Published in final edited form as:

J Asthma. 2014 May ; 51(4): 446–450. doi:10.3109/02770903.2013.878351.

Discrepancies between medical record data and parent reported use of preventive asthma medications

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Abstract

Objective—To assess whether medical record documentation reflects actual home practices regarding the administration of preventive medications to urban children with persistent asthma.

Methods—Baseline data from a prompting asthma intervention were used for this cross-sectional analysis. As part of the larger study, we enrolled children (2–12 years) with persistent asthma in the waiting room at 12 primary care offices (2009–2012). Prior to their visit with a healthcare provider, caregivers reported information regarding their child's asthma symptom severity and current preventive medications (i.e. name and frequency of use). We compared caregiver-reported medication information with medical record data to determine the rate of *complete concordance*, defined as total consistency between the prescribed medication data documented in the medical record and parent report describing how the child is actually using the medication at home.

Results—According to 310 completed medical record reviews, 194 (62%) children had a current prescription for a daily preventive asthma medication. Of these children, 110 (57%) had caregivers who reported complete concordance. Those reporting complete concordance were more likely to have children with greater symptom severity, including fewer symptom-free days in the prior two weeks (6.9 vs. 8.7, $p = 0.018$), and 1 asthma-related hospitalization in the prior year (16% vs. 6%, $p = 0.042$).

Conclusions—Medical records may poorly reflect actual home practices and providers should specifically inquire about medication use and barriers to adherence at the time of an office visit to promote guideline-based, consistent treatment for children with persistent asthma.

Keywords

Caregiver report; concordance; controller medication; medical documentation; urban children

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Declaration of interest

The authors have no conflicts of interest to disclose.

Introduction

Asthma is one of the most prevalent chronic conditions of childhood [1], affecting 14% of children under the age of 18 [2]. Disparities in asthma are evident, with children living in poverty being more likely to be diagnosed [2,3] and to suffer from greater asthma morbidity [4–7].

The National Heart, Lung, and Blood Institute (NHLBI) has published guidelines that provide specific recommendations to healthcare providers regarding asthma assessment and management [8]. In particular, these guidelines recommend that all children with persistent asthma symptoms use a daily-inhaled corticosteroid (ICS) or leukotriene inhibitor for optimal control of asthma symptoms. Despite these recommendations, studies have consistently shown that inadequate treatment with daily preventive medications is common, leaving many children suffering from preventable morbidity [4,9–12]. Furthermore, urban children from poor, minority backgrounds, who are commonly exposed to multiple indoor allergens and tobacco smoke [13], are at greatest risk of inadequate preventive treatment for asthma [4,14–17].

There are many barriers that can prevent children with persistent asthma from receiving optimal preventive therapy, including limited access to care, poor provider-parent communication, inconsistent delivery of guideline-based asthma care by providers [9,18], and inadequate medication adherence at home. In this study, we focused on the potential gap between what preventive medications are prescribed and documented by the physician and how those medications are later administered in the home. Understanding common discrepancies between chart documentation and actual medication use can help providers adequately address barriers to proper medication administration and consistently provide guideline-based asthma care for this population.

Methods

Cross-sectional data for this analysis were collected at baseline as part of a larger randomized trial. We enrolled caregivers of children with asthma, ages 2–12 years, from 12 urban primary care practices from 2009 to 2012. Research assistants interviewed caregivers in the waiting room of the practice prior to their child's healthcare visit. Surveys were administered in either English or Spanish, consent forms were language specific, and research assistants were fluent in the language of consent. All visits for which the child met with a physician, physician assistant or nurse practitioner were included, regardless of the reason for the visit. Children were eligible if their caregivers reported current persistent asthma symptoms or poor asthma control, based on NHLBI guidelines [8]. The primary caregiver provided written informed consent, and assent was obtained from children seven years or older. The study protocol was approved by the Institutional Review Boards.

Preventive asthma medication use

All parent-reported data regarding medication use were collected in the waiting room prior to the child's healthcare visit. Caregivers reported all current asthma and allergy medications prescribed by the child's doctor or other healthcare professional. They were asked

specifically about each medication's name and frequency of use (i.e. every day, some days and only as needed) as well as if the child had taken that medication within the past two weeks. For this analysis, we focused on only preventive asthma medications, including ICSs, combined ICSs/long acting beta agonists and leukotriene inhibitors.

A standardized chart abstraction tool, including a chart for medication documentation and specific checklists for visits, dates and types of visits, was used to collect information from the child's medical record for the prior year, up to (but not including) the enrollment visit. We specifically collected information regarding the name and prescribed frequency of use for all preventive asthma medications. We then compared caregiver report data to medical record review data to determine concordance. *Complete concordance* was achieved when the caregiver reported (1) that the child had a current daily preventive asthma medication prescription, (2) a preventive medication name matching the one documented in the medical record, (3) that the child had used the medication within the past two weeks and (4) that the child was usually receiving the medication daily. This was asked to determine that the child had used preventive medications daily and not sporadically or because it was symptom induced, including in the past two weeks. The caregiver did not need to accurately report the prescribed strength or dosage in order to achieve complete concordance. Parents of children who were prescribed multiple daily preventive medications (e.g. both Flovent and Singulair) only needed to meet criteria for one of the medications in order to be considered completely concordant.

Assessment of asthma symptom severity

Asthma symptom severity was also assessed in the waiting room prior to the healthcare visit. Caregivers were asked to report how often in the prior two weeks their child experienced daytime symptoms, night-time symptoms and days requiring rescue medication use, as well as the number of symptom-free days, in which the child had no symptoms of asthma (such as wheezing, coughing and shortness of breath) for 24 h [19]. Based on the symptoms reported and according to the NHLBI guidelines [8], symptoms were categorized as either mild persistent or moderate to severe persistent severity. Based on enrollment criteria, children with mild intermittent symptoms were not included in the study as eligibility for the larger trial required children to have persistent symptoms or poor control.

Healthcare utilization for asthma

Caregivers reported their child's asthma-related healthcare utilization over the prior year, including the number of emergency room visits, hospitalizations and any visits to the doctor for an acute asthma exacerbation in which prednisone was prescribed.

Assessment of covariates

Demographic characteristics included parent report of the child's gender, age, race (white, black or other), ethnicity (Hispanic or not Hispanic), type of health insurance (Medicaid or non-Medicaid) and primary language (Spanish or English). Caregiver demographics included age (≥ 30 or <30), marital status (single or married/domestic partnership), education level (high school or <high school), and smoking status (yes/no). We included several healthcare variables, including the type of practice where the child was being seen at the

time of enrollment (pediatric or family medicine), caregivers' perception of their child's overall health status (excellent/very good/good or fair/poor), and whether the child had a cold or other respiratory illness at the time of enrollment. We used data from the primary care medical record to assess whether, in the prior six months, the child had attended a healthcare visit specifically related to asthma or a healthcare visit for any reason.

Analysis

We performed χ^2 tests, *t*-tests and Mann-Whitney tests to determine the association of complete concordance with demographic variables, asthma symptoms and healthcare utilization. A two-sided alpha of <0.05 was considered statistically significant. We also used multivariate logistic and linear regression analyses to determine characteristics that were independently associated with complete concordance.

Results

We used data from 310 completed medical record reviews from children enrolled in the study (overall study response rate: 82%). While all of these children reported persistent asthma symptoms, only 194 (62%) had a current prescription for a daily preventive asthma medication documented in their medical record and only this subset of subjects was included in analyses.

Demographic characteristics of the sample are shown in Table 1. Overall, children had a mean age of 6.7 years, 45% were male and 27% were Hispanic. The majority of children had Medicaid insurance (58%) and reported that English was their primary language (83%). Most caregivers had at least a high school education (80%) and were non-smokers (66%).

Caregiver-reported medication use is shown in Figure 1. Among the 194 subjects with a current prescription for a daily-ICS or leukotriene inhibitor indicated in their medical record, 163 (84%) caregivers reported that their child had a preventive medication prescription, and 154 (79%) named a preventive medication that matched the one documented in the medical record. Approximately three quarters (76%) of all caregivers knew that their child was prescribed to take the medication daily. A total of 144 caregivers (74%) reported that the child had used the medication within the past two weeks although, when asked about frequency of use, only 62% reported that the child had taken the medication daily during that time. Overall, 110 (57%) caregivers achieved complete concordance, reporting daily use, and use within the prior two weeks, of the same preventive medication documented in the medical record.

There were no differences between concordant and non-concordant groups in child demographics (i.e. gender, age, race, ethnicity, insurance type and primary language) or caregiver demographics (i.e. age, marital status, education and smoking status) (data not shown). While there were no group differences in practice type or caregivers' perception of their child's overall health status, we did find that subjects with complete concordance reported increased healthcare utilization (Table 2). They were significantly more likely to have medical record documentation of a healthcare visit for any reason within the prior six months (92% vs. 81%, $p = 0.031$) and were also more likely to have had an asthma-related

visit within that time (82% vs. 67%, $p = 0.019$). Those with complete concordance were also more likely to report that their child had a cold or other respiratory illness at the time of enrollment (42% vs. 18%, $p = 0.001$).

Overall, most children (65%) had moderate to severe persistent asthma, and there was no difference in severity classification between those with and without complete concordance (Table 3). However, we found that parents who reported complete concordance also reported fewer symptom-free days in the prior two weeks (6.9 vs. 8.7, $p = 0.018$), and were more likely to report that their child had 1 asthma-related hospitalization in the prior year (16% vs. 6%, $p = 0.042$). In linear and logistic regression analyses controlling for pertinent covariates (cold symptoms at baseline, saw a provider for asthma 6 months ago, race, Spanish language, Medicaid insurance, parent education and caregiver smoking status), hospital stays ($p = 0.037$) and emergency room visits ($p = 0.024$) were significantly different between groups.

Discussion

In this study, we sought to determine whether medical record documentation of preventive asthma medications reflects the actual use of these medications among inner-city children with persistent asthma. Several pertinent findings are noted. First, we only included data from children who had a current prescription for a daily preventive asthma medication documented in their medical record. We found that only 194/310 (62%) met this criteria, reflecting under-treatment of persistent asthma in the primary care clinics. Second, we found that among children with a daily preventive asthma prescription documented in their medical record, only 57% of caregivers reported current daily use of the same preventive medication. This suggests that information from the medical record regarding preventive medication use may not provide a realistic picture of what the child is receiving at home.

Some discrepancies between medical record and parent-report data may be the result of inaccurate documentation. Providers should strive to consistently record asthma severity and medication use at each visit, as research suggests that thorough documentation is associated with the delivery of quality, guideline-based asthma care [20]. However, even when the child's medical record accurately reflects what the physician has prescribed, several barriers to consistent preventive asthma care have been described. For example, caregivers may not properly administer preventive medications due to pragmatic barriers (e.g. lack of time, inability to pay for medications and lack of transportation to the pharmacy), concerns about medication side effects, or parent-provider miscommunication regarding the medication schedule and proven benefits of consistent daily use [21]. While intermittent preventive asthma therapy can be effective [22], all of the children in this study had current persistent symptoms, suggesting that more long-term, consistent therapy is needed for this particular population. Additionally, every child had a current prescription for daily medication use, indicating that the providers agreed with this mode of therapy for these patients.

Not surprisingly, we found that caregivers of children with a recent healthcare visit were more likely to report concordant medication use, suggesting that recent contact with the healthcare system supported preventive care measures at home. This finding supports the

NHLBI recommendation that children with persistent asthma attend an asthma follow-up at least every six months [23]. These follow-up appointments are an opportunity for providers to reconcile the child's medication log, reassess their asthma morbidity and the level of control, discuss asthma triggers such as smoke exposure, address barriers to proper medication adherence, deliver self-management education, reinforce the regimen with the caregiver and child and provide a step-up in therapy as needed.

Children with increased asthma morbidity (i.e. fewer symptom-free days, recent asthma-related emergency room visits or hospitalizations) were more likely to report complete concordance. This is consistent with prior studies showing that parents are more likely to administer preventive medications when their children are actively symptomatic and there is an observable need for the therapy [24,25]. Unfortunately, many children with persistent symptoms, even those with moderate to severe persistent symptoms, report no preventive medication use in this study.

One limitation of this cross-sectional study is that we can only describe associations between caregiver-reported concordance and asthma morbidity or healthcare utilization. Second, we did not collect information on the specific barriers that might impede the caregiver's ability to support successful self-management for young children with asthma. Third, despite increased efforts to move toward a medical home model of care, there may have been cases in which medications were prescribed outside of the primary care office and might have been missed if that information was not incorporated into the child's primary care medical record. Enrollment in an asthma specialist office, rather than a primary care office, may have yielded different results. Finally, we did not include an objective measure of medication adherence. Due to a potential social desirability bias, caregiver-reported adherence in this study may overestimate actual medication administration, suggesting that rates of complete concordance may be even lower.

Conclusion

Among caregivers of urban children with persistent asthma who have a current prescription for a daily preventive medication, only slightly more than half reported that their child is consistently using the medication as prescribed. Thus, patient medical records may not provide accurate information about home medication use. Rather than relying on medical record documentation, pediatricians should use the office visit as an opportunity to specifically discuss the child's current asthma medication use, even if the visit was not specifically related to the child's asthma. This is an important initial step in identifying undertreated children and the patient-specific barriers preventing consistent medication use. Furthermore, recent healthcare utilization was positively associated with complete concordance, supporting the need for these children to attend regular asthma follow-up appointments. Further research is needed to identify specific physician-level, caregiver-level, and patient-level barriers to complete concordance, so that future interventions can be appropriately targeted.

Acknowledgments

I would like to express my deepest appreciation to the authors of this paper that provided me with the guidance to complete this manuscript. A special gratitude to the PI of the study, who gave me the opportunity to pursue this project, offered me constant support and allowed me to achieve my goals. I am grateful to be surrounded by such intelligent and supportive women. Thank you!

Support for this work was provided by a grant from the NHLBI of the National Institutes of Health (R01 HL091835, www.clinical-trials.gov Identifier: NCT01105754). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

References

1. Moorman JE, Zahran H, Truman BI, Molla MT. Current asthma prevalence – United States, 2006–2008. *MMWR Surveill Summ.* 2011; 60:84–86. [PubMed: 21430629]
2. Bloom BCR, Freeman G. Statistics for U.S. Children: National Health Interview Survey, 2011. *Health Stat.* 2012; 10:17–18.
3. Akinbami LJ, Moorman JE, Liu X. Asthma prevalence, health care use, and mortality: United States, 2005–2009. *Natl Health Stat Report.* 2011; 32:1–14. [PubMed: 21355352]
4. Halterman JS, Auinger P, Conn KM, Lynch K, Yoos HL, Szilagyi PG. Inadequate therapy and poor symptom control among children with asthma: findings from a multistate sample. *Ambul Pediatr.* 2007; 7:153–159. [PubMed: 17368410]
5. Newacheck PW, Halfon N. Prevalence, impact, and trends in childhood disability due to asthma. *Arch Pediatr Adolesc Med.* 2000; 154:287–293. [PubMed: 10710030]
6. Akinbami LJ, Moorman JE, Garbe PL, Sondik EJ. Status of childhood asthma in the United States, 1980–2007. *Pediatrics.* 2009; 123:S131–S145. [PubMed: 19221156]
7. McDaniel M, Paxson C, Waldfogel J. Racial disparities in childhood asthma in the United States: evidence from the National Health Interview Survey, 1997 to 2003. *Pediatrics.* 2006; 117:e868–e877. [PubMed: 16651291]
8. Expert panel report III: guidelines for the diagnosis and management of asthma. Bethesda, MD: U.S. Department of Health and Human Services; National Institute of Health; National Heart, Lung, and Blood Institute; National Asthma Education and Prevention Program; 2007. NIH publication No. 07-4051
9. Cabana MD, Rand CS, Becher OJ, Rubin HR. Reasons for pediatrician nonadherence to asthma guidelines. *Arch Pediatr Adolesc Med.* 2001; 155:1057–1062. [PubMed: 11529809]
10. Warman KL, Silver EJ, McCourt MP, Stein RE. How does home management of asthma exacerbations by parents of inner-city children differ from NHLBI guideline recommendations? National Heart, Lung, and Blood Institute. *Pediatrics.* 1999; 103:422–427. [PubMed: 9925835]
11. 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; 98:1051–1057. [PubMed: 8977504]
12. McQuaid EL, Kopel SJ, Klein RB, Fritz GK. Medication adherence in pediatric asthma: reasoning, responsibility, and behavior. *J Pediatr Psychol.* 2003; 28:323–333. [PubMed: 12808009]
13. Kattan M, Mitchell H, Eggleston P, Gergen P, Crain E, Redline S, Weiss K, et al. Characteristics of inner-city children with asthma: the National Cooperative Inner-City Asthma Study. *Pediatr Pulmonol.* 1997; 24:253–262. [PubMed: 9368259]
14. Akinbami LJ, LaFleur BJ, Schoendorf KC. Racial and income disparities in childhood asthma in the United States. *Ambul Pediatr.* 2002; 2:382–387. [PubMed: 12241134]
15. Cabana MD, Lara M, Shannon J. Racial and ethnic disparities in the quality of asthma care. *CHEST J.* 2007; 132:810S–817S.
16. Adams R, Fuhlbrigge A, Guilbert T, Lozano P, Martinez F. Inadequate use of asthma medication in the United States: results of the asthma in America national population survey. *J Allergy Clin Immunol.* 2002; 110:58–64. [PubMed: 12110821]

17. Finkelstein JA, Lozano P, Farber HJ, Miroshnik I, Lieu TA. Underuse of controller medications among Medicaid-insured children with asthma. *Arch Pediatr Adolesc Med.* 2002; 156:562–567. [PubMed: 12038888]
18. Finkelstein JA, Lozano P, Shulruff R, Inui TS, Soumerai SB, Ng M, Weiss KB. Self-reported physician practices for children with asthma: are national guidelines followed? *Pediatrics.* 2000; 106:886–896. [PubMed: 11044140]
19. Szeffler SJ. Challenges in assessing outcomes for pediatric asthma. *J Allergy Clinical Immunol.* 2001; 107:S456–S464. [PubMed: 11344375]
20. Cabana MD, Bruckman D, Meister K, Bradley JF, Clark N. Documentation of asthma severity in pediatric outpatient clinics. *Clin Pediatr (Phila).* 2003; 42:121–125. [PubMed: 12659384]
21. Mansour ME, Lanphear BP, DeWitt TG. Barriers to asthma care in urban children: parent perspectives. *Pediatrics.* 2000; 106:512–519. [PubMed: 10969096]
22. Zeiger RS, Mauger D, Bacharier LB, Guilbert TW, Martinez FD, Lemanske RF Jr, Strunk RC, et al. Daily or intermittent budesonide in preschool children with recurrent wheezing. *New Eng J Med.* 2011; 365:1990–2001. [PubMed: 22111718]
23. New York State Consensus Asthma Guideline Expert Panel. Clinical Guideline for the Diagnosis, Evaluation and Management of Adults and Children with Asthma. 2012. p. 3-6. Available from: www.health.ny.gov/publications/4750.pdf [last accessed 3 Mar 2013].
24. Peterson-Sweeney K, McMullen A, Yoos HL, Kitzman H. Parental perceptions of their child's asthma: management and medication use. *J Pediatr Health Care.* 2003; 17:118–125. [PubMed: 12734458]
25. Chambers CV, Markson L, Diamond JJ, Lasch L, Berger M. Health beliefs and compliance with inhaled corticosteroids by asthmatic patients in primary care practices. *Respir Med.* 1999; 93:88–94. [PubMed: 10464858]

Figure 1.
Parent report of preventive medication use and concordance.

Table 1

Participant demographics.

	<i>N</i> = 194	Percent
Child's gender: Male	87	45
Child's age, mean (SD)	6.74	2.8
Child's race		
White	55	28
Black	74	38
Other	65	34
Child's ethnicity: Hispanic	52	27
Child's health insurance: Medicaid	112	58
Primary language: Spanish	33	17
Caregiver age: 30 yrs	135	70
Caregiver marital status: Single	106	55
Caregiver education: High school	156	80
Caregiver smokes tobacco: Yes	65	34

Table 2

Healthcare factors.

	Total <i>N</i> = 194	Concordant <i>N</i> = 110	Non-concordant <i>N</i> = 84	<i>p</i> Value
Practice type: Pediatric	161 (83%)	91 (83%)	70 (83%)	1.00
Child's overall health status: Excellent/very good/good ^a	117 (60%)	62 (56%)	55 (66%)	0.237
Last healthcare visit: 6 Months ago ^b	169 (87%)	101 (92%)	68 (81%)	0.031
Last asthma-related healthcare visit: 6 Months ago ^b	146 (75%)	90 (82%)	56 (67%)	0.019
Current cold/respiratory illness ^a	59 (32%)	45 (42%)	14 (18%)	0.001

 χ^2 Tests.^aData collected via parent report.^bData collected via medical record review.

Table 3

Caregiver-reported child asthma morbidity.

	Total N = 194	Concordant N = 110	Non-concordant N = 84	Unadjusted p Value	Adjusted p Value
<i>Asthma severity^a</i>					
Mild persistent	68 (35%)	33 (30%)	38 (42%)		
Moderate to severe	126 (65%)	77 (70%)	49 (58%)	0.097	0.343
Symptom-free days/2wks ^b	7.67 (5.0)	6.88 (5.1)	8.70 (4.8)	0.018	0.109
Hospital visits in prior year: Yes ^a	23 (12%)	18 (16%)	5 (6%)	0.042	0.037
ED visits/prior year ^b	1.24 (2.3)	1.61 (2.8)	0.76 (1.2)	0.072	0.024
1 Asthma exacerbation requiring prednisone/prior year ^a	111 (57%)	65 (59%)	46 (55%)	0.561	0.297

^a χ^2 Tests; results reported as N (%).^b Mann–Whitney tests; results reported as mean (SD).^c Linear and ^d Logistic regression models include the following variables: cold symptoms at baseline, saw a provider for asthma 6 months ago, race, Spanish language, Medicaid insurance, parent education and caregiver smoking status.