It is clearly important for businesses and organizations to have accurate measures of the rate of return on investments (ROIs) to guide their investment decisions. In health care, the demographic trends, explosion in high-cost technology, and changing health care system have focused attention on both the costs and the effectiveness of health care services. Total health care costs in the United States have risen for the last 6 years; although growth slowed in 2002, total health care costs are projected to rise from 14.9% of the U.S. gross domestic product in 2002 to 18.4% in 2013 (Heffler et al., 2004). Because of this level of spending, health care executives and decision makers are increasingly interested in economic evaluations (Stone, 2002; Stone, Curran, & Bakken, 2002). Therefore, in an interest to having effective evidence-based nursing interventions adopted into practice, researchers and clinicians may increasingly wish to conduct economic evaluations.

Because of this need, in the summer of 2004, in an effort to help nurse researchers better understand these techniques, a 2-day workshop was held by the National Institute of Nursing Research. Expert faculty from the Agency for Healthcare Research and Quality, Johns Hopkins University, and Columbia University provided a series of lectures and breakout sessions to help nurse researchers understand the mechanics of cost–effectiveness analyses. However, there are a number of other types of economic evaluations found in the literature and used in setting policy that may be of interest to nurse researchers (Stone, Bakken, Curran, & Walker, 2002). Table 1 briefly defines the different types of economic evaluations available. In all of these economic outcome evaluations, alternative strategies are compared (i.e., the introduction of a new policy compared with an old policy) and incremental costs of the competing strategies should be computed. The methods differ only in how effects (outcomes) are measured. Return on investment is a type of cost–benefit analysis conducted from investors’ (e.g., the health care decision maker) perspectives. In past columns, we described in detail the basic steps of economic evaluations (Stone, 2001a, 2001b). The purpose of this column is to provide a brief review of economic evaluations in general and then focus on ROI models.

The general steps in all economic evaluations are illustrated in Fig. 1. The first step is to select the type of evaluation to be conducted based on the question being asked. Return-on-investment models are appropriate when a decision maker is trying to understand how to best invest limited funds.

Framing an analysis includes considering the appropriate perspective, boundaries, and time horizon. The appropriate types of costs and benefits to include vary depending on the perspective from which the analysis is done and the question being asked. For example, in examining the costs related to nursing turnover, the unit manager may only be interested in expenses incurred in the management of their own unit. However, a hospital executive would be interested in the resources used in the management of an entire hospital. This may be applicable if employees are moving from one unit to another in the course of their tenure at an institution. Studies motivated by policy decisions relevant to specific institutions may not wish to consider costs (or savings) outside the institution, such as costs associated with family care giving in the home. However, if family care giving affects the productivity of employees, it may be applicable. From the societal perspective, all costs and benefits are included.

The boundaries of an economic evaluation refer to the scope of a study. Many interventions have some spillover effects that must be considered. The questions become as to what the appropriate scope is and how far should such effects be followed to adequately assess the economic impact of the intervention. For example, benefits of adequate child care through additional employee benefits may include better grades for a child in school, ultimately leading to higher-paid jobs. However, the ultimate benefit of better employment for the child may be too distant to consider in the economic evaluation of child care packages.
The time horizon refers to the period for which costs and benefits are measured in an analysis. The time horizon may vary from as short as 1 year to the lifespan of an individual. The appropriate time horizon to consider will depend on a number of factors. For example, resources related to a wellness intervention may include the intervention itself and those associated with net downstream health care use.

Once an analysis has been framed, the resources to be valued must be determined. In addition, these resources must be converted into dollar values. Analysts vary in how they value resources. In health care environments, charges do not equal true costs. Third party payers negotiate payment for services rendered based on the cost of the service and an agreed-upon profit margin. This occurs in both for-profit and not-for-profit institutions. For health care institutions to generate more revenue fees for service, customers are often asked to pay full charges (i.e., a higher rate of pay). This is called institutional cost shifting. Therefore, in the United States, many analysts use cost-to-charge ratios, which are calculated by dividing the total costs in a given cost center by the total charges for the same resource. Cost-to-charge ratios are recognized as a gross adjustment to charges. They are better than using charges alone but not as accurate as cost accounting systems. In addition, because a dollar from 1980 does not have the same purchasing power as a current dollar, the costs from different years must be calculated and placed into a standard year format using the consumer price index. Standardization of all costs to the same currency and year is essential.

Once all costs and benefits have been calculated, future costs and benefits are discounted to the present value. Discounting reflects the principle that suggests people place greater value on something that they have today than on something that they will have in the future. Interest rates are an example of this principle. Currently, most experts recommend using a 3% discount rate to discount both costs and effects (Gold, Siegel, Russell, & Weinstein, 1996).

In conducting economic evaluations, data gathered may include resource use, value of resources, effectiveness of the intervention, and preferences regarding outcomes. Based on the data gathered, the base case is computed. For most economic evaluations, many of the data points gathered include some assumptions or uncertainty in the parameter. These assumptions should be clearly stated up front to increase the transparency of the analysis. In addition, sensitivity analyses should be conducted to explore the implications of alternative assumptions.
In most economic evaluations, it is necessary to make assumptions and to deal with uncertainty due to the complex phenomena being studied. To quantify the benefit in the numerators of these equations, assumptions are usually needed. In human resource development research, Phillips (1997) used an approach used by industrial–organizational psychologists and asked program participants or their supervisors to assign dollar values to the results of specific training programs. However, he added a step—that of requesting the rater’s confidence ranging from 0% to 100%.

Sensitivity analysis and cost–effectiveness acceptability curves determine the degree to which this uncertainty could influence conclusions about the economic impact of decisions (Fenwick, O’Brien, & Briggs, 2004). Through the use of these techniques, results are calculated separately, varying uncertain estimates of risks, benefits, and values over a reasonable set of parameters. This allows analysts to determine how different the results of an analysis are, given the different possible estimates. For example, in a univariate sensitivity analysis, a single parameter such as the estimation of effectiveness is varied and indicates the degree of influence the particular value has on the outcome of the entire analysis. Although univariate sensitivity analyses are insightful, looking at only one variable is usually inadequate. Multivariate sensitivity analysis and cost–effectiveness acceptability curves examine multiple sources of uncertainty at one time and may generate a more accurate estimate of cost–effectiveness under varying conditions and better inform decision makers. Assessing uncertainty is an important element of a sound economic evaluation.

Specific to an ROI, there are a number of common metrics used, which are designed to measure the economic value of a new and improved process. Each ROI metric is a relevant indicator of how much a new process is worth. There are six basic metrics related to ROI (shown in Table 2). Each metric builds upon its predecessor and refines the accuracy of the economic value of the new process. Return on investment metrics are not independent or mutually exclusive, but each should be considered individually. For example, costs may be astronomical or benefits may be negligible and may marginalize the relevance of the other metrics.

Costs consist of the amount of money an organization has to pay to implement a policy. Benefits are generally considered the amount of money saved by implementing the policy. The net present value is the same equation used for discounting. The benefits-to-cost ratio is a simple ratio of the amount of money saved implementing an improvement process. The ROI is the ratio of money saved to money consumed expressed as a percentage. However, the ROI metric demands that the costs of implementing the improvement method first be subtracted from the benefits. The breakeven point is a measure of how much money must be spent on the new improvement process before it begins yielding its benefits.

Bartel (2000) reviewed published literature estimating the employers’ ROI in training. She critiqued 16 case studies, including her own work, and made a number of recommendations for future ROI studies (Bartel, 1994). The ability to measure effects is of utmost importance. The ideal case study would include a pretest and posttest design in which employees are randomly assigned to the intervention of interest. Because of the difficulty in random assignment, another design that may offer an unbiased estimate of effectiveness is a time series design in which employees serve as their own controls. When a single group time series design is used, it is important that other factors that may be responsible for the performance change be accounted for.

There are many types of economic evaluations. Return on investment is an appropriate economic tool when the perspective is from an investor or a decision maker with limited funds. In many cases, the development of flexible ROIs would be a significant contribution to aid in evidence-based decision making.

### Table 2

<table>
<thead>
<tr>
<th>Metric</th>
<th>Definition</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Costs</td>
<td>Total amount of money spent on new improvement process</td>
<td>[ \sum_{i=1}^{n} \text{Cost}_i ]</td>
</tr>
<tr>
<td>Benefits</td>
<td>Total amount of money gained from a new and improved process</td>
<td>[ \sum_{i=1}^{n} \text{Benefit}_i ]</td>
</tr>
<tr>
<td>Net present value</td>
<td>Discounted benefits based on inflation</td>
<td>[ \frac{\text{Benefits}}{(1 + \text{Inflation Rate})^{\text{years}}} ]</td>
</tr>
<tr>
<td>Benefits-to-cost ratio</td>
<td>Ratio of benefits to costs</td>
<td>[ \frac{\text{Benefits}}{\text{Costs}} ]</td>
</tr>
<tr>
<td>ROI</td>
<td>Ratio of adjusted benefits to costs</td>
<td>[ \frac{\text{Benefits} - \text{Costs}}{\text{Costs}} \times 100% ]</td>
</tr>
<tr>
<td>Breakeven point</td>
<td>Point when benefits meet or exceed costs</td>
<td>[ \frac{\text{Costs}}{\text{Old...Costs/New...Costs} - 1} ]</td>
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</table>

References


