To manage care effectively, managed care organizations (MCOs) necessarily must determine where best to place resources and funds. Due to their unique ability to identify and treat patients with serious chronic conditions such as chronic obstructive pulmonary disease (COPD), MCOs ideally can improve patient outcomes and reduce the costs of care.

Specifically, because COPD is often underdiagnosed and improperly treated in family practice settings, MCOs can encourage primary care physicians to adhere to diagnosis and treatment guidelines that have been shown to result in lower COPD utilization levels and costs. In addition, through the use of sophisticated information systems, MCOs can create systemwide clinical care programs for COPD patients, including the development and implementation of treatment guidelines and measurement of clinical outcomes resulting from the program.

Before undertaking such efforts, however, MCOs should determine whether the prevalence and costs of COPD warrant the resources that would be required and whether useful evidence-based treatment guidelines for COPD are available to help develop an effective program. In addition, MCOs should analyze existing patterns of COPD management within the system in order to identify potential areas that could be improved with a systemwide clinical program.

Intermountain Health Care (IHC), an integrated not-for-profit health care system based in Salt Lake City, Utah, has recently taken these steps. IHC—which ranked number one in Modern Healthcare’s top 100 integrated health care networks in 2000, 2002, and 2003—consists of 21 hospitals, 150 medical facilities and physician offices, 450 physician employees (including 350 primary care physicians), 2,500 affiliated physicians, and 300 employee pharmacists. The health plan covers 480,000 lives and 500,000 affiliate lives.

The IHC integrated information system enables it to capture and evaluate COPD clinical data from medical claims, pharmacy claims, laboratory, pathology, radiology, hospitals, clinics, home care, and mental health components. Figure 1 shows how data are captured and how clinical programs are developed at IHC.

Determining the Prevalence of COPD

An analysis of IHC data suggests that COPD may be underdiagnosed among its plan members. Only 553 of the 292,800 adult plan members (approximately 2 adults per 1,000) have been diagnosed with COPD. In comparison, 60 adults per 1,000 report that they had physician-diagnosed COPD in the United States. Because the vast majority of individuals with COPD are smokers, lower smoking rates in IHC’s geographic region may account for the lower prevalence at IHC.
Assessing the Need for a Clinical COPD Care Program in a Managed Care Organization

![FIGURE 1 Systemwide Disease Management Implementation](image)

Clinical and claims data are captured from claims, pharmacy, laboratory, pathology, radiology, hospitals, clinics, home care, medical/surgical, and mental health components. Based on these data, NCQA/HEDIS initiatives are used to develop clinical programs and for tracking program compliance. The programs are distributed to physicians, and claims services collect claims data and other quality data, such as member complaints. Advocates are used to schedule appointments for preventive care and channel members to appropriate providers. Care management services provide care managers, physicians, and pharmacists. Clinical programs data are integrated and monitored for adherence.

Physicians in the system oversee development of clinical programs, implement standard physician orders, and provide physician communication and education on practice guidelines. Hospitals and clinics manage and monitor performance, provide management support and education, produce patient and physician education materials, and disseminate education and reporting materials on the organization’s Web site.

23% of all American adults report that they smoke, only 12.8% of adults in Utah smoke.7

An underdiagnosis for COPD within IHC would not be unexpected, however, based on national statistics. While an estimated 10 million U.S. adults reported that they had physician-diagnosed COPD in 2000,9 National Health and Nutrition Examination Survey (NHANES) III data suggest that more than double that number (approximately 24 million adults) actually have evidence of impaired lung function.9 Additionally, more than 71.7% of the population with a low level of lung function did not have a current diagnosis of obstructive lung disease in 2000; 46.2% of those with moderate-to-severe impairment did not have a current diagnosis. Most underdiagnosis occurs in patients with mild-to-moderate COPD.8

Additionally, the incidence of COPD and mortality from COPD are both increasing nationwide.9 From 1980 to 2000, the rate of persons with self-reported COPD increased from 55.8 to 60 per 1,000 adults. In the same period, COPD mortality rates increased from 40.7 to 66.9 per 100,000 adults.9 Based on these data, it seems likely that COPD is underdiagnosed at IHC and that the prevalence is higher among IHC members than the clinical data indicate.

Determining the Costs of COPD Care

Improving the quality of service delivered to the patient is the foremost concern for IHC and its physicians. IHC recognizes that when high-quality care is delivered, cost benefits will follow. Costs are easily measured, however, and can indicate how well COPD and COPD exacerbations are managed.

Based on claims data gathered by IHC, the average total annual cost of treatment for a COPD patient is $13,654.4 This amount represents all costs of medical care, including direct care for COPD. The average number of prescriptions filled each year, for any condition, is 49 per COPD patient.

The total annual cost of care of $13,654 per patient at IHC may be higher than expected, based on available evidence. One study of 413 patients found that the median annual cost of COPD care per patient was $1,681 for stage I COPD patients, $5,037 for stage II COPD patients, and $10,812 for stage III COPD patients.9 Patients in this study were staged based on predicted versus actual forced expiratory volume in 1 second (FEV1) values. Forty percent of these total costs were due to hospitalizations.

Similarly, the main costs for COPD care at IHC are not due to the medications used to control the disease, but to the exacerbations of COPD. While medications account for only $2,647, medical costs—including emergency room visits and hospital stays—account for $11,007.9 Reducing the number of exacerbations would therefore reduce overall costs considerably.

The high cost of treating exacerbations and treatment failures is demonstrated in clinical studies as well. Investigation of 2,414 patients with chronic bronchitis and COPD found that
the average cost of treating an acute exacerbation of chronic bronchitis is $159. If a treatment failure occurs, the average subsequent cost for the failure is $477.50. A treatment failure was defined as an unscheduled visit to the general practitioner within a month of the initial exacerbation leading to a change in prescription, an emergency department visit, or a hospital admission.

In view of the costs for COPD care, particularly from patients with severe COPD who are at high risk of exacerbations, it is apparent that IHC is suffering large losses due to COPD. Additionally, because 17% of the patients with COPD account for 71% of the cost of care for COPD patients at IHC, risk stratification and other disease management efforts for high-risk patients may be effective. Studies also indicate a strong correlation between the severity of COPD and the total cost of treatment.

Assessing “Treatability”

Studies show that, while COPD is a prevalent and costly condition that can lead to severe exacerbations and contributes to other common causes of morbidity and mortality, smoking cessation and therapies to reduce inflammation can be expected to alter the course and prognosis of the disease.

In addition, evidence-based treatment guidelines for COPD have been developed by the National Heart, Lung, and Blood Institute and World Health Organization and endorsed by the American Thoracic Society. The Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines assessed interventions that can improve symptomatology and slow or stop the progress of COPD. These include:

- smoking cessation
- reduction of exposure to environmental pollutants
- the use of appropriate pharmacotherapy, including oxygen if indicated
- administration of yearly influenza vaccination
- exercise training programs
- bullectomy (excision of a bullae to improve lung function) and lung transplant (conclusive results are not yet available on lung volume reduction surgery)

These treatments and interventions have been shown to reduce exacerbations and improve the health status of COPD patients. Furthermore, adherence with these guidelines can result in lower health care costs due to COPD.

Comparing COPD Care With Treatment Guideline Recommendations

Based on the GOLD guidelines, IHC developed a pharmacology algorithm for the office-based treatment of COPD in the organization. The algorithm was compared with current drug utilization at IHC. (All products in the GOLD guidelines are included in the IHC formulary.)

The pharmacology algorithm adapted by IHC from the GOLD guidelines is as follows:

- first-line therapy—ipratropium (4 to 8 puffs, 4 times a day [qid])
- second-line therapy—if the outcome is suboptimal, either change to ipratropium bromide/albuterol sulfate combination (Combivent; 3 to 4 puffs, qid) or add albuterol (2 puffs, qid) to the ipratropium.
- third-line therapy—if the outcome is still suboptimal, increase the ipratropium bromide/albuterol sulfate combination or ipratropium plus albuterol dosage to 4 to 8 puffs. Other options are change to long-acting oral theophylline (8 mcg/ml to 12 mcg/ml) or change to ipratropium (4 to 8 puffs, qid) plus a long-acting beta agonist and possibly an inhaled corticosteroid.
- fourth-line therapy—if the outcome is still suboptimal, add an inhaled corticosteroid and oxygen. (Oxygen may also be added in previous lines of therapy, if necessary.)

Because there was evidence of extreme variation in the number of doses of ipratropium required to treat IHC patients effectively, a dose higher than the maximum U.S. Food and Drug Administration (FDA) label dosage was used in the algorithm in order to achieve optimal control. Small studies indicate that doses of ipratropium 4 times that of the recommended FDA label may be necessary to improve exercise performance.

When reviewing IHC drug utilization data, IHC ascertained that anticholinergics are the first-line choice for treating COPD, in line with the recommended algorithm. Nearly one quarter (21%) of patients are prescribed leukotriene modifiers, which, while they may provide limited benefits in mild-to-moderate asthma, have not been proven effective in the treatment of COPD. Currently, there is a lack of good clinical data demonstrating the effectiveness of antileukotrienes in COPD. Most of the trials are in small populations and of short duration.

The high use of leukotrienes in the IHC population could indicate a lack of physician understanding about currently available treatment recommendations and published literature in the COPD field. In addition, 65% of members with COPD are prescribed inhaled corticosteroids, generally along with bronchodilators and other medications. Although no specific target number has been established for the use of inhaled corticosteroids, 65% is a higher utilization of inhaled corticosteroids than expected, based on the published literature. Fluticasone/salmeterol inhalation powder (Advair) is also used commonly, alone or in combination with inhaled corticosteroids. The use of corticosteroid products in the treatment of COPD can provide benefit in some patients with COPD. This is supported by the recent FDA approval of fluticasone/salmeterol inhalation powder for the treatment of COPD.

Reviewing Current COPD Care

Although IHC does not utilize a formal, systemwide clinical COPD program for managing patients, various elements of such a program have been implemented. The Pharmacy and
Therapeutics Committee, which consists of the 5 clinical pharmacists and approximately 20 physicians, routinely reviews new product studies, including those for COPD, and disseminates the information to physicians, if applicable. The committee is currently reviewing the new COPD treatment product tiotropium (Spiriva). Also being reviewed are new data on the use of fluticasone/salmeterol inhalation powder for COPD, a recent new indication for the combination asthma drug.

In addition, IHC employs approximately 20 nurses who are care managers and 5 clinical pharmacists who work in the health plan, all of whom are dedicated solely to clinical functions such as reviewing new drugs, physician interventions, disease management, and patient education and interventions. COPD is one of a number of conditions that care managers and pharmacists address proactively. Care managers contact all COPD patients who have an emergency room visit or hospitalization to offer care management. The established goals of COPD care management include:

- disease progression prevention,
- symptoms relief,
- exercise tolerance improvement,
- patient health status improvement,
- complication/exacerbation prevention and treatment,
- mortality reduction, and
- treatment side-effect minimization.

Specific care management objectives are:

- facilitating smoking cessation,
- encouraging exercise,
- counseling the patient on obesity treatment and nutrition,
- promoting influenza and pneumococcus vaccination,
- providing oxygen therapy when needed,
- encouraging compliance with prescribed medications,
- providing patient education, referring to specialists when needed, and
- monitoring for concomitant diseases.

Unfortunately, 29% of IHC patients refuse the care management services offered to them. Although formal surveys have not been used to identify the reason for the refusals, many patients state that they do not need the intervention because they are receiving care from their physician. Even patients who refuse care management are sent educational materials through the mail on the importance of smoking cessation and other treatment issues.

The COPD pharmacology algorithm outlined above is provided to care managers and pharmacists for internal education and to evaluate treatments in uncontrolled COPD patients. Based on the reviews, care managers may make suggestions to patients and physicians for treatment changes. Clinical pharmacists also provide cost detailing to educate physicians on cost-effective treatments for COPD.

### Elements of an Evidence-Based, Systemwide Clinical COPD Program

IHC compared these elements used at IHC with recommendations for managing high-cost conditions from the Institute of Medicine (IOM). These recommendations were developed by IOM to reduce the burden of illness and improve health care delivery. In its recommendations, IOM lists 15 chronic conditions, including COPD, for which a systemwide approach to care should be implemented. Specifically, IOM recommends that MCOs develop information systems that can identify patients with COPD, allow program developers to select the best treatments for COPD patients, and measure the outcomes of these treatments.

IHC is currently able to identify members with a diagnosis of COPD through a member identification process. Selecting the best treatments and measuring outcomes would be the next step for IHC if a systemwide clinical program were developed. Such programs are already in place for diabetes, congestive heart failure, and asthma. At IHC, clinical program development and implementation are physician-driven processes. Care models and educational material would therefore be developed in collaboration with physicians. In addition, physicians would be able to choose those pieces of the clinical program that best fit their practices.

IHC further recognizes that COPD management should be a systemwide program administered through physician offices and done in conjunction with clinical programs that involve physicians, the health plan, and hospitals. IHC uses its Web site and other physician forums to distribute the program, educational information, and reports to physicians, hospitals, clinics, advocates, and care managers and would do so with a COPD care program as well.

In IHC clinical care programs, 3 classes of outcomes are tracked by the IHC integrated clinical data system:

- total costs of care,
- physical outcomes (the measurement of complications and therapeutic goals),
- service outcomes (perception of quality, including satisfaction levels for patients, families, purchasers, employees, and professionals). Service outcomes also include access issues, such as waiting times for service. In general, if the costs and physical outcomes goals are met, service outcomes are also positive.

Results of these measurements are used to identify areas for improvement, and IHC provides patient-specific COPD information to physicians, such as patients’ current status and problems with patient adherence to medication regimens. Physicians can, in turn, step up treatment or encourage the patient to adhere to the treatment plan.

Tracked over time, these measurements would indicate whether COPD outcomes are improving and suggest possible strategies such as increasing patient education and participation in smoking cessation programs. The measurements would also allow IHC to assess both physician and patient adherence with the care program guidelines.

Stratifying patients by risk would also be essential and is recommended in the GOLD guidelines. Because 17% of
COPD patients account for 71% of the cost of COPD care at IHC, a clinical program that includes risk stratification and closer management of high-risk patients could prove effective for reducing medical utilization levels due to COPD.

Finally, based on GOLD guidelines, IHC would also encourage primary care physicians to take an active role in detecting and treating COPD. Diagnosis can be readily achieved in the primary care setting by reviewing the patient’s smoking history and using office-based spirometry initially for diagnosis and, later, for disease staging and follow-up monitoring.

**Summary**

IHC is currently prioritizing resources, and the need for developing and implementing a COPD clinical care program is still being examined. Both national and IHC data indicate that many people with COPD are not diagnosed, however, and once diagnosed, are not always prescribed optimal treatments. Because of these findings, and the relatively high costs for treating COPD patients in IHC, a system-wide, evidence-based, physician-driven clinical COPD care program may be effective in slowing disease progress, improving patient outcomes, and reducing costly exacerbations.

**DISCLOSURES**

The author received an honorarium from Boehringer Ingelheim and Pfizer Inc. for participation in the symposium upon which this article is based. He discloses no conflict of interest or potential bias regarding this article.

**REFERENCES**