Performance Feedback Improves Pediatric Residents’ Adherence to Asthma Clinical Guidelines

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Abstract

• **Objective:** To determine the impact of a monthly peer-comparison report on pediatric residents’ adherence to asthma guidelines.
• **Design:** Pre- and post-intervention study.
• **Participants and setting:** 21 residents working in a pediatric clinic in a military teaching hospital in Hawaii.
• **Methods:** Residents were trained on the use of asthma guidelines and an ambulatory pathway. Guideline adherence was subsequently measured by asking residents to document in an ambulatory data system whether they had performed 4 pathway tasks when treating asthma patients: assess and classify asthma severity, provide or review an asthma action plan, provide direct patient education, and order spirometry at the visit or within 6 months. Use of controller medications in patients with persistent or unclassified asthma severity was also measured. Monthly reports showing the rate at which individual providers performed each task relative to their peers were generated and provided to the house staff without comment. Individual rates for the 5 measures were averaged monthly and the means compared across 6 months to detect an effect of the reports on resident behavior.
• **Results:** Of 373 patients with asthma at baseline, 36.0% had asthma severity classified, 13.4% of patients had an asthma action plan documented, 28.5% had patient education documented, 4.7% had spirometry ordered, and 37.2% of patients with persistent asthma were on controller medications. At 6 months, rates of documenting an asthma action plan, severity classification, patient education, and ordering of spirometry increased significantly ($P < 0.001$) compared to baseline. Appropriate use of a controller medication did not increase significantly.
• **Conclusion:** Pediatric resident adherence to asthma guidelines improved for 4 of 5 parameters with monthly peer-comparison feedback.

The management of childhood asthma consumes a large portion of health care resources, with direct costs estimated at more than $5 billion per year [1]. In the Military Health Care System, diagnosis-related group (DRG) 98 (bronchitis and asthma) is the most common reason for admission in the pediatric age-group. Most of the expense for asthma management results from hospitalizations and emergency department visits or other unscheduled acute care [1,2].

The use of clinical practice guidelines in caring for children with asthma has been shown to decrease hospitalization and improve patient outcomes [3–15]. Unfortunately, physicians frequently fail to adhere to clinical guidelines for a variety of reasons, including lack of familiarity with the guidelines or lack of motivation to change practice behavior [16–18]. While there have been many different approaches to improving physician adherence, no one method has been demonstrated to be consistently effective [19,20]. Physician profiling, the process of comparing the performance of a physician to that of his or her peers, is an approach that has shown some promise [21,22].

The medical informatics branch of our information management division has developed a robust clinical data repository that is populated with pertinent clinical data from our hospital information systems. A Web-based front end on our intranet “mines” data from the systems for use by the medical center’s clinical leaders and clinicians. Recent programming developments allow our clinicians to monitor their practice patterns and compare their treatment and patient outcomes with that of their peers. We used specially designed reports from this system to provide monthly peer-comparison feedback to pediatric residents in our training program who regularly care for children with asthma. The purpose of this study was to determine whether the regular distribution of these reports to the house staff had an effect on their performance in caring for children with asthma.

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Methods
Setting and Participants
Tripler Army Medical Center, located in Honolulu, HI, has maintained a pediatric service and training program for more than 40 years. The practice provides primary and specialty care for the 80,000 children of service members on Oahu and across the Western Pacific and has more than 50,000 ambulatory visits per year. Twenty-one pediatric residents provide the bulk of the primary care. Approximately 6000 patients are assigned to individual pediatric residents by name, and the residents serve as these patients’ primary care managers.

Data Collecting
For each patient encounter, the resident generates a computerized billing sheet in the ambulatory data system (ADS). This system assigns ICD-9 and evaluation and management codes to the visit for demographic and workload reporting. The resident is responsible for completing the ADS form in order for the practice to receive appropriate workload credit for third-party billing where appropriate. The resident chooses the patient’s diagnosis, evaluation and management code, and procedure code from either predefined lists or dictionary (lexicon) look-up. There are also fields on the ADS form that can be customized for specific clinic use. Residents who care for children with asthma choose the ICD-9 codes 439.0–439.XX for asthma when that is the reason for the visit and add the appropriate code to the patient’s computerized master problem list once they are confident of the diagnosis. In our practice, the diagnosis of asthma is made in a child by strong history, positive response to appropriate therapy, suggestive pulmonary function testing, or consultation with a pediatric pulmonologist or allergist.

We use a Clinical-Economic Outcome (CEO) program that runs on a Microsoft SQL server to manage our data. The CEO program is populated with selected data from the hospital medical information systems (the ADS and the Department of Defense Composite Health Care System, which contains laboratory and radiographic study records, patient summaries, and pharmacy records). The data are linked with each patient’s unique identification in the information systems. Data are extracted from these systems and transferred to the CEO using Health Level 7 (HL7), Intersysystems mSQL queries, and MUMPS programming code. The data are updated on a daily basis where appropriate.

Measures
In July 2001, the pediatric residents were trained on the use of asthma guidelines and an ambulatory pathway for patients with asthma [3,15] and were instructed on the use of the ADS system for asthma patients. They were taught when to suspect asthma and how to confirm the diagnosis, reminded of the ICD-9 code for asthma, and instructed to add the diagnosis to the problem list. They were also asked to electronically document in the customized fields of the ADS encounter form whether they performed 4 specific tasks recommended by asthma guidelines: assess asthma severity (mild intermittent, or mild, moderate, or severe persistent), provide or review an asthma action plan, provide direct patient education, and order or perform spirometry at the visit or within 6 months. These 4 tasks, considered key outcomes by the Army Medical Command’s task force on clinical practice guidelines, were used as measures of physician adherence to the asthma clinical guidelines.

The CEO program automatically assessed a fifth measure. The program searched the pharmacy records of every individual patient with a visit for asthma who was either classified as persistent or was unclassified and who had an active prescription for a controller medication for asthma at the time of that visit. An active prescription was one that was prescribed within 4 months of the visit (including that day) or in which an active refill was on file. Controller medications included inhaled corticosteroids, long-acting β-agonists (rarely used in children), inhaled cromolyn or nedocromil, or leukotriene receptor antagonists.

Performance Reports
At the end of October 2001, the CEO program was used to generate a single-page, 2-sided report of the pediatric residents’ performance on the 5 measures for the period 1 July 2001 to 30 September 2001 (Figure 1). The report showed how frequently each of the pediatric residents recorded having performed the recommended tasks in caring for their assigned patients who had asthma on their master problem list. Each measure was displayed separately as a bar graph, with each bar representing the percentage of asthma patients for whom the task was documented on the ADS form. The graphs were displayed from least to greatest adherence and showed the residents’ performance (in yellow) compared to his or her “anonymous” peers (in blue). The report was distributed to each resident by the chief of pediatrics at the department morning report.

Monthly thereafter, summary reports were provided to each resident. The reports presented data from the previous month, so that, for example, the report provided in December presented November data. When the reports were distributed, the residents were reminded how to correctly complete the ADS forms for patients with asthma, but no further encouragement or incentive was provided. Six reports were distributed to the residents between October 2001 and March 2002.

Analysis
There were 7 data points for each of the 5 measures: baseline (July–September 2001), the 5 subsequent report periods, plus
Thus, of your 25 patients with asthma on their master problem list, 17 have an Asthma Action Plan. For pediatric patients, the Asthma Action Plan is documented by a Clinic Use Only entry or an ancillary order in CHCS for the Asthma Action Plan, Pediatrics. You can compare your number with the Asthma Action Plan, Pediatrics per patient with that of other PCMs in your clinic anonymously.

Thus, of your 25 patients with asthma on their master problem list, 16 have had asthma education. For children, asthma education is documented by a Clinic Use Only entry or as CPT 99071 Patient Education Material in GT ADS in CHCS. You can compare your number of asthma education materials given per patient with that of other PCMs in your clinic anonymously.

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that the power of detecting the observed overall differences as indicated by the analysis of variance at an alpha error of 0.05 ranged from 100% to 94.6%, except for the steroid administration data. The latter revealed very small differences, and the resulting power of detecting those differences was only 47.5%. All tests were performed with NCSS software (Jerry L. Hintz, Kaysville, UT).

The hospital’s institutional review board approved the study protocol.

**Results**

Of the 21 physicians followed, 6 were interns, 7 were second-year residents, and 8 were third-year residents. One of the residents included in the third-year group completed her training off cycle in September 2001 but stayed at the hospital as junior staff and continued to follow her “continuity patients.” The male-to-female ratio of the residents was 1:1, and the mean age ± SD of the physicians was 28.8 ± 3.0 years.

At baseline, the residents cared for 373 patients with asthma. The mean number of patients followed throughout the study period was 371 ± 40 (range, 320–423). Between October and March, 126 reports were generated. All but 3 of the reports were given directly to the residents. These 3 reports were placed in resident mailboxes because the physician was offsite for an extended period.

The overall effect was highly significant ($P < 0.001$) for 4 of the 5 measures over the study period (Table and Figure 2). The percentage of patients with severity classification increased from 36.0 ± 4.2% (mean ± SE) at baseline to 59.0 ± 3.1% ($P < 0.001$). The percentage of patients for whom direct patient education was documented increased from 28.5 ± 2.2% to 51.1 ± 2.9% ($P < 0.001$), documentation of an asthma action plan provided or reviewed increased from 13.4 ± 1.9% to 44.1 ± 2.9%, and documentation of spirometry provided, scheduled, or “not applicable” (for children less than 6 years of age) increased from 4.7 ± 1.0% to 16.1 ± 3.5% ($P < 0.001$). The percentage of patients who were classified as having persistent asthma and prescribed a controller medication did not change significantly over the study period.
Discussion
In 4 of the areas assessed, physician adherence to asthma clinical practice guidelines improved over the study period. While this is an encouraging endorsement for using peer-comparison feedback for affecting provider behavior, there are several areas of caution.

First, the use of electronic documentation of a physician behavior as a measure of adherence has limitations. Documentation of an asthma action plan having been given or spirometry having been ordered does not guarantee that the patients actually received and understood an action plan or had spirometry performed. Similarly, neither the action plan nor the “education provided” documentation can be assumed to reflect the patient’s true comprehension of the material provided. A deeper level of assessment would be necessary to verify whether the measures documented in this study consistently reflected effective adherence to the guidelines. However, the more exhaustive the efforts to validate the documentation (chart reviews, patient interviews), the more cumbersome and less useful the measures become for ongoing provider assessment.

Perhaps the most important measure of guideline adherence in this 6-month review was the utilization of controller therapy in patients with persistent asthma. The use of these medications consistently has been shown to be the most important aspect of effective ambulatory therapy for asthma [5–7,12]. According to the guidelines, patients with persistent asthma should be on controller therapy. However, the results for this measure were disappointing, with less than 50% of patients with persistent asthma recorded as being on controller therapy. Unfortunately, the denominator of this measure may have acted to confound the results. The numerator included all patients with asthma classified as persistent on controller therapy within the report period. The denominator was all patients with persistent asthma plus those whose asthma was unclassified. While the measure was designed to alert the physician as to which of their patients might need controller therapy, it is very likely that many of the unclassified patients included in the denominator had intermittent asthma and would not have been candidates for controller therapy. Because the CEO program could not distinguish among patients who were unclassified, it is likely that the true percentage of patients appropriately treated was higher.

The poor performance with spirometry was discouraging but not surprising to us. In a recently concluded survey of our primary care providers caring for children with asthma, we found that 13% of providers reported having ordered spirometry for patients of appropriate age in the previous 7 days. After a 9-month intervention, the proportion had increased to only 18% (unpublished results.) Pediatricians are accustomed to measuring the effectiveness of asthma therapy by the absence of symptoms, physical findings, or exacerbations. These are all important, but physiologic assessment is considered a key outcome in asthma management according to clinical practice guidelines [3]. Lack of consideration of physiologic assessment may reflect the providers’ lack of comfort with the interpretation of these measures. It may also reflect the fact that spirometry is not yet available in our clinic, and patients must go to the pulmonary function laboratory in another section of the hospital to have it performed. In either case, it is an area that requires attention.

It is not possible to determine whether the peer-comparison aspect of the report solely resulted in the improved performance of the resident or whether other factors also influenced behavior. It is possible that having the report distributed in public by the department chief could have acted as an independent factor for improved performance. The department chief provides the final yearly evaluation for each of the residents (the “senior rater” in military terms) and is very influential in further training and assignments. The knowledge that the chief was reviewing this area of performance on a monthly basis may have provided sufficient motivation, even without peer-comparison. Also, residents engaged in an informal comparison of the reports while they sat next to each other in morning report. Although in a pure sense this is still peer-comparison, it adds another potential confounding variable. Distribution of the report by a research assistant in private or just placing it anonymously in the resident’s mailbox might eliminate these variables.

The study raised another question that remains unanswered. In our system, asthma severity is classified at each visit, which is useful to gauge response to therapy. However, this practice may be misleading in terms of guiding further therapy. For example, a patient may be classified as mild persistent on one visit and given appropriate controller medications, which may lead to improvement such that the classification upon the return visit may be mild intermittent. Our guidance to clinicians has been to classify and treat asthma according to the most severe classification based on disease severity rather than symptom severity. However, different clinicians see the patients at different times, adding an additional measure of subjectivity to an already subjective system. In addition, our computer system queries use the most recent disease severity determination to identify patients who should be on controller medications. These subjective factors can lead to a lack of precision in the data as well as confusion for clinicians who see the patients over time.

In this study of military pediatric residents, monthly peer-comparison feedback was positively associated with increasing adherence to asthma clinical practice guidelines as reflected by improvement in 4 out of 5 different measures over a 6-month period. It is not clear whether these improvements will be sustained, how accurately the improvements reflect true guideline adherence, or whether the results are
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generalizable to a civilian or nontraining environment. However, it is possible that if nothing more, this exercise increased the clinicians’ awareness of the guidelines and made them more likely to obtain appropriate diagnostic studies, use correct severity classification, and manage asthma with appropriate drugs, education, and patient management tools. If this were the only benefit of peer-comparison feedback, it would very likely be worth the effort.

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