

Cost-Effectiveness Analysis of a Worksite Clinic

Is It Worth the Cost?

by David H. Chenoweth, PhD, and Judy Garrett, COHN/CM

Abstract

This study assessed the cost-effectiveness of a worksite clinic. In-house clinic operational costs were compared to off-site (i.e., community) health care costs during a 1-year time frame. Community cost norms were extracted from statewide databases and adjusted to local costs. Lost productivity costs were based on survey feedback from current clinic users, which included their estimated time away from work if they had to seek health care off-site, average hourly wages, and the number of actual treatments rendered by the on-site staff. Combined off-site costs of \$224,461 (health care) and \$113,883 (lost productivity) were nearly twice as high as actual on-site operational costs (\$171,332). Overall, it appears the organization's worksite clinic provides employee health care services 2 to 3 times more cost-effectively than do off-site health care services.

With the advent of higher health care costs and productivity concerns growing at more worksites in the past decade, an increasing number of companies are developing in-house clinics (Reynolds, 2005). These clinics exist in both mid-sized organizations such as Southwire Corporation (Carrollton, GA), New Holland Corporation (New Holland, PA), and Quad/Graphics (Lo-

mira, WI) and large organizations such as Eastman Kodak (Rochester, NY), Perdue Farms (Horsham, PA), SAS Institute (Cary, NC), General Electric (GE) Company (Fairfield, CT), and Eli Lilly Company (Indianapolis, IN) (Adcock, 2005; Pachman, Stempien, Milles, & O'Neill, 1996; Tselikis, 1999). According to some of these companies, on-site clinics make sense in terms of both cost-containment and quality of health care provided to their employees (Gemignani, 1998). For example, an external audit of Lilly's on-site clinics found that employees used fewer outpatient and inpatient services when adjusted for age, gender, and other demographics, than their peers in the community. Moreover, Lilly's database showed the costs to operate the clinic are much less than what the health plan would have been paying if employees used community health care providers (Tselikis, 1999). In a similar vein, Quad/Graphic's health care costs have risen just 6% annually during the past 4 years. On-site occupational health administrators credit this remarkable statistic, in part, to the clinic staff's ability to treat minor ailments before they progress to chronic and more expensive conditions. This cost containment resulted in Quad/Graphic's health care spending rate being 17% lower than the industry average. At software maker SAS Institute, on-site clinics saved the company \$1 million in 2000, according to the initial cost analysis (Shook, 2002). A more recent cost analysis of the company's clinic showed the initial cost savings have been sustained during the past few years (Adcock, 2005).

Like many organizations, Syngenta Crop Protection, Inc. funds its own employee health insurance plan. It has had an in-house clinic since 1973. The clinic serves employees only and operates during standard business hours. Clinic staff treat acute and chronic non-occupational and occupational illnesses and conditions. Employees' clinic records are handled according to the Health Insurance Portability and Accountability Act (U.S. Department of Health and Human Services, 2005) regulations and kept in separate folders apart

ABOUT THE AUTHORS

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Table 1
Primary Cost Categories

Cost Category	Annual Cost	Procedural Cost	Cost per Screening	Number of Screenings
A. Staff personnel*	\$164,276.16			
B. Equipment†	\$3,659.99			
C. Supplies‡	\$7,829.96			
D. Screenings/exams				
D.1. Compliance/wellness exams§				
Man: Lab work with PSA		\$17,183.00	\$160.72	106
Man/woman: Lab work without PSA		\$39,591.00	\$135.30	292
D.2. EKG for other reasons		\$424.05	\$28.27	15
D.3. Blood work: Physical exams		\$15,482.00	\$34.55	448
D.4. Other blood work		\$8,286.00	\$34.55	240
D.5. Drug screening		\$1,732.00	\$17.85	97
D.6. Allergy shots		\$786.59	\$0.75	1,055
D.7. Flu (influenza) shots		\$7,385.00	\$7.24	1,020
D.8. Immunizations		\$3,435.27	\$30.23	107
E. Physician treatments**				
F. Travel medications		\$2,806.00		

* Company-employed full-time occupational health nurse (1) and administrative assistant (1) and part-time clinicians (1 occupational health nurse and 1 occupational physician); the part-time physician carries own medical liability insurance while the nurses carry company-paid liability insurance.

† Equipment lease, office furniture, and depreciation costs.

‡ Cost of clinic including supplies for flu vaccine, allergy, and immunization shots.

§ Compliance exams and wellness exams are essentially the same “hands-on” screenings which include personal health history, complete blood chemistry, complete urinalysis, thyroid tests, lipid profile, electrocardiogram 40 and greater, and prostate-specific antigen (PSA) for men older than 45.

** Physician treatment costs are reflected in staff personnel.

from any other employee data. Employees sign releases to authorize Syngenta’s clinic staff to forward personal health-related data to off-site community providers.

COST-EFFECTIVENESS ANALYSIS

This cost analysis represents the first-ever econometric evaluation of Syngenta’s clinic. Although several econometric techniques can be used to evaluate the value of an on-site clinic, a standard cost-effectiveness analysis (CEA) methodology was chosen for this project because

- Data can be easily formatted into a simple accounting spreadsheet for accurate calculation.
- The analysis can be designed to measure both benefit (e.g., health care cost containment) and cost (e.g., staffing and resources) variables.
- It can be customized for different levels of specificity (degrees of rigor) tailored to selected benefit and cost variables.
- It allows benefit and cost variables selected for a CEA to be measured in both direct and indirect dollars.

Essentially, CEA is designed to compare one program against an alternative strategy to determine which option produces the greatest benefit for the least expense. Rather than assigning monetary values to a single intervention outcome (as happens in cost–benefit analysis), in CEA, only the costs of alternate interventions for achieving a specific outcome are compared. Thus, it can be defined as “A measure of the cost of an intervention relative to its impact, usually expressed in dollars per unit of effect” (Ostwald, 1986).

In applying economic principles to health management issues, some economists prefer to use CEA rather than to speak of “benefit–cost” (Cascio, 1987; Kristein, 1997). The CEA approach eliminates certain problems that can occur in cost–benefit analysis. With CEA, one compares the costs of specific interventions to achieve a given end or the physical outputs of a given dollar spent on different strategies aimed at the same goal.

By and large, this approach helps one avoid the more difficult issues in cost–benefit calculation wherein indirect benefits must be measured (e.g., the “human capital” computation). Because indirect benefit computations are not required, CEA is a simpler calculation for a single goal (although the epidemiological foundation must be the same for both). This approach also allows for comparisons of marginal and average costs of given outcomes. In some cases, a cost-effectiveness approach may indicate the lowest cost alternative for a procedure that may have little or no net benefit on a benefit–cost calculation. In simple terms, a cost-effective intervention is one that achieves a desirable outcome (e.g., providing primary health care services) at less expense than an alternative approach.

CONDUCTING A COST-EFFECTIVENESS ANALYSIS

Although conducting a CEA in a worksite setting can involve numerous tasks, evaluators used the following procedures to conduct this analysis:

- *Establish a program goal and objectives.* What is the in-

Table 2
Cost Differences Between On-Site and Off-Site Clinics

Cost Category	On-Site Clinic			Off-Site Clinic			On-Site versus Off-Site Difference
	Number of Screenings	Cost Per Screening*	Total Cost	Number of Screenings	Cost Per Screening*	Total Cost	
D.1. Compliance/wellness exams							
Man: Lab work with PSA	168	\$129.64	\$21,778.78	168	\$394.00	\$66,192.00	\$44,413.22
Man/woman: Lab work without PSA	280	\$168.75	\$47,250.64	280	\$368.58	\$103,202.40	\$55,951.76
D.2. EKGs for other reasons	15	\$56.87	\$853.00	15	\$106.00 ^{##}	\$1,590.00	\$737.00
D.3. Blood work: Physical exams							
D.3. and D.4. Combined	688	\$63.45	\$43,653.60	688	\$63.87	\$43,947.80	\$294.20
D.4. Other blood work							
D.5. Drug screening [†]	97	\$46.76	\$4,535.98	97	\$105.00	\$10,185.00	\$5,649.02
D.6. Allergy shots [‡]	1,055	\$4.45	\$4,699.61	1,055	\$35.00	\$36,925.00	\$32,225.39
D.7. Flu (influenza) shots [§]	1,020	\$7.24	\$7,385.00	1,020	\$23.00	\$23,460.00	\$16,075.00
D.8. Immunizations [§]	107	\$61.01	\$6,528.32	107	\$83.00	\$8,881.00	\$2,352.68
E. Physician treatments ^{**}	1,514	\$22.88	\$34,645.00	1,514	\$66.98	\$101,407.72	\$66,762.72
			Total = \$171,332.37			Total = \$395,790.92	
							Net Difference = \$224,485.55

* Staffing, procedural, and interpretation costs.
[†] Actual cost based on community vendor charge.
[‡] Off-site cost is based on local cost data provided by United HealthCare and Blue Cross Blue Shield of North Carolina, outpatient only.
[§] Off-site cost charged by Guilford County Department of Health, as quoted on December 23, 2003.
^{**} Per treatment cost based on percentage (45.1%) of physician workload devoted to treatment, average time of <10 minutes per treatment, and annual salary and benefits paid to part-time physician working an average of 10.75 hours per week.
^{##} Electrocardiogram (EKG) costs include staffing, procedural, and interpretation costs.
 Note. PSA = prostate-specific antigen.

intervention supposed to do for employees, the organization, or both? For example, an on-site clinic is designed to enhance health and productivity management outcomes (Goal) by providing quality and cost-efficient health care services to employees (Objective 1), motivating employees to use on-site health care services in a responsible manner (Objective 2), and encouraging employees to assume personal responsibility to avoid unnecessary absenteeism and loss in productivity (Objective 3).

- Calculate total intervention costs. Totals need to include major cost items such as personnel, facilities, and equipment and minor cost items, such as duplicating and recordkeeping.
- Determine the effects of each program intervention. One must compare the number of positive effects (e.g., early detection and treatment of chronic or potentially serious health-related conditions) of all interventions.

- Compare financial costs from both interventions to determine which is most cost-effective. Although a CEA may show one intervention has a greater return-on-investment (ROI), the decision to keep or eliminate a particular intervention should not be based solely on this comparison. An intervention with a moderate ROI may produce certain benefits that are not easily quantified (e.g., enhanced employee morale); not experienced throughout an organization (e.g., fewer accidents that lead to greater productivity in some departments); or delayed (e.g., enhanced management-labor relations that foster a culture of teamwork and greater productivity).

Because CEA is based, in part, on the cost of a specific program or intervention, it is important to consider if and when certain cost items should be factored into the actual analysis. For example, major cost entities such as staffing,

Table 3
On-Site Clinic Versus Off-Site Clinic Costs

<i>Cost Category</i>	<i>On-Site Clinic</i>	<i>Off-Site Clinic</i>
A. Health care costs	\$171,322.00	\$395,793.00
B. Lost productivity	\$0.00*	\$113,883.00
Total cost	\$171,322.00	\$509,676.00
Divided by number of employees	725.00	725.00
Per capita cost	\$236.00	\$703.00
Total cost	\$171,332.00	\$509,676.00
Divided by number of treatments/exams	1,962.00	1,962.00
Per treatment cost	\$87.32	\$259.77

* Employees can use clinic anytime during their flex-time work shift; thus, the time spent at the clinic is made up in the remainder of the workday.

screening equipment, medication, and laboratory analyses are typically chargeable items in a clinic budget. Yet, utility costs, for example, are usually treated as an incidental cost and, thus, are not charged to the clinic budget.

IDENTIFYING ON-SITE VERSUS OFF-SITE COSTS

Based on various clinic-centered cost data generated by Syngenta's health services staff, a cost accounting template was prepared to identify and compare in-house clinic costs against community cost norms. The template was prepared with data spanning a period of 1 year: July 2002 to June 2003. Specific procedures used in preparing the template included

- Identifying specific on-site clinic costs that could be subjected to a cost comparison versus off-site (i.e., community) health care services.
- Constructing a financial cost accounting worksheet including all on-site clinic costs incurred during the specified time frame.
- Obtaining market-specific norms to reflect off-site costs for the selected cost categories (costs were extracted from a statewide database [United HealthCare and Blue Cross Blue Shield of North Carolina, 2003]).
- Conducting a comparative analysis on each cost category to identify cost differences between actual on-site clinic services costs versus estimated off-site services.
- Calculating differences between on-site clinic costs versus off-site services costs to determine cost-effectiveness.

Table 1 shows primary cost categories pertinent to Syngenta's on-site clinic. Each of the six cost sectors were deemed acceptable for this analysis because they are direct cost entities according to the health services staff, are quantifiable (i.e., measurable and tangible) entities that can be verified with various cost data provided by the health services staff, and reflect a good index of employee demand for and use of health care services.

The next step was to construct a financial cost accounting worksheet including all on-site clinic costs incurred by Syngenta and to establish reasonable norms to reflect off-site costs for each of the selected services. Specific types of off-site cost data (D1, D2, D5, D6, and E in Table 1) were obtained from Syngenta's health services staff.

Off-site costs for blood work were considered identical to Syngenta's on-site costs, presuming that most

health care providers (private and public) could obtain blood analysis services from a local laboratory at the same or similar price per unit. The remaining types of costs (flu shots and immunizations) were obtained from sources listed in the footnotes of Table 2.

After community cost norms were obtained, a framework was constructed in which Syngenta's on-site clinic costs could be directly compared against community cost norms for each of the selected costs. Subsequently, financial cost differences between actual on-site clinic services versus estimated off-site services were quantified, as shown in Table 2.

In addition to the net cost-savings difference of nearly \$224,461 to Syngenta, it is important to note that on-site health care services also save employees approximately \$37,000 in out-of-pocket costs. This results when employees do not have to use off-site providers that would charge them a per visit co-payment of \$20 (1,514 treatments and 336 wellness examinations multiplied by \$20 equals \$37,000).

ON-SITE VERSUS OFF-SITE COST DIFFERENCES

Direct costs of approximately \$171,332 were incurred by Syngenta for providing health care services within its on-site clinic during the 1-year time frame. In contrast, if the identical number and type of services performed on-site were performed in off-site health care settings, Syngenta's costs would be approximately \$395,793, or approximately \$224,461 more than its actual expenditures. Yet, this cost difference only reflects direct costs incurred for staffing, equipment, supplies, various screenings and examinations, and physician treatments. It does not factor in other hidden costs such as lost productivity if employees would have to leave work to seek health care services in off-site health care settings. Nor does the cost difference factor in the number of days that employees would presumably come to work because they have on-site health care services instead of staying home and, thus, incurring lost-time absences.

These "hidden costs" have been studied by numerous organizations including GE. For example, employees using GE's on-site clinic were surveyed related to whether they would have used an outside provider if the corporate medical clinic were not available, and how many days per year they estimated they came to work because there was

Measuring the Effect of an On-site Clinic

Number of employee treatments	1,514
Estimated time away	x 2 hours (median)
Number of lost work hours	3,028
Average hourly wage	x \$37.61*
All workers' lost productivity	\$113,883†

* Obtained from Syngenta's Human Resource Information System department.

† Salary that would have been paid to non-working employees.

an on-site clinic when they would otherwise have stayed home. The results indicated that, on average, employees who used the facility saved 3.3 days of absenteeism. In addition, 69% of employees indicated they would have sought attention elsewhere, suggesting the presence of an on-site center does not solely induce demand (Pachman et al., 1996).

Although the scope of Syngenta's cost appraisal was not designed to reflect GE's research, Syngenta's health services staff and its evaluation vendor agreed initially to consider the issue of hidden costs in this evaluation. The first step undertaken in this pursuit involved the administration of a Medical Treatment Survey to recent visitors at Syngenta's on-site clinic. Two hundred and ten employees responded to the survey that consisted of the following seven items:

- Estimate the amount of time it would take to travel round trip to your health care provider's office.
- How long do you usually wait to see your health care provider?
- Estimate your total amount of time away from work if you were to visit your health care provider rather than coming to the on-site clinic.
- Do you address your health problems earlier by having an on-site clinic available to you?
- How many trips to your health care provider would you have made in the past year if an on-site clinic was not available?
- If you need regular allergy shots, please estimate the total amount of time away from work you would spend weekly to receive treatment if you received this service at your health care provider's office.
- How far in advance do you need to schedule an appointment to see your health care provider?

At least three of these queries provide some quantitative indices that can be used to measure the effect of an existing (or non-existing) on-site clinic. Specifically, self-reported responses for Items 3, 5, and 6 were used to generate the data shown in the Sidebar.

Collectively, when the lost productivity cost avoidance is combined with the health care cost savings noted previously, the cumulative cost savings is as follows: \$224,461 (health care cost savings) + \$113,883 (lost productivity cost avoidance) = \$338,344 (total cost savings).

IN SUMMARY

Cost-Effectiveness Analysis of a Worksite Clinic

Is It Worth The Cost?

Chenoweth, D.H., & Garrett, J.

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- 1 With the advent of higher health care costs and productivity concerns growing at many worksites, more companies are developing in-house medical clinics as a health and productivity management strategy. A formal evaluation plan should be considered as a viable technique to measure the costs and benefits of such interventions.
- 2 Cost-effectiveness analysis is a tool to demonstrate the value of occupational health services in relation to their costs and compare costs with alternative approaches. Selected community cost norms can be compared to actual on-site clinic costs to determine cost-effectiveness of a specific intervention.
- 3 Analyzing intervention costs related to designated goals is essential for strategic planning. Comparing all direct costs involved in operating an in-house medical clinic against off-site costs is an effective way to identify which approach is more cost-effective. Moreover, it may help nurses identify business opportunities or highlight services that are not as cost-effective as others. This provides an opportunity for nurses to objectively determine the best approach to provide options for the most effective services to meet employee and organizational needs.

On comparison of total cost savings against clinic operational costs, a benefit-cost ratio yielded the following ROI:

$$\frac{\text{Benefit}}{\text{Cost}} = \frac{\$ 338,344}{\$ 171,332} = \frac{\$ 1.97}{\$ 1.00} = 1.97 \text{ to } 1 \text{ (ROI)}$$

This ROI does not include employees' co-payment cost savings of \$37,000. If employees' co-payment cost savings were added to Syngenta's direct health care cost savings, the combined savings would be \$375,344—or a benefit-cost ratio of nearly 2.2 to 1.

OUTCOME MEASUREMENT

Focusing on the primary goal of this evaluation project—to determine if Syngenta's on-site clinic is cost-effective—it is important to conclude this analysis with a true CEA outcome measurement comparing actual on-site clinic versus estimated off-site health care costs. Specifically, Syngenta needs to determine which of the options can provide quality, convenient health care services at the least expense.

To conduct this head-to-head comparison, the CEA data shown in Table 3 was used.

Collectively, the financial comparisons previously described show health care services rendered through Syngenta's clinic are far more cost-effective than off-site health care services. In addition to corporate cost savings of nearly one-third of a million dollars, employees also financially benefit from the on-site facility in terms of personal convenience, on-the-job productivity, and avoiding out-of-pocket co-payments. Overall, it appears that Syngenta's on-site clinic provides employee health care services 2 to 3 times more cost effectively than do off-site health care services.

In addition to the CEA approach used in this analysis, occupational health management professionals should consider all available econometric options before they embark on an actual analysis. For example, some on-site professionals have successfully used the AAOHN's "Success Tools" in their clinic and health care delivery evaluation projects (Morris & Smith, 2001). By researching various options, occupational health managers will increase the odds of choosing an appropriate evaluation tool to meet their particular needs and, thereby, be in position to further demonstrate their economic worth to their respective organizations.

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Cost-Effectiveness Analysis of a Worksite Clinic: Is It Worth the Cost?

This issue of the AAOHN JOURNAL contains a Continuing Education Module on "Cost-Effectiveness Analysis of a Worksite Clinic: Is It Worth the Cost?" 1.0 contact hours of continuing education credit will be awarded by AAOHN upon successful completion of the posttest and evaluation.

A certificate will be awarded and the scored test will be returned when the following requirements are met by the participant: (1) The completed answer sheet is received at AAOHN on or before January 31, 2007; (2) A score of 70% (7 correct answers) is achieved by the participant; (3) The answer sheet is accompanied by a \$10.00 processing fee. Expect up to 6 weeks for delivery of the certificate.

Upon completion of this lesson, the occupational health nurse will be able to:

1. Explain why some organizations provide on-site medical clinic services.
2. List four major steps involved in conducting a cost-effectiveness analysis.
3. Distinguish between direct and indirect costs.
4. Describe how to estimate lost productivity costs associated with the absence of an on-site medical clinic.

AAOHN is accredited as a provider of continuing education in nursing by the American Nurses Credentialing Center's Commission on Accreditation. AAOHN is additionally approved as a provider by the California Board of Registered Nursing (#CEP9283) and the Louisiana State Board of Nursing (#LSBN3).

Contact hour credits received for successful completion of the posttest and evaluation may be used for relicensure, certification, or re-certification.

Directions: Circle the letter of the best answer on the answer sheet provided. (Note: You may submit a photocopy for processing.)

1. As a result of cost containment, Quad/Graphic's health care spending rate is ____% lower than the industry average.

- A. 6.
- B. 11.
- C. 17.
- D. 24.

2. According to the initial cost analysis, on-site clinics at SAS Institute saved the company \$_____ in 2000 with these savings sustained during the past few years.

- A. 350,000.
- B. 500,000.
- C. 750,000.
- D. 1 million.

3. All of the following are characteristic of cost-effectiveness analysis (CEA) except:

- A. The analysis can measure both benefit and cost variables.
- B. It assigns monetary values to a single intervention outcome.
- C. It can be customized for different levels of specificity.
- D. It allows variables to be measured in both direct and indirect dollars.

4. In conducting a CEA at the worksite, the occupational health nurse does this step first:

- A. Establishes program goals and objectives.
- B. Determines the effects of each program intervention.
- C. Calculates total intervention costs.
- D. Compares financial costs from both interventions to determine which is most cost-effective.

5. According to Syngenta data comparing on-site clinic cost per screening versus off-site clinic cost per screening, the difference for a man's physical exam with lab work including a prostate-specific antigen was:

- A. \$853.00.
- B. \$21,778.78.
- C. \$44,413.22.
- D. \$66,762.72.

6. What was the overall net cost-savings difference for Syngenta when comparing on-site clinic costs versus off-site clinic costs?

- A. \$37,000.
- B. \$66,763.
- C. \$171,332.
- D. \$224,461.

7. It is estimated that on-site clinic services saved Syngenta employees _____ in out-of-pocket costs.

- A. \$2,353.
- B. \$5,649.
- C. \$16,075.
- D. \$37,000.

8. The GE data indicated that employees who used the on-site medical clinic saved, on average, _____ days of absenteeism.

- A. 1.7.
- B. 2.4.
- C. 3.3.
- D. 4.7.

9. With the use of data from the Medical Treatment Survey, the addition of employee co-payment cost savings to Syngenta's total direct medical care cost savings yielded a benefit-cost ratio of:

- A. 1.75 to 1.
- B. 1.97 to 1.
- C. 2.2 to 1.
- D. 2.8 to 1.

10. Overall, the data support that Syngenta's on-site clinic provides employee health care services _____ times more cost effectively than do off-site services.

- A. 1 to 2.
- B. 2 to 3.
- C. 3 to 4.
- D. 4 to 5.

ANSWER SHEET

Continuing Education Module

Cost-Effectiveness Analysis of a Worksite Clinic: Is It Worth the Cost?

February 2006

(Goal: To gain ideas and strategies to enhance personal and professional growth in occupational health nursing.)

Mark one answer only!

(You may submit a photocopy of the answer sheet for processing.)

- | | |
|------------|-------------|
| 1. A B C D | 6. A B C D |
| 2. A B C D | 7. A B C D |
| 3. A B C D | 8. A B C D |
| 4. A B C D | 9. A B C D |
| 5. A B C D | 10. A B C D |

EVALUATION (must be completed to obtain credit)

Please use the scale below to evaluate this continuing education module.

	4 - To a great extent	3 - To some extent	2 - To little extent	1 - To no extent
1. As a result of completing this module, I am able to:				
A. Explain why some organizations provide on-site medical clinic services.	4	3	2	1
B. List four major steps involved in conducting a cost-effectiveness analysis.	4	3	2	1
C. Distinguish between direct and indirect costs.	4	3	2	1
D. Describe how to estimate lost productivity costs associated with the absence of an on-site medical clinic.	4	3	2	1
2. The objectives were relevant to the overall goal of this independent study module.	4	3	2	1
3. The teaching/learning resources were effective for the content.	4	3	2	1
4. How much time (in minutes) was required to read this module and take the test?	50	60	70	80

*Please print or type: (this information will be used to prepare your certificate of completion for the module).
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