
<tr>
<th>Study</th>
<th>Description</th>
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<tbody>
<tr>
<td>Evans 1997</td>
<td>22 clinics with predominantly (≥ 67%) African-American or Latino children were randomised to intervention or control. Intervention was (a) education session for all staff, (b) tutorial session for physicians and (c) monthly visit by nurse educator. It is uncertain (although unlikely) if the program specifically included an Indigenous person. Corresponding author contacted via email (26th Feb 2007) with no response. Hence the study was excluded.</td>
</tr>
<tr>
<td>Kelso 1995</td>
<td>Non randomised study. Retrospective controls used. Letter written to corresponding author (Kelso) for further information was returned.</td>
</tr>
<tr>
<td>Moudgil 2000</td>
<td>Non indigenous groups. Study based in England evaluating impact of asthma education on white Europeans and Indian sub-continent ethnic groups.</td>
</tr>
<tr>
<td>Ratima 1999</td>
<td>Non randomised study.</td>
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</tbody>
</table>

RCT: randomised controlled trial