

Monitoring Worksite Clinic Performance Using a Cost-Benefit Tool

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Objective: The purpose of this study was to explore the usefulness of continuously assessing the return on investment (ROI) of worksite medical clinics as a means of evaluating clinic performance. **Methods:** Visit data from January 1, 2007, to December 31, 2008, were collected from all the on-site clinics operated for the Pepsi Bottling Group. An average system-wide ROI was calculated from the time of each clinic's opening and throughout the study period. A multivariate linear regression model was used to determine the association of average ROI with penetration/utilization rate and plant size. **Results:** A total of 26 on-site clinics were actively running as of December 2008. The average ROI at the time of start up was 0.4, which increased to 1.2 at ~4 months and 1.6 at the end of the first year of operation. Overall, it seems that the cost of operating a clinic becomes equal to the cost of similar care purchased in the community (ROI = 1) at ~3 months after a clinic's opening and flattens out at the end of the first year. The magnitude of the ROI was closely related to the number of visits (a function of the penetration/utilization rate) and the size of the plant population served. **Conclusion:** Serial monitoring of ROIs is a useful metric in assessing on-site clinic performance and quantifying the effect of new initiatives aimed at increasing a clinic's cost effectiveness. (J Occup Environ Med. 2009;51:1151-1157)

Expenditures incurred by the US corporations for employee health care benefits are increasing at an ever-expanding rate, affecting the profitability of many labor-intensive industries.¹⁻³ For these companies to remain more competitive, they have responded to increased expenditures by passing on higher health insurance premium costs to employees.⁴⁻⁸ Worksite medical clinics have been identified as a vehicle that can reduce health care costs for the corporation as well as offer a substantial benefit to employees.⁹⁻¹⁶ Employees receive prompt medical attention, lose less time from work, and experience lower out-of-pocket costs, because on-site medical care is usually provided at no or low cost to the employee.

Studies have indicated that worksite medical clinics can provide medical care for both occupational and nonoccupational conditions at a lower cost than the cost of similar care rendered by community medical providers. Assuming the operating cost of the clinic is an investment and the cost of similar care offered by community medical providers is an expected cost, the difference between the two can be considered as a saving or a return on investment (ROI).¹⁰⁻¹²

Unfortunately, studies that document the cost effectiveness of on-site clinics have done so at the end of a study period and not continuously as a monitoring tool. The purpose of this study was to use an ROI assessment tool that continuously monitors clinic performance. The ROI assessment tool determines a clinic's cost effectiveness at various points in time, from start up to maturity. For

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employers interested in establishing worksite clinics, this information can assist them in determining what to expect with regard to the cost and benefits of such a venture. It also will help employers with established on-site clinics to better manage these programs by making it possible for them to measure the impact of current and new initiatives that can affect the clinic's cost effectiveness.

Materials and Methods

Study Sites

Pepsi Bottling Group (PBG) is the world's largest manufacturer, seller, and distributor of Pepsi-Cola beverages, with ~70,000 employees. The company has annual worldwide sales of nearly \$14 billion. Its principal operations are in the United States, Canada, Greece, Mexico, Russia, Spain, and Turkey. PBG's "Healthy Living" program was launched in 2004 to assist its 33,000 US employees and their families in improving their health. The Healthy Living Program won the National Business Group on Health's Gold Award in 2007, the C. Everett Koop National Health Award in 2007, and the National Business Group on Health Platinum Award in 2008.

As part of PBG's Healthy Living initiative, PBG contracted with the Johns Hopkins University School of Medicine to establish and operate employee health and wellness clinics in the US plants with large concentrations of employees. The first clinic was initiated in January of 2003 and, at the end of this study, there were 26 clinics nationwide. Today, PBG Employee Health and Wellness Centers in 18 states serve more than 14,000 PBG employees. All clinics are staffed by one mid-level provider (nurse practitioner or physician assistant) employed by Johns Hopkins University. Some clinics provide the mid-level provider with administrative assistance of up to 16 hours per month. Each mid-level provider has access to a local physician for consultation. Clinic hours vary to pro-

vide services for employees on all shifts within a particular plant. The services provided include the assessment and treatment of occupational and nonoccupational injuries and illnesses, case management for work and nonwork-related conditions, referrals to primary care physicians, chronic disease monitoring, physical assessments, crisis management intervention, wellness initiatives, Department of Transportation examinations, drug screening, and influenza and other immunization programs.

The PBG bottling plants are responsible for marketing, making, and distributing soft drink products. The bottling plants range in size from

roughly 200 employees to more than 700 employees (Table 1). Approximately 80% of workers are engaged in the physical activities of selling, manufacturing, and distributing the soft drinks. The remainder of the workforce (20%) is engaged in managerial activities. The sales division (Account Representatives, Bay Drivers, Bulk Drivers, Merchandisers, etc.) sells, transports, and stocks products. Operations employees manufacture and transport bottled products to distribution points. Marketing Equipment Managers are responsible for placing and maintaining vending machines and soda fountains. Other than management employees, most workers

TABLE 1

Locations, Opening Dates, PBG Employees, and Periods* Included in the Analysis

Location	Employees	Opening Date	Closing Date	Periods Included in the Analysis
Baltimore, MD	406	January 2003		26
McKees Rocks, PA	335	May 2003		26
Orlando, FL	586	February 2004		26
Buena Park, CA	489	September 2004		26
San Diego, CA	354	October 2004		26
Piscataway, NJ	411	December 2004		26
Mesquite, TX	507	June 2005		26
Philadelphia, PA-1	375	June 2005	November 2007 [†]	14
Atlanta, GA-1	345	August 2005	September 2007 [†]	12
Denver, CO	743	December 2005		26
Stone Mountain, GA-1	221	April 2006	August 2007 [†]	11
Detroit, MI	449	September 2006		26
Houston, TX-1	377	October 2006	February 2008 [†]	17
Hayward, CA	428	November 2006		26
Burnsville, MN	592	February 2007		25
Riverside, CA	496	March 2007		24
Phoenix, AZ	595	April 2007		23
Albany, NY	351	May 2007		22
Tulsa, OK-1	367	July 2007	February 2008 [†]	11
Sacramento, CA-1	460	August 2007	May 2008 [†]	12
Winston-Salem, NC	709	August 2007		19
Atlanta, GA-2	345	October 2007		17
Stone Mountain, GA-2	221	October 2007		17
Philadelphia, PA-2	375	November 2007	May 2008 [†]	4
Torrance, CA	384	January 2008		14
Las Vegas, NV	365	February 2008		13
Tulsa, OK-2	367	April 2008		11
Fresno, CA	412	April 2008		11
Houston, TX-2	377	May 2008		10
Philadelphia, PA-3	375	May 2008		10
Sacramento, CA-2	460	June 2008		9
Howell, MI	341	July 2008		8
Johnstown, PA	358	September 2008		6

*Each period = 4 wk.

[†]These closed clinics were reopened in the same location at later dates, with different nurse practitioners.

spend much of their day away from the plant. However, most employees attend meetings in the plant at least weekly.

The Integrated Claims Management System

The Integrated Claims Management System (ICMS)¹⁷ is an electronic patient record used to record all medical information generated by clinical activities. The ICMS is a web-based system that permits information transfers among multiple parties (ie, physicians, mid-level providers, and laboratories). The information is encrypted and password protected. The ICMS system was created 2002 by the Johns Hopkins University for use in its Health, Safety and Environment Program in Baltimore and later adapted for use for multiple clinic sites.

ROI

The metric used to calculate the ROI in this study is a per-encounter index savings (PEIS) outcome.^{10–12} The PEIS is a quantitative value that reflects the approximate cost savings tied to a single visit in each of the following types of encounters: 1) occupational, 2) nonoccupational, and 3) testing. Occupational encounters include initial and follow-up office visits as well as initial and follow-up physical therapy visits. The approximate cost of each type of visit is based on regional cost norms. Total occupational encounter cost savings then are combined with cost savings associated with replacement labor cost avoidance, reduced third-party administrator fees, and reduced workers' compensation indemnity costs. All the preceding occupational cost savings are summed into an aggregate cost savings value, which then is divided by the aggregate number of occupational visits to compute a PEIS dollar value. The details of PEIS calculation can be found in previous papers.^{10–12}

The PEIS value assigned to nonoccupational encounters requires a two-step calculation. First, the number of nonoccupational office visits is multiplied by a regional cost norm

to calculate total cost savings. Second, the total cost savings is divided by the total number of nonoccupational encounters to generate a PEIS value.

The third and final encounter subjected to a PEIS calculation is testing, which includes 1) Department of Transportation certification/recertification, 2) preplacement drug screening and ergonomic testing, 3) random drug screening and blood alcohol testing, 4) flu shots, and 5) tetanus shots. Regional cost norms for each of the preceding tests are multiplied by the number of tests conducted in order to compute a PEIS value.

Once PEIS values have been computed for each of the three major categories (occupational, nonoccupational, and testing), they are added together to compute an aggregate cost savings value. The aggregate cost savings value is then divided by the clinic's annual operational cost to compute the net ROI value.

Preparing the ROI Report

The mid-level provider manually inputs the employee visit into the electronic medical record in the ICMS, capturing information such as visit date, visit type, encounter type, and intervention type. Once the required fields are entered, the employee visit information is transmitted and saved in a data warehouse, where batch-job query procedures are run based on defined criteria and then fed into a customized template worksheet for formatting purposes. Once the visit activity is summarized on the basis of the specified criteria, the results are grouped and costs are assigned on the basis of the type of encounter or visit (ie, occupational versus nonoccupational) and transferred into a management report on a PBG-period basis. Each period has 4 weeks and each year has 13 periods.

The report calculates a clinic's ROI on the basis of the operational costs of the site and determines the cost savings on the basis of the PEIS described earlier. For example, a random drug test, on average, costs

PBG ~\$33 to perform. The cost savings is multiplied by the quantity of encounters to derive a total cost savings for this type of occupational visit. A similar analysis is done for all other visit types to derive the aggregate ROI for the clinic site.

Data Analysis

On-site visit data from January 1, 2007, to December 31, 2008, were collected from ICMS for all of the clinics operated by Johns Hopkins for PBG.

For the purposes of this study, clinic- and system-wide ROIs were obtained by calendar period from the time of clinic opening. A log-linear mathematical model was used to determine the cumulative ROIs of all clinics after opening. Reopening a clinic in the same location was treated as a new clinic opening if there was a change in mid-level provider personnel.

To determine the level of utilization of the on-site clinics, the average number of visits by service type during the first 3 years (39 PBG periods) after their opening was calculated. Log-linear curves were used to fit the trend lines.

The proportion of unique employees using the clinic per PBG period (4 weeks) when compared with the whole plant population was calculated as period penetration/utilization rate. A multivariate linear regression was used to assess the association of ROI with the total number of employees and the PBG period penetration/utilization rate. Data from 2008 were used for this regression analysis. SAS 9.1¹⁸ was used in all data analyses.

Results

PBG On-Site Clinic Openings

Figure 1 shows the cumulative net number of on-site clinics at PBG. The first clinic was opened in January 2003. A total of 26 on-site clinics were actively running as of December 31, 2008.

The locations, opening date and closing dates, and the number of PBG employees at the sites for these clinics are shown in Table 1. On seven occasions, clinics were closed and reopened with new mid-level providers.

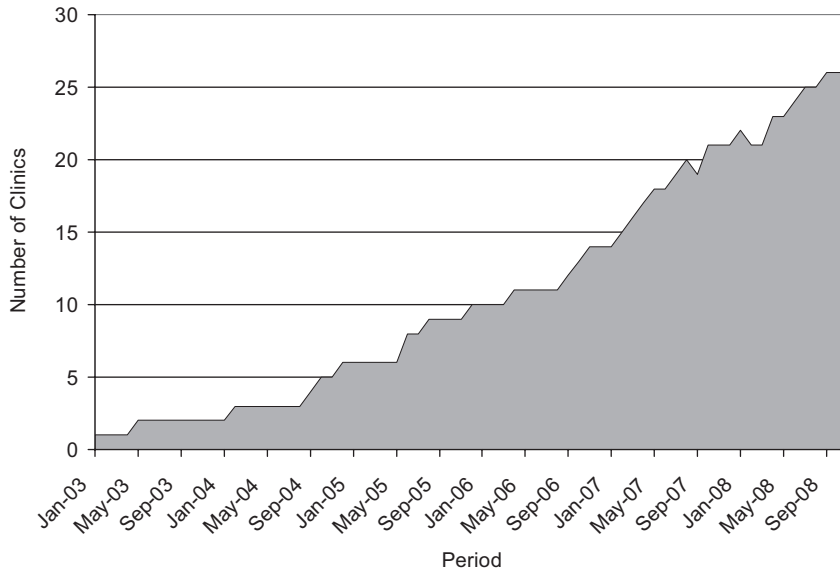


Fig. 1. Cumulative net number of on-site clinics in the PBG, 2003–2008.

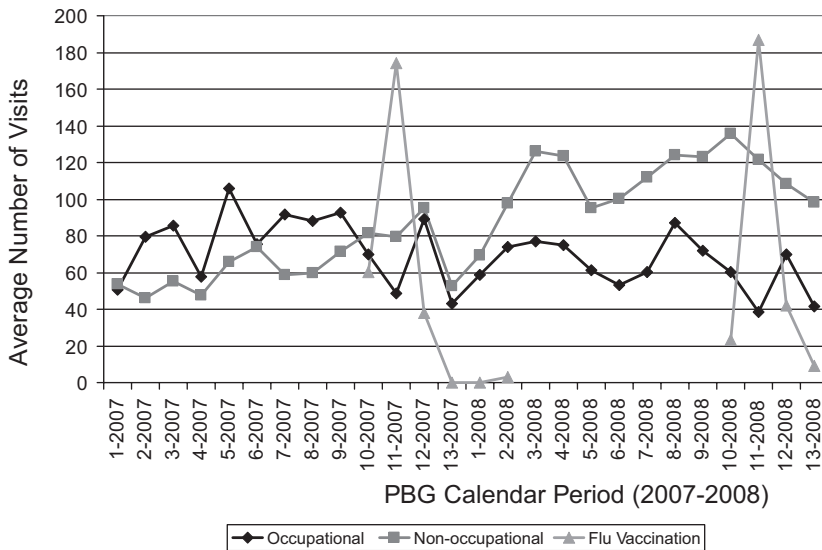


Fig. 2. Average number of visits by type of service, for the 26 PBG periods, January 2007 to December 2008.

visits increased during 2007 to 2008 (Fig. 2). Flu vaccination has significant seasonal service peak during winter periods. However, occupational and other nonoccupational visits did not show a clear seasonal pattern.

Monitoring ROI by Calendar Period

As previously mentioned, the ROI for each clinic was calculated every 4 weeks. For simplicity, Fig. 3 presents only the average ROI for all clinics according to the PBG calendar period, from January 2007 to December 2008. The ROI trend line started at 1.21 and ended at 1.36, increasing by 0.0059 for each PBG period, or 0.1534 for 26 PBG periods, based on the linear regression result. Although flu vaccination has a significant seasonal-service peak during winter periods, it contributed little change in ROI during the winter periods because the saving associated with flu vaccinated is limited.

Average ROI After Opening

Figure 4 presents the ROI values after clinic opening. All clinics that were open for at least 36 months were included in these calculations. On average, a new clinic reported an initial low ROI (0.4), which quickly increased to 1.2 by the sixth period (~6 months) and to 1.6 at the end of 13 periods (1 year) after opening. After a clinic had been open for ~1 year, the period-to-period ROI increases flattened out.

Monitoring Service Capacity After Opening

Figure 5 presents the average number of occupational and nonoccupational visits for the first 3 years after opening. At the time of opening, the observed numbers of occupational and nonoccupational visits were both at about 20. The number of occupational visits increased to more than 60 within the first six periods after opening and then fluctuated between 60 and 120. The number of nonoccupational visits in-

The study period covered 2 full years (26 PBG periods), from January 2007 to December 2008. The longest time for any one clinic to be represented in the study was 26 PBG periods (Baltimore, MD; McKees Rocks, PA; Orlando, FL; Buena Park, CA; San Diego, CA; Piscataway, NJ; and Mesquite, TX) and the shortest Johnstown, PA, was six periods. The clinic at Philadelphia, PA, was opened in June 2005 but changed nurse practitioners twice, once in November 2007 and the

other in May 2008, respectively. Each new practitioner was treated as a unique analysis unit in this study, so that the second nurse practitioner at this location would be the one with shortest time covered with only four periods in the analysis.

Monitoring Service Type by Calendar Period

The average number of visits per clinic per period for occupational visits decreased, whereas nonoccupational

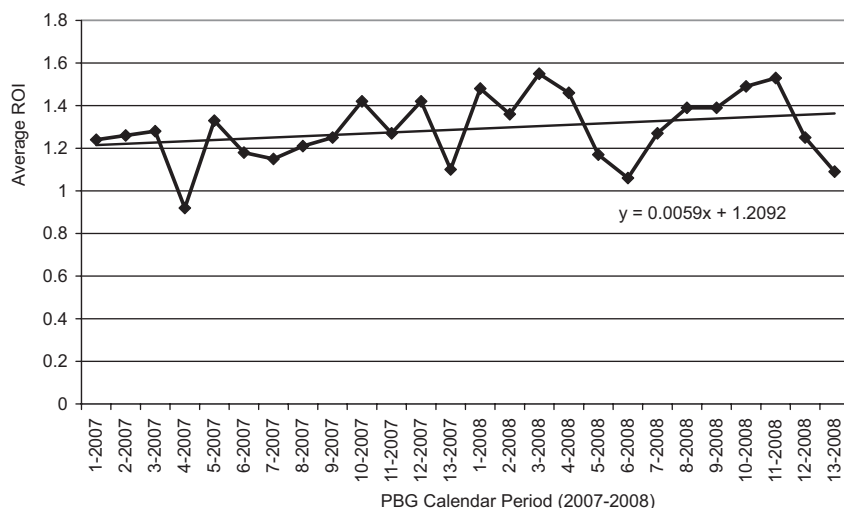


Fig. 3. Average ROI By calendar period, January 2007 to November 2008.

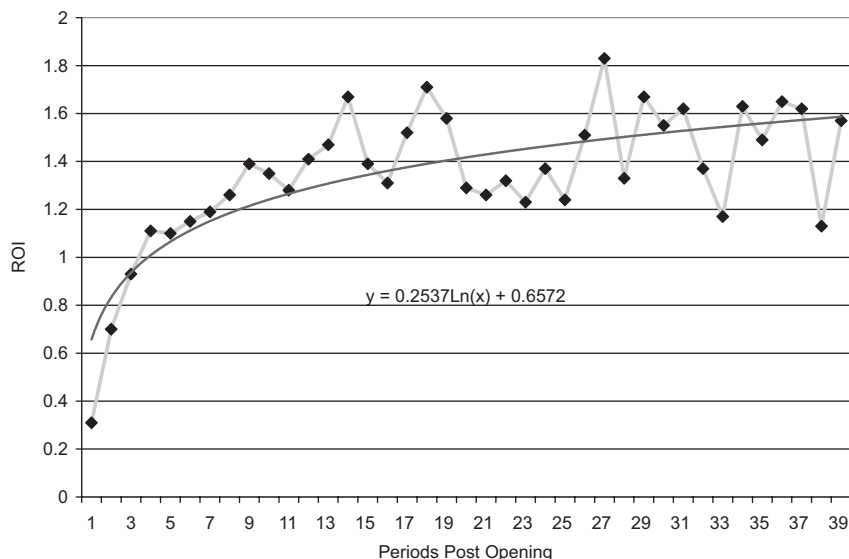


Fig. 4. Average ROI curve over 39 periods (3 years) after opening.

creased to more than 80 within the first six periods after opening and then fluctuated between 80 and 140. The log-linear regression lines indicate that, on average, the difference between the number of nonoccupational and occupational visits continue to increase after clinic opening.

Association of ROI With Number of Employees and Penetration/Utilization Rate

The proportion of unique employees using the clinic per PBG period (4 weeks) divided by whole plant population was defined as period penetra-

tion/utilization rate. This rate is influenced by services provided, awareness of services, and other factors that may influence the number of visits in a period. The average ROI is dependent on the total number of visits, and the number of visits is dependent on the population-size and penetration/utilization rate.

Based on the result of the multivariate linear regression, average ROI can be estimated using the following formula ($P < 0.001$; $R^2 = 0.9572$):

$$ROI = 0.0014187 \times \text{number of employees}$$

$$+ 3.6896 \times \text{penetration/ utilization rate per period.}$$

Table 2 shows the example ROI estimation based on the different employee numbers and PBG period penetration/utilization rate (unique visit per PBG period/number of employees). For instance, for the locations with 200 employees, 20% of penetration rate per PBG period is needed to break even or have an ROI of 1.0. For locations with 100 employees, 25% of penetration rate per PBG period is needed to break even (Table 2).

Discussion

The magnitude of our findings (an ROI of ~1.6) is consistent with previous studies that have addressed the cost-benefit ratios for the provision of on-site medical care at a specific point in time.^{10-12,16} As in other studies, our ROI calculation tool included cost-saving benefits attributed to the on-site delivery of primary health care services to employees as measured by occupational office visits, nonoccupational office visits, and various tests. Additional cost-saving metrics were included in our tool, such as return to work efficiencies, replacement labor cost avoidance, and reduced third-party administrative fees. However, the ROI calculation tool did not include other financial benefits that we believe accrue from these clinics. For example, on-the-job productivity is enhanced because employees using on-site clinic services remain on site and avoid additional on-duty driving time to seek off-site services. The prevention programs provided by the clinics may reduce future illness costs by addressing illnesses when they are reversible and lower in cost as opposed to treating these conditions when they have become more advanced and costly. Thus, the cost-savings values generated by the ROI tool used here are arguably quite conservative. We currently are refining our tool to include

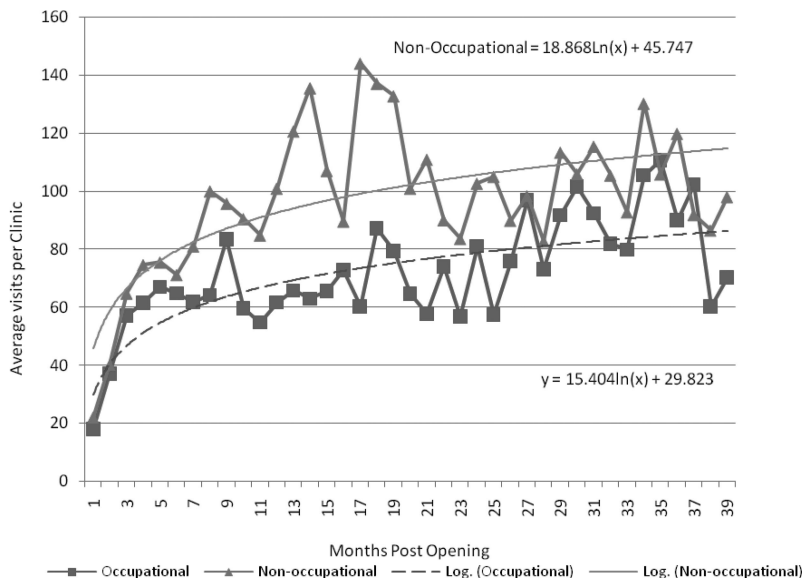


Fig. 5. Average number of visits by type of service, for the first 39 periods (3 years), after opening.

more productivity-related measures to address this issue.

Our study has indicated that the calculation of an ROI on a periodic basis can be a useful tool for gauging clinical performance. Using this approach, we found that it takes approximately three PBG periods for a clinic to break even after it opens. The low initial ROI is presumably associated with start-up expenses and a lower number of employees using the clinic. The clinic’s cost effectiveness increases steadily until ~1 year after opening. Then, the value levels off, presumably, because further increases are constrained by the size of the plant population.

Not unexpectedly, the magnitude of the ROI directly is tied to the proportion of the workforce served (penetration/utilization rate) and the size of the plant population. We found that a higher penetration/utilization rate is needed in small plants to achieve an ROI similar to that found in larger plants (Table 2). For example, a plant with 100 employees needs a penetration rate of 25% to break even, having an ROI of 1.06. A plant with 200 employees needs only a penetration rate of 20% to break even, having an ROI of 1.02.

Internal PBG information indicates that after the implementation of additional acute care services, wellness events, or other such programs, there was an increase in the number of presentations to the clinics and an increase in the ROI. This observation suggests that clinics that service smaller populations need to make a concerted effort to establish a variety of wellness initiatives and publicize these efforts (to increase penetration/utilization rates) in order to achieve the ROIs that larger plants can achieve.

Figure 2 indicates that the average number of occupational visits decreased during the study period. Therefore, the increase in nonoccupational visits was the primary driver of the increasing ROI. This observation was gratifying, highlighting the effectiveness of PBG’s accident prevention and safety management programs. It also indicated that the goal of increasing the ROI should be tied to nonoccupational visits and wellness programming, not to the treatment of accidents. This is not to say that the availability of an on-site clinic cannot have an effect on the cost of accidents. For example, better management of an occupational injury, once the injury has occurred,

TABLE 2

ROI Estimations Given Different Employee Numbers and PBG Period Penetration Rates

Penetration Rate (%)	Employees		
	100	200	300
10	0.51	0.65	0.79
15	0.70	0.84	0.98
20	0.88	1.02	1.16
25	1.06	1.21	1.35
30	1.25	1.39	1.53
35	1.43	1.58	1.72
40	1.62	1.76	1.90
45	1.80	1.94	2.09
50	1.99	2.13	2.27

has been shown to significantly decrease workers’ compensation costs.^{17,19–21} Unfortunately, our ROI assessment process was not designed to adequately capture these savings.

Lastly, once an on-site clinic matures, there seems to be no seasonal variation in the ROI except for preventative immunizations, which occur throughout the winter months.

Serial monitoring of a clinic’s cost-effectiveness is helpful in assessing on-site clinic performance from start-up to maturity as well as periodically. It will enable managers to set targets for newly opened clinics and to initiate programs aimed at increasing the benefit of worksite clinics to the corporation and its employees. Employers with similar demographics and job tasks may use our experience to gain an appreciation of the parameters necessary to achieve a cost-effective operation.

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