OBJECTIVE:
To describe different types of pharmacoeconomic analyses that can be useful for evaluating drug products and managed care pharmacy services. This article addresses issues to be considered for a pharmacoeconomic study of pharmaceutical care and how to critically analyze the pharmacoeconomic literature.

DATA SOURCES:
Literature and Internet references, ongoing studies.

DATA SYNTHESIS:
Not Applicable.

CONCLUSION:
Pharmacoeconomics is changing the practice of managed care pharmacy. Pharmacists should evaluate the pharmacoeconomics literature as part of their professional services. In addition, pharmacists should document their pharmaceutical care interventions and the effects on patient outcomes.

KEY WORDS:
Pharmacoeconomics, Outcomes, Databases

J Managed Care Pharm 1997; 3: 720-726

The number of published pharmacoeconomic (PE) studies has grown from 505 in 1987 to 1821 in 1996 (see Figure 1). Many of these studies are high quality and have much useful information to help managed care pharmacists and other providers make appropriate and efficient drug therapy decisions. Unfortunately, there are also many published articles that provide incomplete, inaccurate, or misleading information. To further complicate the matter, high-quality and low-quality papers are sometimes published in the same journals. Even methodologically sound studies do not pertain to all patient populations, levels of severity of illness, or managed care environments.

Although there is no "gold standard" regarding research and publication of PE analyses, there are some basic principles that can help readers critically evaluate PE literature. Some basic questions (see Table 1) can help formulary committee members and other decision makers determine whether a study has relevance for their patient population. A greater understanding of the value and limitations of PE studies allows pharmacists to incorporate PE data into their practice in the same way that they incorporate efficacy and toxicity data. This article describes general principles of pharmacoeconomics, specific types of PE analyses, some key points to consider when analyzing PE studies, and how PE factors can influence the professional role of managed care pharmacists.

PRINCIPLES OF PHARMACOECONOMICS

Any PE analysis will have three components: 1) description of the programs being evaluated; 2) associated costs of each program; and 3) associated outcomes or consequences of each program. The program description should include all products, services, and related health care resources used or provided in a specific time period relating to a particular episode of treatment or illness. The analysis should address issues such as study perspective, analytical framework, data collection, discounting, generalizability, and quality of life.

STUDY PERSPECTIVE

The first step in performing any PE analysis is establishing the study perspective, or the point of view of the analysis—Who is the intended audience for the study? The
study's perspective will influence the research questions, research design, and data variables. Most PE analyses use one or more of the following six perspectives: society (societal), policy maker, payor, patient, health care provider, and pharmaceutical industry. In many instances, these perspectives overlap, particularly with the tremendous growth of managed care organizations (MCOs). Typically, PE research has taken the societal, policy maker, or managed care payor perspective.

The societal perspective assumes that society seeks to maximize the overall efficiency of the health care system as part of the larger economy. However, this is a broad and difficult perspective to address, since there is no consensus as to what society as a whole views as the outcomes that should be “maximized.” On the other hand, policy makers, who are concerned with creating and implementing decisions that affect only a subset of individuals or institutions within the larger health care system, represent a more narrow perspective. They tend to represent a particular organization or group of patients and make decisions that will be best for this specific audience. Payors such as Medicaid, Medicare, and private insurance (e.g., indemnity or health maintenance organizations) primarily are concerned with maximizing outcomes to benefit their members, while most efficiently using their resources.

The patient perspective, which is concerned with individual patients’ (or subsets of patients’) outcomes, is more subjective because it includes patient preferences. The patient perspective is less common in the empirical literature because payors, rather than patients, make decisions regarding health care.

The health care provider perspective refers to the persons or organization responsible for diagnosing and treating patients. Medical training for health care providers typically does not include much discussion of cost issues, and providers tend to be more concerned with evaluating treatment options based solely on reported efficacy.

The pharmaceutical industry is primarily concerned with: deciding whether to continue developing a product that is in the early research stages; using preliminary studies to determine appropriate endpoints in Phase III trials; incorporating quality-of-life and health economics into clinical trials; ensuring compliance with Food and Drug Administration (and other)

regulations; assessing competition and pricing issues; and product marketing. The objective of a study performed by the pharmaceutical industry is dependent on the development stage of the drug or product, as indicated in Table 2.

One difficulty with using published PE studies for decision making is that analyses that focus on one perspective may not provide enough information to translate results to another audience. This is because outcomes and cost results of a study depend on the perspective from which it was written. Studies that demonstrate cost-effectiveness from a societal perspective, incorporating societal costs and patient quality-of-life (QOL) measures, may not enable managed care providers to decide whether the new intervention would cut costs in their institution.

**TYPES OF ANALYSES**

Once the perspective has been established, researchers must decide which type of PE analysis is appropriate. There are five

**Table 1. Screening Questions to Determine if a Pharmacoeconomic Study Is Relevant for a Specific MCO**

<table>
<thead>
<tr>
<th>Question</th>
<th>Relevant if answered positively</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the study deal with a patient population similar to those we serve?</td>
<td>Yes</td>
</tr>
<tr>
<td>Does the study include the relevant outcomes and cost categories for our institution?</td>
<td>Yes</td>
</tr>
<tr>
<td>Is it likely that we would achieve similar effectiveness of outcomes?</td>
<td>Yes</td>
</tr>
<tr>
<td>Are the costs of care transparent (i.e., stated clearly and referenced) and do they seem reasonable?</td>
<td>Yes</td>
</tr>
<tr>
<td>Do the assumptions seem reasonable, and is sensitivity analysis performed?</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Table 2. Pharmaceutical Manufacturers’ Objectives of Pharmacoeconomics Analyses by Development Phase**

<table>
<thead>
<tr>
<th>Development Phase</th>
<th>Objectives of Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/II</td>
<td>Go/no go decisions</td>
</tr>
<tr>
<td></td>
<td>Determination of appropriate outcome measures/endpoint for future studies</td>
</tr>
<tr>
<td>III</td>
<td>Provide support for approval process (particularly abroad)</td>
</tr>
<tr>
<td></td>
<td>Translate randomized, controlled trial data into economic outcomes</td>
</tr>
<tr>
<td>IV</td>
<td>Provide postmarketing data for promotion</td>
</tr>
<tr>
<td></td>
<td>Determine real world effectiveness compared to efficacy</td>
</tr>
</tbody>
</table>
types of PE analyses that measure outcomes in different ways, as outlined in Table 3. Each of the analyses measures costs in monetary units.

### Cost-Benefit Analysis

Cost-benefit analysis (CBA) reports both costs (C) and benefits/consequences (B) in dollars. The results of CBAs are presented in terms of net benefits (B-C), the net present value of net benefits, the cost-benefit ratio (B/C), or the return on investment (B/C/C). CBA is useful in decision making regarding resource allocation to various treatments or program options. For example, CBA would allow an MCO to decide whether to provide additional prenatal care or pediatric services. CBA is sometimes viewed as superior to other forms of PE analysis from a theoretical standpoint since it translates all outcomes into dollar equivalents, thereby allowing greater comparisons across multiple treatments and disease states. However, CBA makes it difficult to ascertain dollar values for certain costs and benefits.

### Cost-Effectiveness Analysis

Cost-effectiveness analysis (CEA) is the most common analysis found in the empirical literature. CEA reports the costs of achieving comparable, nonmonetary outcomes (e.g., the cost of drug A vs. drug B to reduce blood pressure by a clinically significant difference such as a decrease of 5-10 mmHg). It helps analyze competing treatments or programs seeking similar outcomes. CEA is preferred when outcomes are measured directly in natural units, such as blood pressure measurements, and do not require any subjective translation to either utilities or dollars. In general, results are reported with marginal or incremental cost-effectiveness ratios (i.e., results are presented as the ratio of the incremental change in costs per incremental change in effectiveness), such as marginal cost per additional year of life saved or incremental cost of an additional reduction in blood pressure by 5 mmHg.

### Cost-Consequence Analysis

Cost-consequence analysis (CCA) is gaining popularity among researchers. While CEA measures outcomes along a single parameter, CCA offers an advantage in that it not only evaluates the entire program of care but also incorporates several outcome measures. As such, CCA can be used to evaluate practice guidelines and disease state management programs. The outcomes in a CCA may be presented as a matrix, highlighting the relative advantages of competing therapies or programs along multiple dimensions; however, the multiplicity of outcomes makes it more difficult to definitively determine which of the competing therapies analyzed is preferable. For example, it may be difficult to decide among three competing agents with varying treatment costs, efficacy results, side-effect profiles, and compliance rates. Similarly, the appropriate selection of an anti-diabetic agent might examine differences in blood glucose control, weight loss, incidence of cardiovascular disease, and amputations across therapies.

### Cost-Utility Analysis

The cost-utility analysis (CUA) is similar to the CEA, except that it includes societal and/or patient preferences to adjust outcomes, such as additional years of life saved. CUA adds adjustment factors that recognize that the value of an additional lifetime will be different if a patient spends that year ill in a nursing home than if the individual spent the year as a healthy community-dweller. Thus, CUA incorporates QOL measures into the analysis. The most common measure is MOS SF-36, which provides a general measure of functioning and well being and is used often since it has been validated in many populations and is widely accepted. For many studies, however, this instrument may not be sensitive enough to detect differences or address all of the relevant health concerns. Since QOL measures are subjective and do not always affect the bottom line for managed care providers, QOL data are often reported separately along with the CEA.

### Cost-Minimization Analysis

Cost-minimization analysis (CMA) is used to identify the lowest-cost alternative when various drugs or programs produce equivalent results. CMA is criticized because the assumption that outcomes are equivalent seems unlikely in many instances. Also, equivalent outcomes in a clinical trial that examines relatively healthy patients may not translate to the real world practice setting. One reason CMA is used by managed care decision makers is that drug budgets are often separated from global system budgets; there is an incentive to use the lowest-cost alternative among comparable drugs without complete consideration for downstream costs such as health expenditures for future complications of illness.

### PE EVALUATIONS: PROS AND CONS

While PE evaluations should be performed on programs and should include factors other than simple drug acquisition

<table>
<thead>
<tr>
<th>Types of Analyses</th>
<th>Cost measured in:</th>
<th>Consequences measured in:</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost-benefit</td>
<td>Dollars</td>
<td>Dollars</td>
<td>Allows comparison across illnesses</td>
</tr>
<tr>
<td>Cost-effectiveness</td>
<td>Dollars</td>
<td>Natural units (e.g., blood pressure)</td>
<td>Most popular form of empirical analysis</td>
</tr>
<tr>
<td>Cost-consequences</td>
<td>Dollars</td>
<td>Matrix of outcomes</td>
<td>Difficult to calculate ratios/make comparisons</td>
</tr>
<tr>
<td>Cost-utility</td>
<td>Dollars</td>
<td>Subjective measure (e.g., quality of life)</td>
<td>Incorporates patient preferences</td>
</tr>
<tr>
<td>Cost-minimization</td>
<td>Dollars</td>
<td>Equivalent outcomes</td>
<td>Insignificant or no differences in outcomes</td>
</tr>
</tbody>
</table>
cost, it may be difficult to determine which particular aspects of a successful program contribute the most to the overall value. For example, in a disease-state management program for dyslipidemia where pharmacists provide pharmaceutical care, dietitians provide nutritional education, and exercise physiologists work to increase patients' physical activity, it may be difficult to determine which program component contributes to lowering total cholesterol low-density lipoprotein levels, myocardial infarction, and mortality. For this reason it is difficult for payors to determine where to direct resources.

**DATA SOURCES**

PE studies may use one of several data sources, all of which have strengths and weaknesses. The most common sources are randomized controlled trials (RCTs), databases (also referred to as observational or secondary data sources and which include insurance claims, automated hospital databases, Medicaid, etc.), meta-analysis, modeling, and expert opinion.

**Randomized Controlled Trials**

RCTs are the "gold standard" for clinical research aimed at determining efficacy and toxicity of a drug treatment; they provide rigorous scientific evidence related to the effect of a drug therapy under highly specific and controlled conditions. RCTs are not necessarily accurate predictors of a treatment's effectiveness (i.e., how well a treatment will work in a real-world practice setting); and they do not take into account variations in treatment guidelines, health services, compliance rates, or other aspects of medical care.

**Databases**

Using data from sources such as Medicaid claims files, automated hospital records, or managed care databases, researchers can conduct various retrospective analyses with relatively large populations. Databases particularly are helpful in monitoring patterns and practices within certain subpopulations, and more accurately reflect what occurs in the real-world practice setting. The major limitation of database information is its inapplicability to other populations. Since the data is gathered only on a particular population (usually the insured, the hospitalized, etc.), the study results may only be applicable to that population.

**Meta-analysis**

When data are limited, meta-analysis is useful. Using multiple quantitative and statistical methods to summarize research results from several (usually smaller) studies, meta-analysis can help determine statistical significance of results in studies that were underpowered due to small sample size. This type of analysis is beneficial to economic evaluations because it may yield correlations where previously none existed. It also is useful in summarizing results in terms of ratios, which are inherent in cost-effectiveness research. One major drawback to meta-analyses is that they are prone to the researcher's choices in including or excluding previous studies. In addition, there may be publication bias where studies are omitted from analysis because they have not been previously published or catalogued in medical literature databases such as Medline.

**Modeling**

Modeling is useful when data are limited and/or unreliable due to uncertainty (caused by sampling error or limited time horizon). This type of analysis allows a range of outcomes to be mapped out using a variety of parameters under differing circumstances to predict future outcomes or costs. Decision trees (one of the simplest means of modeling uncertainty) evaluate a proposed treatment pathway, its associated costs, probabilities of outcomes, and subsequent outcomes, and compare these factors with those from other pathways. Markov chains and processes, more complex forms of decision trees, are used to analyze longer-term, more complex outcomes of a disease or treatment. Markov chains are used to analyze sequences of events and the likelihood of one event to follow another.\(^1\)

**Expert Opinion**

When data are unavailable or when conflicting data exist, expert opinion is useful. It can be obtained through consensus panels addressing specific assumptions regarding costs and outcomes. However, to ensure that an opinion is accurate, it is important to examine the list of panel members to ensure that a wide-ranging depth and scope of knowledge is represented.

When reviewing research, regardless of the source(s) of data, readers should be mindful of the following issues:

▲ What is the choice of comparison therapy? Usually, RCTs compare a new or experimental treatment with standard treatment or no treatment/placebo. Comparisons to placebo may not be appropriate unless the standard of care is no treatment; it also depends in part on whether the new therapy is intended as a substitute or adjunctive therapy.

▲ Who is funding or sponsoring the study? Many companies sponsor or fund studies of their products. While this does not imply a conflict of interest for researchers who establish

---

**Table 4. Different Reporting Mechanisms for Results of GUSTO Trial**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Survival at 30 days</th>
<th>Mortality at 30 days</th>
<th>Absolute increase in 30-day survival</th>
<th>Percentage increase in 30-day survival</th>
<th>Absolute decrease in 30-day mortality</th>
<th>Percentage reduction in 30-day mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptokinase</td>
<td>92.7</td>
<td>7.3</td>
<td>Baseline</td>
<td>Baseline</td>
<td>Baseline</td>
<td>Baseline</td>
</tr>
<tr>
<td>TPA</td>
<td>93.7</td>
<td>6.3</td>
<td>1.0%</td>
<td>1.1%</td>
<td>1.0%</td>
<td>13.7%</td>
</tr>
</tbody>
</table>

---

1. REF: 1.0%
publishing rights a priori, it should be taken into consideration when reviewing the research. After all, many research studies with negative results never make it into the published literature.

**How are costs and outcomes determined?** Some reported costs may be associated with the protocols of the study, not the treatment or outcomes themselves; these are not costs associated with the actual administration of the therapy. There is also a cost attributable to ascertainment bias (i.e., being under a physician's care as required in a clinical trial increases the likelihood of detecting an illness and the resulting associated costs). It is important to consider other protocol biases (e.g., selection bias).

**Are the results applicable to your practice setting?** Clinical outcomes may vary from one environment or practice setting to another; issues such as compliance may drastically alter outcomes and vary from RCT to the real world. The practitioner should be very careful about generalizing.

**What (if anything) is missing from the article?** Reading similar studies often helps provide a basis for comparison to determine whether the research has appropriately addressed the research question, variables selection, inclusion/exclusion criteria, and methodology. Missing data or information is not necessarily misleading if the reader is aware of it and can assess its impact on the study's outcomes.

**PRESENTATION OF RESULTS**

There are numerous methods for presenting empirical results in PE literature. For example, negative outcomes can be presented so that their significance is downplayed; conversely, less significant positive outcomes can be presented so that their magnitude is overstated. This is increasingly important when results are presented for marketing or promotional purposes by the sponsoring company. As an example, consider the results of the GUSTO trial, which document the differences in survival rates for patients treated with tissue plasminogen activator (TPA) as compared with streptokinase for acute myocardial infarction. As demonstrated in Table 4, both of the following statements are true:

- **TPA increases the probability of survival by 1% in the study population.**
- **TPA decreases the probability of death by 13.9% in the study population.**

The second statement may appear a more compelling argument for use of TPA despite its significantly higher cost than streptokinase. For this reason, it is important to examine the data results, not just the discussion or interpretation of results. This is increasingly important when results are presented for marketing or promotional purposes by the sponsoring company.

**PHARMACOECONOMIC EVALUATION OF PHARMACEUTICAL CARE**

The emergence of PE evaluation, and the corresponding objective of cost savings, has affected the role of the pharmacist. The shifting of segmented aspects of health care to a more coordinated health care industry has meant many changes for practicing pharmacists. Traditionally, income was generated by dispensing a pharmaceutical product. However, increased concern for the economics of providing health care made the drug product expenditures an optimal target. Reducing drug expenditures was accomplished easily through volume discounts, decreased dispensing fees, mail-service pharmacies, and increased automation. Because of external pressures from payors, pharmacists effectively decreased the pharmacy budget; however, there is little room left to decrease the cost of pharmaceutical products. Pharmacists now are developing innovative ways to manage the budget and generate revenue for services. More important, changes in health care have shifted the focus of pharmacy practice from dispensing medications to providing pharmaceutical care. Viewing drug products and the pharmacy budget as separate entities in the health care industry now appears short-sighted. Viewing the entire health care picture with pharmacy services as one aspect should help improve long-term goals to provide quality health care and decrease overall resource utilization. Increasing the pharmacy budget may decrease overall health care utilization.

The result of changes in the New Hampshire Medicaid program exemplifies this. The prescription coverage was limited to three prescriptions per month. The consequences of implementation of the prescription limit was increased nursing home admissions and hospitalizations. Examining the overall use of resources demonstrated that decreasing one aspect of health care costs (i.e., the pharmacy budget) resulted in an increase in another area of health care expenditures (i.e., nursing home admissions and hospitalizations). The economic outcome was a three-fold increase in overall health care costs for the New Hampshire Medicaid program for that year of limited prescription coverage.13

Pharmacoeconomics provides pharmacists with a tool to evaluate the use of pharmaceutical resources such as prescriptions and pharmaceutical care. Comparing one product to another in a CEA analysis may help to decide which products should be placed on a formulary. Three outcome measures—therapeutic, humanistic, and economic outcomes—need to be evaluated for different treatments or different disease management programs.14 Therapeutic outcomes include prevention of heart attacks with antihypertensive therapy; humanistic outcomes include quality of life and patient satisfaction; and economic consequences include the cost of treatment from various consequences (see Table 3).

In addition, PE analyses permit clinical practice guidelines to be developed. The Agency for Health Care Policy and Research Guidelines on Smoking Cessation 1 recommend the use of nicotine-replacement products, which PE analyses have
illustrated are cost-beneficial. Indeed, several managed care organizations have implemented smoking cessation programs because of this. Expanding the use of PE can help pharmacists design disease state management programs that involve all aspects of patient care. Pharmacoconomics helps determine the most efficient use of resources (e.g., whether the patient should receive drug therapy, surgery, or another management option). For established disease management programs, PE analyses can determine whether they are viable by examining their therapeutic, economic, and humanistic outcomes.

Managed care organizations and payors may use PE analyses to determine which disease-state management program provides the best outcomes for the use of various resources. It also may help determine which health care provider group (i.e., pharmacists, nurses, physicians) should be employed to perform services for the disease state management program.

Unfortunately, there has been little published work analyzing the effect of pharmaceutical care on medical and PE outcomes. A significant amount of work has documented the number of interventions performed by pharmacists in community, hospital, or managed care settings. In addition, there is a body of literature that has linked pharmacists’ interventions to increased compliance or intermediate endpoints/surrogate measures. These publications are important first steps toward evaluating the PE benefit of pharmaceutical care; however, documenting interventions and improvement in compliance represent intermediate endpoints. There remains a need for studies that provide valid scientific evidence to support the relationship between interventions/compliance and clinical outcomes.

Documentation is an important requirement to be able to conduct a PE evaluation of the pharmaceutical care services being provided, whether they stand alone or as one aspect in a disease state management program. Pharmacists must collect data from their interventions. This includes providing information on what they did, how they did it, and the outcome of the intervention.

One of the most important uses of PE analyses for pharmacists is to justify the value of the pharmacist and, potentially, to ensure the survival of the pharmacy profession. Taking responsibility for drug therapy outcomes is necessary for the profession, both financially and psychologically. Pharmacists must be involved in documenting outcomes and collecting data to determine whether pharmaceutical care services have accomplished what was intended. Often, there are projections of cost-savings with various pharmaceutical care interventions; however, the economic outcomes of these interventions are not typically verified.

To ensure continued support of pharmacy programs, pharmacists need to document and analyze the data from their interventions. Pharmacoeconomic analyses can be used to obtain reimbursement for providing pharmaceutical care and justifying the pharmacist’s role in various settings.

Pharmacists can take steps to involve themselves in justifying the value of pharmaceutical care, including: 1) providing pharmaceutical care; 2) collecting data regarding the provision of pharmaceutical care in the practice setting; and 3) analyzing the data to determine the PE consequences of the care provided.

The following examples demonstrate the use of PE analyses for pharmacists providing pharmaceutical care:

- The first scenario involves a networked community pharmacy that wants to become more involved in providing pharmaceutical care for patients with asthma who are enrolled in their affiliated MCO. Under the current reimbursement structure, the pharmacist may be prohibited from providing pharmaceutical care for patients with asthma since it is the drug product, not pharmaceutical care, that is reimbursed. To help enable the pharmacist to provide pharmaceutical care, the pharmacist can design a PE evaluation of the pharmaceutical care services for patients with asthma seen at his or her practice setting. One potential way is to identify patients with asthma and randomize these patients to standard care or to standard care plus disease management care. The pharmacist will provide pharmaceutical care services for the latter group including peak flow meters, education regarding their disease, and assessment and management of their disease. The pharmacist then must collect data on outcomes of interest, including therapeutic, economic, and humanistic outcomes. Therapeutic parameters may include peak flow readings and number of asthma exacerbations; economic parameters may include number of physician visits, hospitalizations, emergency room (ER) visits and medication costs; humanistic parameters may include patient satisfaction and quality of life. Pharmacists can use CEA to analyze the data and determine the value of the pharmaceutical care services being provided for asthma patients. This CEA then can be used to demand reimbursement for the pharmacists providing these types of pharmaceutical care services for patients with asthma.

- The second scenario involves pharmacists providing pharmaceutical care services in a HMO to patients with diabetes. This can be used to justify an additional pharmacy position. The pharmacist serves as a physician extender and assesses the patient’s disease, determines appropriate management, and educates the patient. Again, the data need to be collected for the three outcomes areas. Therapeutic parameters include glycosylated hemoglobin, and incidence of retinopathy, nephropathy and neuropathy, as well as cardiovascular disease such as myocardial infarctions. Economic parameters in this case may include the cost of hospitalizations, surgeries/procedures such as amputations, ER visits, medications and supplies, and physician visits. Humanistic parameters which can be measured are similar to those described in the first scenario. Analyzing this data can allow the pharmacist to show that these services are cost effective from a managed care perspective and that an additional pharmacist position may be justified using a CBA.

Although the two examples above are more programmatic, the value of smaller pharmaceutical care interventions can be analyzed. Pharmacists can perform a CEA on pharmaceutical
care services for patients with infectious diseases who are treated with antibiotics. If pharmacists determine the appropriate antibiotic for each patient, follow-up with the patient via phone three days after receiving the antibiotic, and manage the patient according to his or her clinical profiles, the value of this pharmaceutical care intervention can be assessed. This type of pharmaceutical care service may be able to decrease physician visits for those patients who fail initial therapy or may ensure that patients complete the entire course of antimicrobial therapy.

As pharmacoeconomics become more routine in the evaluation of drug products and services, it becomes critical for pharmacists to understand the general principles of this new discipline and how PE can affect their practice environment. If pharmacists are to utilize PE tools, they must provide pharmaceutical care services, collect data on outcomes, and analyze these outcomes to determine their PE value. Pharmacists should use a CEA that can compare the differences in costs and outcomes of competing treatment programs. Using this documentation strategy, pharmacists can use the results of the CEA to obtain reimbursement or justify additional pharmacist positions.

The changing health care industry has provided pharmacists with new opportunities to assume expanded roles. The use of PE analyses is critical to proving our effectiveness in these activities.