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Evaluating Worksite Wellness: Practical Applications for Employers

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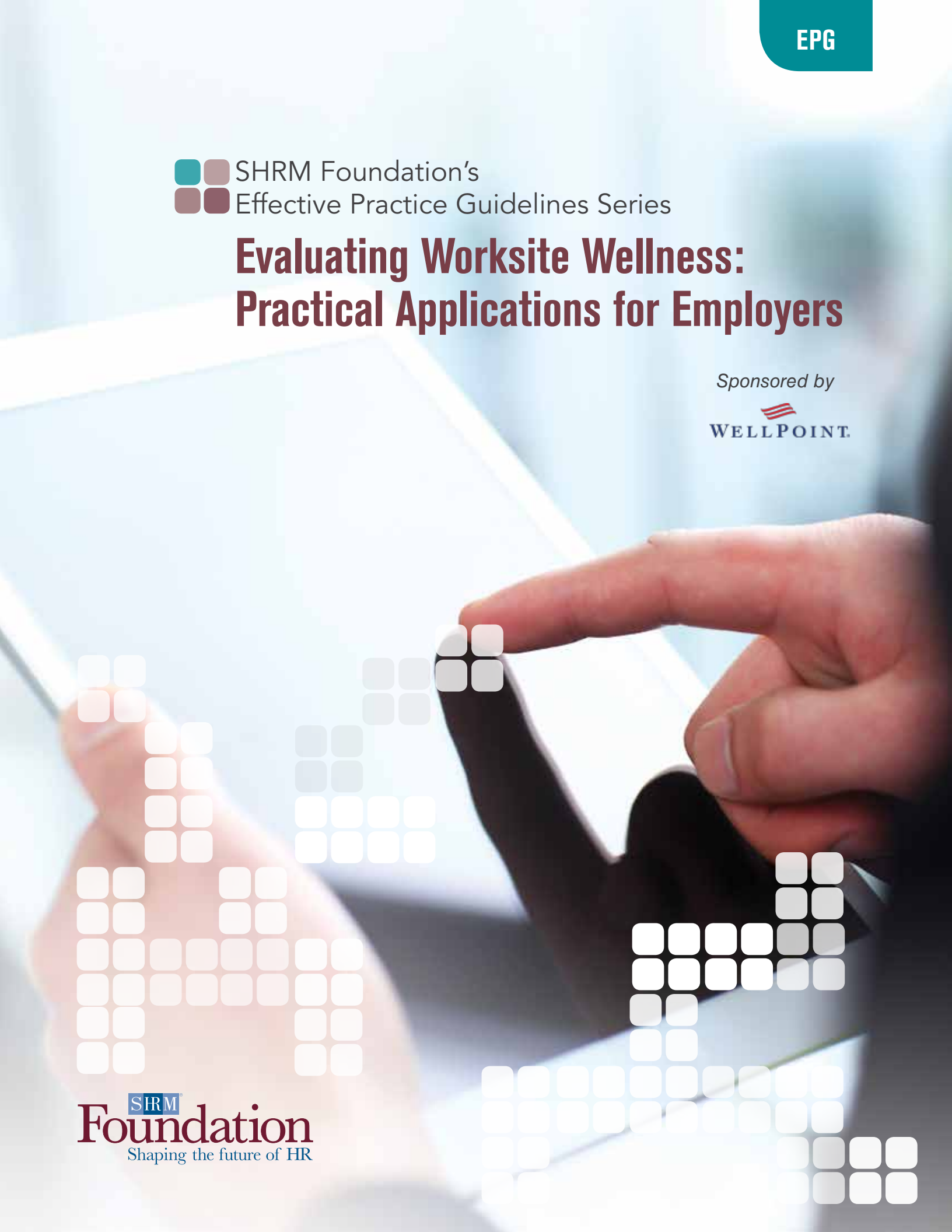

SHRM Foundation
Shaping the future of HR

Evaluating Worksite Wellness: Practical Applications for Employers

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FOREWORD

High-performance organizations understand that fostering a healthier workforce can build significant competitive advantage. However, developing, executing and sustaining an effective worksite wellness program are among the most challenging tasks facing human resource professionals. Demands to justify the costs of wellness programs continue to grow, and collecting and analyzing the data is often a complex and time-consuming task. This publication can help.

Evaluating Worksite Wellness provides techniques, tools and strategies for evaluating a wellness program effectively. It covers the issues essential to any evaluation in a straightforward, step-by-step fashion that is thorough, yet easy to follow. Using these tools to develop and evaluate your wellness program will help you to offer more targeted, cost-effective interventions that yield results. Not only will you save your company money, you will also help improve the health and well-being of your employees.

This is the 19th report in the SHRM Foundation's Effective Practice Guidelines series. Created in 2004 for busy HR professionals, the series integrates research findings with expert opinion on how to conduct effective HR practice. It provides the tools to successfully practice evidence-based management. Other recent reports include *Leveraging Workplace Flexibility for Engagement and Productivity, Promoting Employee Well-Being* and *Building a High-Performance Culture.* To ensure the material is both research-based and practical, the reports are written by subject-matter experts and then peer-reviewed by both academics and HR professionals.

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Mark Schmit, Ph.D., SPHR
Executive Director

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REVIEW

Bruce Elliott
Manager, Compensation and Benefits
Society for Human Resource Management

DESIGN AND EDITING

Blair Cobb
Senior Design Specialist
Society for Human Resource Management

Katya Scanlan
Copy Editor
Society for Human Resource Management

PROJECT MANAGEMENT

Beth McFarland, CAE
Director, Foundation Programs
SHRM Foundation

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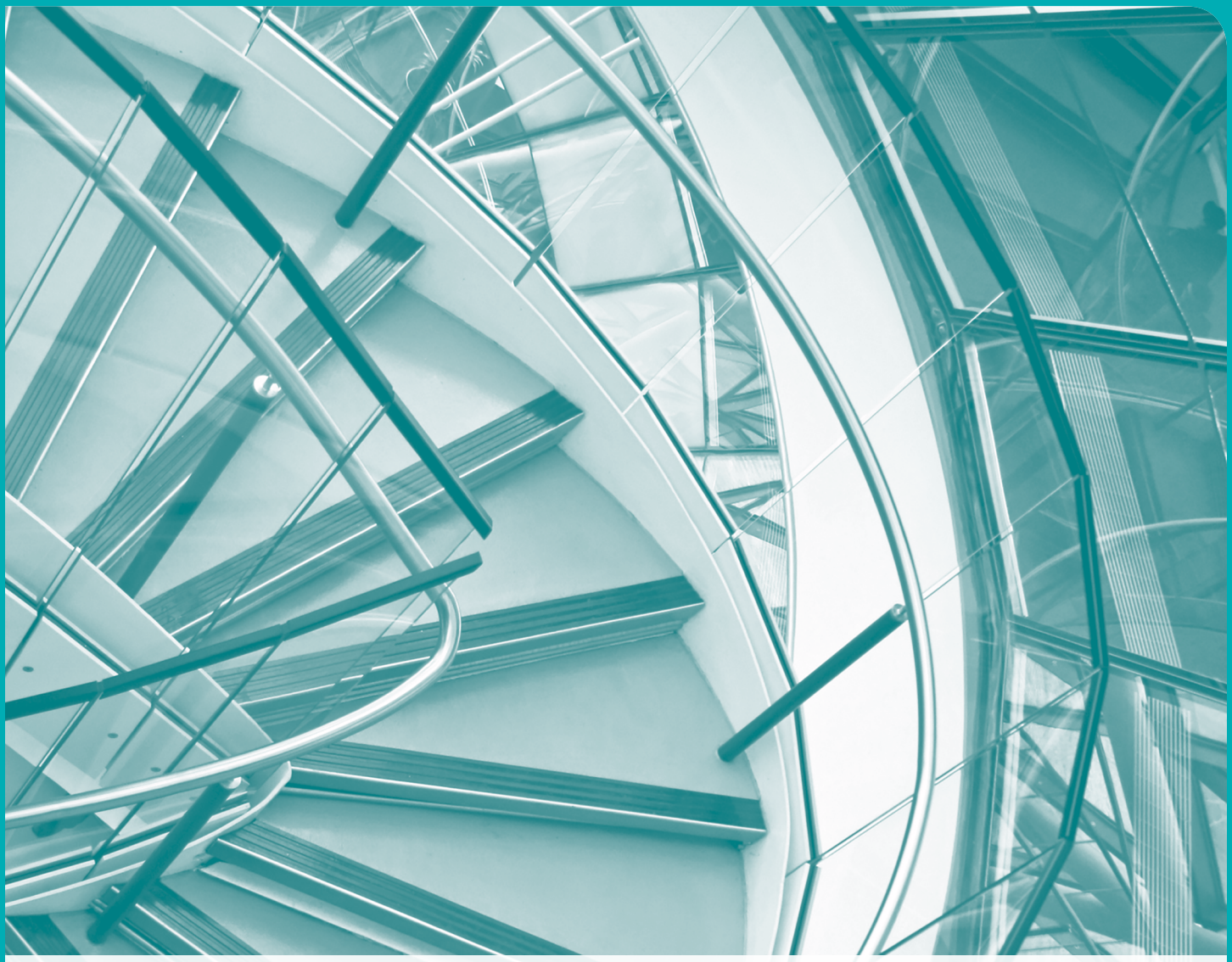
ABOUT THE AUTHOR

David Chenoweth, Ph.D., has more than 35 years of experience in worksite health management and is a Fellow of the International Association for Worksite Health Promotion. As president of Chenoweth & Associates, Inc., an econometric data analysis and worksite health management consultancy, he has designed health and productivity management programs, policies, tools, and incentive strategies for public and private-sector organizations. He has conducted risk-factor cost analyses for nine states, developed programming and ROI tools in Europe, Scandinavia and the U.S., and served as chief econometric analyst in the development of the well-known physical inactivity cost calculator. Chenoweth is professor emeritus at East Carolina University, where he served on the faculty for 31 years and directed the worksite health promotion academic program. Recently, he taught a Massive, Open Online Course (MOOC) on "Dynamics in Worksite Wellness Evaluation & ROI" for the University of Wisconsin. He has served as a monthly columnist for *Occupational Health & Safety* and frequently speaks on various worksite health issues throughout the U.S. and presented at worksite health forums in Europe and Jamaica. David has written nine books, including *Evaluating Worksite Health Promotion,* as well as chapters in three books, and numerous articles in refereed journals. He received his master's degree from Ball State University and his Ph.D. from The Ohio State University.



Offering targeted, cost-effective wellness programs that yield results will not only save your company money, but will also help improve the health and well-being of your employees.

EVALUATING WORKSITE WELLNESS: PRACTICAL APPLICATIONS FOR EMPLOYERS

Developing, executing and sustaining an effective worksite wellness program are among the most challenging tasks facing human resource professionals. Demands to justify costs for wellness programs are growing and so is the value of careful wellness program planning to an organization's bottom line.

This report provides techniques, tools and strategies for evaluating a wellness program effectively. This report covers the issues essential to any evaluation, including:

- How to identify the right tools and techniques in various situations.
- How to request appropriate data for conducting a medical claims data analysis.
- How to assess which risk factors should be monitored regularly.
- How to identify and compare program costs against program benefits.
- How to determine whether an intervention is likely to pay for itself.
- How to compare two or more interventions for cost-effectiveness.
- How to prepare a forecast of projected benefits and costs associated with an intervention.

The information presented here is aimed at anyone responsible for implementing and evaluating a wellness program.

I. SELECTING THE RIGHT TOOLS AND TECHNIQUES

The first step in determining what tools and techniques meet your organization's needs is to answer some key questions.

Table 1: Choosing the Right Evaluation Tool

If You Want to:	Consider Using:	Especially If You:
Identify which conditions are responsible for the largest share of your organization's health care costs.	*Claims data analysis (CDA)*	▪ Want to use claims data as a baseline and follow-up (impact) variable. ▪ Have or are planning a new program. ▪ Would like to compare participants vs. nonparticipants on a common metric. ▪ Work in an organization that is large or has an accommodating third-party administrator (TPA).
Calculate the financial cost of a risk factor.	*Risk factor cost appraisal (RFCA)*	▪ Want to determine which risk factor(s) to target. ▪ Have or are planning a new program.
Determine if and when benefits will offset program costs.	*Break-even analysis (BEA)*	▪ Have initiated a new program and want to know its payoff potential. ▪ Want to compare projected costs vs. anticipated benefits of a potential program.
Determine if a particular intervention is more cost-effective than another intervention.	*Cost-effectiveness analysis (CEA)*	▪ Have a budget that limits your programming options. ▪ Want to know if one version of a program is more or less cost-effective than another version—for example, personal health coaching vs. online health coaching.
Compare program costs against benefits.	*Benefit-cost analysis (BCA)*	▪ Have a fully operational program with expected benefits. ▪ Want to compare two or more different types of programs—for example, health coaching vs. low back health.
Project best, worst and midrange outcomes.	*Forecasting*	▪ Want to gauge how a new or potential program may perform.

- What is the scope of your wellness program? For example, are your wellness efforts primarily activity-based lifestyle programs, or are they more oriented toward health risk appraisal and screening?
- Which specific behaviors or risk factors are you trying to change?
- How long has your wellness program been fully operational?
- Which specific types of variables do you want to measure?
- Do you have the data needed for each type of evaluation?
- During what time frame do you want to evaluate specific variables?
- What is the scope and rigor you want to achieve in your evaluation? That is, are you aiming for a basic, intermediate or advanced evaluation?
- Are you confident in your team's ability to conduct an appropriate evaluation?

With the answers to these questions in mind, you will be able to consider several options to determine which method of evaluation will best meet your needs. The summary in Table 1 demonstrates how various brands of analysis fit particular situations.

The need to justify costs for employee wellness programs is intensifying at most worksites and so is the need to use health care claims data to drive wellness programming. When used correctly, claims data can help HR professionals conduct a front-end program "diagnosis," monitor the progress of a wellness program at the intermediate stage and assess the impact of a program that has been in place for a while.[1]

Before deciding to analyze claims data in-house, assess your firm's resources to determine whether this is the best option in terms of operations and the bottom line. Prerequisites for in-house analysis include:

- Staff members who understand risk identification and appraisal techniques.
- Adequate time to request, acquire, review and analyze the data.
- Access to claims data from insurers, third-party claim administrators (TPAs) and health care providers.
- Willingness of decision-makers and stakeholders to work together to review, analyze and integrate data into an objective report with universal value.
- A clear framework to help those conducting the analysis.

When you have determined that an in-house analysis is the right option for your organization, the process can be attacked step-by-step by 1) requesting and assessing data, 2) measuring risk factor costs, and 3) tying strategies to highly ranked risk factors and completing a proportionate risk factor cost appraisal.

II. MEDICAL CLAIMS: ANALYZING DATA AND MEASURING RISK FACTOR COSTS

Requesting and Assessing Claims Data Reports

Most midsize and large organizations are self-insured, making it relatively easy to acquire blind claims data from insurers or TPAs on an annual basis. Small businesses usually purchase health plans in a consortium or cooperative arrangement managed by an insurer or administrative services only (ASO) vendor. If this is your situation, company-specific claims data and reports are probably not available. Moreover, anyone with access to claims data in a small business might be able to identify individual employees with specific medical conditions, which is a violation of federal statutes.

Despite improvements by insurers and TPAs in generating faster, data-driven claims reports, most claims and cost data are long on numbers and short on other information. Sometimes wellness managers do not ask the right questions to obtain the best data, and often insurers and TPAs fail to educate their clients regarding proper interpretation of reports and may even withhold relevant data. It is essential for your organization to develop an open and trusting relationship with your health plan or TPA to secure *aggregate (group-wide) claims data reports* on a regular basis. These reports should be more than numbers and dollar values listed in tables and spreadsheets; they

"Building a business case for evaluating the benefits and costs of worksite clinics and onsite health coaching programs is critical in C-Suite support for any employer-based wellness program. For this reason, I have been a strong proponent of health care claims data analysis for my wellness programs and clients during my 18-year career. Analyzing claims data in a pre- and post-test analysis over a 2-3-year period allows you to assess changes in health risk factor levels and the medical costs associated with these risks. Claims data analysis also allows you to look at the cost-avoidance that your program has been able to produce over this time period. By analyzing claims data, you are able to assess gaps in care, which is essential for the provider of your program.

By knowing where your gaps in care are, your provider will be able to focus on key elements of the program participants' health, which enables your provider to assist the participants in making the appropriate behavior change. This behavior change should correlate to better health and a positive return on investment."

Jared Pankowski, M.S. Ed.
Client Services Strategist
TargetCare, Inc.
Charlotte, North Carolina

Do You Need a Consultant?

Some employers have in-house personnel skilled in conducting evaluations. But if your organization does not have the staff, tools and expertise to administer a thorough wellness program evaluation, hiring a qualified consultant is an option well worth considering.

Approach the selection of a consultant in a careful, step-by-step manner similar to the way you expect the program evaluation to be done:

1. Articulate why your firm needs a consultant.
2. Make sure that all internal resources have been fully tapped, confirming that there is no employee or team of employees on staff who can solve the problem.
3. Solicit detailed proposals and bids from several consultants.
4. Develop a list of criteria to use in judging all candidates. Common criteria include:
    - Fees.
    - Availability.
    - Experience.
    - Type of clientele served.
    - Specialties.
    - Reports from references.
    - The ability to customize services.
5. Interview the top candidates in person, by video conference or by phone conference, soliciting feedback from all staff members.
6. Avoid consultants who charge large fees up front or who appear to be inflexible.
7. As part of the hiring process, make sure that your contractor carries appropriate liability insurance, shows evidence of current coverage and lists your company on the policy when appropriate.

should provide information that will enable managers in your organization to perform year-to-year comparisons with genuine value.

Approaching claims data reports in three phases will help you make sure you gain the most value from the data.

Phase 1: Review data, find gaps and ask questions

The obvious first step in this process is to check with your benefits department to make sure the firm is receiving medical claims data reports from your health plan or TPA.

If you are not currently receiving reports, inform the health plan provider or TPA that your organization needs quality claims data reports for various business functions, including health plan benefit design, employee health screening, wellness programming and cost-management strategies. If you are starting from scratch, with no current claims data reports, this is a good time to work with all stakeholders in implementing a model program.

If you have medical claims data reports onsite, your team can begin reviewing them for valuable information. Keep in mind that the reports may provide only limited data, which will restrict the types of analysis you can perform later. Be sure to:

1. Review the reports thoroughly.
2. Note the types of data included and any important gaps.
3. Develop questions to drive your subsequent data requests.

Basic assessment analysis

If the reports you have onsite provide fairly limited data, your team will be able to complete only a basic assessment analysis, focused on the larger, organizational level. A basic assessment can answer the following questions:

- What are the most common types of claims by *Major Diagnostic Category* (MDC)?
- What are the most expensive types of claims by MDC, particularly

claims that exceed your firm's stop/loss threshold?

- What is the average length of stay for the most common inpatient conditions?
- How many recurring hospitalizations occurred for the same chronic or acute conditions? This value will help gauge the quality and efficiency of care previously delivered.
- What is the year-to-year comparison of total medical care costs over the past three to five years?

Problem-focused analysis

In contrast to basic assessment, a problem-focused analysis is more likely to identify specific problems and trends.[2] A problem-focused analysis can answer many of the following questions:

- What are the most common claims by MDC, *Diagnosis Related Group* (DRG) and *International Classification of Disease* (ICD)?
- What are the most expensive types of claims by DRG or ICD?
- How does the outpatient use rate compare with local, regional and national norms?
- What are the fastest-growing outpatient claims in the past five years?
- What percentage of total health care charges for the top five outpatient MDCs were incurred by employees? By spouses? By dependent children?
- What percentage of charges for the top five inpatient DRGs are linked to lifestyle? To environmental or occupational factors? To genetics? To poor health care?
- If current trends continue, what will the organization's annual health care costs be in the next three to five years?

After you have identified the gaps in your current claims data reports and developed a list of general and specific questions, it is time to make a new request.

Phase 2: Request new data, review data and set priorities

Before making a new data request, make sure you know the composition of your organization's enrollee population, which includes everyone enrolled in any of the health plans. Note differences among populations enrolled in health maintenance organization (HMO), preferred provider organization (PPO), point of service (POS), exclusive provider organization (EPO) or other types of plans. Analyzing the membership of different health plans may help you in applying financial incentives, such as premiums, deductibles and co-pays. If your company provides health care benefits to dependents and retirees, be sure to request claims data reports that include and differentiate among all enrolled groups. A typical profile might reveal differences, such as those below:[3]

Enrollee Group	Enrollees (%)	H.C. Claims (%)	H.C. Costs (%)
Employees	40	30	25
Dependents	50	50	45
Retirees	10	20	30

Take time to review and prioritize various types of data in the claims reports. Identify which data are most relevant to the basic assessment and problem-focused analysis discussed above. Focus only on relevant data. After you have gathered the specific data for analysis, it is time to start crunching the numbers.

Phase 3: Analyze the data

There are many different ways to slice and dice data. Some of the more common methods are explained below.

Comparing enrollee groups by costs

In many organizations, spouses and dependents generate more claims and costs than employees.[3] In some organizations, the opposite trend

Figure 1: Profile of a Company's Health Care Claims and Costs by Enrollee Group

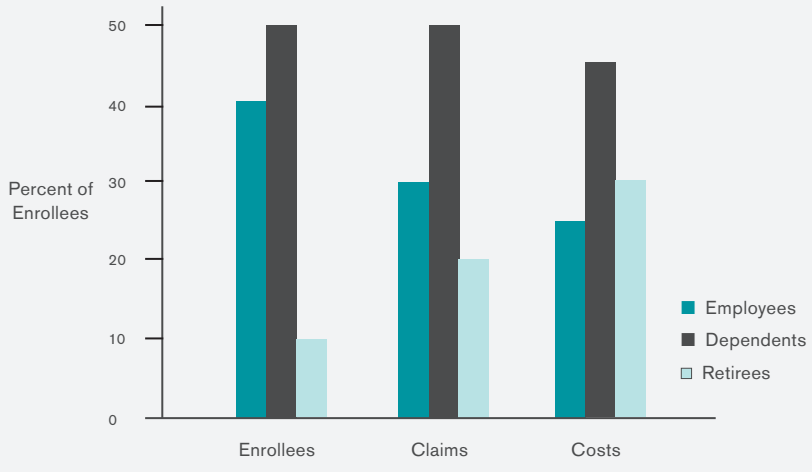


Table 2: Tabulation of Health Care Claims and Costs by MDC and ICD

MDC/ICD	Health Care Claims Employees # Rank	Health Care Claims Dependents # Rank	Claims Cost Employees # Rank	Claims Cost Dependents # Rank
MDC: Circulatory				
Hypertension				
Angina pectoris				
Ischemia				
MDC: Musculoskeletal				
Lumbago				
Arthritis				
Bursitis				
MDC: Respiratory				
Brochitis				
Influenza				
Asthma				

occurs. In either case, it is important to track, record and compare health care use and health care cost patterns between employees and dependents. This is especially critical if your wellness program is geared primarily to employees or if you plan to offer specific types of programs or activities to dependents, such as annual health risk appraisals to qualify them for health plan benefits. A simple tabulation sheet can be used to determine past and present trends and the most common and most expensive types of claims (see Table 2).

Graphing data to identify differences by MDC

When you complete the tabulation of claims and costs in your organization, you will probably see differences between employees and dependents within each group. If your company offers many health care plans, you may also notice differences among plans. At this point, you should be able to graph results that will help you focus on immediate opportunities and challenges. Figure 2 shows employees incurred more health care expenses in the Circulatory MDC category, with less in the Respiratory, Digestive and Musculoskeletal categories.

Comparing enrollee groups by use of health care

In your analysis of claims data, you can expect to see health care use differences between and within enrollee groups. For example, nearly 50 percent of the claims filed at one worksite were confined to only four MDCs, as shown in Figure 3.[3]

Breaking MDCs into ICDs for greater specificity

Because MDCs are only broad categories of health care claims, breaking them down into ICD subcategories is needed to identify the actual conditions and illnesses that prompted individuals to seek health care services. Many organizations receive their claims data formatted only by MDCs. Depending on the coding and data formatting practices of a particular insurer or TPA, the scope of claims reports may include up to 25 different MDCs.[4] Standard categories include:

1. Alcohol/Drug Use
2. Blood Forming and Immunologic
3. Burns
4. Circulatory
5. Digestive
6. Ear/Nose/Throat
7. Eye
8. Endocrine/Nutrition/Metabolic
9. Factors Influencing Health Status
10. Genitourinary
11. Hepatobiliary
12. Human Immunodeficiency Virus
13. Infectious and Parasitic
14. Injury, Poisoning, Toxic Effects
15. Kidney and Urinary Tract
16. Mental
17. Multiple Significant Trauma
18. Musculoskeletal/Connective Tissue
19. Myeloproliferative/Neoplasm
20. Newborns/Other Neonates
21. Pregnancy/Childbirth/Puerperium
22. Reproductive (Female)
23. Reproductive (Male)
24. Respiratory
25. Skin/Subcutaneous/Breast

By and large, the current standard listing of 25 MDCs collectively represent a broad spectrum of over 500 DRGs and several thousand ICDs. Because they are so general, MDCs cannot reveal the level of specificity needed to conduct a high-end claims data analysis. To conduct a quality analysis, you must request DRG and ICD claims data. The increasing specificity in moving from MDC to DRG to ICD is charted in Figure 4.

In conducting an initial analysis of medical claims data, "drill down" and identify major risk factors that contribute to a large portion of your organization's medical care costs.

Figure 2: Percentage of Total Health Care Costs by MDC

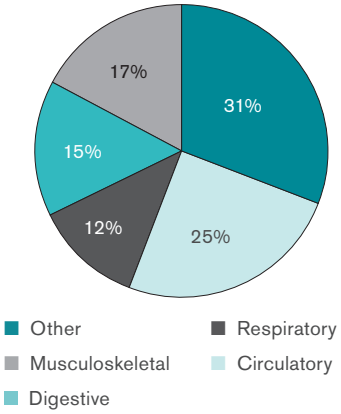


Figure 3: Percentage of Total Health Care Claims by Most Frequently Reported MDCs

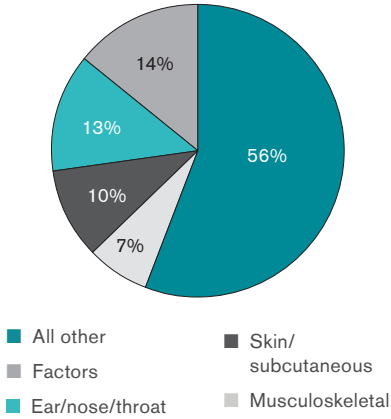
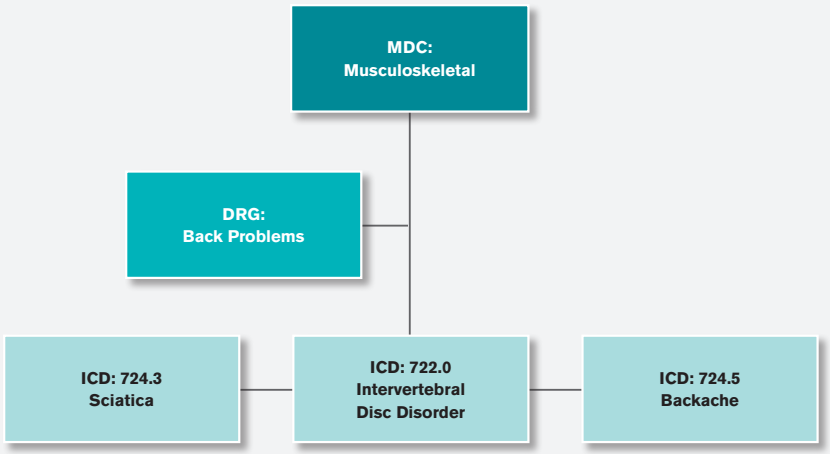


Figure 4: Levels of Health Care Claims



Measuring Risk Factor Costs

The ability to measure risk factor costs began with the field of *prospective medicine* in the early 1960s.[5] Previously, data analysts had little to guide them in calculating the real cost of major risk factors. The most visible research at the time examined the relationship between tobacco use and various health conditions, leading to the first Surgeon General's report on smoking.[6] At the time, no one was researching direct medical care costs associated with smoking. Most researchers of the era linked a particular condition to a single risk factor, tying diabetes only to genetics, for example.

Prospective medicine: the identification of specific risk factors that contribute to a particular condition, disease or disability and strategies to prevent or reduce those risks.

Eventually, this one-to-one concept gave way to the current understanding of *multirisk-factor causation.* We now know that many illnesses and diseases are caused by multiple risk factors, derived from lifestyle, genetics, environment and health care.[7]

For example, musculoskeletal claims are one of most common and expensive claims at many worksites, with low back pain being particularly frequent. Research conducted over several decades indicates that low back pain is more common in individuals with one or more of the following risk factors:[8]

- Age (over 35 years of age).
- High stress.
- Obesity.
- Low work satisfaction.
- Medical history.
- Repetitive motion.
- No prework stretching.
- Physical inactivity.
- Cigarette smoking.
- Poor ergonomics.
- No job rotation.
- Male gender.

Equitable risk factor weighting

One simple way to calculate the cost of a single risk factor is to use an *equitable risk factor weight method*, as shown below.

The equitable risk factor weight method has several limitations. Most notably, it is based on the premise that each risk factor has the same level of influence on health. But epidemiological studies done in public health and worksite settings clearly show that no two risk factors have the same influence on a person's predisposition for low back pain or any other illness or disability. Ideally, risk factor cost calculations should distinguish among variations in risk factors.

Proportionate risk factor weighting

In today's marketplace, *Proportionate Risk Factor Cost Appraisal™ (PRFCA)*, illustrated in Figure 5, is designed to precisely distinguish risk factor-specific influences and associated costs. PRFCA™ is a proprietary technique developed by Chenoweth & Associates, Inc.

PRFCA analyzes and weights specific risk factors linked to lifestyle, genetics,

Equitable Risk Factor Weighting

ICD#724.2
Low back pain

Total cost of condition	÷	*# of risk factors*	=	*Individual risk factor cost*
$ 200,000	÷	*12*	=	*$ 16,666*

environment and health care. PRFCA also accounts for the percentage of employees and dependents who have specific risk factors and distinguishes between inpatient and outpatient claims and costs.

Proportionate risk factor cost: the portion of a health condition's medical cost that is directly attributed to a specific risk factor.

The distinction between inpatient and outpatient claims is meaningful because:

- Outpatient claims are far more common than inpatient claims.
- An inpatient claim is significantly more expensive than an outpatient claim.
- A "contamination effect" occurs if all claims and costs are bundled together, artificially inflating or deflating the actual composite (adjusted) cost used in the PRFCA calculation.

Identifying risk factors that may be modified

A person's overall risk of medical claims is heavily influenced by decisions and events related to lifestyle, environment, genetics and health care, as shown in Figure 6.[9]

Contributing Factor	Influence (%)	Examples
Lifestyle	51	Exercise habits, diet, tobacco use
Environment	20	Type of occupation, environmental exposures
Genetics	19	Family history of certain diseases
Health care	10	Quality of care, misdiagnosis, not taking medication

Applying the PRFCA to manage risk

For an organization to successfully manage its overall employee health risk profile, health management personnel must follow a logical progression of actions:

- Identify the most common and expensive health claims.
- Use a measurement tool to calculate the proportionate cost of specific risk factors.
- Determine how much of each risk factor-specific cost is due to lifestyle, environmental, genetic and health care influences.
- Provide targeted interventions that are behavior-based to reduce the incidence and severity of each risk factor.

Among the preceding tasks, the third can be particularly challenging for many organizations because risk factor weighting research is ongoing. Fortunately, as the field of prospective medicine continues to evolve, several risk factor appraisal tools have been developed, including PRFCA. PRFCA is a trademarked property of Chenoweth & Associates, Inc., but worksite health management personnel are permitted to use its framework in noncommercial activities. If you would like to apply PRFCA to your organization's risk factor profile, follow the steps outlined on the next page in the box titled "To Apply for PRFCA to Your Risk Factor Profile."

Figure 5: Proportionate Risk Factor Cost Appraisal™

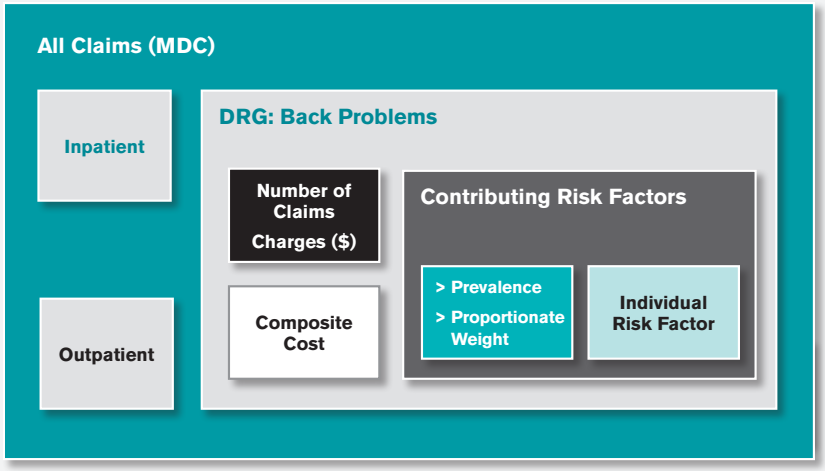
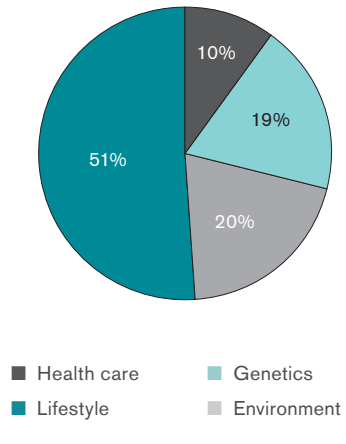


Figure 6: Contributing Factors to Health Status (approximate percentages)



To Apply PRFCA to Your Risk Factor Profile

1. Gather and review your organization's health care claims and cost data over the past three to five years.
2. Identify the five most expensive MDCs.[1] If you have DRG- or ICD-level claims data, use those data instead of MDCs.
3. Prepare the upper portion of the PRFCA framework (Table 3) for each of your selected MDC, DRG or ICD claims[2] by calculating the following:
   - Number of inpatient claims.
   - Number of outpatient claims.
   - Total inpatient payments.
   - Total outpatient payments.
   - Average inpatient payment.
   - Average outpatient payment.
4. Calculate the Ratio: Out/In value of inpatient claims versus outpatient claims. In the example provided in Table 3, divide the number of outpatient claims (280,800) by the total number of all claims (352,262) to compute the outpatient portion of the Out/In ratio (280,800 ÷ 352,262 = .797). Do the same calculation for outpatient payments ($272,331,208 ÷ $1,013,091,523 = .268); then, add the two percentages together, and divide by two to determine the ratio (.797 + .268 = 1.065; 1.065 ÷ 2 = .532). Then subtract the outpatient ratio (.532) from 1.00 to determine the inpatient portion of the ratio (.468).
5. Calculate the outpatient side of the Net Cost by multiplying the average outpatient payment ($969.84) by its corresponding Out/In ratio (.532), resulting in a net cost of $515.95; then repeat the same procedure on the inpatient side ($10,365.79 x .468 = $4,851.19).
6. Calculate the Composite Cost by adding each of the net costs ($515.95 + $4,851.19 = $5,367.14) and dividing by two ($5,367.14 ÷ 2 = $2,683). The composite cost represents the adjusted cost of all inpatient and outpatient claims based on the fact that outpatient claims greatly outnumber inpatient claims, whereas the average cost of an inpatient claim greatly exceeds that of an outpatient claim.
7. Prepare the bottom part of the PRFCA framework by:
   - Listing the composite cost [column A].
   - Listing each risk factor[3] by name [column B].
   - Listing the risk factor weight[4] for each risk factor in decimal form [column C]; 18% is listed as 0.18.
   - Listing the percentage of subjects with the risk factor in decimal form [column D].
   - Listing the number of claims for the selected ICD [column E].
8. Compute the Risk Factor Cost by multiplying column A by column C by column D by column E, resulting in the total cost per risk factor in column F.

Table 3: A Sample PRFCA™ Framework

A	B	C	D	E	F	G
Site	**# Claims**	**Total Payments**	**Avg. Payment**	**Ratio: Out/In**	**Net Cost**	**Composite**
OUTPATIENT	280,800	$272,331,208	$969.84	0.532	$515.95	$2,683.00
INPATIENT	71,462	$740,760,315	$10,365.79	0.468	$4,851.19	
Total	**352,262**	**$1,013,091,523**				
Composite	**Risk Factor**	**Risk Factor Weight**	**% with Risk Factor**	**Total # of Claims**	**Risk Factor Cost**	
$2,683	Diabetes	0.18	0.064	352,262	$10,887,770	
$2,683	Smoking	0.14	0.3496	352,262	$46,257,901	
$2,683	Hypertension	0.12	0.24	352,262	$27,219,425	
$2,683	Physical Inactivity	0.12	0.596	352,262	$67,594,907	
$2,683	High Cholesterol	0.11	0.1245	352,262	$12,943,403	
$2,683	Obesity	0.17	0.592	352,262	$95,116,770	
$2,683	Family History	0.04	0.167	352,262	$6,313,394	
$2,683	Alcohol Abuse	0.05	0.0715	352,262	$3,378,800	
$2,683	Age>40	0.03	0.5	352,262	$14,176,784	
$2,683	Depression	0.04	0.2	352,262	$7,560,951	
		1.00		**Total:**	**$291,450,104**	

[1] Note that the top 5 most common claims in an organization are usually different from the top 5 most expensive claims.

[2] The PRFCA™ can be performed on a specific MDC or DRG, if ICDs are not available.

[3] Risk factors are obtained from various resources (e.g., journals, proceedings, professional associations, databases).

[4] Each risk factor weight reflects the approximate influence that each risk factor has on the ICD. The maximum weight is 1.0 (100 percent). A risk factor weight of .15 signifies that 15 percent of the total risk is due to that particular risk factor, and so on.

Note: Risk Factor Weights (column C) can vary from analyst to analyst, based on his or her subjective interpretation of the published research.

You can subject any MDC- or ICD-specific claim to the PRFCA methodology as long as:

- Claims and cost data are known.
- Tangible risk factors can be identified.
- Risk factor weights are known or can be generated.

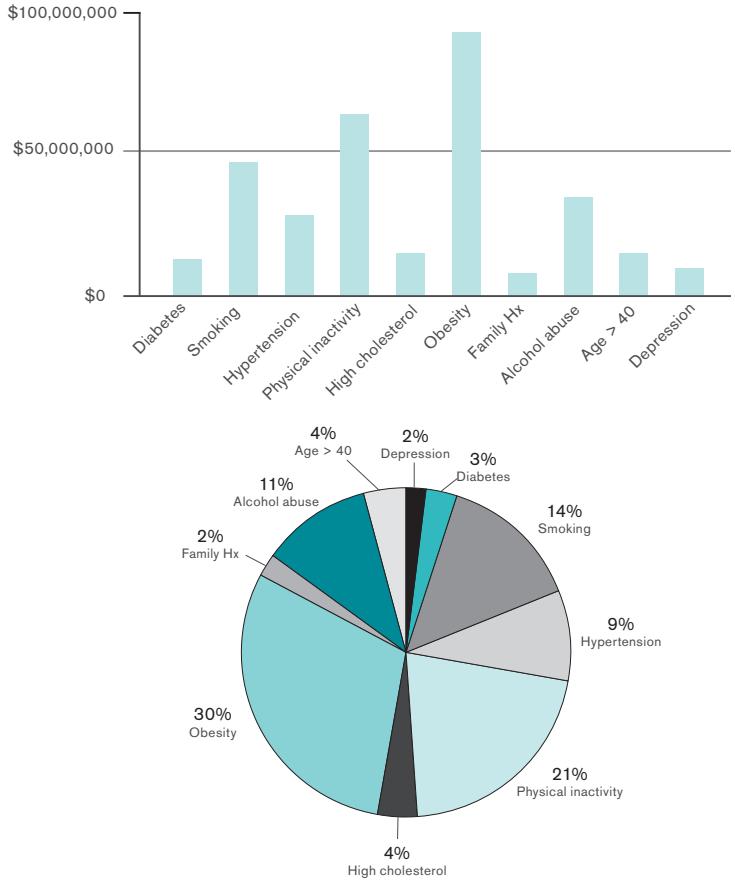
After you have conducted a PRFCA, the results should be portrayed in a clear format for easy and accurate interpretation. Two common options for presenting risk factor costs are a horizontal scale and a pie chart, as illustrated in Figure 7.

Tying strategies to highly ranked risk factors

As you complete the analysis phase, you should be able to identify specific risk factors that significantly influence your employees' overall health status. For example, after identifying the three to five most costly risk factors for each ICD, you can calculate the total costs across all ICD listings to determine the five most expensive risk factors overall. A sample listing of ICD-specific risk factor costs and the composite costs for the top five risk factors is presented in Table 4.

Creating a composite of risk factor costs provides an excellent opportunity to develop specific risk reduction strategies that can be customized to address your organization's risk profile.

Figure 7: Two Examples of Illustrating Risk-Factor-Specific Costs



Calculating risk factor costs without claims data

Many employers—especially small worksites—do not have medical claims data readily available to use in their forecasting plans. Without such data, can you still calculate the relative cost of major risk factors? Probably. Many risk factor cost studies have been published to guide researchers. For example, a cross-section of published studies shows that direct medical care costs vary significantly by risk factor (see Figure 8).[10]

In addition to the expenses associated with medical care, many risk factor conditions can be costly in terms of absenteeism and presenteeism, as reflected in Table 5.[11]

> **Presenteeism:** when an employee is at work but not performing at full capacity due to an illness or other health condition.

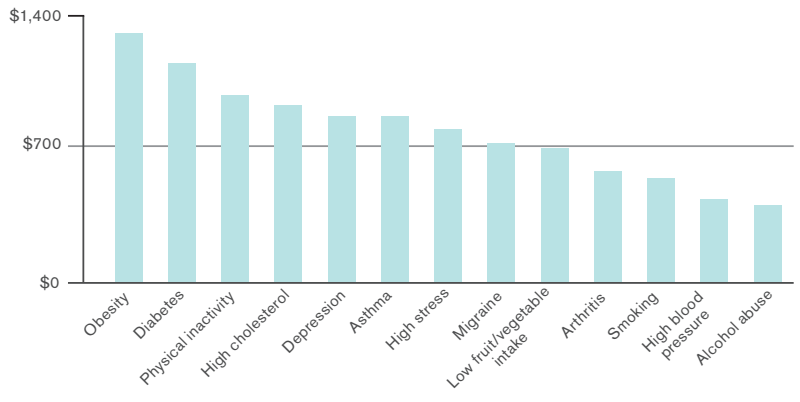
Many risk factors result in medical care and lost productivity costs. You should include both types of costs in any equation. Use the framework in Table 6 to calculate risk factor-specific costs for medical care, lost productivity, and combined medical care and lost productivity. For example, if an organization of 500 employees had a diabetes prevalence rate of 8.3 percent and a median per-employee compensation rate of $50,000, the total medical care and lost productivity cost of this particular risk factor would be about $536,592 per year, as shown in Table 6.

To create a customized risk factor calculation tailored to your setting, follow these steps when using Table 7:

Table 4: Risk-Factor-Specific Costs for the Most Costly ICDs

MDC: Genito-Urinary	
ICD: Urinary tract infection	
▪ Gender: female	$42,500
▪ Low water intake	$38,000
▪ Using a diaphragm or spermicide	$10,000
MDC: Musculoskeletal	
ICD: Low back strain	
▪ Poor ergonomics	$37,000
▪ Obesity	$22,500
▪ Physical inactivity	$17,000
MDC: Pregnancy	
ICD: Delivery without complications	
▪ Physical inactivity	$43,000
▪ Smoking	$15,000
▪ No prenatal monitoring	$5,540
MDC: Circulatory	
ICD: Hypertension	
▪ Obesity	$45,000
▪ Physical inactivity	$43,000
▪ Smoking	$31,500
Composite Risk Factor Costs	
1. Physical inactivity	$104,000
2. Obesity	$67,500
3. Smoking	$46,500
4. Gender: female	$42,500
5. Low water intake	$38,000

Figure 8: Approximate Annual Medical Costs for Specific Risk Factors



1. List the number of employees in column B.
2. List the prevalence rate of the targeted risk factors in column C.
3. Multiply column B by column C, and place the sum in column D.
4. List the median annual compensation per employee in column E.
5. Multiply column A by column D by column E, and insert the sum in column F. This sum is the total lost productivity cost.
6. Multiply column D by column G, and insert the sum into column H. This sum is the total medical care cost.
7. Add columns F and H, and insert the sum in column I. This is the combined medical care and lost productivity cost.

If you have reviewed the preceding section, you understand the value of claims data analysis and risk factor cost appraisal in driving your wellness program decisions. When you feel comfortable with these techniques, move on to consider how another econometric technique—break-even analysis—can be used prior to, or early in, the implementation of your wellness program.

Table 5: Estimated Percentage of Lost Productivity Related to Risk Factor Conditions

Risk Factor	Absenteeism (%)	Presenteeism (%)	Total (%)
High glucose	4.94	18.26	23.20
Depression	2.61	14.51	17.12
Alcohol abuse	5.00	4.78	9.78
Obesity	1.40	8.30	9.70
High cholesterol	3.14	4.91	8.05
Smoking	2.84	4.78	7.62
High stress	3.08	4.45	7.53
Arthritis	2.36	4.90	7.26
Hypertension	0.37	5.70	6.07
Asthma	4.80	1.20	6.00
Migraine headache	3.96	1.99	5.95
Physical inactivity	.28	4.59	4.87

Table 6: Risk Factor Cost Calculation Framework

	A	B	C	D	E	F	G	H	I
Risk Factor	% Workload Lost	# Employees	Prevalence	# At-risk Employees	Median Annual Compensation	Employer Lost Productivity Cost	Per Employee Medical Cost	Employer Medical Care Cost	Employer Total Cost
Alcohol abuse	0.0978						$386		
Arthritis	0.0726						$617		
Asthma	0.06						$803		
Depression	0.1712						$804		
Diabetes	0.232	500	0.083	42	$50,000	$487,200	$1,176	$49,392	$536,592
Hypertension	0.0607						$447		
High cholesterol	0.0805						$892		
Migraine	0.0595						$723		
Obesity	0.097						$1,351		
Physical inactivity	0.0487						$982		
Stress (high)	0.0753						$764		

"At Hamilton Medical Center we use break-even analysis as a tool for making strategic decisions before investing capital dollars. It's important that we gain as much knowledge as possible about the potential market, expected volumes, equipment cost, FTE requirements, construction cost, and other financial indicators—all of which are factored into the break-even analysis. In addition to being a decision-making tool, the break-even analysis helps us compare expected and actual results once a new service is operational.

We recently made the decision to initiate a $5 million expansion and renovation of our Bradley Wellness Center. Because the project involved new, cutting-edge services, the research that went into the analysis and the results were paramount in our decision to invest in this initiative."

Danny Wright
Vice President
Hamilton Medical Center
Dalton, Georgia

III. USING BREAK-EVEN ANALYSIS TO DETERMINE A PAYOFF

Will your wellness program generate sufficient value before your operating budget is exhausted? How long will it take for cost savings to offset all of your programming costs? *Break-even analysis* (BEA) offers a way to measure whether a specific intervention is on the right track to achieve its goal.

As budgets tighten and accountability becomes more important, wellness program managers must monitor the financial side of their programs more closely than ever. Thus, it is not surprising that BEA remains a principal tool in strategic planning.[12]

Many tools are available for determining the financial impact of a specific program, but none is more powerful than BEA. Sometimes referred to as "cost-volume-profit analysis" or "contribution analysis," BEA can help decision-makers answer questions, including:

- Is my wellness program positioned to pay for itself in a timely manner?
- When should I intensify my programming efforts to achieve break-even status?
- What is a reasonable time frame within which a wellness program should break even?
- How many at-risk individuals should my program affect to achieve break-even status?

Break-even point: the point when the financial value of the positive outcome (benefit) is equal to the financial cost of the intervention.

The Concept of Break-Even

A break-even point is achieved when program-generated benefits equal the total costs required to operate a program, as demonstrated in Figure 9.

Because expenses are incurred immediately when operating a wellness program, you should consider costs—both fixed and variable—first.

Performing a BEA

If you follow a logical plan, performing a BEA need not be an overwhelming task.

Step 1: Identify and calculate the monetary value of all cost items (use a simple expense record like the one in Table 7)

Approach each BEA with a realistic idea of when a wellness program will

Fixed costs: items such as salaried staff, rent and insurance that remain constant over a specified period of time and are not affected by the quantity of products or services purchased.

Variable costs: costs that fluctuate with the quantity of products or services purchased to implement an intervention; variable costs reflect expenses that are likely to vary month-to-month or seasonally and are calculated on a per-unit basis, such as hourly wages, supplies, utilities and equipment replacements.

Figure 9: The Concept of Break-Even

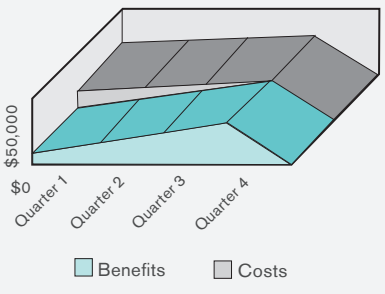


Table 7: A Sample Expense Record

	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
FIXED													
Staff Salaries													
Rent													
Insurance													
Property Tax													
Depreciation													
Data Processing													
Annual Screening													
Staff Certification & Licensing													
Other													
VARIABLE													
Staff [hourly] Wages													
Utilities													
Office Supplies													
Equipment													
Travel													
Other													

break even. The accuracy of any BEA depends on recognizing and measuring as many direct costs as possible, so be sure to identify and track all fixed and variable costs associated with your wellness intervention.

If you cannot identify all the fixed and variable costs, factor in an additional 10 to 15 percent to capture some portion of your unknown costs.[13] It is better to approach the cost side of the BEA calculation with a liberal mindset to ensure that you account for as much of your actual wellness program costs as possible. And approach the benefits side of a BEA with a more conservative mindset.

Some research suggests that a high-quality, well-attended low back health program may achieve break-even status in about one year, if not sooner.[14] However, because there are many variables—both controllable and uncontrollable—that influence if and when a program will achieve break-even status, it is always best to anticipate that this type of program will take longer than a year to break even. Always try to deliver more than you promise, not promise more than you can deliver.

Break-even points vary considerably based on different impact variables, as seen in Table 8. High-quality biometric screenings supported by personalized health coaching can favorably influence an employee's health status within 12 to 18 months, possibly sooner.[15] But it is difficult to credit biometric screenings with productivity or cost-control benefits because any potential link between these variables has not been well established.

After all costs are valued and recorded, illustrate each set of fixed and variable costs on a BEA grid at designated intervals, as illustrated in Figure 10. For example, if a worksite wellness program's fixed costs are budgeted for $50,000 for the fiscal year, then divide the annual costs by four, and list 25 percent of these annual costs for the first quarter interval, 50 percent of the annual costs for the second quarter interval, 75 percent of the annual costs for the third quarter interval and the full annual costs at the fourth quarter interval. Any unaccounted variable

Table 8: Potential Break-Even Thresholds for Specific Wellness Interventions[16]

Wellness Intervention	Impact on Employee Health Status	Impact on Employee Productivity	Impact on Company's Health Care Costs
Biometric Screening	12-18 months	NWE*	NWE
Condition Mgmt. (asthma, arthritis, diabetes, etc.)	6-12 months	6-12 months	12-18 months
Drug-Testing	3-6 months	3-6 months	NWE
Employee Assistance Program (EAP)	12-18 months	12-18 months	> 24 months
Ergonomics	3-6 months	3-6 months	NWE
Financial Incentives	6-12 months	NWE	NWE
Flex-Time Work Schedule	3-6 months	3-6 months	NWE
Low Back Health	6-12 months	6-12 months	12-18 months
Medical Self-Care	3-6 months	6-12 months	12-18 months
Mental Health/Depression Management	3-6 months	3-6 months	12-18 months
Nutrition	3-6 months	6-12 months	NWE
Physical Activity	3-6 months	6-12 months	12-18 months
Smoking Cessation	3-6 months	6-12 months	36-48 months
Stress Management	3-6 months	3-6 months	NWE
Tobacco-Free (Clean Air) Worksite	3-6 months	3-6 months	6-12 months
Weight Management	6-12 months	12-18 months	NWE

*NWE = not well established

costs should be recorded for each quarter as they are incurred.

Step 2: Add fixed and variable costs to calculate total cumulative costs, as shown in Figure 11

When you proceed from Step 1 to Step 2, assess how your quarterly expenses compare to your budgeted allowance. For those programs and activities that are offered over short time frames, such as offering daily or weekly lunchtime yoga sessions for one month, it is appropriate to monitor actual versus budgeted costs on a monthly basis.

By monitoring your wellness program costs at designated intervals, you can

Figure 10: Variable and Fixed Costs at Quarterly Intervals

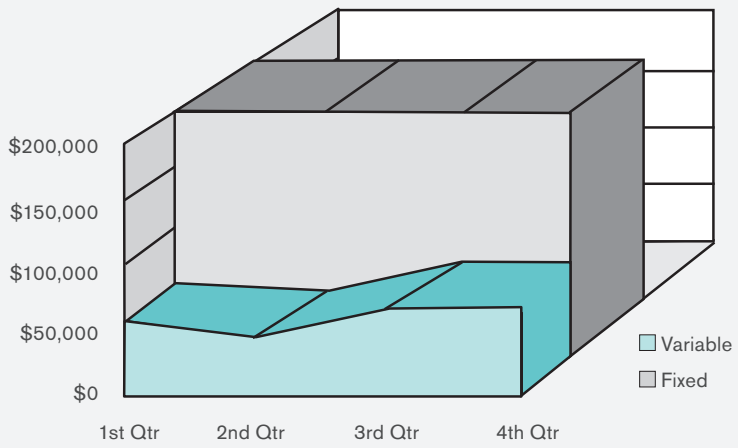
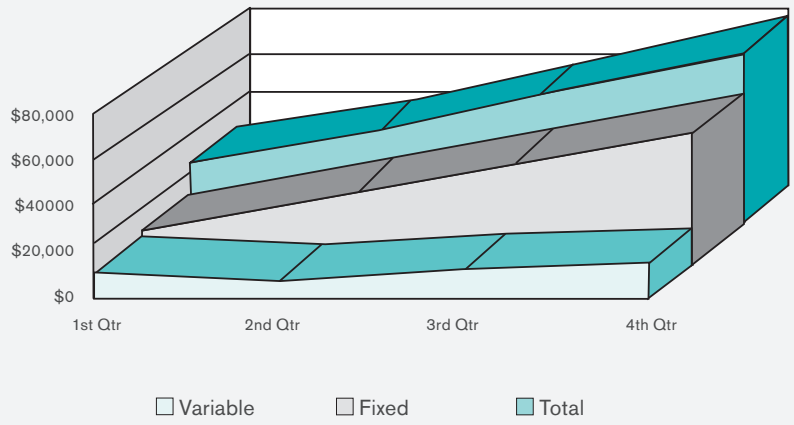


Figure 11: Cumulative Fixed, Variable and Total Costs at Quarterly Intervals



readily identify an expense item that exceeds its budgetary allowance and take prompt action by adjusting benefit and cost projections accordingly.

Step 3: Establish a baseline to determine when to begin projecting future costs and benefits, and determine a benefit variable to compare against fixed and variable costs

Establishing a baseline. The benefit ("impact") variable should reflect one or more of the primary goals of your wellness program. For example, the major goals of your healthy back program might be to:

- Reduce the number of low back injuries.
- Reduce the average cost of low back injuries.

The BEA involves some degree of forecasting, so it is important to establish a valid baseline or reference point on which to base your projections. First, review low back injury prevalence and cost data over the past several years. At a minimum, back-related medical care and workers' compensation costs should be tracked and used in the baseline. If other outcome metrics, such as absenteeism or short-term disability are tracked in your organization, they could also shed light on the real cost of low back injury and, therefore, should be included into the baseline index. Reviewing several years of past data may reveal a trend while providing consecutive intervals of data that you can use to establish an appropriate baseline. Some worksite situations may allow data acquisition and analysis to occur at shorter time intervals (monthly, quarterly or semiannually). Select a time frame in which you can readily acquire and analyze appropriate data for your own organization.

Generally, when you have several years of past data that show a) a consistent year-to-year downward trend, b) no year-to-year change or c) a consistent year-to-year upward trend, it is acceptable to use the last interval's performance as the baseline. For example:

Time Interval Before Program	Upward Trend	No Change Trend	Downward Trend
4th quarter	17	17	17
3rd quarter	19	18	15
2nd quarter	23	17	13
1st tquarter	28*	18*	11*

**Can be used as the baseline index.*

Benefit variable: the desired outcome or goal of a wellness program, such as improved health status, less health care use, fewer sick leave absences and medical cost containment.

Although it is common to see data trends, some of your wellness program performance indicators may actually display a "roller coaster" pattern, increasing early on, dropping in the next period, rising in the next period and so on. If this is the case, consider several options in selecting a baseline:

- Add all the periodic data, and divide the sum total by the number of months or years in which data were tabulated to calculate a yearly average.
- Exclude the highest and lowest values, and average the remaining values.
- List all the data values from lowest to highest or highest to lowest, and then choose the value in the middle, the median.

- Add only the highest and lowest values; then divide the sum total by two to calculate an average, or mean.

If you have difficulty deciding which approach to take, consider one or more of the following strategies:

- Look at the slope (angle) of a specific trend or data set, and consider the pros and cons of using a specific baseline approach.
- Review the professional literature to see how other human resource and wellness personnel have approached this issue.

Although you may wish to consider using various types of benefits in your BEA, cost savings is commonly targeted.

Calculating cost savings. Once you have established a baseline, decide how to calculate the tangible cost savings. Let us assume that your healthy back program has been underway for six months and that back injury-related medical care costs are noticeably lower than during this same time frame last year. In this case, *reduced back injury costs* is the cost savings benefit and can be calculated by subtracting quarterly costs for the baseline (last) year from quarterly costs for the impact (current) year, as shown in Figure 12.

These short-term comparisons can be extended over a long period of time (Year 1 versus Year 2, Year 2 versus Year 3 and so on). This information can provide you with strategic implications for future programming.

Step 4: Calculate current and projected benefits based on any cost reduction

Assume that your baseline versus impact back-injury costs were as illustrated in this table:

Quarter	Quarterly Cost Difference	Cumulative Cost Savings
1st	Decrease of $25,000	$25,000
2nd	Decrease of $15,000	$40,000
3rd	Decrease of $20,000	$60,000
4th	Decrease of $17,500	$77,500

Based on the first quarter impact that yielded a $25,000 savings, you need to determine how long it would take for the savings to equal or exceed total program costs ($80,000). You may assume that the first quarter cost savings ($25,000) will be repeated in subsequent quarters, but that may not be an accurate gauge of what will happen. It is a good idea to supplement the first quarter cost savings with another quarterly measurement to determine if your initial assumption is legitimate. If back-injury cost savings were $15,000

Figure 12: Baseline Year vs. Impact Year Back Injury Cost and Cost Savings

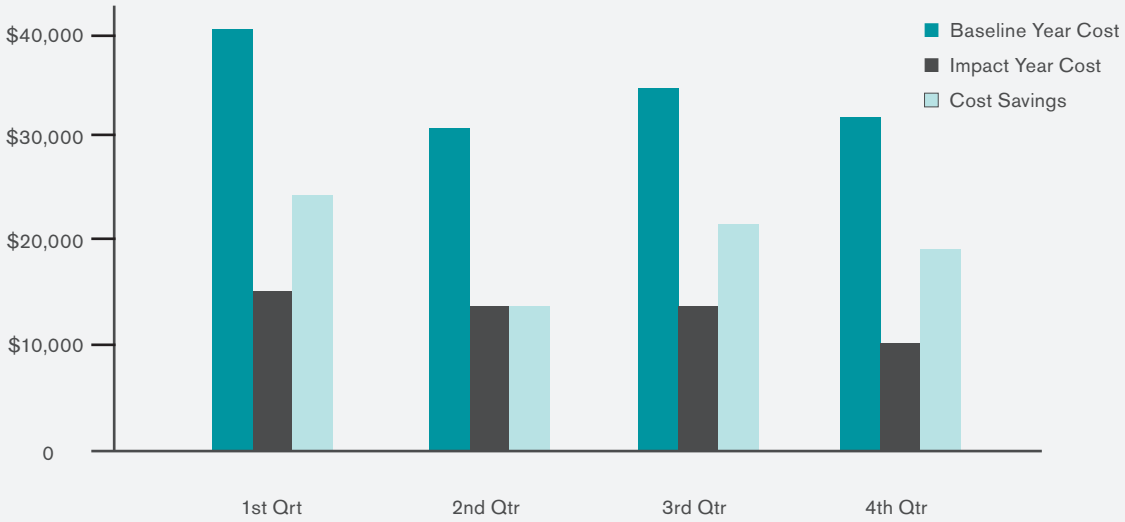
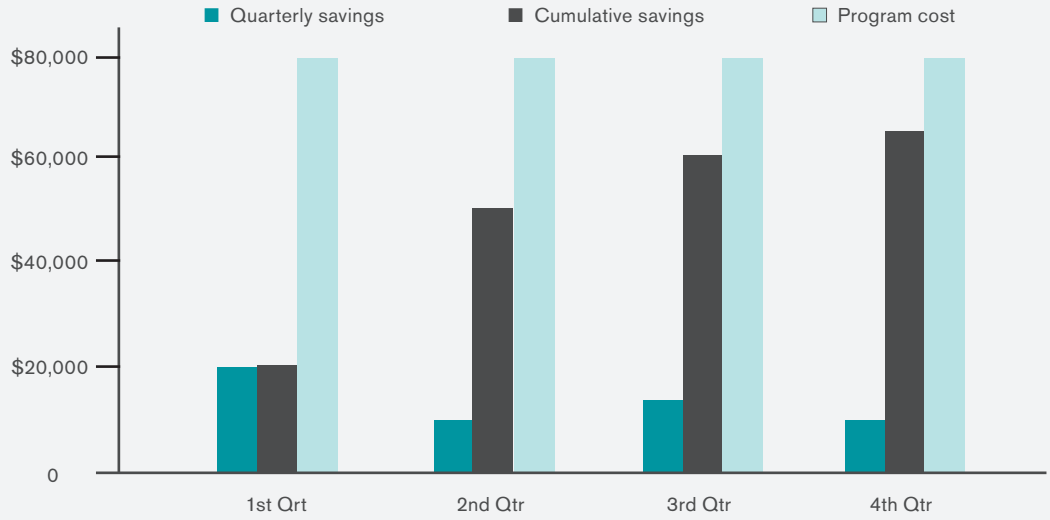


Figure 13: Quarterly vs. Cumulative Cost Savings Compared to Program Costs



in the second quarter of the intervention, then realization of two consecutive quarters of cost savings a) strengthens the basis of your assumption and b) demonstrates that, if this trend continues, break-even status may be achieved around the one-year mark.

As you conduct a break-even analysis, note that cost-saving values can differ significantly depending on whether you calculate these values on an annualized or a cumulative basis. (Refer to the listing in Step 4.) Decide how to best illustrate these cost differences in your BEA framework. You can treat cost differences on a time interval basis, such as quarterly, or on a cumulative basis, by adding the first quarter value to the second quarter value, and so forth. Figure 13 illustrates that each approach can generate different values. For example, cumulative cost savings provide an accurate profile of total costs throughout the time frame of a program and often provide a more objective index of a program's performance than using only individual quarterly savings.

The projected cost difference at the end of the fourth quarter of $77,500 is slightly below the annual program cost of $80,000. What amount of additional cost savings will you need to reach the break-even point of $80,000? By using a cumulative, time-series approach, you can see that you will need an additional $2,500 in cost savings to achieve break-even status.

Break-even	$80,000
Year 1 program difference	-$77,500
Cost difference	$2,500

Step 5: Calculate and illustrate all cost-saving benefits to determine if and when a break-even point will be achieved, based on the initial impact (use Figure 14 as a guide)

We know that the cost of the back health program is $80,000 per year, or $20,000 per quarter. The cumulative cost savings at the end of the fourth quarter is $77,500, meaning it will take a fifth quarter of cost savings at or above $22,500 to break even.

Cumulative (4th quarter) cost savings	$77,500
Cost savings needed to break even	$80,000
Difference (deficit)	$2,500
Difference (deficit)	$2,500
Quarterly program cost	+20,000
Deficit + quarterly program cost	$22,500*

*Cost savings required in 5th quarter to achieve break-even status.

By extending the back health program from four to five quarters, the overall cost of the program increased to $100,000 ($20,000 x 5). Because the program was offered in quarterly modules to facilitate data tracking, it was necessary to offer the program another full quarter to maintain designated intervention and measurement time frames.

You can use the preceding steps in preparing and calculating a BEA of your wellness program, but what options do you have when you have limited data or inadequate time to perform a full-blown BEA?

For example, suppose you just conducted a risk factor cost appraisal and found hypertension to be your organization's most expensive risk factor. Your appraisal showed that the annual direct medical care cost for hypertension is $200 for each employee with this risk factor. (To determine the total cost of a risk factor, supplement the medical care cost with a lost productivity cost appraisal depicted in Table 6.) You want to know how many individuals with hypertension your intervention must affect to achieve a break-even point. This is where an impact threshold analysis can be of great value.

Impact threshold analysis

An *impact threshold analysis* (ITA) is designed to determine the number of at-risk employees an intervention must affect to pay for itself or break even. The ITA equation factors in:

- The cost of an intervention.
- The individual (unit) cost of the targeted risk factor.
- The number of participants who successfully achieve the program goal.

Let's assume you plan to spend $5,000 of your wellness budget on an intervention to reduce the number of employees with a specific risk factor. Suppose your risk factor cost calculation indicated the annual cost for the targeted risk factor (hypertension) averages $200 per at-risk employee. Based on this scenario, an ITA can be used to show that the intervention would need to affect at least 25 at-risk individuals for the cost savings to offset the intervention cost, as displayed in Figure 15.

The ITA framework can be applied to virtually any situation, as long as both

Figure 14: Quarterly and Cumulative Savings Compared to Program Cost

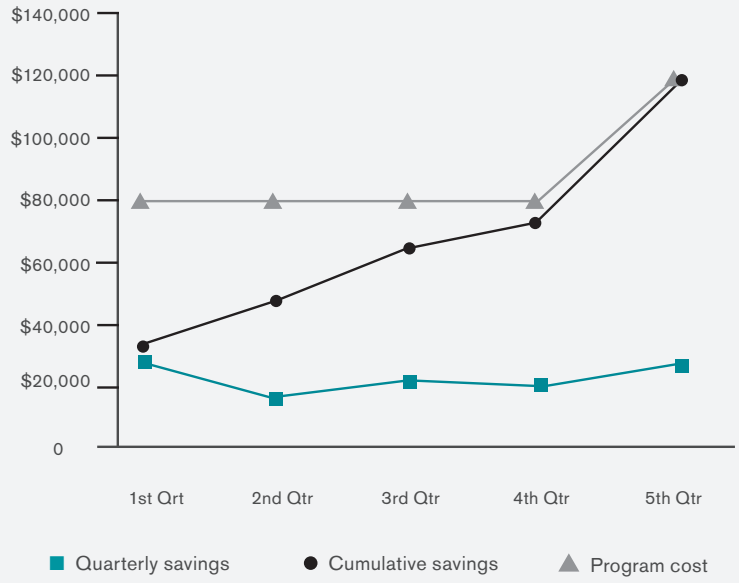
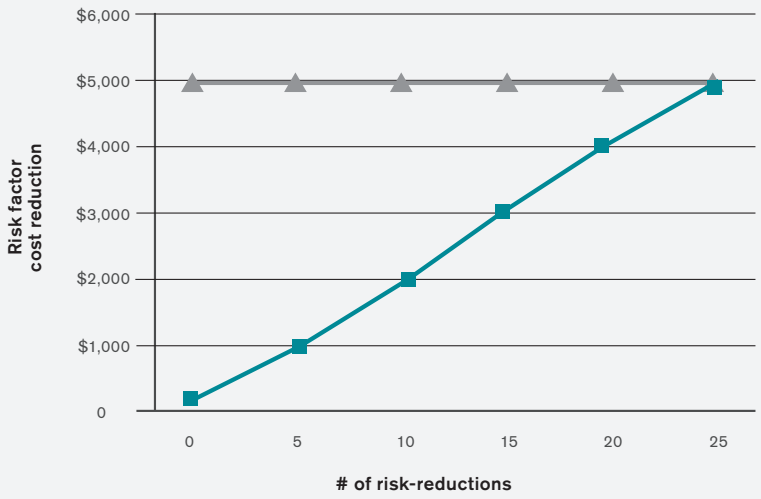


Figure 15: A Sample Impact Threshold Analysis



Intervention Cost	divided by	RF Cost	equals	Break-Even Point
$ 5,000	÷	$200	=	25

the intervention cost and risk factor cost are known. The next time you contemplate a "what if" scenario and have limited data, such as only the risk factor cost and intervention cost, consider an ITA.

Summary

A break-even analysis can be a powerful tool in determining the potential value of a new, existing or expanding program, service or facility. However, it should not be the only gauge for assessing potential or real value of a wellness intervention, nor should it be used in place of other market analyses that incorporate key demographic, cultural, social, political, economic, financial and other factors. When a BEA is used correctly and in conjunction with other analytical and forecasting techniques, it will yield valuable information for decision-makers to use in making sound financial decisions.

There are other econometric tools, in addition to risk factor cost appraisals, BEAs and ITAs, that you may use in your wellness program. Chapter IV provides an overview of cost-effectiveness analysis, an excellent tool for human resource and wellness practitioners to consider when they want to compare different strategies with a similar goal.

IV. USING COST-EFFECTIVENESS ANALYSIS TO COMPARE PROGRAMMING OPTIONS

What if you want to compare one type of wellness program or activity with another program to determine which produces the greatest benefit for the least expense? When properly designed and implemented, *cost-effectiveness analysis* (CEA) can answer that question. Rather than assigning monetary values to a single intervention outcome (as is done in benefit-cost analysis), CEA compares only the costs of alternate interventions for achieving a specific outcome.[17] In particular, CEA compares the costs of different approaches to achieve a specific goal, or compares the physical outputs of a given dollar spent on different strategies aimed at the same goal. For example, when you have a single goal in mind, CEA provides a framework to compare marginal and average costs of given physical outcomes. In fact, in some cases, a CEA may point to the lowest cost alternative for a particular intervention that may actually have little or no benefit within a standard benefit-cost calculation.

> **Cost-effectiveness:** a measure of the cost of an intervention relative to its impact, usually expressed in dollars per unit of effect.

In simple terms, a cost-effective intervention is one that achieves a desired outcome at a lower cost than alternative interventions. For example, if you wanted to gauge which smoking-cessation and health-coaching approaches are the most cost-effective, you could integrate your own data into the framework illustrated in Table 9.

Based on the sample results listed in Table 9:

- The "cold turkey" approach achieved the desired outcome at only one-third the cost of the gradual withdrawal with onsite counseling approach ($40 ÷ $120 = .33).
- The online health coaching modules achieved the desired outcome for about 13 percent less cost than the one-on-one coaching sessions (e.g., $50 ÷ $57 = .87).

Conducting a CEA

The following example illustrates a step-by-step approach for designing and implementing a CEA:

- Determine your program goal and objectives. What is the wellness intervention supposed to achieve? For example, a healthy back program is designed to reduce the number of back injuries (goal) by increasing each participant's low back flexibility (objective #1) and by motivating proper lifting techniques (objective #2).
- Calculate total intervention costs. Identify and tabulate real cost items, including personnel, facilities, equipment, utilities and incentives.
- Determine the outcome of each program intervention. Compare the outcomes of all interventions. For example, Table 10 lists two approaches implemented to reduce the prevalence and cost of low back injuries, and Table 11 lists three different interventions designed to reduce the prevalence and cost of migraine headaches.
- Compare intervention outcomes and determine which is most cost-effective. For example, the weekly back seminar initially cost more than the daily prework stretching intervention, and the latter approach was far more cost-effective ($60 versus $135 per positive impact), as shown in Table 10. The two-tiered approach ($8.00 per positive impact) was slightly more cost-effective in reducing migraine headaches than the single intervention ($8.04 per positive impact) and significantly more cost-effective than the three-tiered intervention ($11.62 per positive impact), as shown in Table 11.

"As a nurse, saving lives and improving health is always part of my mission. Working in the corporate world, that focus is still there, but managers at any corporation want to hear more than a testimonial from someone who had a life-changing experience as a result of services from the occupational health clinic or wellness program. The big questions today are: How does this affect our overall bottom line, and can you justify what you are doing with figures?

Our Health Services program must constantly collect data and review it to see if our efforts are cost-effective for the company. We started with our in-house health clinics, which provide physicals, primary care, vaccinations, and allergy shots to our employees. We compared the cost of the clinic to costs if those visits had been submitted under our health care plan. The cost savings were there and provided a means for us to expand our wellness program.

We continued to measure everything we were doing in our wellness program, from participation to biometric results, in addition to our annual review of health care claims. The data provided information to guide our direction and highlight needs in our wellness program. It also gave us a way to show the leadership positive progress toward maintaining and improving the health and health care costs for our employee and dependent population. Sometimes the figures indicated that we needed to change direction or focus, but overall the data kept our Health Services and our wellness program, Reaping Rewards, an integral part of the company. And this all happened at a time when many wellness programs and occupational clinics have fallen to the wayside because there is no data for management except the cost of operation."

Judy Garrett, RN, COHN/CM, B.A.
Health Services Manager
Syngenta Crop Protection
Greensboro, North Carolina

Table 9: A Sample CEA Framework Comparing Two Different Approaches Per Program Intervention

Smoking Cessation					
		Participants		Quitters	
Intervention	Cost of Program	# of	Cost per	# of	Cost per[1]
"Cold turkey" with self-help booklet	$2,000	100	$20	50	$40[2]
vs. Gradual withdrawal with onsite counseling	$3,000	100	$30	25	$120
Health Coaching					
		Participants		Achieving Health Goal	
Intervention	Cost of Program	# of	Cost per	# of	Cost per[1]
Online modules	$500	50	$10	10	$50[2]
vs. One-on-one sessions	$2,000	50	$40	35	$57

[1] *Cost of program divided by number of successful impacts.*

[2] *Most cost-effective.*

Table 10: A Sample CEA Comparing Two Healthy Back Program Options

Program Option	Cost	Impact Objective	Cost/Outcome*
Weekly Back Seminar and Healthy Plan Premium Incentive	$5,000	100 screenings conducted	$ 50.00 per screen
		50 individuals diagnosed as being high risk for low back injury	$100.00 per at-risk diagnosis
		40 individuals participating in the program	$125.00 per participant
		37 individuals reported no back injuries after one year of program	$135.00 per injury-free outcome
Daily Prework Stretch & Warmup	$3,000	100 individual screenings	$30.00 per screen
		80 individuals diagnosed as being high risk for low back injury	$37.50 per at-risk diagnosis
		75 individuals participating in program	$40.00 per participant
		50 individuals reported no low back injuries after one year of program	$60.00 per injury-free outcome

* Total cost of option divided by the level of impact objective

Table 11: A Sample CEA Comparing Three Migraine Intervention Options

	Option #1[1]		Option #2[2]		Option #3[3]	
	100 Participants		100 Participants		100 Participants	
Rx Drug Plan Cost	$500		$600		$700	
Objective	#	$/Participant	#	$/Participant	#	$/Participant
Participants reporting no migraine at end of first quarter	40	$12.50	40	$15.00	68	$10.29
Participants reporting no migraine at end of second quarter	41	$12.19	50	$12.00	75	$ 9.33
Participants reporting no migraine at end of third quarter	42	$11.90	60	$10.00	76	$ 9.21
Participants reporting no migraine at end of year	43	$11.62	75	$ 8.00	87	$ 8.04

[1] A common prescription drug such as Oral Ergotamine, Imetrix or Eltriptan.
[2] Option 1 plus stress management counseling.
[3] Options 1 and 2 plust a “quiet room.”

Which of the two back health programs listed in Table 10 was the most cost-effective? The daily prework stretch and warm-up option generated a positive impact for only $60, compared to $135 for the back seminar and health plan premium incentive; the former approach is about 56 percent more cost-effective than the latter approach ($60 ÷ $135 = .44; 1.00 - .44 = .56).

Although a CEA may indicate that one intervention is more cost-effective than another approach, the decision to keep or eliminate a particular lower-performing intervention should not be based on this comparison alone. An intervention with a marginal level of cost-effectiveness may actually produce certain benefits that may not be easily quantified, such as enhanced employee morale; may be experienced throughout an organization, such as fewer accidents, leading to greater productivity in a specific department or among a small number of individuals; or may take time to become apparent, such as an increasing level of employee loyalty or fostering a higher quality of work performance.

Sample CEA Planning Worksheet

If CEA is a new concept for you, and you are hesitant to plunge in, the worksheet in Table 12 can help. Use the worksheet for an initial trial run CEA. You will see that it is built on the skeleton framework of Table 10, so you should refer to the information in Table 10 to guide you in completing your own worksheet.

Follow these steps:

1. List your program options (#1a and #1b).
2. List the cost of each program option (#2).
3. Establish and list three to four measurable objectives (#3). You must use the same objectives for each option to ensure that both options are subjected to the same performance standards.
4. Divide the value listed in each of the impact objectives (#3) by the total cost of the specific option (#2) to calculate the cost per outcome (#4).
5. Compare the cost per outcome value at the end of each option (#5a versus #5b) to determine which has the lowest cost (e.g., most cost-effective).

Cost Items

Cost-effectiveness analysis is based in part on the cost of a specific intervention, so it is important to consider if and when specific cost items should be factored into the actual analysis. For example, if you work in an organization with an onsite fitness center, medical clinic, employee assistance counseling center or other health management facility, you should determine whether a facility's cost items are actually factored into the organization's wellness budget or into an independent budget line linked to another department or division. You should also distinguish how specific cost items are accounted for in a new or existing facility. Table 13 provides a guide. Of course, the final decision regarding which cost items are actually included in a CEA should align with your organization's and wellness program's accounting policies.

Using CEA as a Forecasting Tool

Most often, CEA is used to compare different intervention options after they have been implemented, but its versatility provides front-end and intermediate applications as well. In fact, CEA has three-dimensional applications. It can be used:

- **Prospectively before a program is offered,** by integrating projected impact and cost values into a BEA framework to explore sample "what if" scenarios.

Table 12: A Sample CEA Planning Worksheet for Comparing Two Intervention Options

Program Option	Cost	Impact Objective	Cost/Outcome
#1a _____	#2 _____	#3 _____	#4 _____
		#3 _____	#4 _____
		#3 _____	#4 _____ (#5a)
#1b _____	#2 _____	#3 _____	#4 _____
		#3 _____	#4 _____
		#3 _____	#4 _____ (#5b)

Table 13: Cost Item Considerations in a CEA

Usually Included	Cost Item	Probably Included
	PERSONNEL	
Yes	Full-time	
Yes	Part-time	
	FACILITIES	
No	Existing (already paid for)	If construction costs have not been paid for
No	Fitness center (already paid for)	If a substantial portion of the center is frequently used for nonfitness functions that cause normal fitness activities to be moved, scaled down or rescheduled
No	Clinical, such as medical clinic, EAP counseling center (already paid for)	If construction costs have not been paid for, or if provided offsite and contracted via rental or leasing arrangement
No	Meeting rooms (already paid for)	If rooms were built for or are designated primarily for wellness functions
	INCENTIVES/REWARDS	
Yes	Financial and/or nonfinancial (e.g., health plan discounts, clothing, gift cards)	
	EQUIPMENT/MATERIALS	
Yes, especially when new, replaced, leased or rented for a specified time	Fitness	
Yes	Health screenings, such as HRA advanced laboratory/biomarker testing	
No	Communications	If purchased or used exclusively for wellness
No	Technology	When new or replaced; if leased or rented for a specified time
Yes	Nurse or medical advisor hotlines	
	LOST WORK TIME/PRODUCTIVITY	
Yes	Wellness activity conducted on paid work time	
No	**MAINTENANCE**	If maintenance duties are performed by outside personnel
No, if conducted in-house	**EVALUATION**	If performed by outside consultants

- **Concurrently when a program is actually underway,** by integrating actual impact and cost values into a BEA framework to regularly monitor the progress of each intervention option.
- **Retrospectively, after two or more intervention options have been completed,** to determine which approach was the most cost-effective.

Let's take a closer look at how a CEA framework can be modified to serve as a forecasting tool. We will assume that you want to know if it is more cost-effective for employees with minor acute illnesses to be treated by the onsite occupational health nurse or in an offsite doctor's office. A list of common acute conditions that could be used in this comparison includes the following:

Condition Range	ICD Codes
Eye or ear	372.0-389.9
Respiratory	450.0-519
Musculoskeletal	710.0-739
Signs/symptoms/ ill-defined	780.0-799
Injury	800-999

The CEA framework highlighted in Table 14 could be used to conduct this onsite versus offsite comparison. The first step would be to construct a CEA framework that is customized around the scope of all tangible and readily accessible costs. For example, let's assume that the primary role of the occupational health nurse at the onsite health clinic is to identify and treat acute, on-the-job conditions, such as sore throats, sprained ankles, allergies, lacerations and contusions. In this scenario, the procedures listed in Table 14 could be used to conduct a CEA comparison between the onsite and offsite treatment options.

Based on the sample data listed in Table 14, it would be more cost-effective for the company to have acute ailments treated by an onsite occupational health nurse ($59.75 per treatment) than in an offsite doctor's office ($100 per treatment). Of course, onsite health care services may not be feasible in some worksites for various reasons.

Summary

Cost-effectiveness analysis is a good tool for comparing how much "bang for the buck" an organization receives from several intervention options. Budget allocations and risk-reduction targeting can be enhanced as you determine if a particular intervention should be continued, expanded, dropped or revised.

Although CEA is a popular econometric technique to compare two or more interventions targeted toward the same goal, some human resource and wellness professionals may want to evaluate a single program. When you only want to compare the costs and benefits of one program, you should consider a benefit-cost analysis, as described in the next section.

V. USING BENEFIT-COST ANALYSIS TO DETERMINE ROI

Are you expected to measure the financial value of your wellness program? If so, how do you measure your program's benefits and costs? And how does your program's return on investment (ROI) value compare against other worksite wellness programs in the area? In this chapter, we will take a close look at assigning values to benefits and costs, the ways benefit and cost values can be used to generate an ROI value, and tips on how to tailor a *benefit-cost analysis* (BCA) to fit your particular wellness program.

The primary purpose of a BCA is to determine whether a program is financially worthwhile. This is an econometric technique comparing the monetary value of the primary costs and benefits of a particular intervention.[18] The BCA compares these costs and outcomes within the context of a ratio, such as:

$$\text{B/C Ratio} = \frac{\text{Benefit}}{\text{Cost}}$$

A BCA is feasible when benefits and costs can be measured in monetary terms. But quantifying something by a monetary value should not be the sole basis for performing a BCA. Although most cost items can be identified and assessed a monetary value, this is not the case for all benefits. For instance, can you accurately gauge the real financial value of a person who experiences less stress, is less depressed or has a lower level of back pain after participating in your wellness program? What is diminishing stress worth in financial terms? What is the financial value of moving from depression to happiness? And can you attach a price tag to a pain-free life? Clearly, BCA cannot account for all the benefits—direct and indirect—that may result from a wellness program.

For costs and benefits that *can* be quantified, a BCA can be used to appraise the value of a wellness program or strategy. Let's assume that your blood pressure control program generated cost savings of $50,000 in reduced hypertension-related health care costs and lost-productivity costs, with an annual intervention cost of $20,000. If so, this particular benefit-to-cost comparison would yield a numerical ratio of 2.5 to 1, or a dollar

Table 14: Procedures for Conducting a CEA

Phase I: Determining Current Cost-Effectiveness	
Onsite Treatment	
List the annual salary ($65,000) and benefits ($13,000) of the occupational health nurse (OHN).	$78,000
List the annual workload for the OHN.	2,000 hours
Determine and list the average number of minutes needed to treat a typical minor (acute) ailment or condition.	15 minutes (.25 hour)[1]
Calculate the percentage of the OHN's annual workload devoted exclusively to treating a single minor ailment or condition.	.000125 (.25 ÷ 2,000)
Multiply the per-case workload by the OHN's annual compensation to determine the employer's labor cost per treatment.	.000125 x $78,000 = $9.75
Calculate the employer's equipment and supply cost per treatment.[2]	$100,000 ÷ 2,000 = $50
Calculate the employer's total medical care, equipment and supply cost per treatment.	$9.75 + $50 = $59.75
Offsite Treatment	
Determine and list the average outpatient claim cost incurred in an offsite physician's office.[3]	$100
Compare the employer's total onsite medical care cost per claim ($59.75) to the employer's offsite medical cost ($100) to determine the difference.	$100 - $59.75 = $40.25
Phase II: Projecting Future Cost Avoidance (Savings)	
List the onsite vs. offsite cost difference, and multiply it by the number of onsite treatments to compute the daily cost-avoidance value.	$40.25 x 8 = $322 (daily)
Multiply the daily cost-avoidance value by the daily, weekly and monthly multiples.	$322 x 5 = $1,610 (weekly) x 4 = $6,440 (monthly) x 12 = $77,280 (annually)

[1] One per hour (8 per day) based on the premise that approximately 45 minutes of every onsite hour are devoted to other nontreatment activities, including employee health screening, environment testing, administrative, data entry and meetings.

[2] A sample worksite clinic with annual operating, equipment and supplies costs of $100,000.

[3] Ideally, this cost value should reflect the average dollar cost paid by your organization for an outpatient acute care claim.

"Poudre School District is the public school system in Fort Collins, Colorado. We are self-insured, and we negotiate benefits and salary at the same time. Our goal was to create a health plan that had prevention at the forefront. We integrated all our benefits, including the employee clinic, the employee assistance program, disease management, wellness, and health data integration. The desired outcome was a healthier, more productive employee, which we hoped would lead to improvement in student achievement, fewer accidents and injuries, and less lost time.

We are a public system, so it is imperative that we make good use of tax dollars. After we developed our conceptual design, we arranged for a thorough benefit cost analysis and return on investment study. As a result, our school board had the confidence to approve funding for our venture.

Now that we are in full operation, we have a tool that evaluates the outcomes of our services—looking at the benefit cost analysis and ROI—in real time. We are accountable for responsibly using our tax-based funding and designing programs that are data-driven."

Cindy Guillaume, LCSW
Manager, Employee Assistance Services
Poudre School District
Fort Collins, Colorado

ratio of $2.50 to $1:

Metric		Total Cost		Numerical Ratio	Dollar Ratio
Benefit		$50,000		2.5*	$2.50
Cost	=	$20,000	=	1.0	$1.00

* $50,000 ÷ $20,000 = 2.5

The preceding ratio can be compared to that of another program if you want to determine which of the two programs is the most cost-effective. Suppose you compare the preceding program's benefit-cost ratio with that of a daily prework warm-up intervention that yields the following ratio:

Benefit		$20,000		20	$6.66*
Cost	=	$3,000	=	3	$1.00

* Benefit ÷ Cost = $20,000 ÷ $3,000 = $6.66

Although both programs are successful, the prework warm-up intervention produced a better benefit-to-cost ratio. From a financial perspective, it is more than twice as cost-effective as the more expensive blood pressure screening program ($6.66 ÷ $2.50 = 2.66).

Based on initial results, should you scrap or even downsize the blood pressure screening program? No. The blood pressure screening program is generating an excellent ROI value of 2.5 to 1. It is also an excellent long-term strategy to effectively detect borderline or full-blown high blood pressure before this "silent killer" can lead to more serious consequences, including renal disease, kidney dialysis, lower quality of life and higher health care costs.

By and large, the preceding comparison illustrates how individual BCAs conducted on each program can be used to determine cost-effectiveness and why it is essential to consider all the current and future implications before deciding on the fate of a particular program when it may not necessarily be as cost-effective as another program.

A BCA provides meaningful data to the extent that benefits can be accurately measured. But benefits such as saving human lives, preventing heart attacks or easing chronic back pain are not easily translated into real financial values.[19] Although it is possible to calculate the direct costs of treating a heart attack victim or to discount a person's future job earnings lost from a disability, using a BCA beyond its analytical capabilities can result in great technical challenges and significant ethical questions.

Conducting a Benefit-Cost Analysis

As you prepare to conduct a BCA on your wellness program, realize that the cost side of the analysis requires an accurate calculation of the resources used in planning and implementing an intervention. In contrast, the benefit side of the equation involves calculating the monetary value of any

positive outcomes from the program that can be quantified. Direct benefits are usually measurable using standard accounting reports and conventional financial analysis. Indirect benefits, such as saving a person's life or reducing lost wages can be substantial and they can be difficult to prove using conventional cost accounting.

Limiting a BCA to direct costs and direct benefits is preferable because it is less labor-intensive and more time-efficient, and it minimizes potential "second guessing" or "fudging the numbers" if senior managers question the validity of your measurements.

To conduct a sound BCA, first prepare an appropriate BCA framework. Take time to objectively identify the range of potential benefits and costs that apply to your particular setting. Here is a sample listing of typical benefits and costs:

Typical Benefit Items
Lower health risk level
Fewer injuries/accidents
Fewer health care expenses
Fewer sick leave absences
Lower Rx drug costs

Typical Cost Items
Personnel salary/wages
Facility operations
Health screenings
Equipment and maintenance
Incentives

In theory, calculating direct benefits resulting from a wellness intervention should be relatively simple. However, before any benefit can be calculated, you must select tangible benefits that can be measured and are strongly linked to your wellness intervention. After all costs and benefits have been identified and measured, they can be subjected to a financial comparison. In most cases, the goal of this comparison is to determine the net benefit of a particular intervention. If the value of the benefits minus the value of the costs is positive, then the analysis would indicate that the intervention is financially worth the effort.

Another way to determine the net benefit of a single intervention or multiple interventions is illustrated in Table 15, which compares three types of medication used to treat migraine headaches. Note that this example includes three different intervention options, rather than just a single intervention, which is usually the focus of a traditional BCA. By using several performance indicators to reflect possible cost savings, the sample equation generates a BCA ratio based on medication costs versus reduced disability costs. The steps required to conduct a BCA are listed below the table.

As seen in Table 15, "Brand A" medication generated the highest benefit-cost ratio ($3.46) and, thus, produced the higher impact per dollar among the various medications.

Calculating Net Benefit

The net benefit of any intervention can be calculated as follows:[18]

Net Benefit = [∑L$ + ∑GP + ∑PI] - C

∑L$ (sometimes called the *direct benefit*) might be, for example, a reduction in medical expenses due to lower health risk levels.

∑GP might be, for example, an increase in an employee's general productivity, leading to greater output. (Example: As the incidence of low back injury is reduced, on-the-job performance increases.)

∑PI might be, for example, a gain in the employee's working income due to reduced illness and injury and their effects on absenteeism.

Although *GP* and *PI* are often classified as indirect benefits, they are real benefits that should be integrated into the overall benefit equation, when possible.

C is the cost of the wellness intervention.

Table 15: A Sample BCA of Medication Costs vs. Disability Cost Savings*

	Medication		
	Brand A	Brand B	Brand C
A. Number of participants[1]	50	50	50
B. Annual meds cost per participant[2]	x $150	x $165	x $189
C. Total cost of medication[3]	$7,500	$8,250	$9,450
Performance Indicators			
D. Disability days			
1. 6 months before intervention[4]	325	325	325
▪ Before[5] (per participant)	6.5	6.5	6.5
2. 6 months during intervention[6]	195	205	250
▪ During[7] (per participant)	3.9	4.1	5.0
▪ Difference[8] (per participant)	(-2.6)	(-2.4)	(-1.5)
E. Disability costs			
▪ Average cost per disability[9]	$ 200	$ 200	$ 200
▪ Difference	x 2.6	x 2.4	x 1.5
▪ Cost difference per participant[10]	$ 520	$ 480	$ 300
▪ Number of participants	x 50	x 50	x 50
▪ Cost difference (savings)[11]	$26,000	$24,000	$15,000
Benefit-Cost Comparison			
F. Cost difference (benefit)	$26,000	$24,000	$15,000
divided by	÷	÷	÷
Cost of Rx medication[3]	$7,500	$8,250	$9,450
G. Benefit-cost ratio[12]	**$3.46:1**	**$2.90:1**	**$1.58:1**

* Some health economists consider the term "cost avoidance" to be a more accurate representation of these dollars, because monetary benefits actually represent the amount of future dollars not spent, rather than dollars that are actually deposited and incurring interest.[19]

[1] List the number of persons participating in each intervention. Each of the sample groups consists of 50 participants.

[2] List the individual prescription cost of each intervention.

[3] Multiply the number of participants by the annual medication cost per participant.

[4] List the total number of disability days per group over a designated time frame, such as six months before the intervention.

[5] Divide the total number of disability days per group by the number of participants before the intervention.

[6] List the total number of disability days per group during the six months of the intervention.

[7] Divide the total number of disability days per group by the number of participants during the intervention.

[8] Subtract the number of per-participant disability days during the intervention from the number of per-participant disability days prior to the intervention.

[9] List the average cost per disability based on the employer's costs associated with job replacements and any measurable loss in actual productivity.

[10] Multiply the average cost per disability by the difference in disability days to calculate the cost difference per participant.

[11] Multiply the cost difference per participant by the number of participants to calculate the net cost difference per participant.

[12] Divide the cost difference by the cost of Rx medication for the group to calculate the benefit-cost ratio.

Determining Present vs. Future Value

It is generally true that the dollar in your pocket will probably not buy as much in the future as it does today. The present value of future dollars needs to be calculated to make reasonable comparisons across time periods. This adjustment can be made in different ways, but one of the most common approaches involves choosing a *discount rate* that is used to translate today's cost and benefit dollars into future values.

Discount rate: a percentage value used to indicate what today's dollar is worth.

Considering the political, financial and labor uncertainties in today's global economy, organizations cannot predict future costs and inflation rates. There is always a chance that desired benefits will not materialize or will be different from what is expected. Economists use the term *risk* to indicate that the probability distribution is not known or that a situation of uncertainty exists. Businesses, particularly those in the financial and insurance sectors, handle this uncertainty by adding a *risk premium* to the discount rate commensurate with the degree of riskiness attached to the project or intervention. For example, an organization might use a discount rate equal to the interest rate it could get for its money if invested in risk-free government bonds, plus a risk premium.

Many economists prefer to tie discount rates to the inflation rates associated with major cost items in a particular setting. For example, if salaries and wages are rising annually at 3 percent, then a discount rate of 3 percent would be applied to personnel compensation costs. Because present value calculations, benefit-cost ratios and net gain or loss figures are sensitive to the discount rate, it is best to conduct several analyses using different discount rates to determine how a particular intervention would fare under each rate. A range of low-end to high-end discount rates could be used to represent potential best-case and worst-case scenarios.

Suppose your organization is in the midst of determining what it can purchase in the next three to five years, based on your current wellness budget. Let's assume a health care inflation rate of 9 percent to 12 percent per year during this time and that you decide to use various discount rates ranging from 9 percent to 15 percent on the presumption that actual health care inflation rates may exceed initial estimates. After the range of viable discount rates has been chosen, each rate can be integrated into the following present value adjustment (PVA) formula for calculating the present value of future costs:[20]

$$PV_C = \frac{C_y}{(1 + r)_y}$$

PV_c = the cost of the intervention in current dollar values
C_y = the intervention cost for each year
r = the discount rate
y = the year

Let's also assume that you want to invest $40,000 per year for the next three years in a wellness program and that you have decided that a 10 percent discount rate is appropriate, based on recent trends. At these values, the present value of the costs tied to this multiyear program would be expressed as:

$$PV_c = C_1 + C_2 + C_3$$

The three-year cost of the intervention of $120,000 (3 x $40,000) expressed in today's dollars is actually worth about $99,496 during this time frame. The budgeted amount of $40,000 each year actually purchases about $36,363 of wellness goods and services in the first year, about $33,057 of wellness goods and services in the second year, and only about $30,075 of wellness goods and services in the third year. The year-to-year value of your wellness budget buys fewer and fewer goods and services.

Another way to look at this PVA scenario is to imagine that the initial $40,000 worth of wellness goods and services would lose about $3,700 of its value at the end of the first year of the wellness program, another $3,300 at the end of the second year of the program, and an additional $3,000 at the end of the third year of the program. In other words, the 10 percent discount rate used in this situation would result in a drop of almost 25 percent in the purchasing value of the wellness program in just three years ($30,075 ÷ $40,000 = .75; 1.00 - .75 = 25). Of course, you could prevent this year-to-year drop in the purchasing value of your wellness program by increasing your annual wellness budget at or above the prevailing discount rate.

Now that you have seen how a discount rate affects the purchasing value of a wellness dollar, let's proceed with a strategy for selecting an appropriate discount rate that is tailored to a particular setting.

Calculating a Representative Discount Rate

The first step in selecting an appropriate discount rate is to realize that all cost items are not necessarily

The annual cost values would be calculated as follows:

$$C_1 = \frac{\$40{,}000}{(r+1)} = \frac{\$40{,}000}{(1+.10)} = \frac{\$40{,}000}{1.10} = \$36{,}363.64$$

$$C_2 = \frac{\$40{,}000}{(r+1)_2} = \frac{\$40{,}000}{(1+.10)_2} = \frac{\$40{,}000}{1.21} = \$33{,}057.85$$

$$C_3 = \frac{\$40{,}000}{(r+1)_3} = \frac{\$40{,}000}{(1+.10)_3} = \frac{\$40{,}000}{1.33} = \$30{,}075.18$$

After the cost values have been calculated for each of the selected years, you can add all the values to determine the total programming cost over the three-year period:

PV_c = \$36,363.64 + \$33,057.85 + \$30,075.18 = **\$99,496.67**

affected by the same rate of inflation in today's marketplace. Various benefits can be influenced at different rates of inflation.

If your organization establishes an onsite walking trail for employees to use before work, during breaks and after work, the major cost items for the trail included in the annual budget would be a) a part-time trail attendant, b) several pieces of stretching equipment at the trail entrance, c) trail maintenance and d) trail lighting. About 50 percent of the costs would be for the trail attendant, 25 percent for equipment, 20 percent for trail maintenance and the remaining 5 percent for lighting.

To determine a single overall discount rate for the combined cost items, first you must identify appropriate inflation rates for each of the cost items. For example, find out the average annual wage inflation for part-time employees in your organization, and assign that to the trail attendant costs. You can assume that equipment inflation is based on the expected life span of specific pieces of equipment, depreciation, the manufacturer's warranty and replacement guidelines. Maintenance inflation will be based on the average annual inflation tied to trail supplies and wages paid to your organization's maintenance personnel. Finally, contact the local utility provider to determine the amount of kilowatts needed to power a dusk-to-dawn light after installation and to calculate an annual inflation rate.

Now that you have established representative inflation rates for all the major cost items, it is time to determine the percentage of total costs for each of the four cost categories. Using the data for each cost item, use the framework in Table 16 to compute an aggregate inflation (discount) rate.

Based on the distribution of total costs and the inflation rate for each of the cost items, the aggregate adjusted inflation (discount) rate for all cost items is 4.7 percent.

Determining an aggregate discount rate for benefits is a bit more challenging because benefits are often more difficult to clearly define and definitively link to a wellness intervention. Thus, it is typical for analysts to assign equal credit to each of the benefits in a PVA.

Suppose that individuals using the walking trail improved their overall health status, resulting in fewer visits to the onsite health clinic, lower medical care costs for hypertension and lower workers' compensation costs for musculoskeletal strains. Specific inflation rates for each of these benefits could be obtained in several ways. The inflation rate for the onsite clinic could be accounted for by

Table 16: A Cost Inflation Calculation of Sample Cost Items

Cost Item	Total Costs (%)		Annual Inflation Rate (%)		Cost Item Inflation (%)
Attendant	50 (.50)	x	4	=	2.00
Equipment	25 (.25)	x	5	=	1.25
Maintenance	20 (.20)	x	6	=	1.20
Utilities	5 (.05)	x	5	=	0.25
Total	**100**				**4.70**

Table 17: Calculation of Sample Inflation Rates for Selected Benefit Items

Benefit	% of Total Benefits		Annual Inflation Rate		Benefit Inflation
Reduced Clinic Visits	.333 (1/3)	x	4%	=	1.33%
Reduced Medical Costs	.333 (1/3)	x	8%	=	2.66%
Reduced Workers' Comp Costs	.333 (1/3)	x	6%	=	1.99%
Total	**1.00**				**5.98%**

comparing the percentage of clinic visits incurred by participants before and after the walking trail became operational. The inflation rate for lower hypertension costs could be determined by assessing the rate of medical inflation over the past three to four years. And the inflation rate for workers' compensation costs could be determined by tracking the rate of the organization's total workers' compensation costs over the past three to four years. The same approach used previously to calculate costs (in Table 16) can be used to calculate benefits, as shown in Table 17.

Based on the distribution of total benefits and inflation rates assigned to each of the benefit variables, the aggregate adjusted inflation (discount) rate for all benefits is 5.98 percent. Simply put, the monetary value of any benefits can be expected to drop nearly 6 percent per year.

BCA and Present Value Adjustment

After the monetary value of costs and benefits has been established, a PVA can be used to determine the present and future values of both metrics (see Table 18). Let's assume your medical self-care program was evaluated and showed a benefit-cost ratio of $1,000 to $750, or a return of $1.33 for every $1 spent ($1,000 ÷ $750 = 1.33). You wonder if this 33 percent ROI will have any staying power in the future. Chances are, it will not.

The actual purchasing value of benefit dollars weakens at a greater rate than cost dollars.[20] It is important to discount each of these values according to how the economy affects them. To do so, these values are subjected to specific discount rates, which resemble interest rates but are used to depreciate benefits and costs over a designated period of time.

On the benefit side, a discount rate of 5 percent to 10 percent has historically been used to depreciate the future value of a company's health care cost savings because health care costs have risen annually in this range over the past decade or so. However, it is best to use your organization's actual health care inflation rate to boost the overall accuracy of the PVA calculation.

On the cost side, dollars spent to fund a wellness program are weighed less heavily than future benefits for at least two reasons:

- Due to inflation, a dollar will usually purchase more risk-reduction resources this year than it will next year.
- Economists depreciate the value of cost dollars at a lower discount rate than benefit dollars on the economic principle of how those dollars are generally treated over time.

Decision-makers could conceivably choose not to fund a wellness program and instead invest their dollars in a savings account that could begin to accrue interest immediately. In contrast, any benefit dollars, such as medical care cost savings, would not begin to accrue financial dividends until they are actually achieved and invested, which could take months or years.

Due to the factors mentioned above, it is common for executives to ask the question: "Could we have invested the cost dollars in another project and earned a higher ROI?" Notice that

Table 18: Present Value Adjustment

Benefit Side:

	Year 1	Year 2	Year 3
$PV_C = \Sigma \frac{B_y}{(1+r)^y}$	$= \frac{B_1}{(1+r)^1}$	$= \frac{B_2}{(1+r)^2}$	$= \frac{B_3}{(1+r)^3}$
	$= \frac{\$9{,}760}{(1+.10)^1}$	$= \frac{\$9{,}760}{(1+.10)^2}$	$= \frac{\$9{,}760}{(1+.10)^3}$
	$= \frac{\$9{,}760}{(1.10)}$	$= \frac{\$9{,}760}{(1.21)}$	$= \frac{\$9{,}760}{(1.33)}$
	= $8,872	= $8,066	= $7,338

Cost Side: Determine the approximate amount of personnel time exclusively devoted to screening, educating and monitoring (SEM) high-risk employees.

Annual Budget	**$168,875**
x SEM time	**.045** (4.5% of total workload)
SEM cost incurred by employer	**$7,599**

	Year 1	Year 2	Year 3
$PV_C = \Sigma \frac{C_y}{(1+r)^y}$	$= \frac{C_1}{(1+r)^1}$	$= \frac{C_2}{(1+r)^2}$	$= \frac{C_3}{(1+r)^3}$
	$= \frac{\$7{,}599}{(1+.075)^1}$	$= \frac{\$7{,}599}{(1+.075)^2}$	$= \frac{\$7{,}599}{(1+.075)^3}$
	$= \frac{\$7{,}599}{(1.075)}$	$= \frac{\$7{,}599}{(1.15)}$	$= \frac{\$7{,}599}{(1.24)}$
	= $7,069	= $6,608	= $6,128

Calculate Net Benefit-Cost Ratios:

	Baseline	End of Year 1	End of Year 2	End of Year 3
Benefit Cost	$= \frac{\$9{,}760}{7{,}599}$	$= \frac{\$8{,}872}{7{,}069}$	$= \frac{\$8{,}066}{6{,}608}$	$= \frac{\$7{,}338}{6{,}128}$
Return on Investment	$= \frac{\$1.28}{1.00}$	$= \frac{1.25}{1.00}$	$= \frac{1.22}{1.00}$	$= \frac{1.19}{1.00}$

the ROI ratio in Table 18 gradually decreases over time because benefit dollars (discounted at 10 percent) depreciate faster than cost dollars (discounted at 7.5 percent). The current ROI of 28 percent (1.28 ÷ 1.00) will be nearly erased within a decade if the self-care program is discontinued or fails to sustain the initial impact, as seen in Figure 16. This example shows that even a small 3 percent annual decrease in net ROI drops the initial 28 percent ROI to 19 percent in less than 3 years.

The preceding example demonstrates the basics of identifying and calculating relevant costs before doing a PVA. Whether you plan to do a BCA alone or as a prelude to a PVA, ensure that all costs and benefits can be measured and assigned appropriate monetary values. If you take the time to prepare and conduct a fundamentally sound BCA, you can use the results in making sound programming decisions now and in the future.

In addition to using BCA and PVA outcomes in planning current and future programs, consider the role of forecasting, which can be a useful supplement to guide your efforts. The final chapter of this booklet provides an overview of forecasting, how to construct an appropriate forecast and how to use forecasting outcomes to enhance your strategic planning.

VI. FORECASTING TO PLAN FOR THE FUTURE

Any human resource professional striving to improve some or all facets of a worksite wellness program by forecasting the future will do well to pay attention to past and current trends as a guide. Let's look at the steps to follow in preparing a forecast.

Forecast: to calculate or predict some future event or condition, usually as a result of rational study and analysis of available pertinent data.

Preparing a Basic Forecast

Forecasting helps us gauge how past and present trends may influence future events.[21] The accuracy, applicability and relevance of any forecast are enhanced when forecasters use accurate data, reasonable timelines and market-driven indices. Forecasts, regardless of their frequency, should *not* be stand-alone predictors of future outcomes. Human resource teams should supplement forecasts with ongoing assessments that factor in demographic, social, financial, political, occupational and technological changes occurring in a particular organization.

There are many ways to prepare a basic forecast. Figure 17 illustrates a simple forecasting process comprising six steps.

Step 1: Select a forecast variable

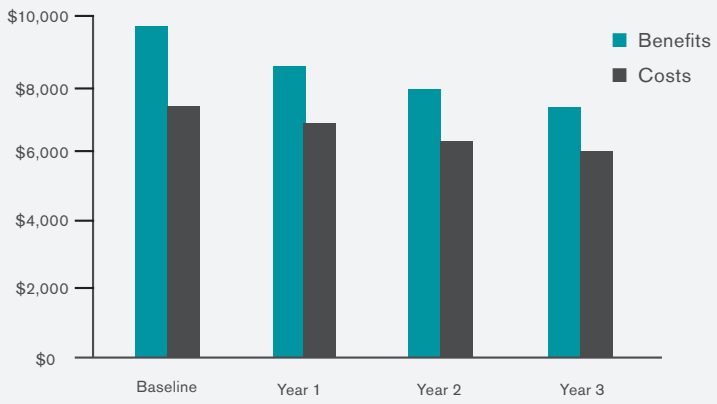
The first step in preparing a basic forecast is to select an appropriate variable with past and present data. Virtually any variable, or "metric," is suitable for a forecast if it can be tracked over time with an appropriate index. For example, the cost of living is tracked by the *consumer price index* (CPI), which is a measure of the average change over time in the prices paid by consumers for a market basket of consumer goods and services, such as groceries, fuel and clothing.[22]

Employee and organizational variables typically included in wellness program forecasts are:

- Accidents and injuries.
- Health care use (claims).
- Health care costs.
- Health risk assessment/screening.
- Health status level.
- Risk factor prevalence.
- Migration into/out of health plans.
- Quality of life/work life.
- Participation and adherence.
- Productivity.

Traditionally, *productivity* has been defined and measured in three ways: manufacturing productivity (the number of gadgets produced per day), qualitative productivity (the number of defects per 100,000 units produced) and efficiency

Figure 16: Benefits versus Costs Over Time

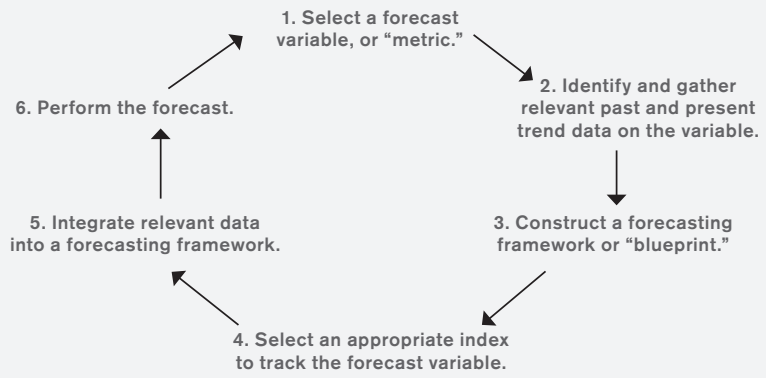


"Optimum Health Management, LLC (OHM), utilizes an array of metrics to evaluate the outcomes of worksite-based wellness and condition management programs, and to perform predictive modeling to forecast opportunities for cost avoidance.

Data on biometrics, health behaviors, health-related work impairment, employee salaries/wages, and medical and workers' compensation claims are among the metrics OHM uses to conduct health management forecasting. Current trends in the prevalence of health risk factors and chronic conditions are assessed to determine the potential impact of targeted population health management initiatives on avoiding future medical and lost productivity costs, through the prevention and effective control of those health conditions. By combining a bit of art along with scientific methodology, such forecasting provides valuable information for health management strategic planning and projecting the ROI of the program."

Robin C. Rager, Ph.D.
Principal
Optimum Health Management, LLC
Torrance, California

Figure 17: Steps to Use in Preparing a Forecast



(the number of people needed to properly operate a division). However, a growing number of wellness practitioners are using productivity variables such as *absenteeism, presenteeism* and *short-term disability* in their forecasts.

Index: a measure of the average change over time in a particular variable.

Step 2: Identify and gather relevant data

The accuracy of any forecast depends on the validity and reliability of the data used to track the selected variable. As you are preparing a forecast, identify and gather only the types of data that are relevant to the selected variable. With careful attention, you will be able to enhance the odds that your forecast will be:

- Accurate and contain as little margin of error as possible.
- Tailored to the uniqueness of your targeted population.
- Generalizable to other groups that are similar to your targeted population.
- Valuable in your strategic planning.

In gathering appropriate data for your forecast, assess your worksite to see what types of data are available in various departments that may be of potential use, including human resource, benefits, medical and safety data. Based on the types of data that you find in-house, decide how to fill any gaps by tapping outside sources. Many public and private research firms and professional associations provide data that can be used in preparing specific types of forecasts. See Table 19, on the following page, for a sampling of organizations that provide wellness-related data. Although many organizations provide data in the public domain, at no cost to the user, first check to see if a data request involves a purchase or leasing fee before making the request.

After you have selected a variable for your forecast, identify what factors can positively or negatively influence the variable. For example, let's assume that one of the primary goals of your wellness program is to reduce health care utilization for lifestyle-related conditions such as heart disease, hypertension, diabetes and high cholesterol. Since *health care utilization* is the forecast variable, you would identify and track as many specific factors that have been associated with this particular variable. The professional literature indicates that many factors influence a person's decision to use or not use health care services.[23]

Table 19: A Sampling of Organizations with Wellness-Related Data

Type of Data	Name of Organization	Website Link
Absenteeism	SSQ Financial Group	http://www.ssq.ca/healthinsightsolutions
	U.S. Bureau of Labor Statistics	http://www.bls.gov/cps/lfcharacteristics.htm
	Statistics Canada	http://statcan.gc.ca
Accidents and Injuries	Centers for Disease Control & Prevention (CDC)	http://www.cdc.gov/niosh/data
Health care utilization	U.S. Census Bureau	https://www.census.gov/compendia/statab/cats/health_nutrition/health_care_utilization.html
Health care costs	U.S. Census Bureau	https://www.census.gov/compendia/statab/cats/health_nutrition/health_expenditures.html
	Deloitte Center for Health Solutions	http://www.deloitte.com/assets/Dcom-UnitedStates/Local%20Assets/Documents/us_dchs_2012_hidden_costs112712.pdf
Inflation	Forecastchart.com	http://www.forecast-chart.com/inflation-medical-care-cost.html
	U.S. Bureau of Labor Statistics	http://bls.gov/data/inflation_calculator.htm http://www.bls.gov/news.release/cpi.nr0.htm
Participation	U.S. Department of Labor	http://www.dol.gov/ebsa/pdf/workplacewellnessmarketreview2012.pdf
	Sporting Good Manufacturers Association	http://assets.usta.com/assets/1/15/SGMA_Research_2012_Participation_Topline_Report.pdf
	OPTUM	http://www.optum.com/content/dam/optum/Employer/White%20Papers/wellness-in-the-worklplace-2012-WP.pdf
Productivity (U.S. economy)	U.S. Census Bureau	http://www.census.gov/compendia/statab/cats/labor_force_employment_earnings.html
	U.S. Bureau of Labor Statistics	http://www.bls.gov/news.release/prod2.toc.htm http://www.bls.gov/spotlight/2013/productivity/
Risk factor costs	Society for Human Resource Management (SHRM) Foundation	http://www.shrm.org/foundation
	Milken Institute	http://www.chronicdiseaseimpact.com/ebcd.taf?cat=state&state=ID
	Centers for Disease Control & Prevention (CDC)	http://www.cdc.gov/brfss/data_tools.htm
	East Carolina University	http://www.ecu.edu/picostcalc/
	The George Washington University Medical Center	http://www.alcoholcostcalculator.org/
	Agency for Healthcare Research and Quality	http://www.ahrq.gov/research/findings/factsheets/tools/statesnapshots/index.htm
	American Diabetes Association	http://www.diabetes.org/advocacy/news-events/cost-of-diabetes.html
	National Institutes of Health	http://www.nhlbi.nih.gov/health/educational/lose_wt/BMI/bmicalc.htm
Workers' Compensation	National Council on Compensation Insurance	https://www.ncci.com/nccimain/IndustryInformation/ResearchOutlook/Pages/default.aspx
	Oregon Department of Consumer and Business Services	http://www.cbs.state.or.us/external/dir/wc_cost/files/report_summary.pdf

For example, a brief listing of these variables would include:

Forecast Variable: Health Care Utilization

- Age.
- Gender.
- Salary/wages.
- Type of work activity/occupation.
- Present health status.
- Existence of a chronic health condition(s) .
- Health plan premium, deductible or co-pay.
- Access to health care services.
- Perceived severity of illness or condition.
- Confidence in health care system.
- Availability of an onsite health clinic.

Once all influential factors have been identified, you can begin to establish the framework of the forecasting framework.

Step 3: Construct a forecasting framework

Although various approaches are used to construct forecasting frameworks, the following protocol is tailored to a typical worksite wellness program.

Establish a time frame for conducting the forecast. Your time frame should recognize that a forecast may be vulnerable to daily and weekly events and may lose some validity and accuracy over the long haul. If your forecast variable changes, especially on a year-to-year basis, determining an appropriate time frame to use it in your forecast can be difficult. In these types of situations, consider the following guidelines:

- If the forecast variable showed little or no year-to-year change in the past four to five years, it is relatively safe to use a similar time frame for the forecast.
- If there is strong potential that new forces—such as political influences, change in workforce size or other demographic characteristics, change in employee benefits, or relocation of workers—may directly influence the forecast variable, then it is appropriate to:
  - Monitor all potential influences.
  - Construct several "what if" scenarios.
  - Project best-case, average-case and worst-case forecasts.

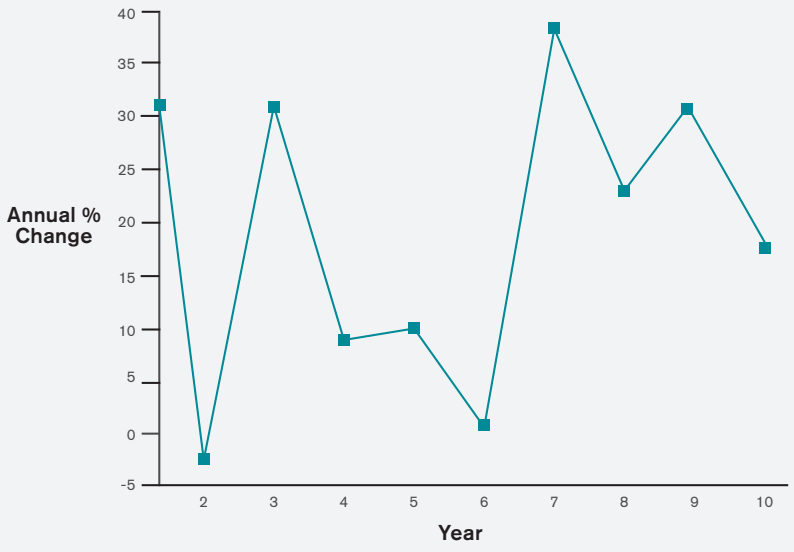
This three-tiered approach provides a full-spectrum of possibilities to consider.

If the forecasted variable showed substantial year-to-year change over the past few years, then it is appropriate to limit the forecast to a shorter time frame, such as to one to two years, or to use a multiyear average to calculate the forecast. For example, one organization's health care utilization over five years was about 22.4 percent. But there was wide year-to-year volatility, even in consecutive years, as evidenced by a low of 1 percent in one year and a high of 38 percent in the following year, as seen in Figure 18.

Identify and monitor factors that influence the forecast variable. It is important to understand major factors that currently influence the forecast variable you have selected, as well as additional factors that are expected to influence the variable in the near future.

Let's focus on one of the most common targets of worksite wellness programs: rising health care costs. Since the 1970s, employers have tried all sorts of cost-containment strategies, from health plan redesign and cost shifting to wellness programs and financial incentives, with mixed results. Nevertheless, senior managers in many worksites often expect worksite wellness programs to serve a cost-containment strategy, despite the fact that as much as 85 percent of rising medical care costs are driven by economic forces beyond the influence of worksite wellness programs, policies and incentives.

Figure 18: Annual Percentage Changes Across 10 Years Health Care Utilization



Identify as many factors that currently drive your company's health care costs as you can, and additional factors that may drive these costs in the future. Let's assume that you and your colleagues have identified the following factors:

Present

- Medical inflation
- Technology
- Cost-shifting
- Medical care monopolies
- Legislation
- Poor employee health
- Lack of consumerism
- Aging workers
- Lack of onsite health clinic
- "Sentinel effect"
- Leveraged discounts
- Health care consolidation
- Internet purchasing
- Prescription drug marketing
- Excess diagnostic tests

Future

- Medical inflation
- Technology
- Cost-shifting
- Medical care monopolies
- Legislation
- Poor employee health
- Lack of consumerism
- Aging workers
- Lack of onsite health clinic
- "Sentinel effect"
- Leveraged discounts
- Health care consolidation
- Internet purchasing
- Prescription drug marketing
- Excess diagnostic tests
- Patient Protection and Affordable Care Act
- Global medical care access

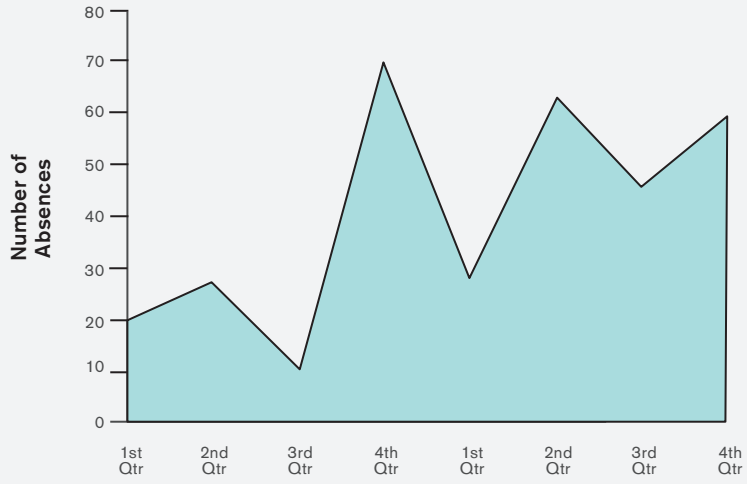
It is difficult to know how much influence any of these factors have on an organization's year-to-year health care costs, but keep them in mind when you proceed to choosing a time frame and index for your forecast.

Choose an appropriate index as a baseline. Assuming that you have selected a forecasting variable, chosen a forecasting time frame and identified major variables that influence the forecasting variable, it is time to choose an appropriate index that can be used as a baseline. The baseline value you select will significantly influence the outcome value of your forecast and should accurately reflect the current status or trend of the forecast variable.

Most baseline variables tend to fluctuate in value from year to year. Try to establish a baseline index that does not favor the best side or the worst side of a multiyear trend, but rather reflects a middle-of-the-road value. Figure 19 illustrates significant quarter-to-quarter changes in one organization's absenteeism over two consecutive years.

Considering this quarter-to-quarter volatility, how would you determine a representative index to use in forecasting absences in the next year or two? There are several viable options to consider in computing a representative baseline. These options are listed on the next page.

Figure 19: Quarterly Absenteeism Over Two Years (in Days per 1,000 Employees)



1. **Compute the mathematical *median* ("midpoint").** The median is probably most familiar to you as the 50th percentile. The median is the value that exactly separates the upper half of the distribution of scores from the lower half. Simply put, 50 percent of the scores are greater than the median, and the other 50 percent of the scores are lower than the median. To compute the median, first list all absence values per quarter in ranked order:

   70 63 59 45 27 27 20 10

   Next, because there is an even number of values, select the two most centralized values. Add them (45 + 27) and divide the sum (72) by two (2) to compute the median.

   45 + 27 = 72
   72 ÷ 2 = 36

   If you have an uneven number of scores, you would select the score that is exactly in the middle of all values. Let's say that you have nine scores with the following distribution:

   70 63 59 45 31 27 27 20 10

   There are a total of nine values, so you would simply subtract one from nine and then divide that sum by two, as follows:

   9 - 1 = 8
   8 ÷ 2 = 4

   Now count four value spaces from the far left (45) and four value spaces from the far right (27) to locate the median (31), which is between the two values:

70	63	59	45	**31**	27	27	20	10
(+4)	(+3)	(+2)	(+1)	(0)	(-1)	(-2)	(-3)	(-4)

2. **Compute the *mode.*** The French expression a la mode literally means in vogue or in style. The mode is the score that is most common, or seems to be "in style." Although the mode is easily obtained by visually scanning the scores, it is the crudest measure of central tendency and may not necessarily be used as often as either the median or the mean. The mode in the following range of numbers is 27:

   70 63 59 45 **27** **27** 20 10

3. **Compute the arithmetic *mean.*** The mean is more commonly known as the *average*. The mean can be computed by adding up all the scores and dividing by the number of scores, as follows:

   70 + 63 + 59 + 45 + 27 + 27 + 20 + 10 = 321
   321 ÷ 8 = 40.12

   If there is wide difference between the highest and lowest scores, the mean of 40.12 may or may not necessarily be a good index to use as a baseline. By dropping the highest (70) and lowest (10) scores—known as outliers—you can reduce the number of scores from eight to six and compute a mean that is similar to the mean previously computed:

   63 + 59 + 45 + 27 + 27 + 20 = 241
   241 ÷ 6 = 40.16

   The similar means are due to the relatively close proximity between the highest score (70) and the second (63) and third (59) highest scores. In this instance, the elimination of outliers was not necessary to compute a representative baseline. Eliminating outliers is most appropriate when there is a wide disparity (> 10 percent) between the individual scores in the highest end and the individual scores in the lowest end.

Comparing the Mean, Median and Mode

If a measure of central tendency is a single value that best represents the performance of the group as a whole, which single value should be used? If you compute the mean, median and mode for the same set of scores, very rarely will all three values be identical. Which one will give you the best single value that describes the entire distribution? The answer to that question is not a simple one.

In most cases, we should ignore the mode because it is a rather crude measure of central tendency. This leaves the mean and median to be considered, and, as you probably have guessed, the mean is more often given as a measure of central tendency. However, in many instances the median is a valuable statistic. The median is not affected by extreme or atypical values as much as the mean is, so it is useful in situations where the distribution of scores are either positively or negatively skewed.

Almost all forecast variables change in value over time. When reviewing past and present changes in a particular variable, it is important to know that an actual change in *dollar value* may or may not have a similar slope as a *percentage* change. Figures 20 and 21 illustrate how the slope representing the dollar value can differ significantly from the slope representing the percentage change by year.

Figures 20 and 21 are based on employee health care costs that have traditionally increased year to year. To forecast future costs, can we assume that future costs will probably increase? If so, at what rate? And what rate should be used to project future costs?

Let's assume that the average annual rate of medical inflation highlighted in Figure 21 was 8.87 percent. We could use this percentage as a reasonable index to forecast year-to-year cost increases over the next several years. However, this single index does not offer us enough options to accurately provide a range of best-case, average-case and worst-case projections. Using several inflation indices provides a full-scale forecast.

Because this particular forecast centers on employee health care costs, make sure that health care inflation indices are actually incorporated, so that you can be sure that you are comparing apples *(health care costs)* to apples *(health care inflation)*.

In today's marketplace, it is not uncommon to see some analysts

Figure 20: Annual Costs in Dollars

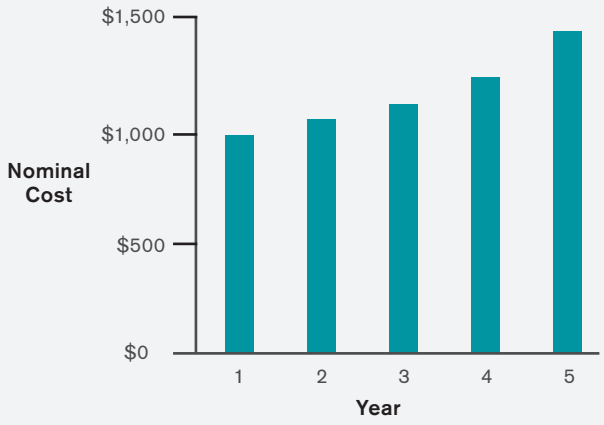
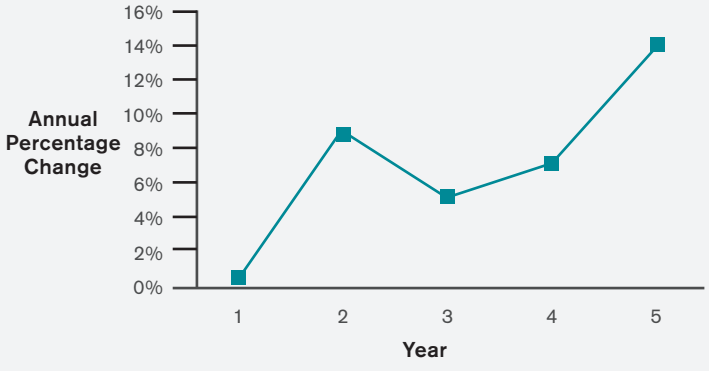


Figure 21: Percentage Change in Annual Costs

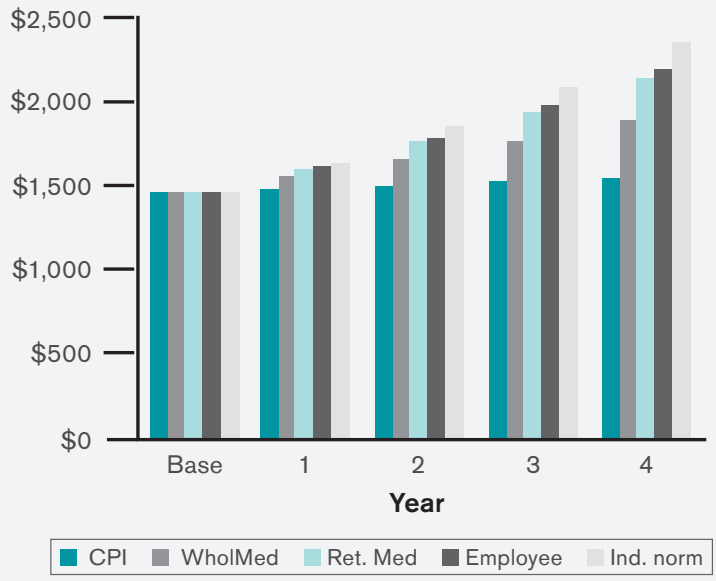


supplement health care inflation indices with nonhealth-care inflationary indices such as the CPI. Some financial managers include the CPI in their cadre of inflation indices when establishing cost-containment goals, but CPI-driven goals are unrealistic to achieve because the bulk of an organization's health care costs are driven by economic forces beyond the scope of an organization's wellness programs and policies.

Figure 22 provides an example of how a nonhealth-care index such as the CPI can generate an unrealistically low-cost projection compared to actual health care-related indices. This happens when using the CPI to gauge future health care cost inflation trends because the CPI includes primarily nonhealth-care items and is not designed to provide an accurate projection of health care cost inflation.

In addition to health care utilization and cost variables, many organizations subject various employee health-related variables to forecasting, such as those outlined in the table below.

Figure 22: Projected Health Care Costs Using Five Different Rates of Inflations



Note: CPI = consumer price index @ 1.5% per year; WholMed = wholesale (discounted) medical inflation @ 7% per year; RetMed = Retail medical inflation @ 10.3% per year; Employee = Employee out-of-pocket medical costs @ 11% per year; Ind. norm = Industry-specific norm @ 13% per year.

Forecast Variable	Typical Indices
Health coaching participation	▪ Percentage change (+ or -) in health coaching participants over the past 12 months ▪ Percentage change in the number of employees expected to participate in the next 12 months ▪ Percentage change in employees expected to participate by age groups (< 30, 31-40, 41-50, etc.) ▪ Level of new or expanded incentives offered to drive participation
Injuries/accidents	▪ Percentage change in 2-3 years for specific types of injuries (e.g., joint sprains, back strains) ▪ Percentage change in employees by occupation who experienced the greatest portion of injuries in the past year
Risk factor prevalence	▪ Percentage change in the size of the workforce expected in next 12 months ▪ Percentage of employees by age groups with the highest risk factor rates in the past 3-4 years
Equipment replacement costs	▪ Use patterns (under vs. overuse) in the past 12 months ▪ Types of equipment that were replaced at least twice in the past five years ▪ Annual cost inflation by specific type of equipment[1] (see Figure 23)

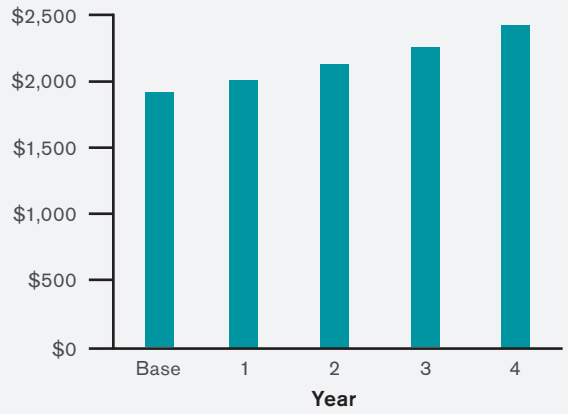
Step 4: Prepare a customized forecast

In preparing a forecast that is customized to meet your needs, be sure to incorporate all the essential elements:

- Forecast variable, or metric: the primary variable you are forecasting.
- Baseline: the current value of the forecast variable.
- Forecast index: the specific measurement used to influence the value of the forecast variable over a designated period of time.
- Time frame: the period of time you are planning to forecast, shown on the horizontal axis.
- Quantitative index: a number, percentage or dollar value used to indicate the value of the forecast variable over a designated time frame, shown on the vertical axis.

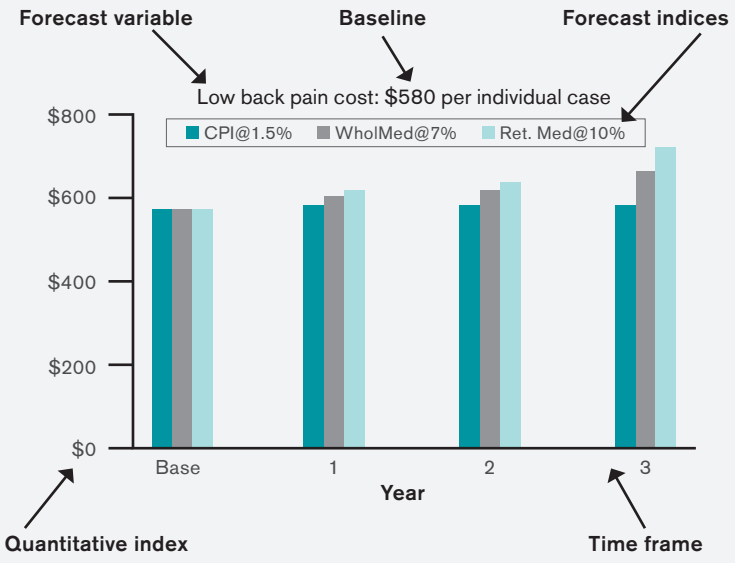
Figure 24 illustrates how each of these elements is integrated into an actual forecasting framework. If the average annual medical care cost of a low back condition is $580, and if you want to calculate what the current cost for this condition will be in the next three years, you will choose the CPI as an index to factor in the general cost inflation for common household items. You will also choose two medical inflation rates: a) the annual wholesale medical inflation rate of 7 percent, to represent what larger organizations in your area have paid for employees' health care over the past few years, and b) the annual retail medical inflation rate of 10 percent, to represent what smaller and midsize organizations in your area have paid for employees' health care over the past few years. In using the three different rates, you can see the noticeable year-to-year cost differences in Figure 24.

Figure 23: Annual Cost of a Sample Piece of Equipment at 5% Annual Inflation



For example, medical equipment such as a stethoscope and blood pressure cuff may be subjected to higher rates of inflation (due to faster depreciation) than other goods that are less frequently used. In worksite wellness settings, a motorized treadmill is typically subjected to a higher rate of inflation than, say, a computerized check-in system due to a greater amount of physical wear and tear on the treadmill and, thus, more frequent maintenance and replacement costs. Figure 23 illustrates equipment that initially costs $2,000 with an expected lifespan of four years and what it would cost at the end of the lifespan to purchase a new piece of equipment if the purchase price of the equipment increased 5 percent per year ($2,431).

Figure 24: Essential Elements of a Basic Forecasting Framework



Step 5: Perform the calculation

To calculate the probable cost of a low back claim in the next few years, first establish current inflationary trends.

Indices	Inflation Rate (%)	Relevance to Back Claim
Consumer price index (CPI)	1.5	None[1]
Wholesale medical inflation	7	High
Retail medical inflation	10	High
Company's back claims	13	Very high

[1]Although the CPI measures general inflation, not medical inflation, it is used in this example simply to provide a "low end" projection.

Because all four index trends listed in a table above are rising, the forecast calculation should include a year-to-year multiplier, ranging from 1.015 to 1.13 based on the trend of each index. For example, the forecast would be calculated as follows.

Index	Now	Year 1	Year 2	Year 3
CPI	$580 x 1.015	= $589 x 1.015	= $598 x 1.015	= $606
Wholesale medical	$580 x 1.07	= $620 x 1.07	= $664 x 1.07	= $710
Retail medical	$580 x 1.10	= $638 x 1.10	= $702 x 1.10	= $772
Company's	$580 x 1.13	= $655 x 1.13	= $740 x 1.13	= $836

When these calculations are completed, a three-year forecast shows back claim costs ranging from a low of $606 (at CPI) to as much as $836 (at the company's trend), as shown in Figure 25.

Forecasting Potential Cost-Avoidance Benefits

One of the most common uses of forecasting, especially in wellness program settings, is to determine potential *cost-avoidance benefits*. Suppose that your company is currently spending $100,000 annually on various low back injuries. On reviewing past medical claims cost data, you notice that low back injury costs have risen approximately 10 percent annually over the past five years. In its quest to stem these rising costs, your company hires a local worksite wellness firm to design and implement a low back injury prevention program. The firm's annual fee is $15,000 to design, revise and monitor the program. The contract includes specific performance outcomes that all parties have agreed to, specifying that the new program will:

- Motivate employees to adopt safe lifting practices and personally report any low back incident at the time it occurs.
- Cut the traditional 10 percent annual increase in back injury claim costs by at least 50 percent within 12 months and, at a minimum, sustain this impact in subsequent years.
- Generate enough cost-avoidance benefits to offset the combined program and medical care costs within five years.

In the absence of this program, low back injury costs are projected to continue to rise about 10 percent per year, based on the past trend. You could prepare a forecasting

Figure 25: A Three-Year Forecast Based on Four Rates of Inflation

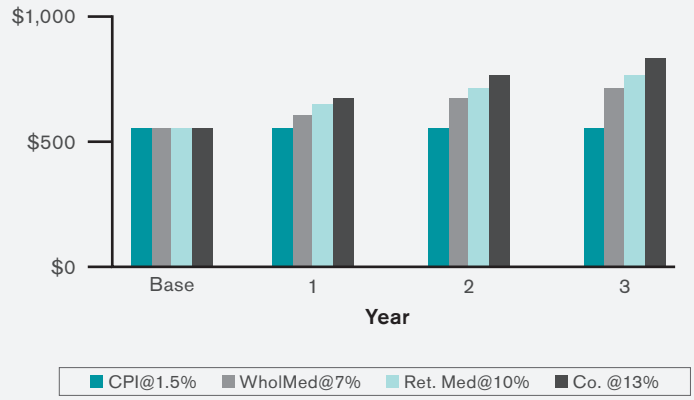
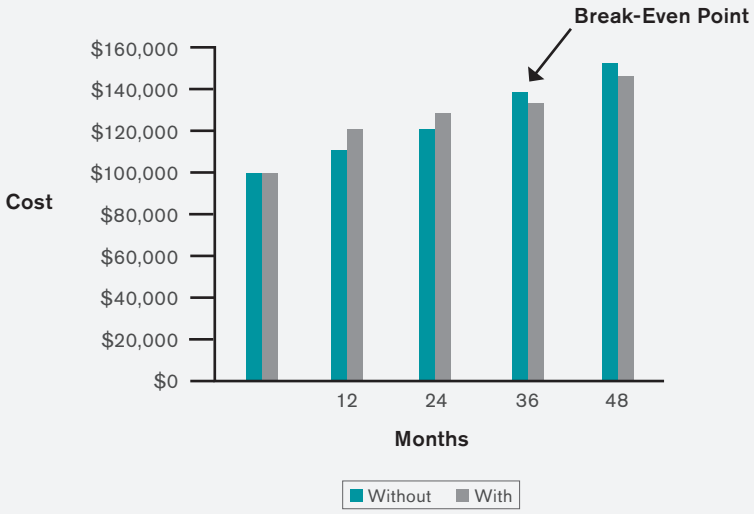


Figure 26: Projected Costs With vs. Without an Intervention

Figure 27: Projected Costs and Break-Even Point With and Without the Intervention



framework such as the one highlighted in Figure 26 to compare projected low back injury costs with and without the program, and to determine if and when projected cost savings will equal or exceed programming costs. In preparing this framework, you will first need to conduct a simple cost comparison, as shown in Table 19.

Note that in this example, total intervention costs during the first 24 months actually exceed nonintervention costs. However, approaching 36 months, the program's impact is expected to reduce the projected level of back injuries enough to achieve a break-even point, as highlighted in Figure 27. And, assuming that the program will continue making an impact at this rate, the organization would incur cost-avoidance benefits of nearly $3,000 around the 36-month interval and nearly $10,000 at the four-year mark.

Break-Even Point

Forecasting provides information to gauge possible scenarios in the future, but forecasts are vulnerable to the volatility of today's ever-changing marketplace, which may prompt forecasters to consider using a range of conservative, low-end indices to liberal, high-end indices in their prognostications, to see the full spectrum of projected outcomes. This broad-based vision will enable you to make more informed and objective planning and budgeting decisions.

Table 19: Medical Costs With vs. Without an Intervention

Time	Without Intervention	With Intervention		
	Medical costs	Medical	Programming	Total Cost
Baseline	$100,000 x 1.10 (10%)	$100,000 x 1.05 (5%)*		
12 months	$110,000 x 1.10	$105,000 x 1.05	$15,000	$120,000
24 months	$121,000 x 1.10	$110,250 x 1.05	$15,000	$125,250
36 months	$133,100 x 1.10	$115,762 x 1.05	$15,000	$130,762
48 months	$146,410	$121,550	$15,000	$136,550

*5% is 50% of the previous 10% annual cost increase.

VII. CONCLUSION

Today human resource and wellness program managers must be proactive in meeting the growing demand for more rigorous evaluations of worksite wellness programs. Now that you have reviewed the various frameworks available for conducting an evaluation of your own organization's program, it is time to decide what comes next.

Each framework described in the preceding pages has a distinct function. You may want to review the first section on "Selecting the Right Tools and Techniques." By taking the time to objectively assess your firm's resources, evaluation capabilities and needs, you can make an informed choice.

Using these tools to develop and evaluate your wellness program can create benefits for both your organization and its employees.

For Assistance

For technical assistance in using any of the frameworks or tools described in this report, you may contact the author by phone at 252-636-3241, or by e-mail at dave@chenoassociates.com.

The need to justify costs for employee wellness programs is intensifying at most worksites and so is the need to use health care claims data to drive wellness programming.

GLOSSARY

Benefit-cost analysis: measuring benefits against costs to determine the best (or most profitable) course of action.

Break-even analysis: measuring the point at which costs and benefits are equal.

Claims data analysis: analyzing medical claims to identify the most common and expensive conditions for various purposes, including risk factor identification, health plan underwriting and wellness planning.

Consumer price index (CPI): a measure of the average change over time in the prices paid by consumers for a market basket of consumer goods and services.

Cost-effectiveness analysis: a measure of the cost of an intervention relative to its impact, usually expressed in dollars per unit of effect.

Diagnosis-Related Group (DRG): a system used to classify a hospital (inpatient) stay into one of approximately 500 groups.

Exclusive provider organization (EPO): a managed care plan in which members must receive their care from affiliated providers; treatment provided outside the approved network must be paid for by the member.

Forecasting: the use of historical data to determine future trends.

Health maintenance organization (HMO): a broad term encompassing a variety of health care delivery systems using group practice and providing alternatives to the fee-for-service private practice of medicine; a typical HMO provides basic and supplemental health maintenance and treatment services to members who prepay a fixed periodic fee that is set without regard to the amount or kind of services received.

International Classification of Diseases (ICD): a system of diagnostic codes maintained by the World Health Organization for classifying and diagnosing diseases, including signs for a wide variety of signs, symptoms, abnormal findings, social circumstances and external causes.

Major Diagnostic Category (MDC): a group of similar Diagnosis-Related Groups (DRGs) such as all those affecting a given system of the body (circulatory, for example).

Mean: the average of all values; the mean is calculated by dividing the sum of all values by the number of values.

Median (also called the midpoint): the middle number in a given sequence of values; taken as the average of the two middle values when the sequence has an even number of values.

Mode: the number that appears most often in a set of numbers.

Point of service (POS): a type of managed care health plan that combines the characteristics of a health maintenance organization (HMO) and a preferred provider organization (PPO); members of a POS plan do not choose their service until the point at which the service is provided.

Preferred provider organization (PPO): an organization of physicians, hospitals, pharmacists and other health care providers whose members discount health care services to subscriber patients.

Proportionate risk factor cost: the portion of a health condition's medical costs that is attributed directly to a specific risk factor.

Prospective medicine: the identification of specific risk factors that contribute to a particular condition, disease or disability and the prescribed strategies to prevent or reduce the risks.

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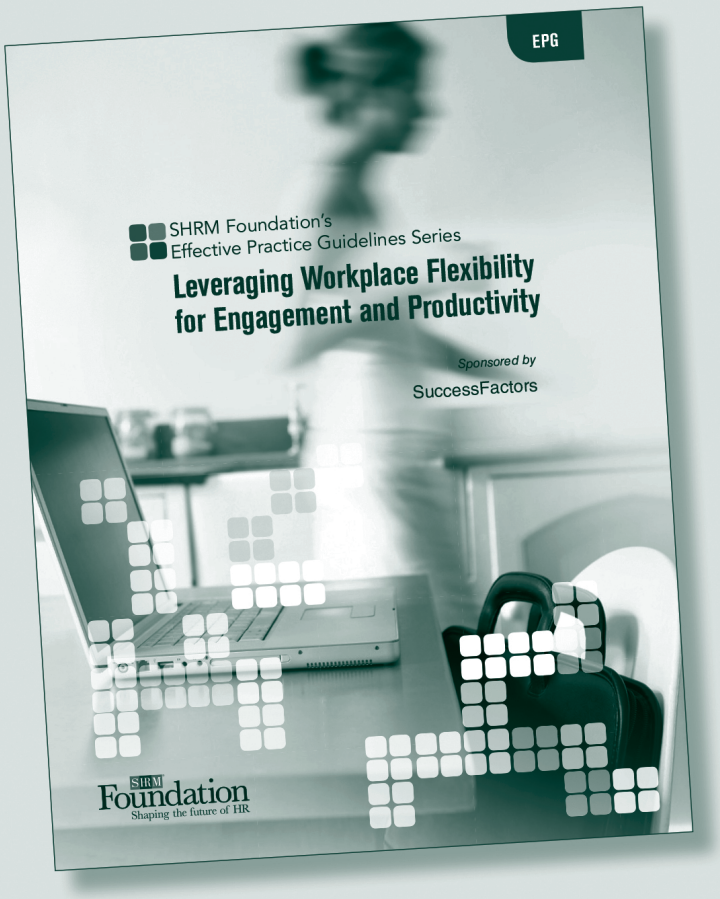
Workplace Flexibility: Strategies that Work

The changing nature of work and the workforce is driving the need for more flexible work arrangements. Organizations that want to attract and retain high-performing employees understand the benefits of using workplace flexibility to increase productivity.



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