Community health workers and environmental interventions for children with asthma: a systematic review

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CRD summary
The review concluded that community health worker-delivered home-based interventions for paediatric asthma consistently decreased asthma symptoms and daytime activity limitations. However, improvements in trigger reduction behaviours and allergen levels, mediators of these outcomes, and emergency care use were inconsistent. Potential limitations in the review process and uncertain study quality make the reliability of the authors' conclusions unclear.

Authors' objectives
To evaluate the effectiveness of home-based interventions for paediatric asthma delivered by community health workers and that addressed multiple environmental triggers.

Searching
MEDLINE and CINAHL were searched. Search dates were not given, but included articles were published between 2004 and 2008. Search terms were reported. Unpublished studies were not considered.

Study selection
Randomised controlled trials (RCTs) of home-based interventions that addressed multiple environmental triggers for asthma and were given by community health workers to families with children with asthma were eligible for inclusion. Community health workers were defined as people specifically trained to deliver the intervention and who had no formal professional or paraprofessional training in health care.

Most interventions in the included studies were based on social cognitive theory. Community health workers provided education relevant to asthma triggers and provided relevant resources (particularly pillow and mattress encasements) to families. Most interventions were tailored individually. Intervention periods ranged from six weeks to one year and usually comprised three to nine home visits of about an hour. Controls were usual care; in some studies there was an additional low-intensity intervention control group. All studies were undertaken in urban settings in USA with low income families. Mean age of children ranged from 5.8 to 9.0 years. Most participants were African American or Hispanic. Outcomes included: direct mediators of improved health outcomes; asthma-related health outcomes; and indirect mediators of health outcomes or psychosocial influences on health.

The authors did not state how many reviewers performed study selection.

Assessment of study quality
There was no formal validity assessment.

Data extraction
Study characteristics and results were presented in a tabular form that give significance and direction of outcomes.

The authors did not report how many reviewers performed data extraction.

Methods of synthesis
A narrative synthesis was provided because there was heterogeneity in the interventions and outcomes reported.

Results of the review
Seven RCTs were included (n=2,316, range 100 to 937). A single study reported blinded data collection. In one RCT data was collected by those who carried out the intervention. One RCT had limited power. Standard protocols were used in four RCTs. Length of follow-up ranged from four months to two years. In some studies, drop-out differed
between intervention and control groups or for different types of participants.

**Asthma-related health outcomes**: There was a significant decrease in caregiver-reported asthma symptoms in the intervention groups (four RCTs) and in caregiver reports of activity limitations (three RCTs); these persisted for two years after the intervention in one RCT. There were significantly fewer unscheduled asthma-related clinical visits associated with interventions in three of six RCTs. One of four RCTs found a significant benefit on medication use (for reduced under-treatment for children who should be on control medication). Similarly, one of four RCTs reported a significant effect on lung function: a significant improvement in daily nadir peak expiratory flow (PF) and forced expiratory volume (FEV₁).

**Direct mediators of improved health outcomes**: Findings in relation to behaviour change were mixed both within and between studies with improvements for some behaviours but not for others. Mostly the behaviours that improved were related to resources provided as part of the intervention, which included pillow and mattress encasement, vacuum cleaner use, kitchen exhaust fan use, use of caulk and boric acid, and use of doormats or removal of shoes. There was no statistically significant difference between groups in the two studies that assessed knowledge. All seven RCTs measured a variety of allergens and exposures with mixed results. Significant improvements were reported in reduced: cockroach (but not rodent) numbers; dust mite, cat, and dog antigens depending on the location investigated; combined dog, cat, dust mite and cockroach antigens; nitric acid concentration; particulate matter; dust weight; condensation and moisture scores; and composite trigger scores; but not for antigen concentration in dust. Some significant results were not sustained after longer follow-up periods.

**Cost information**
Cost per child of the interventions including community health worker salary ranged from US dollars ($) 492 to $2,000, where reported.

**Authors’ conclusions**
Overall, the studies consistently identified positive outcomes associated with community health worker-delivered interventions. Outcomes included decreased asthma symptoms, daytime activity limitations and emergency and urgent care use. However, improvements in trigger reduction behaviours and allergen levels, and hypothesised mediators of these outcomes were inconsistent. Trigger reduction behaviours appeared to be tied to study-based resource provision.

**CRD commentary**
The review addressed a well-defined question in terms of participants, interventions, study design and relevant outcomes. Relevant databases were searched. It was unclear whether language restrictions were applied, unpublished studies were not considered and search dates were not given; therefore, some relevant studies may have been missed. Study quality was not formally assessed and the limited relevant data reported did not allow the reader to assess the quality of the included RCTs. It was not possible to assess whether efforts were made to reduce error and bias during the review process as no relevant information was reported. Relevant study details were reported, but some results were not described clearly. A narrative synthesis was provided due to heterogeneity in interventions and outcomes. In view of some potential limitations arising from the review process, uncertainties about the quality of included studies and inconsistency of some results, the extent to which the authors’ conclusions are reliable is unclear. All the studies were of mostly African American or Hispanic populations in urban USA and the generalisability of the results to other populations was unclear.

**Implications of the review for practice and research**
**Practice**: The authors did not state any implications for practice.

**Research**: The authors identified a need for further studies that specifically targeted effectiveness of use of social cognitive theory in home-based interventions for paediatric asthma. They also identified a need for studies that measured participants' self-efficacy and broke down knowledge into behavioural capability and outcome expectations. They further recommended studies that targeted the social and emotional support given by community health workers and their role in liaison to health care providers and in improved asthma medication. Social, behavioural and environmental dimensions of asthma management should be considered in the design and evaluation of asthma intervention programmes.
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