INTRODUCTION

Asthma is a chronic disease that can be functionally debilitating for many patients and costly from both an economic and societal perspective. Poorly controlled asthma takes a toll on patients and is associated with increased emergency department (ED) visits, hospitalizations, unplanned physician visits, and missed school days and workdays, as well as loss of productive days.

The burden of asthma is borne out not only in terms of patient symptomatology and inconvenience but also by its direct and indirect economic impact. Asthma creates a financial burden on patients and their families, payers, and employers through direct medical expenditures and missed workdays.

The current standard treatment of asthma is based on consensus-based guidelines such as those of the National Asthma Education and Prevention Program (NAEPP). Although these guidelines, which were revised in 2007, are generally the most widely accepted in the U.S. for the treatment of asthma, many patients who are treated according to these or to other evidence-based guidelines still do not achieve adequate symptom control. There may be striking variability among individuals in their response to recommended therapies as well as individual variations in the clinical manifestation of the disease. This variability of response is so common within any population that it must be expected.

For a health plan population, management cannot be achieved without methods to track individuals with variable responses to standard therapy. The most recently released versions of the guidelines recommend tracking a measure of asthma control at regular visit intervals and using this measure to guide therapeutic decisions. Calculating the degree of variation of response to process measures allows health care providers to characterize the population and to make treatment decisions for each patient.

The variable expression of asthma among patients may be difficult to recognize. Variations in disease may be expressed in terms of both functional symptoms and patients’ responses to therapy. These differences are observed even among patients with apparently similar severity of disease. Individual patients also respond in various ways to different classes of medications for asthma, including inhaled corticosteroids, leukotriene modifiers, and beta-adrenergic agonists. Because of the inherent variability in responses to therapy, many patients remain symptomatic despite close adherence to NAEPP guidelines.

This variability in the clinical expression of asthma and response to therapy has an impact on patients’ symptoms, clinical outcomes, and health care costs. Fewer than 20% of patients with poorly controlled asthma account for almost 80% of direct expenditures for asthma care. Unfortunately, identifying these frequent users of health plan resources is a daunting task, because data must be available from many sources. Predictive modeling through the use of claims data alone has proved to be of limited value in terms of identifying members of the high-risk cohort.

Data derived from Healthcare Effectiveness Data and Information Set (HEDIS) measures do not accurately predict which individuals will become frequent users of health care resources. Instead, health care plans must incorporate regular and careful monitoring of symptoms through the use of patient-reported outcomes as part of an overall asthma-management strategy to identify patients with disease that remains uncontrolled.

In this article, we review the limitations of using retrospective and administrative claims data to identify patients at risk for asthma exacerbations and their subsequent extensive use of resources; conversely, however, we highlight the importance of carefully tracking symptoms in order to assess the level of asthma control. Finally, we recommend a disease-management strategy for managed care organizations (MCOs) in which patient-reported outcomes tools are used, in addition to claims data, to identify patients whose asthma remains poorly controlled despite clinical follow-up and their use of recommended asthma therapy.

VARIABILITY IN RESPONSE TO ASTHMA MEDICATIONS

Disease-management programs are based upon a predictable course of a disease. Diabetes, heart failure, and renal failure are examples of disease states in which anticipated progression can be slowed through closer adherence to evidence-based guidelines. However, the variability in patient response to pharmacotherapy is a confounding factor in the treatment of asthma in the managed-care setting. This variation of response affects the clinician’s confidence in predicting outcomes of the covered population. Despite the high prevalence of patients who are treated in accordance with the NAEPP guidelines (updated in 2007), asthma often remains uncontrolled, partially because of the variability of the treatment’s effectiveness. This finding is observed for all the commonly used classes of asthma controller medications, including inhaled corticosteroids, leukotriene modifiers, and beta-adrenergic agonists. This pattern is apparent even when we...
compare traditional agents such as beclomethasone (e.g., Beclovent, GlaxoSmithKline) with newer products like montelukast (Singulair, Merck) (Figure 1).11

Genetically mediated variations in response to pharmacotherapeutic agents may result in erratic or unreliable asthma control for patients. The emerging field of pharmacogenetics has allowed researchers to identify polymorphisms associated with individual variability in response to therapy for asthma (Figure 2).12 Because genetic markers for variations of asthma response are not yet widely available, we cannot easily predict the variation in patients’ clinical responses and their outcomes.

These variations in response to therapy have been observed in well-controlled clinical trials, which are designed to address various environmental factors and patients’ compliance with guidelines. In treating patients in real-world practice, we would expect to find even more variations of response and of population-based clinical outcomes. This is the dilemma facing health plans today.

IDENTIFYING PATIENTS WITH UNCONTROLLED ASTHMA

Effectiveness of Claims Data

Among actual patient populations, computerized predictive models based on administrative claims are limited in their ability to identify patients with asthma who are at high risk.13,14 Such models often show a lower correlation with patients’ actual use of therapy than in other chronic diseases such as heart failure and diabetes. Those diseases appear to have a more predictable pattern, with an associated progressive decline in clinical status without treatment.

This pattern does not hold true with asthma; patients may improve, decline, or experience a variable course, independent of their level of therapy. Even though retrospective and administrative claims data are a crucial component to a comprehensive strategy for identifying
frequent users of health care resources, several studies that employ such data demonstrate the unreliability of these data as a lone predictor of patient outcomes. It is anticipated that combining patient-reported outcomes (PRO) information with claims data will improve asthma management and, subsequently, patient outcomes. By including PRO information, clinicians can adjust therapies to maintain better asthma control and reduce the risk of exacerbations.

Couie et al. A prospective cohort study of 378 adults in a university asthma program was conducted to assess the value of measuring emergency department (ED) visits as a predictor of future uncontrolled asthma. After one year, 73 patients (24.5%) had visited the ED because of asthma exacerbations. On retrospective analysis, these 73 patients demonstrated more self-reported lifestyle restrictions because of asthma, more hospital admissions and ED visits for asthma, and poorer asthma control than those who had not required ED asthma treatment since their entry into the cohort.

The factors most strongly associated with subsequent ED treatment included waking at night, regular use of a beta-agonist, and a past history of emergency treatment or admission for asthma. The authors suggested that special attention should be given to patients whose asthma causes lifestyle restrictions and the need for asthma-related hospitalization.

Johnson et al. Another group of authors used administrative claims data to compare asthma outcomes among 196 high-risk asthmatic patients, enrolled in an asthma care support program, with a matched cohort. The investigators looked at asthma-related hospitalizations, ED visits, and physician office visits to determine the effects of the care support program. Using propensity scores from the claims data, they observed that the number of total hospitalizations, asthma-related hospitalizations, bed days, and ED visits was lower for the study participants than for the matched cohorts not participating in the program. This suggests that the beneficial effects of monitoring and education in an asthma disease-management program might promote more informed use of these health care resources. We note, however, that models using claims-based data to determine asthma-related outcomes may be limited because of a lack of sensitivity, specificity, and consistency.

Grana et al. These authors developed an administrative claims-based, risk-stratification model to identify high-risk and more severely ill asthma patients based on data from 54,573 members enrolled in a large, independent HMO (U.S. Healthcare). Using logistic regression, the model sought to predict the probability of asthma-related hospital admissions among five groups with asthma of varying severity. Using pharmacy, laboratory, and specialist claims, the researchers found that this model demonstrated a sensitivity score of 0.70 and a specificity score of 0.71; however, it also lacked consistency. When the authors applied logistic regression to data for the following year to predict subsequent claims, the model consistently overestimated the probability of hospital admissions.

This study, in a “gatekeeper” HMO model, captured all primary care visits. On the other hand, in Preferred Provider health plans (PPOs) with no mandated primary care physician (PCP), asthma severity might be overestimated for a plan’s members because the reason for a primary care visit might not be captured. This oversight can cause clinical visits for specific diseases to go unnoticed in the claims data.

Lieu et al. A model by Lieu et al., which employed health utilization claims data, identified 19% of pediatric patients who were at high risk for asthma-related adverse outcomes, defined as ED visits and hospitalizations. This model, based on data from 210,125 children who were members of Northern California Kaiser Permanente, showed a sensitivity of only 49% and a specificity of 84%. The authors concluded that prediction models based on computerized utilization data could identify children with asthma who might have an elevated risk for future ED visits and hospitalizations; however, they also acknowledged that such models can have limited sensitivity and specificity in actual patient populations.

Li et al. In another predictive model based on claims data, Li et al. found that a prior hospitalization for asthma was the most predictive factor for future hospitalizations; the relative risk (RR) was 6.5 for a hospital admission if the patient had been admitted in the baseline year. The sensitivity of this factor alone in predicting subsequent hospitalizations, however, was low (33%). This risk was more accurately characterized when lung function was assessed during the hospitalization. When lung function was included in the analysis, a previously hospitalized patient whose lung function remained moderately or seriously reduced had a greater than 50% chance of being admitted again the following year. (Moderately or seriously reduced function was defined as a forced expiratory volume in 1 second [FEV₁], a forced vital capacity [FVC], or an FEV₁ or FVC below 60%) The authors concluded that further research would be required before such a model can be used in clinical practice.

Effectiveness of Claims plus Pharmacy Data

None of these claims-based studies demonstrate an R-square for asthma as close to unity as predictive tools of other clinical conditions. The following studies, which analyzed data from various MCOs, suggest that supplementing administrative claims data with pharmacy utilization data might be more useful in identifying patients at high risk for emergency hospital care than medical claims data alone.

Schatz et al. In a retrospective cohort study conducted at two California sites, patients who needed targeted intervention were identified through administrative data sources. The investigators stratified patient risk for ED hospital care based on patients’ use of beta-agonists:

- Patients considered at high risk for emergency hospital care needed such care in the previous year or used more than 14 beta-agonist canisters or oral corticosteroids.
- Patients considered at medium risk used more than 14 beta-agonist canisters or oral corticosteroids but needed no emergency or hospital care.
- Patients considered at low risk used fewer than 14 beta-agonist canisters, did not use oral corticosteroids, and did not need emergency or hospital care.

This simple scheme proved valuable; the model was able to identify patients within each group who were at risk for emergency hospital care.

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Schatz et al. In another study by Schatz et al., claims data were used to evaluate the relationship of potential asthma quality-of-care markers to subsequent emergency hospital care.20 Controller medications and beta agonists were found to be possibly better predictors of emergency hospital care than quality-of-care markers for asthma (as determined by HEDIS measures, such as use of any controller medication).

In the total sample of approximately 110,000 patients, the use of one or more controller drugs (odds ratio [OR], 1.35) and four or more controller drugs (OR, 1.98) was associated with an increased risk of emergency hospital care. In contrast, a controller/total asthma medication ratio of more than 0.5 (OR, 0.73) and the dispensing of fewer than six beta-agonist canisters (OR, 0.30) were associated with a decreased risk. On the basis of these findings, the authors concluded that a medication ratio of greater than 0.5 functioned as the best quality-of-care marker for identifying those patients with persistent asthma.

Leone et al. This study also assessed medication use as a predictor of asthma.21 The authors observed that the level of asthma severity, as determined by the intensity of asthma treatment, indicated acute exacerbations requiring hospital admission. The model used in the study might be helpful in targeting subgroups of populations for intensive intervention programs, but an important limitation to this study was the inability of the model to estimate the specificity and sensitivity of the predictive parameter.

COMMENT: Although retrospective reviews regarding the types of prescribed therapy and prescription fill rates may be helpful in identifying asthma patients at risk for exacerbations, the sensitivity of this information must be confirmed in larger studies. Ideally, analyzing the prescription history of asthma patients, in addition to medical claims data with and without the inclusion of PRO information, would be beneficial in determining the usefulness of retrospective prescription data.

Further complicating this equation is the difficulty in maintaining long-term asthma control because of the unpredictability of disease exacerbations. This difficulty highlights the need for constant monitoring for disease control, as previously mentioned, as well as documenting the need for adequate and consistent use of controller therapy.

Stempel et al. In this study, 53% of patients who exhibited asthma control in the first year had a period of uncontrolled asthma in the second and third years.22 At the end of three years, only 27% of patients were considered to be continuously in control of their asthma. Likewise, despite the extensive use of short-acting beta-agonists, oral corticosteroids, and ED visits, fewer than 50% of patients who had uncontrolled asthma had filled prescriptions for any type of controller medication. The use of controller medications over time was greater in the patients who had controlled asthma, but this rate declined to 46% at the end of the study.

COMMENT: The addition of pharmacy data to medical claims data can improve the accuracy of predictive modeling, but it does not achieve the degree of precision found with disease conditions having a more predictable response to therapy.

Effectiveness of HEDIS Measures

HEDIS measures are commonly used to evaluate quality care in asthma. Similar to models that employ medical and pharmacy claims data, HEDIS criteria have shown a lack of effectiveness in identifying patients with uncontrolled asthma and in stratifying asthma severity and risk for health care utilization by health plan members.

Cababa et al. These authors compared the assessment of asthma severity based on criteria from HEDIS and from the National Heart, Lung, and Blood Institute (NHLBI).23 In this analysis of 896 pediatric patients, using the NHLBI criteria, the authors identified 656 (73%) as having had persistent asthma, based on HEDIS criteria, compared with 538 patients (38%) who did not. Although the HEDIS criteria for persistent asthma were fairly sensitive (0.89), they were not very specific (0.70). For children not consistently using daily controller medications (n = 346), sensitivity was even lower (0.45) but specificity was similar (0.68). As a result, the authors recommended that these findings be interpreted with caution.

Berger et al. The findings of Cabana and colleagues were subsequently confirmed in another study that assessed HEDIS measures for the appropriate use of asthma medications among 49,637 health plan members.24 Employing both pharmacy and medical claims, including outpatient, hospitalization, and ED visits, the Berger investigators used HEDIS criteria to identify patients with persistent asthma and their subsequent risk of ED visits and hospitalizations based on controller medication use and adherence to therapy.

The investigators found that 45.9% of patients with persistent asthma were not using any type of controller medication, whereas 35.7% were using one class of long-term controller medications and 18.4% were using more than one class of these controller medications. For the following year, however, more than 25% of these patients did not need any asthma medication.

Adherence to medication regimens played an important role in predicting the risk for an ED visit or hospitalization:

- Patients with low adherence to their controller medication had the highest risk for an ED visit or hospitalization (OR, 1.72 and 2.23, respectively). Low use was defined as needing a single controller medication with less than a 120-day supply.
- Patients with moderate or high adherence had the lowest risk of ED visit or hospitalization. Moderate use was defined as needing a single controller with more than a 120-day supply but less than a 180-day supply. High use was defined as needing a single controller with a 180-day supply or more.

The authors stated that current HEDIS measures of the appropriate use of asthma medications tend to cause patients to be mislabeled as having persistent asthma when in fact they might have intermittent asthma. Although HEDIS measures may show some predictive value for populations, they are not adequate as tools for predicting future disease activity in individuals.

COMMENT: The analysis of raw claims data, even when coupled with a chart review that employs HEDIS measures, does not capture reductions in a patient’s functional status resulting from clinical disease. Important quality-of-life problems, such
as lost workdays needed for time to care for a child with asthma, as well as reduced productivity at work and at home, are not reported in the medical claims data. However, these types of measures could be collected with PRO tools.

HEDIS data are useful for analyzing process measures of care, such as the use of inhaled steroids for patients with persistent asthma. Because of the variable responses of patients with asthma, these process measures are not useful for determining individual outcomes.

THE IMPORTANCE OF TRACKING SYMPTOMS

The tracking of important measures of disease activity (e.g., symptoms, the use of rescue medication, missed days of school or work) is a valuable tool for assessing asthma control and the risk of exacerbations. These patient-reported measures serve as practical indicators of lifestyle limitations and, ultimately, use of resources; they are also crucial for evaluating the level of asthma control in a plan's patient population.

Questionnaires and Surveys

Studies have shown that using validated questionnaires to assess asthma symptoms and to track similar measures (e.g., use of health care resources, quality of life) is a reliable method of determining disease severity and asthma control.

Juniper et al. The authors sought to validate the use of the Asthma Control Questionnaire (ACQ) for assessing disease control in patients whose asthma was stable between clinic visits.25 In this seven-item questionnaire, patients were asked to assess the severity of their symptoms (e.g., wheezing, shortness of breath, limitations in activities) during that week. The reliability of the ACQ was high, with an intra-class correlation coefficient (ICC) of 0.90 in patients whose asthma was stable between clinic visits.

The questionnaire was also very responsive to changes in asthma control (P < .0001). As an asthma instrument, the ACQ had strong evaluative and discriminative properties that could be used with confidence in clinical trials and in cross-sectional surveys.

Nathan et al. The Asthma Control Test (ACT), a five-item patient-based survey, is used to identify patients with poorly controlled asthma.26 The internal consistency reliability of the ACT scale ranged from 0.79 to 0.83 (based on the degree of asthma control) and was 0.84 when all patients in the study were included.

As a screening tool, the test also identified patients whose asthma was not adequately controlled without requiring an assessment of FEV1. This test was a reliable and valid measure that showed promise in identifying patients with poorly controlled asthma.

Electronic Medical Records

The use of electronic medical records (EMRs) to track symptoms and monitor responses to therapy is another helpful tool for determining disease severity and control. EMRs enable clinicians to view the patient's entire medical history or to focus on a specific disease state. This capability can lead to greater adoption of evidence-based medicine, which may result in better overall care and in less use of health care resources.

Index of Asthma Control

Vollmer et al. Similar to instruments for assessing asthma severity and control, patient-reported measures can help in assessing quality of life and the use of asthma-related health care. In a study of 5,181 members of the Northwest Division of Kaiser Permanente, Vollmer et al. reported a simple index of asthma control employing self-reported measures of health care utilization and quality of life.27 This index featured a five-level measure of asthma control problems (range, 0–4), which exhibited marked and highly significant cross-sectional associations with self-reported use of health care resources and with generic and disease-specific quality-of-life instruments. Each increase in the number of asthma-control problems was also correlated with clinically significant quality-of-life impairment (physical and mental health, functional limitations) and increased use of health care resources such as doctor or ED visits and inpatient stays.

INTEGRATING PATIENT AND CLAIMS DATA

Disease Management

The combined use of retrospective and administrative claims data and PRO information may be useful in the ability to identify patients at risk for asthma exacerbations and subsequent ED visits and hospitalizations. Currently, several asthma disease-management programs utilize medical and pharmacy claims data to predict a population at risk, and they employ nurse-derived PROs to develop a viable strategy to identify those asthma patients who represent the highest risk.

Disease management is a system of coordinated health care interventions and communications for populations with conditions in which patient self-care efforts are significant.28 For asthma, this includes, but is not limited to, the routine assessment of pulmonary function, patient education, monitoring of medication adherence, review of symptoms and their impact on daily functioning, frequency of exacerbations, and development of an action plan. Although these measures cannot be easily assessed through administrative data, they are clinically important in identifying patients with uncontrolled asthma. That is why disease-management programs are beneficial in chronic diseases, such as asthma; they help improve overall quality of care (and better patient functioning), result in less use of health care resources, and decrease medical costs.

Buchner et al. A study was performed to evaluate an asthma disease-management initiative based on the 1997 NAEP guidelines.29 In the second year of this program, the proportion of plan members who were prescribed oral or inhaled corticosteroids increased by 30%. The members responded to this therapy and needed fewer inpatient services. A similar trend was observed for health-related quality of life, satisfaction with quality of care, exposure to patient education, disease knowledge, and members' confidence in their ability to manage their disease. All these parameters showed statistically significant improvements during the follow-up year (year two) of the program for both adults and children.

COMMENT: As with many other chronic diseases, the management of asthma requires a multidisciplinary approach in order to identify, evaluate, and treat asthmatic health plan members. Multidisciplinary interventions must focus on
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asthma control to prevent exacerbations and to ensure the appropriate use of medications that will be effective for each patient. This approach should also include education to ensure that patients and their families take an active role. As a strategy, a multidisciplinary approach can help to achieve disease control and reduce associated use of health care resources.

Jones et al. Since 1996, the Breathmobile Program has used specially equipped mobile asthma clinics staffed with multidisciplinary teams to provide ongoing preventive care to children with asthma at schools in urban lower socioeconomic settings. This program, certified by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), uses a direct assessment of asthma control at each visit and an EMR to systematically track and display each patient’s pattern of important clinical measures over time. Clinical control of asthma is defined based on the goals of therapy in the NAEPP guidelines. Visits at regular intervals are used to evaluate the response to therapy, to adjust therapy based on response, and to reinforce families’ understanding of strategies to reduce exposure to asthma triggers and adhere to a daily management plan. These strategies have been associated with improved asthma control and a decreased need for acute care, including hospitalizations and ED visits.

Patel et al. These authors evaluated the impact of a multidisciplinary asthma disease-management program on processes of care and health care utilization for adults and children in a large, medical group practice throughout the Chicago metropolitan area. This intervention included the development of a patient registry, a systematic approach to evaluating asthma control using the Asthma Therapy Assessment Questionnaire (ATAQ), case management, and physician education.

Chart reviews and administrative claims analyses showed that the program was beneficial in several areas. Primarily, medical record documentation improved asthma diagnoses (83.3% at baseline vs. 98.6% afterward; P < .001) and patient education (15.7% vs. 26.1%; P < .001). After the program was implemented, the number of asthma-related ED visits decreased from 148 per 1,000 to 88 per 1,000 (P < .001). This trend was also seen for asthma-related hospitalizations, which decreased from 81 per 1,000 at baseline to 37 per 1,000 per year after the program (P < .001). From these results, the authors noted that comprehensive disease-management programs that raise the standards of asthma care across populations have the potential to improve outcomes for this population.

Yurk et al. PRO tools are an integral part of a comprehensive strategy to track asthma symptoms and promote disease control. In a prospective cohort study involving 16 U.S. MCOs, the authors evaluated a set of questionnaire-based screening tools to identify the risk of one-year adverse outcomes in adults with moderate-to-severe asthma. The 58-item questionnaire included the generic Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) and condition-specific measures. The strongest predictors for adverse outcomes in the study population were comorbid illness and prior use of the ED. The model discrimination ranged from 0.67 to 0.78 for predicting hospitalization, ED use, absenteeism, and symptoms. As exemplified by this study, questionnaire-based risk models can identify patients with asthma who are at increased risk for adverse outcomes, thereby indicating the importance of patient-reported data in targeting individuals for intervention.

Peters et al. The value of an integrated strategy for predicting the future use of health care for asthma has been confirmed. Peters et al. combined patient responses from the Asthma Therapy Assessment Questionnaire (ATAQ) with prior use of asthma health care resources from administrative claims data. Although the data served as the strongest predictor of future health care utilization, the ATAQ control index helped to identify 1% of individuals without recent acute care who had an estimated six-fold elevated risk (95% confidence interval [CI], 4.2–8.4) of needing acute care in the future.

The added benefit-derived integration of the ATAQ control index is significant, considering that only a small fraction of individuals with acute events in one year had acute events in the previous year. Past care was one of the best predictors of future health care utilization; the more acute the utilization, the better the prediction.

COMMENT: A combined approach that uses administrative claims data and patient-reported outcomes is important in identifying patients with uncontrolled asthma, those at risk for future exacerbations, and those who might become frequent users of health care resources in the future. However, these models must provide greater specificity to identify these patients with greater accuracy.

CONCLUSION

Asthma is a chronic disease that can be debilitating for patients and costly from an economic and societal perspective. Patients with uncontrolled asthma are at high risk for exacerbations that adversely affect health outcomes, which, in turn, leads to an increased use of health care resources. Uncontrolled asthma has a significant financial impact on patients, families, payers, and employers as a result of direct and indirect medical expenditures.

Because of the variation both in expression of asthma and in its management by physicians, administrative claims data alone are neither specific nor sensitive enough to identify asthmatic patients with the highest risk for future exacerbations and the subsequent need for increased health care resources. Similarly, data derived from measures such as HEDIS are inadequate as a sole source for stratifying asthma severity in a plan’s patient population.

Instead, the complex nature of asthma warrants a combined approach to identify and monitor patients with uncontrolled or difficult-to-treat asthma. This approach requires the incorporation of PRO tools plus predictive modeling, based on retrospective medical and pharmacy administrative claims data. PRO measures provide a practical component to be used in a complementary manner to the claims data so that patients can be properly characterized, evaluated, and treated. All of these steps help to improve outcomes and optimal use of resources.

Another potential tool, the EMR, can help identify patients within a practice who might need more attention than is currently provided. For health plans, the use of personal health records (PHRs) that are integrated into the health plan database can supplement the pharmacy and claims data to enhance the strength of predictive modeling.

In the updated NHLBI/NAEPP asthma guidelines, released...
in 2007, key elements on assessing and monitoring asthma have been refined to address severity, control, and responsiveness to treatment as separate but related concepts. These guidelines also include separate recommendations for children in two different age groups: 0 to 4 years and 5 to 11 years. The guidelines include an updated step-care approach of six levels based on asthma severity as well as on age groups. These guidelines should provide a new opportunity for MCOs to integrate claims data with direct monitoring of patients to effectively administer and monitor therapy in the management of this complex and variable disease state. Through this integrated approach, we can identify patients with uncontrolled and difficult-to-treat asthma, thereby providing appropriate care to reduce exacerbations, the need for health care, and costs.

REFERENCES


