

MANAGEMENT, EDUCATION & ADHERENCE

Telephone Case Management for Asthma: An Acceptable and Effective Intervention within a Diverse Pediatric Population

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Background. Asthma disproportionately affects low-income and medically underserved children; additional tools are needed in the effort to improve asthma care. **Objectives.** We reviewed the implementation of a telephone case management program provided by community health workers (CHWs) as an alternative to home visits, to examine its efficiency, acceptability, and capacity to identify and address challenges with asthma management. **Methods.** This retrospective cohort study included children (and their caregivers) presenting for scheduled visits to a comprehensive asthma clinic at an urban, public hospital during 2007. **Results.** Overall, 83.2% of caregivers were contacted for follow-up. Of those not reachable, one-third had been discharged from the clinic, and most of the remainder later returned for a subsequent visit. Latino patients were more likely not to be reached by telephone ($p < .001$). Following the implementation of telephone case management, the number of patient visits to the asthma clinic increased by almost one-third. **Conclusions.** Telephone case management identified problems which were successfully addressed through improved patient care practices and system changes within the clinic. Telephone case management by CHWs can be an efficient, acceptable mechanism to supplement comprehensive asthma care in a diverse, urban pediatric population.

Keywords asthma, pediatrics, telephone case management, underserved populations

INTRODUCTION

Successful management of asthma in the United States is impaired by significant geographic, socio-economic, and cultural barriers. Asthma is one of the most common chronic diseases in the United States, and its prevalence is disproportionately high among minority children living in urban areas (1, 2). Caregivers of children and families facing financial stress struggle with access to optimal asthma care (3, 4), and within Latino and African American subgroups, cultural differences between health-care providers and patients also appear to contribute to inadequate treatment of asthma (5–7).

In an effort to address the complexities of asthma management in the pediatric population, the National Heart, Lung, and Blood Institute recommends community outreach for asthma care as an adjunct to formal medical evaluation, frequent monitoring, and asthma education (8). One mechanism for offering such programs is through the use of community health workers (CHWs), who possess cultural awareness and language skills specific to the communities they serve (9). Home visits by CHWs are associated with increased symptom control and fewer exacerbations (10–12), as well as fewer hospitalizations and urgent-care visits (13–15). Patients and their families who receive home visits from CHWs demonstrate a better understanding of the use of asthma controller medications (16). Home visits, in particular, are more beneficial when provided by culturally and linguistically matched

providers (17); cultural context is an important consideration for home visitors providing services to ethnically noncongruent families (18). Unfortunately, home visits are not without drawbacks. They are resource-intensive, requiring significant time for travel and the visit. They also can be viewed as intrusive and may be challenging to schedule and even dangerous to perform in high-crime neighborhoods (19). As a result, compliance with home visits has been a challenge (20).

Telephone case management provides an alternative to home visits. This form of communication with patients is less time-intensive and consequently more cost-effective, and it may carry greater acceptability among some patients and their families. Patients perceive telephone follow-up as satisfying (21, 22) and as an effective means for providing emotional support (23, 24). Within pediatric populations, telephone follow-up after emergency department use, to educate patients and families about appropriate use of clinic-based resources, has been shown to decrease subsequent emergency department utilization (25, 26).

Telephone case management in conjunction with home visits has been recommended for asthma management (27). However, not much is known about the unique role of telephone follow-up in the setting of comprehensive management (28), including whether telephone case management without a home visit offers an effective and acceptable adjunct to clinic-based pediatric asthma management. Neither have studies examined the feasibility and acceptability of telephone follow-up specifically for minority patients. Thus, we sought to examine the efficiency and acceptability of telephone follow-up by CHWs as a supplement to scheduled visits to a comprehensive

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asthma management program in a diverse, urban population. In addition, we sought to examine whether identified gaps in asthma management could be successfully identified and addressed via this mechanism.

METHODS

We conducted a retrospective evaluation of the medical records of children seen for scheduled medical visits in the *Yes We Can* program in the calendar year 2007, the first year of full implementation of the structured telephone follow-up program.

Program

The *Yes We Can* Urban Asthma Partnership is a comprehensive, medical-social model for pediatric asthma care based in an academic, urban, public clinic in San Francisco since 2002. Children are referred to the program via several mechanisms, including primary care-provider requests, urgent visits for asthma, and school/daycare referrals. *Yes We Can* provides clinic-based asthma care for children with poorly controlled asthma coupled with case management by CHWs. The program initially relied on home visits by workers who were present at clinic visits and then extended case management (environmental remediation, asthma education, social supports) into the home setting. In 2006, the *Yes We Can* Urban Asthma Partnership home visit program transitioned to a telephone-based case management model in response to the limited capacity to provide time-intensive home visits to support the nearly 1000 annual visits per year. Details of this program and assessment of its positive impact on asthma outcomes have been published elsewhere (29).

During scheduled clinic visits to the *Yes We Can* program, each patient received a full medical assessment by a trained asthma clinician. This included a physical examination, spirometry (for children over 4 years), and skin testing (at first visit for all children over 2 years) and culminated with the creation of an Asthma Action Plan outlining routine and emergency asthma management recommendations. In addition, a CHW (who was culturally and linguistically matched to the patient whenever possible) provided general asthma education, review of the Action Plan, and environmental control education to the patient and family members during this visit. CHW involvement was tailored to the needs of each patient, focusing on areas that the medical clinician and CHW felt would be most beneficial to the patient and family. On average, the CHW component of the clinic visit lasted 15–20 minutes. Return visits were scheduled after 1 month, then 6 months, and then yearly.

For the telephone component of the *Yes We Can* program, the CHW who worked with the patient during the scheduled clinic visit attempted to contact the patient's caregiver within 2 weeks of the visit to follow-up on the recent visit and to assist with any problems that may have arisen. In addition to collecting other information, the CHW asked each parent/caregiver to report on the following:

- (1) whether he/she received an Asthma Action Plan for the child at the clinic visit (as a means to educate about the importance of having and using such a plan);
- (2) the names of the asthma medications the patient had been prescribed and how and when these medications had been used (as an opportunity to provide education in this area);
- (3) whether the medications had been received from the pharmacy (to uncover any need for the medical provider and/or CHW to work with the patient's insurance plan or pharmacy to ensure that medications could be obtained); and
- (4) whether the caregiver understood emergency management (as a measure of the understanding of the Asthma Action Plan).

On the basis of the responses, the CHW provided additional support through provision of a new Asthma Action Plan, education about medications and their use, assistance with pharmacy problems, and review of actions to take in an asthma emergency. The CHW also addressed any other questions or issues raised by the parent/caregiver, consulting the medical clinician when appropriate. Telephone follow-up calls lasted an average of 5–10 minutes.

The CHW entered all relevant information from the follow-up calls onto the standardized follow-up form; these forms were reviewed weekly by asthma clinicians. If a family was not reached by telephone within 2 weeks of the clinic visit and after at least three attempts, the CHW documented the failed contact attempts and mailed a notification of the date/time of the future asthma clinic visit to the address on file for the patient.

CHW staffing was consistent throughout 2007, with two full-time CHWs providing all follow-up calls and home visits. They represent the language preferences and two racial/ethnic groups seen most often in our clinic.

Data

During data collection, the follow-up forms and other components of the patient's medical record were reviewed for demographic (birth date, visit date, gender, race/ethnicity) and clinical data (symptoms and medication use), as well as caregiver's knowledge and behaviors around asthma management (including responding to an asthma emergency, the presence/application of Asthma Action Plan, and future appointments). Intercooled Stata 9.0 (StataCorp, College Station, TX, USA) was used to provide chi-square analyses of the demographics, clinical data, caregiver knowledge, and visit outcome of children seen in the asthma clinic.

Analysis

Patients (aged 0–21 years) seen for scheduled visits in the pediatric asthma clinic during the calendar year 2007 were included in this evaluation. Children who received home visits were not included in the evaluation to avoid

confusion about the impact of the telephone follow-up calls. For patients who had multiple visits to the clinic, only information from the first visit within this time period (although they may have been previously ever in the clinic) and its associated telephone follow-up were used in the analysis. Visits within 2 months of the scheduled follow-up date were considered “appropriate.” Initial data collection and the subsequent data review protocols were approved by the Institutional Review Board at our institution.

RESULTS

During the period of this evaluation, the clinic operated as a specialty clinic colocated within the pediatric clinic, two–three sessions (half day) per week. The two CHWs followed case loads of approximately 250 patients each; this included patients admitted to the inpatient ward, those seen in urgent care, and those followed in the *Yes We Can* clinic program.

Overall, 364 unique patients were evaluated in 2007 in the *Yes We Can* clinic, for a total of 641 visits (see Table 1). The average age of these patients was 7.1 years (range 7.7 months to 19.8 years); the majority were Latino (55.5%). Almost half of the patients had multiple visits to the clinic during the study year (43.2%; range 2–5 visits).

Only data from the first visit for each patient during the study period was used. Overall, 83.2% percent of these patients’ caregivers were successfully contacted after the clinic visit (see Table 2). Among those 61 patients whose caregivers were not able to be contacted, 19 had been discharged from the clinic and thus did not need a follow-up appointment. Among those 42 patients whose caregivers were not reached but who were designated by the clinicians as needing further clinic visits, 78.6% later returned for subsequent visits within the appropriate interval. Of note, Latino patients were less likely to be reached successfully for follow-up telephone calls ($p < .001$; see Table 2). Although the numbers were too small to show statistical significance, there was a trend suggesting that among patients whose caregivers were unable to be reached, Latino patients were more likely to later return for follow-up visits (83.9%) than were African

TABLE 1.—Patient demographics and visits.

Characteristic	Number	Percent
Total visits	641	
Total patients	364	
Age	7.1 years (range 7.7 months to 19.8 years)	
Male	222	61.0
Ethnicity		
Latino	202	55.5
African American	99	27.2
Other	63	17.3

TABLE 2.—Telephone contact success.

	Successfully contacted by telephone (%)
Overall	303(83.2)
Latino	154(76.2)*
African American	91(91.9)
Other	58(92.1)

* $p < .001$.

American (57.1%) patients or those from non-Latino or African American subgroups (75%).

Telephone responses are detailed in Table 3. Most children were reportedly in good control (77.9%). Among those patients who reported using beta-agonist medication to treat asthma symptoms, 43.8% had not required treatment for the past week, suggesting good asthma control. Almost all the caregivers/parents reached by telephone gave positive responses to questions about the educational services provided in the clinic. Overall, 99.2% reported having an Asthma Action Plan, with similarly high responses for mattress/pillow encasements and spacers. Most (82.5%) of caregivers accurately reported the instructions for daily medication use. Notably, 79.3% of caregivers responded that they were unclear about what steps to take if the child’s beta agonist was not working during an asthma flare.

TABLE 3.—Telephone contact responses—caregiver report during telephone follow-up conversation with CHW.

	Number	Percent
Current asthma control		
No symptoms currently ($n = 294$)	229	77.9
Last beta-agonist use ($n = 162$)		
<1 day ago	45	27.8
Within past week	46	28.4
Within past month	43	26.5
>1 month ago	28	17.3
Clinic education/materials		
Received action plan ($n = 256$)	254	99.2
Received asthma education in clinic ($n = 261$)	261	100.0
Has a spacer at home ($n = 248$)	240	96.8
Has mattress/pillow encasements at home ($n = 238$)	193	81.1
Understands “green zone” medication use (controllers/daily asthma management) ($n = 286$)	236	82.5
Understands “red zone” actions when beta agonist not working (emergency asthma management) ($n = 270$)	56	20.7
Knows next asthma clinic appointment date/time ($n = 217$)	188	86.6
Medication/pharmacy issues		
Received prescription at clinic visit ($n = 303$)	257	84.8
Filled prescription from clinic visit ($n = 257$)	129	50.2

Despite 98.5% of caregivers reporting that they had received needed prescriptions in clinic, only 50.2% had successfully filled prescriptions at the time of the telephone follow-up call.

In 9.7% of all telephone calls, CHWs noted that further follow-up was needed. In these cases, the CHW received support from supervising clinicians to address issues such as problems with the use of medications in the school setting, prescription of medication that was not covered by the patient's health plan, or clinical issues related to the patient. The most frequent indication for physician support was the inability to obtain prescriptions from the pharmacy.

Knowledge gaps in understanding of the Asthma Action Plan and the use of controller and emergency medications noted during telephone follow-up call were successfully addressed by CHWs during the call through educational discussion tailored to the needs of each family. Additionally, by working with patients, asthma clinicians, and local pharmacies, CHWs were able to address 100% of identified pharmacy-related problems, resulting in confirmed receipt of all prescriptions.

DISCUSSION

Telephone contact after medical visits is a common mechanism for communicating with patients and families. Within the *Yes We Can* Urban Asthma Partnership's medical-social model, telephone case management evolved out of the pragmatic need to maximize services to asthma patients and the conceptual desire to create a culturally and linguistically acceptable model for delivery of care. Pragmatically, once telephone case management replaced home visits, the clinic was able to operate with increased patient volume without an increase in other staff: in-clinic visits rose from 616 in 2006 to 817 in 2008, the year after the telephone program had been instituted. Also of note, there were no significant increases in asthma-related sick visits or hospitalizations throughout the transition from home visits to telephone case management; in other words, there were no detrimental effects from moving away from home visits. Conceptually, the program was efficiently delivered and well received. Patients were successfully contacted via telephone (83.2% of patients were reached, as compared to home visit completion of closer to 45% during a pilot study in our clinic in 2005). This high level of acceptability suggests that telephone follow-up is a practical and successful way to reach patients from low-income and minority households (30).

Among those patients who were not reached for telephone follow-up, 78.6% returned for future visits, suggesting that they were not deterred from attending follow-up visits because of our contact attempts. Despite a linguistically and culturally appropriate CHW who made all contact attempts after previously having met patients in person at the clinic visits, 77% of patients who could not be reached were Latino. Nevertheless, the fact that

nearly 80% of patients returned despite not being reached via telephone (78.8% of these patients being Latino) supports that the attempts to call were not deterrents to further care. Latino caregivers and patients may prefer to have all medical and social supports delivered in the clinic setting rather than via telephone follow-up or home visits. The lower contact rate among Latino families may represent decreased acceptability of telephone contact, lack of telephone access (particularly during the hours when the follow-up calls were made), or another factor that has yet to be determined.

Although commonly used, telephone case management is a communication strategy that is rarely structured and less often evaluated. Beyond accomplishing our goals of demonstrating a less resource-intensive case management system, this evaluation added to our clinical practice by allowing us to identify and address an important medical system issue and knowledge deficits in our families.

Telephone follow-up allowed us to identify and quickly address a major medical system issue: not obtaining prescriptions. Although the literature suggests a 7–28% noncompliance rate for filling primary prescriptions (31, 32), we did not anticipate this would be a significant problem within our asthma clinic, given our comprehensive management. However, after noting that nearly 1 in 10 patients had a pharmacy-related issue, we readily incorporated remedies into our system. These pharmacy-related problems were as follows: lack of transportation to pick up prescriptions, clinician writing for a nonformulary medication, and patient with inactive Medicaid coverage. CHWs were able to address all pharmacy-related problems, most often by contacting pharmacies or by consulting physicians in the asthma clinic on the patient's behalf. On some occasions, the CHWs worked with Medicaid eligibility staff to help reinstate coverage to get medications. Further, we were able to address this issue on a broader level by working with local pharmacies and health plans to expand formulary coverage and to create, disseminate, and continually update a list of asthma medications categorized by type of Medicaid coverage to help minimize future pharmacy problems.

Knowledge deficits among patients and caregivers were noticed in two areas: use of baseline medications and response to asthma emergencies. Regarding baseline medications, nearly all patients in this clinic were expected to be on controller medications (because the clinic serves children with poorly controlled asthma), and all patients were expected to be on a short-acting beta agonist as needed. The reported understanding of baseline medication use (the medication regimen to follow when the child was NOT having an asthma flare) was only 82.5%, but this is still substantially above the often-quoted rate of controller medication use (58%) among children with asthma (33). This topic was readdressed in all telephone contacts. In the area of asthma emergencies, many families noted that they would come directly to the hospital in the case of a flare, rather than stating that they would increase the frequency of beta-agonist use as an interim step in the treatment process. The discrepancy

between patient knowledge of an Action Plan (99.2%) and patient knowledge of what to do in an emergency (20.7%) prompted staff to spend more time during clinic visits teaching patients how to utilize emergency plans and how to address increased asthma symptoms through more frequent beta-agonist use.

In addition to these primary findings, we made some observations related to our culturally diverse population. Disproportionately more Latino patients/families were unreachable by telephone, despite the presence of culturally and linguistically competent staff at all clinic visits and in telephone follow-ups. This observation has helped redirect the efforts of the clinic staff toward clinic-based education and follow-up when it is deemed most acceptable to the families. CHWs now ask families during the asthma clinic visit whether they prefer telephone follow-up or clinic-based follow-up. Additionally, CHWs now explain the reason for collecting patient telephone numbers and ask for the best contact number for reaching patients regarding the clinic visit only (clarifying that the number will not be used for billing or other administrative issues). Finally, all patients are given the date and time of their follow-up appointment at the time of the visit, rather than solely via telephone follow-up, to ensure the best chance of future attendance in the event that telephone contact is not successful.

The findings of this evaluation may be limited in their generalizability for several reasons. First, this intervention occurred in a highly structured setting with a well-established care team. Telephone contact may be less acceptable and/or effective in settings where clinical care and case management are not integrated, such as when the person making the telephone calls has never met the patient/family. Further, not all populations face the same economic, linguistic, and cultural challenges, which may make our findings most relevant to urban, economically disadvantaged, minority children and families. Also limiting the interpretation are the lack of a control group (receiving no telephone follow-up or an alternate intervention) and the potential for response bias from participants aiming to please the CHWs. However, for the purposes of a descriptive study of telephone management and clinical improvement, this work has lessons for other programs focusing efforts on the care of underserved communities.

CONCLUSIONS

Telephone case management can be a helpful adjunct to clinic visits for pediatric asthma care among underserved populations where social, cultural, and financial barriers to care are particularly prevalent. It is an efficient and effective means for supporting asthma care through the identification of gaps in care and through the reinforcement of management strategies. In the setting of an urban asthma clinic for underserved children, a single telephone call within 2 weeks of a clinic visit effectively uncovered patients' concerns not previously noted in clinic visits.

Issues related to pharmacy problems and patient knowledge deficits were successfully addressed on an individual patient/family level; systems of care issues were also identified and targeted for improvement. Telephone case management by CHWs can be an efficient, acceptable mechanism of case management as a supplement to comprehensive care in a diverse, urban pediatric population with asthma.

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DECLARATION OF INTEREST

The authors report no competing interests. The authors alone are responsible for the content and writing of this paper.

REFERENCES

1. Bryant-Stephens T. Asthma disparities in urban environments. *J Allergy Clin Immunol* 2009; 123:1199–1206.
2. Aligne CA, Auinger P, Byrd RS, Weitzman M. Risk factors for pediatric asthma: contributions of poverty, race, and urban residence. *Am J Respir Crit Care Med* 2000; 162:878–877.
3. Cope SF, Ungar WJ, Glazier RH. Socioeconomic factors and asthma control in children. *Pediatr Pulmonol* 2008; 43:745–752.
4. Smith LA, Hatcher-Ross JL, Wertheimer R, Kahn RS. Rethinking race/ethnicity, income, and childhood asthma: racial/ethnic disparities concentrated among the very poor. *Public Health Rep* 2005; 120:109–1016.
5. Wu AC, Smith L, Bokhour B, Hohman KH, Lieu TA. Racial/ethnic variation in parent perceptions of asthma. *Ambul Pediatr* 2008; 8: 89–97.
6. Lieu TA, Lozano P, Finkelstein JA, Chi FW, Jensvold NG, Capra AM, Quesenberry CP, Selby JV, Farber HJ. Racial/ethnic variation in asthma status and management practices among children in managed Medicaid. *Pediatrics* 2002; 109:857–865.
7. Valerio M, Cabana MD, White DF, Heidmann DM, Brown RW, Bratton SL. Understanding of asthma management: Medicaid parents' perspectives. *Chest* 2006; 129:594–601.
8. National Heart Lung and Blood Institute. National Asthma Education Program: Expert Panel 3 guidelines to the Diagnosis and Management of Asthma. Bethesda, MD: National Heart, Lung and Blood Institute, 2007.
9. Li P, Guttman A. Recent innovations to improve asthma outcomes in vulnerable children. *Curr Opin Pediatr* 2009; 21:783–788.
10. Bryant-Stephens T, Li Y. Outcomes of a home-based environmental remediation for urban children with asthma. *J Natl Med Assoc* 2008; 100:306–316.
11. Postma J, Karr C, Kieckhefer G. Community health workers and environmental interventions for children with asthma: a systematic review. *J Asthma* 2009; 46:564–576.
12. Eggleston PA, Butz A, Rand C, Curtin-Brosnan J, Kanchanaraks S, Swartz L, Breyse P, Buckley T, Diette G, Merriman B, Krishnan JA. Home environmental intervention in inner-city asthma: a randomized controlled clinical trial. *Ann Allergy Asthma Immunol* 2005; 95: 518–524.
13. Fisher EB, Strunk RC, Highstein GR, Kelley-Sykes R, Tarr KL, Trinkaus K, Musick J. A randomized controlled evaluation of the effect of community health workers on hospitalization for asthma: the asthma coach. *Arch Pediatr Adolesc Med* 2009. 163:225–232.

14. Krieger J, Takaro TK, Song L, Beaudet N, Edwards K. A randomized controlled trial of asthma self-management support comparing clinic-based nurses and in-home community health workers: the Seattle-King Country Healthy Homes II Project. *Arch Pediatr Adolesc Med* 2009; 163:141–149.
15. Bryant-Stephens T, Kurian C, Guo R, Zhao H. Impact of a household environmental intervention delivered by lay health workers on asthma symptom control in urban, disadvantaged children with asthma. *Am J Public Health* 2009; 99:S657–S665.
16. Parker EA, Israel BA, Robins TG, Mentz G, Xihong Lin, Brakefield-Caldwell W, Ramirez E, Edgren KK, Salinas M, Lewis TC. Evaluation of community action against asthma: a community health worker intervention to improve children's asthma-related health by reducing household environmental triggers for asthma. *Health Educ Behav* 2008; 35:376–395.
17. La Roche MJ, Koinis-Mitchell D, Gualdrón L. A culturally competent asthma management intervention: a randomized controlled pilot study. *Ann Allergy Asthma Immunol* 2006; 96:80–85.
18. Diccio-Bloom B, Cohen D. Home care nurses: a study of the occurrence of culturally competent care. *J Transcult Nurs* 2003; 14: 25–31.
19. Weiss HB. Home visits: necessary but not sufficient. *Future Child* 1993; 3(13):113–128.
20. Postma JM, Smalley K, Ybarra V, Kieckhefer G. The feasibility and acceptability of a home-visitation, asthma education program in a rural, Latino/a population. *J Asthma* 2010; 48: 139–146.
21. Johnson K. Use of telephone follow-up for post-cardiac surgery patients. *Intensive Crit Care Nurs* 2000; 16:144–150.
22. Strinko JM, Howard CA, Schaeffer SL, Laughlin JA, Berry MA, Turner SN. Reducing risk with telephone follow-up of patients who leave against medical advice or fail to complete an ED visit. *J Emerg Nurs* 2000; 26:223–232.
23. Cox K, Wilson E. Follow-up for people with cancer: nurse-led services and telephone interventions. *J Adv Nurs* 2003; 43:51–61.
24. Kelly DF, Faught WJ, Holmes LA. Ovarian cancer treatment: the benefit of patient telephone follow-up post-chemotherapy. *Can Oncol Nurs J* 1999; 9:175–178.
25. Racine AD, Alderman EM, Avner JR. Effect of telephone calls from primary care practices on follow-up visits after pediatric emergency department visits: evidence from the Pediatric Emergency Department Links to Primary Care (PEDLPC) randomized controlled trial. *Arch Pediatr Adolesc Med* 2009; 163:505–511.
26. Nelson EW, Van Cleve S, Swartz MK, Kessen W, McCarthy PL. Improving the use of early follow-up care after emergency department visits. A randomized trial. *Am J Dis Child* 1991; 145:440–444.
27. Brugge D, Bagley J, Hyde J. Environmental management of asthma at top-ranked U.S. managed care organizations. *J Asthma* 2003; 40: 605–614.
28. Mistiaen P, Poot E. Telephone follow-up, initiated by a hospital-based health professional, for postdischarge problems in patients discharged from hospital to home. *Cochrane Database Syst Rev* 2006; 4:CD004510.
29. Thyne SM, Rising JP, Legion V, Love MB. The Yes We Can Urban Asthma Partnership: a medical/social model for childhood asthma management. *J Asthma* 2006; 43:667–673.
30. Coughley K, Klein G, West C, Diamond JJ, Santana A, McCarville E, Rosenthal MP. The child asthma link line: a coalition-initiated, telephone-based, care coordination intervention for childhood asthma. *J Asthma* 2010; 47(3):303–309.
31. Fischer MA, Stedman MR, Lii J, Vogeli C, Shrank WH, Brookhart MA, Weissman JS. Primary medication non-adherence: analysis of 195,930 electronic prescriptions. *J Gen Intern Med* 2010; 25(4):284–290.
32. Matsui D, Joubert GIE, Dykxhoorn S, Rieder MJ. Compliance with prescription filling in the pediatric emergency department. *Arch Pediatr Adolesc Med* 2000; 154:195–198.
33. Milgrom H, Bender B, Ackerson L, Bowry P, Smith B, Rand C. Noncompliance and treatment failure in children with asthma. *J Allergy Clin Immunol* 1996; 98(6 pt 1):1051–1057.

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