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Home Visiting for Intervention Delivery to Improve Rural Family Asthma Management

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Abstract

The focus of this article is on the use of home visits in an asthma self-management intervention study with rural families who have a school-aged child with asthma. The study design involved randomization of the sample by elementary schools, then baseline (pre-test) and post-intervention data collection. The purpose of this article is to describe challenges in and pose solutions for implementing home visits for asthma self-management in rural areas. Home visiting is a strategy for program delivery that takes advantage of the home context for tailoring services to address the family's individual needs. The advantages of intervening in the home included being able to (a) use actual home conditions for individualizing the asthma education to meet families' needs; (b) match home visitors with family in terms of ethnicity and language; (c) retain a high percentage of families over the year-long duration of the study; and (d) not add to family burden of managing asthma.

Asthma is the most common chronic illness of childhood, affecting 7% of children ages 4–15 years (Mannino et al., 2002). Members of ethnic minority groups are disproportionately affected with 8.2% of African American and 7.6% of Hispanic children having a diagnosis of asthma as compared to 6% of non-Hispanic White children (Akinbami & Schoendorf, 2002). The impact of asthma on inner-city children and their families has been well documented; however, asthma is also a significant problem for families who live in rural areas.

It is a commonly held belief that “country living” is healthier because adults perceive that children in rural areas tend to engage in more outdoor activities. However, epidemiological studies indicate that rural populations have significant health disparities in terms of greater prevalence of chronic illnesses and lower rates of physical activity which together contribute to greater risk for poorer health among rural populations (Hanson, Lapidus, Zuniga, & Murphy, 2000; Patterson, Moore, Probst, & Shinogle, 2004). Asthma is a significant problem for rural families that is compounded by the lack of qualified health care providers, rural hospital, and urgent care services, and fewer social services than are available to urban dwellers (Barrett, Gallien, Dunkin, & Ryan, 2001; Mueller, Patel, & Boilesen, 1998; Price, Kirkland, & Kreisler, 1994). This lack of resources contributes to the need for rural dwellers to travel to urban areas to receive health care for complex illnesses (Crago, Coors, Lapidus, Sapien, & Murphy, 1998). Further, rural families report significantly more problems with the distance traveled to reach primary ($p = .003$) and specialty ($p < .0005$) providers than do urban families (Zollinger, Saywell, Smith, Robinson, & Knudson, 2000).

Asthma is a significant health problem for families with children. When considering the reduced availability of health care resources and the distances families travel for both routine and urgent care, one can appreciate the complexity and heavy burden for managing asthma that resides in the family's hands. “Asthma morbidity and mortality are [seen as] largely

preventable when patients and their families are adequately educated about the disease and have access to high-quality health care” (Akinbami & Schoendorf, 2002, p.315). Horner and Fouladi (2003) indicate that rural families can be supported in their home asthma management through education that focuses on environmental control strategies, medication decision-making, symptom assessment, and preventive strategies. Good asthma management involves a comprehensive approach for reducing the frequency of symptom occurrence and the duration of exacerbations (American Academy of Allergy, Asthma, and Immunology [AAAAI], 2004). One mechanism for improving family asthma management in rural areas is through the provision of an intervention that takes place in the context of that management – in the family’s home. The purpose of this article is to describe challenges in and pose solutions for implementing home visits to improve rural families’ home asthma management.

Background

Home visiting is a strategy for program or service delivery that takes advantage of the home context for tailoring services to address the family’s individual needs (Allen & Tracy, 2004; Sweet & Appelbaum, 2004). Much of the research that uses home visiting as an intervention strategy has focused on families with infants or young children.

Olds and colleagues (2004) have demonstrated the benefits of early home visiting programs to improve young child and maternal health in a randomized control trial with a 3-group design. All participating mothers were enrolled in the home visiting program late in pregnancy and received developmental screening of their children at 6, 12, 15, 21, and 24 months of age as the standard of care. Those families that only received the developmental screenings were designated as the control or “usual care” group. There were two treatment groups of families who also received home visits either by paraprofessionals or by nurses from birth until the child was 2-years of age. Both treatment groups had greater improvements than the control group although the paraprofessional group had smaller effects than the nurse group (Olds, Robinson, et al., 2004). In follow-up studies conducted when the children were 4-years (Olds, Robinson, et al., 2004) and 6-years of age (Olds, Kitzman, et al., 2004) long-term benefits of the early home visiting program were found. The nurse home visit group continued to have significantly increased cognitive and emotional development gains 2.5 years after the conclusion of the home visit program (Olds, Kitzman, et al., 2004), while the paraprofessional home visit group had greater maternal health gains (Olds, Robinson, et al., 2004).

Home visits have also been used to provide an environmental intervention for urban children who have asthma (Morgan et al., 2004). Families of 5- to 11-year old children ($n = 937$) who had a diagnosis of asthma were randomly assigned to a treatment or control group. Assessments of the child’s asthma morbidity (symptom frequency, health care utilization), environmental allergen titers, and pulmonary function were assessed at baseline and every six months for two years. A number of physical resources (e.g. mattress and pillow covers, air purifiers or filters) and educational materials were provided to the treatment group through five mandatory home visits. While there were no clinical or statistical differences between the groups at baseline, the intervention group had significantly fewer days with symptoms at 12- and 24-months (both p ’s $< .001$), and had less school absenteeism at 12-months ($p = .003$) and 24-months ($p = .009$) than the did the control group (Morgan et al., 2004).

Sweet and Appelbaum (2004) conducted a meta-analysis of 60 home visiting programs with young children. Their analysis indicates that home visiting supported both the parents and the children as evidenced by outcomes of parenting behavior and attitudes, and by children’s increased cognition and socio-emotional outcomes. Consistent with Olds and colleagues findings, using professional home visitors to deliver the intervention was associated with greater improvements than when non-professional home visitors provided the intervention.

The home environment is the primary care delivery site for the majority of family asthma management (Navaie-Waliser, Misener, Mersman, & Lincoln, 2004). Because asthma exacerbations are often provoked by indoor allergens or other indoor environmental stimuli such as exposure to tobacco smoke, strong scents of household cleaning products, or other fragrances (e.g. potpourri, perfumes), providing a home-based intervention takes advantage of the context in which both health problems and health management occur (AAAAI, 2004).

Home Visiting

Home visits were incorporated into the procedures of a pilot study conducted with rural school-aged children who had a diagnosis of asthma and with their parents. The challenges encountered in home visiting in this pilot study will be described. Solutions were identified and incorporated into the implementation procedures for a subsequent larger intervention study and will be discussed.

Pilot Study Case

The pilot study used an experimental design with children randomized by schools into treatment (4 schools) or comparison (3 schools) groups. The intervention design included small group education for the children that took place at their schools and individual parent education provided at home through a booklet developed for this project. The booklet included information on asthma management, pathophysiology, medication actions, medication scheduling and administration, questions to ask the physician, ways to safely increase the child's exercise and physical activity, and an asthma management plan based on the green-yellow-red zones of peak expiratory flow rate. The parents' booklets were written at a 5th grade reading level, written in English and Spanish, and field-tested with bilingual community residents who were not study participants (Horner, Surratt, & Juliusson, 2000).

The study was approved by the Institutional Review Board of a large southwestern university. Home visits were made for study enrollment, data collection, and to review parent education materials. Data was collected 3 times, first at the time of study entry after obtaining parental consent and child assent, and again at 6 and 12 months. The children's classes were provided after the baseline data were collected. Parents' educational materials were reviewed at the 6-month home visit.

There were 60 families enrolled in the study, with 42 boys and 18 girls between ages 7 and 11 years of age ($m = 8.87$, $sd = 1.03$). The ethnic/racial composition of the sample was 42% African American, 32% White, and 26% Hispanic. Nearly half (49%) of the families were singleparent families and half (48%) had low family socioeconomic status. One child and four parents were Spanish-speaking only. Two bilingual graduate research assistants were assigned to these families and they provided individualized instruction to the Spanish-speaking child and parents.

Challenges in Home Visiting

Many of the challenges encountered in home visiting in rural areas can also occur in urban areas. The challenges faced by the research team members in home visiting included scheduling the visits, locating the home, ensuring home visitor safety, maintaining contact with families, and characteristics of the home environment that can impede the scheduled home visit activities.

Scheduling the visits—Families have many competing demands for their time and so home visits had to be scheduled when parents and children were not engaged in other activities. Recognizing that the children's school schedules would limit the available time to meet with

families, home visits were arranged to take place either after school or during teaching-training days when children were not in school, or occasionally on the weekend. Children were also involved in many after school activities such as sports, youth clubs, dance, band, or some had individual tutoring sessions that reduced available time for meetings. Furthermore, many of the parents worked more than one job which further reduced the possible meeting times for home visits.

The research team considered these competing demands on families' time when scheduling the home visits. Further, the traditional daytime office hours (e.g. 8 a.m. to 5 p.m.) would not yield opportunities to contact families. It was quickly determined that telephone calls to families for the purpose of arranging the home visits had to be made in the early evening hours.

Locating the home—There is an art to locating homes in rural areas. Today's computer-savvy professionals have been known to rely on internet resources such as MapQuest™ to obtain driving directions only to find discrepancies between the printed instructions and the actual roads when traveling. Anticipating this limitation of map resources, the member of the research team who would be visiting the home asked the parents for directions to their homes. The challenges encountered in locating homes were compounded by the clarity and accuracy of the directions provided by the parents as well as the visitors' interpretations of those directions. For example, when a parent provided instructions to "drive to the end of the road at the Stop and Go™ and turn left," the researcher discovered that not only did the road not end at the convenience store it continued on another 20 miles to the next town. At other times the home visitor had incomplete notations for the directions to the family's home and would arrive in the general vicinity of the home and find that three roads in the neighborhood had similar names (e.g. Greene Grove, Greene Street, and Greene Garden). In this latter instance the parent had also described the home so the visitor assessed the houses with the correct street number and found the one house that corresponded to the parent's description.

Ensuring home visitor safety—When traveling in rural areas a number of factors had to be considered including the condition of rural roads, dust clouds from adjacent fields, and unrestrained dogs and other livestock which became road hazards. While the primary farm-to-market roads are paved, fewer side streets and arterial feeder roads in rural areas are paved. The condition of dirt roads deteriorate in response to vehicle traffic and weather causing some difficulties for small cars when driving on them such as flat tires or vehicle break downs. The roads can also become obstructed physically when cattle or sheep stray out of fields onto the roads, or dogs enter the roads in their efforts to guard their home territories. Another common hazard is the heavy clouds of dust that blow off fallow fields adjacent to the roads that create an impenetrable fog for drivers. These road hazards can result in the home visitors being stranded in sparsely populated areas and represent a safety issue for home visitors.

In addition, home visitors needed to be alert to their surroundings and to how they presented themselves to the families and their neighbors. In those instances when the home visitor arrived at a home before the family, neighbors were sometimes suspicious of the waiting visitor. Visitors communicated clearly with neighbors about their presence to dispel any notions that they might be bill collectors or other undesirable agency representatives. Visitors took care to dress neatly and conservatively when making home visits to reduce unwanted attentions that might otherwise have been directed towards young women.

Managing the home environment—Challenges facing all home visitors are ways to manage competing environmental stimuli such as the noise from a television or stereo. Strategies included requesting that the television be turned off or the volume turned down, or moving to another room in the home to meet with the parents and child. Home visitors quickly

learned they needed to be flexible during the visits as other children in the family also required their parents' attention.

Maintaining contact with families—The rural school districts that participated in the pilot study were known to have a high turnover rate among their students as families moved in and out of the district over the course of a school year. Since the pilot study involved a series of home visits that took place over the course of a calendar year, this high mobility was a major challenge for maintaining contact with families.

In the case of families who moved, school health personnel were able to provide information as to what school the child had been transferred. Letters were mailed to families asking them to telephone or send an enclosed response postcard with their new telephone numbers. While this was not successful with all families, many families remained in the study despite moving out-of-district.

In addition to the high mobility, some families had intermittent telephone disconnections. The home visitors would make note of the disconnections and plan to reattempt contact each week for the next month. Many times the telephones were reconnected in a few weeks' time and then contact could be made. When repeated attempts failed, the home visitors contacted the school health personnel. The school health personnel had alternate telephone numbers for all of the children in their schools (e.g. neighbors' or other family members' telephone numbers) and obtained permission for the home visitors to call the alternate numbers as a means of contacting families. During the first home visit, the home visitors obtained lists of alternate telephone numbers from the families that could be used in the future.

Outcomes of Home Visits for Family Asthma Management

Study findings have been reported elsewhere (Horner & Fouladi, 2003; Horner, 2004). Table 1 provides a summary of the percent change in outcome scores in comparison with participants' baseline scores. All of the families improved their asthma management from baseline to the 12-months later, which may be a result of all families receiving home visits that focused on asthma. In the comparison families, the questionnaires may have sensitized the parents and children to the need to attend to specific activities for managing or reducing asthma symptoms. Parents of children with more severe asthma were found to perform more asthma management behaviors (Horner & Fouladi, 2003). Further, the children from poorer families had the greatest sustained gains in asthma management ($F = 5.484, p = .024$) over the 12-month duration of the study (Horner, 2004). Additionally, the poorer children reduced their school absenteeism by 12% at the end of the study in comparison to middle class children who experienced a 10% increase in their absenteeism, although this was not statistically significant.

The research team was able to take advantage of the home visits to tailor the parent information by addressing parents' concerns, answering questions, and identifying asthma triggers that existed in the home. The parent booklet was reviewed during the 6-month home visit and parents reported they had received very little information about asthma care prior to the home visit intervention (Horner, 2004).

The use of home visits reduced the participant burden as they did not have to travel to a central meeting site. For many of the poorer families this would have required arranging for transportation and might have precluded their participation in the study. Furthermore, home visits reduce the power inequalities that are inherently present in traditional health care situations (Allen & Tracy, 2004). The parents were able to get acquainted with the home visitors and trust was developed during these face-to-face meetings. These factors may have contributed to the relatively high (76%) retention rate attained in this study with a mobile population.

Lessons Learned: Strategies for Home Visiting in Rural Areas

While a number of solutions or strategies for dealing with the challenges of making home visits in rural areas were included in the pilot study, additional measures were developed for the larger intervention study. The larger intervention involves four rural school districts, in-school asthma education for children, a home visit education visit for parents, and data collection that occurs four times over the course of the 12-month study (i.e., baseline, and 1-, 3-, and 7-months after the children's intervention is complete). This study has been reviewed and approved by the Institutional Review Board of a large southwestern university. The study is currently in the third year. Rural school districts are enrolled sequentially on an annual basis when the school year begins. The cumulative sample ($n = 94$) is composed of 49% Hispanic, 27% White, and 24% African American children, with 47% from low socioeconomic status families. Sixteen (35%) of the Hispanic families speak Spanish only. Bilingual and bicultural home visitors make the home visits to these Spanish-speaking families.

Strategies for scheduling home visits—Scheduling home visits continues to be a challenge. At the first home visit, alternate telephone numbers are obtained for every family. A primary difference noted from the pilot study is that more families have cellular telephones that they use as their primary contact point. The lower cost of wireless phone service has made this an affordable option for poorer families. In addition, families are given a magnetic business card that has the principal investigator's and project coordinator's names and the research office telephone numbers (local and 1-800-number). The magnetic card can be placed on the refrigerator as a reference for families to use if they need to contact the researchers.

Before the subsequent follow-up home visits, postcards are mailed to the participants' homes to remind them about the up-coming home visit. In the postcard, participants are invited to telephone the research office to schedule a time for the home visit or they can wait until a member of the research team contacts them. Telephone calls to remind families of the scheduled home visits are also made two and then one day in advance of the scheduled meeting day. Messages can be left on voice mail for these reminder telephone calls.

Strategies for locating homes—To facilitate the home visitors' work to locate the homes, we obtained copies of school district maps from chambers of commerce in small towns and by purchasing county-level map books. We continue to ask parents for driving directions and check these verbal directions against printed maps.

Strategy for increasing visitor safety—To increase home visitor safety through access to support resources, cellular telephones have been rented for their use when making home visits. The original rationale for the cellular telephone was to provide a way for stranded home visitors to contact a member of the research team. However, the most common use of the cellular telephone has been to contact the family when the home visitor arrives and finds no one at home. Typically the family is either delayed in traffic or some unexpected event has occurred (e.g. parent has a flat tire, child became ill at school). The cellular telephones have also been used to call the families at home to clarify directions to the house when the visitor has had difficulties with this.

Summary—Use of these strategies in addition to those refined in the pilot study has assisted us in scheduling and making home visits to these rural families. Home visitors receive positive comments about both the content of information provided as well as the families' appreciation that the intervention is provided at a time and place that is convenient for them. Preliminary findings reveal an 84% retention rate among participating families for the first 2 years of complete study data. The children have experienced a decrease in absenteeism from an average

of 5% to 3.8%, roughly equivalent to 2 days, but this is not statistically significantly different between the comparison and treatment group children.

Discussion

Home management of asthma is a significant burden for families in terms of cost (e.g., health care costs, lost wages, and other out-of-pocket expenses), and concerns over the need to travel to urban sites to receive health care (Lara et al., 2001; Zollinger et al., 2000). This results in significant health disparities among rural people who already have lower incomes and fewer social and health care resources. While the challenges in making home visits in rural areas are similar to those experienced in urban areas, the lack of resources in rural areas may increase the value or benefit derived from making home visits for health promotion and self-management to rural families. Because home visiting is an expensive intervention, public health resources could be maximized by combining home visits with other less expensive strategies such as telephone consultation and health promotion messages in school newsletters.

While the outcomes of the home visit intervention are encouraging, the pilot study is limited by the small sample size for conducting complex statistical analyses. Furthermore, the improvements demonstrated by both treatment and comparison groups may be a type of Hawthorne effect as all participants were fully informed that this was a study of childhood asthma and this may have sensitized them to the importance of asthma self-management (Polit & Beck, 2004).

The advantages of intervening in the home included being able to (a) use actual home conditions for individualizing education to meet families' needs; (b) match home visitors with family in terms of ethnicity and language; and (c) retain a high percentage of families over the year-long duration of the study. More importantly, home visits do not add to the family expense of managing asthma. By addressing the family's specific information needs, family asthma management can be improved.

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Table 1

Change in Outcome Data From Baseline to 12-month Post-Intervention

	<u>% Change</u>	<u>% Change</u>
<u>Asthma Management</u>	<u>Treatment Group</u>	<u>Comparison Group</u>
Parent	+ 23%	+ 12.5%
Child	+ 8%	+ 14%
	<u>Poor Families</u>	<u>Middle Class Families</u>
<u>Asthma Management</u>		
Parent	+ 12.7%	+ 13%
Children	+ 11%	+ 5.2%
<u>Absence Rate</u>	- 12%	+ 10%