RESEARCH NOTE

TIME COSTS ASSOCIATED WITH CERVICAL CANCER SCREENING

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Abstract

Objectives: Time costs borne by women when undergoing cervical cancer screening have rarely been elucidated, although such costs may pose substantial barriers to care. The purpose of this project was to quantify the opportunity costs associated with cervical cancer screening in young women attending Planned Parenthood Clinics.
Methods: We conducted a self-report survey of 105 women from six clinics to measure travel, waiting, and exam times associated with cervical cancer screening. Respondents recorded their time of arrival and departure, length of time in the waiting room, age, income level, and hours per week they worked outside of the home. Time costs were valued three ways: through self-reported hourly wage, age- and gender-adjusted minimum earnings, and national age- and gender-adjusted hourly wages.
Results: Respondents were on average 24 years old, worked 29 hours per week outside the home, and earned less than $20,000 per year. Mean time for one-way travel was 18.7 minutes; waiting room time was 16.9 minutes; and exam time was 50.8 minutes. Time costs were estimated to be $14.08 per visit based upon the self-reported hourly wage; $16.46 per visit based upon age- and gender-adjusted minimum earnings; and $19.63 per visit based upon age- and gender-adjusted national wage rates.
Conclusions: Time costs associated with cervical cancer screening represent an important opportunity cost and should be considered in studies attempting to identify barriers to screening adherence. Our results indicate that time costs accounted for up to 25% of cervical cancer screening costs. Time costs should be identified, measured, valued, and included in cost-effectiveness analyses of cervical cancer screening.

Keywords: Cervical cancer screening, Indirect costs, Cost analysis, Cost-benefit analysis

The Papanicolaou (Pap) smear has been the standard screening test for cervical cancer for three decades, and when used in population-based screening programs has led to a reduction in cervical cancer incidence and mortality (4;32). Currently, failure to be screened represents

the greatest obstacle to preventing invasive cervical cancer in the United States (11). In a 1997 study, approximately 7% of women in the United States reported never having been screened, and fewer than 80% of women reported having had a Pap smear in the preceding 2 years (31). The rates of screening are even lower for women who are at higher risk for cervical cancer (22;31;35).

The Panel on Cost-Effectiveness in Health and Medicine recommends including time costs accrued during travel to and from the clinic, in the waiting and exam rooms, and during the actual exam (14). Studies have shown that time and travel distance are potentially important barriers to participation in cervical cancer screening (2;3;6;15; 19;20;21;22;24;25;35); however, the majority of cost-identification and cost-effectiveness analyses evaluating cervical cancer screening have failed to include such costs (5;8;9;10;16; 17;23;26;27;28;29;34;36). One reason that researchers have omitted time costs, despite acknowledging that such costs may be substantial, is the lack of available empiric data on patients' time investment.

The purpose of our study was to quantify the opportunity costs associated with cervical cancer screening in young women attending Planned Parenthood Clinics. We estimated time costs based upon the travel, waiting, and exam times incurred during outpatient visits for Pap smear examinations and valued them according to self-reported wages, minimum adjusted wages, and target wage rates.

METHODS

We developed a survey to measure the time spent traveling to, waiting for, and undergoing Pap smear screening (available upon request from the authors). The survey was distributed in six clinics in a large Midwestern metropolitan area between April and July 1998. Each clinic was asked to distribute 25 surveys to consecutive women attending the clinic for cervical cancer screening. Women met the inclusion criteria if they were over the age of 18 years and their visit was for a regular physical exam that included a Pap smear; if returning for a follow-up Pap smear due to a previously abnormal test; or if undergoing colposcopy. Results are based upon all responses regardless of the reason for visit, unless otherwise noted. The one-page survey asked women to anonymously record their time of arrival and departure, the length of time they were in the waiting room, the primary reason for their visit, their age and income level, the number of hours per week they worked outside of the home, and the type of activities (e.g., child care) they performed if they did not work outside the home. Women left their completed surveys in a box when exiting the clinic. The research protocol was approved by the University of Cincinnati Institutional Review Board and by the directors of each of the participating clinics.

Patients recorded one-way travel and waiting times directly on the survey. Exam time was defined as the difference between total clinic time (i.e., time between entering and exiting the clinic) and waiting time. Total travel time was assumed to be twice the one-way travel time.

We assigned a value to patient time in three ways: a) using the respondents' self-reported wages; b) using the self-reported wage but substituting the national age- and gender-adjusted minimum earnings if greater than the reported wage; and c) using the national gender- and age-adjusted average wage rates (target wages) as reported by the U.S. Census Bureau (12;30;33).

Self-reported Wages

Patients recorded their personal annual income level by selecting one of eight income levels. We used the midpoint for each category as the annual income for each category and calculated an hourly wage based on the number of hours patients reported working during

an average week. The hours worked per week multiplied by 50 gave an estimate of the total number of hours worked per year. The annual income divided by the total number of hours worked per year provided an estimate of the hourly wage. For women who did not report working outside the home but did record an annual income, we imputed an hourly wage based upon the median hourly wage reported by other women in the same income level.

National Age- and Gender-adjusted Minimum Earnings

Our second estimate scaled self-reported hourly wages that were below the national lower bound up to national age- and gender-adjusted minimum earnings. In 1997, the minimum hourly earning rates recorded by the U.S. Census Bureau for women aged 16–19 years was $5.59; for women aged 16–24, $6.03; and for women 25 years and older, $8.83 (30). We inflated the 1997 wages to 1998 dollars using the annual rate of increase in hourly earnings from 1996 to 1997 (3.8%; the 1997–98 rate was not available) (30). Although the Census Bureau's age categories were not mutually exclusive, we assigned the rates for 16–19-year-olds to those in our sample who were 18–19 and the rates for 16–24-year-olds to those who were 19–24 years old. Thus, the following age- and gender-adjusted minimum hourly earning rates were applied: 18–19 years old, $5.80; 20–24 years old, $6.26; and 25 years and older, $9.17. For those reporting wages above the national age- and gender-adjusted minimum earning rates, we used respondents' actual self-reported hourly wage to compute the time costs.

National Gender- and Age-adjusted Hourly Wages

As an upper bound estimate, we used 1998 mean national gender- and age-adjusted wage rates (target wages) from the Current Population Survey (12;33). We assumed an average 40-hour work-week with 50 weeks of work per year. Hourly wages used for each age group were as follows: 18–24 years, $9.20; 25–29 years, $13.65; 30–34 years, $14.97; 35–39 years, $16.83; 40–44 years, $16.75; 45–49 years, $16.64; and 50–54 years, $16.93.

RESULTS

Among the six clinics, a total of 130 surveys (87%) were completed; all of the missing surveys were from one site. Nineteen (14.6%) respondents were excluded because they did not meet the age inclusion criteria, and six (4.6%) surveys were excluded because of missing time data, leaving 105 completed surveys for the analysis (Table 1). Most respondents were young (mean age, 24 years); the majority earned less than $10,000 per year, and nearly 85% of the sample earned less than $20,000 per year. On average, women worked 29 hours per week outside the home (median, 35 hours), with only 15% reporting working fewer than 10 hours per week. Thirty-seven women (35%) worked 40 hours per week, and eight women (7.6%) worked more than 40 hours per week. The majority of the respondents (94.3%) traveled by car to the clinic. Most visits were for an annual physical exam that included a Pap smear (n = 97), although eight patients had returned for a follow-up Pap smear due to a previous abnormal result and six were seen for both a Pap smear and colposcopy.

Total patient time amounted to 1.76 hours (106 minutes) including travel, waiting, and exam time. One-way travel time averaged 18.8 minutes (median, 15 minutes), although two women reported traveling 1.5 hours and another reported a 2-hour one-way drive to the clinic. Total clinic time, including time in the waiting and exam rooms, averaged 68.4 minutes (range, 15–240 minutes). Waiting time averaged slightly more than 17 minutes (median, 15 minutes) or approximately 25% of the total clinic time. Four women (3.8%) had to wait an hour or more in the waiting room. Examination time averaged 51 minutes

Table 1. Survey Respondents' Characteristics (n = 105)

Age in years	
Mean (standard deviation)	24.2 (6.4)
Median	23.0
Range	18–54
Annual income level (%)	
<$10, 000	52.4
$10,000–19,999	32.4
$20,000–29,999	12.4
$30,000–39,999	1.9
$40,000–49,999	0.0
$50,000–59,999	1.0
Hours worked/week outside the home	
Mean (standard deviation)	29.1 (15.5)
Median	35.0
Range	0–65
Mode of travel to clinic (%)	
Car	94.3
Bus	1.0
Walked	4.8

Table 2. Hourly Wage Rate Estimates and Screening Time Costs (1998 U.S. Dollars)

	Hourly wage rate			Screening time cost		
Method	Mean (SD)	Median	Range	Mean (SD)	Median	Range
Self-reported hourly wage[a]	8.09 (10.19)	6.67	2.50–87.50	14.08 (17.13)	9.05	1.89–116.67
National age- and gender-adjusted Minimum earnings[b]	9.61 (9.65)	7.50	5.77–87.50	16.46 (16.74)	11.75	1.89–116.67
National gender- and age-adjusted Hourly wages[c]	11.01 (2.66)	9.20	9.20–16.93	19.63 (11.15)	16.87	2.61–75.38

[a] Hourly wage based upon self-reported income level and hours worked per week.
[b] Hourly wage based upon self-reported hourly wage adjusted to national age- and gender-adjusted lower-bound earnings if below the lower bound.
[c] Hourly wage based upon national gender- and age-adjusted hourly wages.

(median, 45 minutes) or 75% of the total clinic time. Seven women (6.7%) spent over 90 minutes in the exam room, with one woman spending 165 minutes in the exam room.

Self-reported Hourly Wage Time Costs

Fifteen women did not report working outside of the home but reported an income. (These women may have been reporting a household income, may have been temporarily unemployed, or may have had income from investments or other nonwork sources.) We imputed their hourly wage based upon the median wage reported by other respondents within the same income level. The average hourly self-reported wage was $8.09 (median, $6.67) (Table 2). There was a 35-fold difference between the lowest ($2.50) and the highest ($87.50) wage rates. Total time costs associated with screening were $14.05, based on the mean, and $9.05, based on the median.

National Age- and Gender-adjusted Minimum Earnings Time Costs

Thirty-seven women (35%) reported hourly wages below their national age- and gender-adjusted minimum earnings rates. When their self-reported wages were increased to their respective national age- and gender-adjusted minimum earnings, the average hourly wage rose by $1.52 to $9.61 (median, $7.50; range, $5.77–$87.50). Time costs associated with screening averaged $16.46 (median, $11.75; range, $1.89–$116.67) based upon these estimates.

National Gender- and Age-adjusted Hourly Wages

The average hourly wage using national gender- and age-adjusted rates was $11.01, with a median of $9.20. Using this method, the time costs associated with screening amounted to $19.63 (median, $16.87). The range ($2.61–$75.38) using the national gender- and age-adjusted rates was much narrower than with the previous two methods of valuation, demonstrating that using national wages removes a substantial amount of variability.

Sensitivity Analysis Excluding Outliers

Four women had self-reported wages in excess of $20.00 an hour ($33.33, $36.67, $50.00, and $87.50). When they were excluded, the mean wages fell to $6.35 using self-reported hourly wages, $7.94 using the national age- and gender-adjusted minimum earnings, and $10.99 using national average gender- and age-adjusted wages. The mean time cost using self-reported hourly wages dropped to $11.29, and likewise, the mean time costs using the national age- and gender-adjusted minimum earnings dropped to $13.75. The national average gender- and age-adjusted hourly wages time costs only dropped by 7 cents. Excluding the four outliers with wages greater than $20.00 an hour, therefore, had a substantial effect on the averages for the first two methods of estimation but not for the third.

DISCUSSION

The objective of this study was to measure and value patients' time costs associated with cervical cancer screening. We defined patient time costs as the monetary value of the total travel, waiting, and examination time incurred during outpatient visits for Pap smear examinations. Study participants recorded the actual time incurred during their visits, and their time was valued by three different methods to illustrate the impact of varied valuation assumptions.

On average, women expended 1.75 hours participating in a single cervical cancer screening exam. Nearly 65% of the total time incurred was attributable to time in the clinic, while 35% was attributed to travel time. Once in the clinic, 75% of patients' time was spent in the examination room, and the remainder was spent in the waiting room. When time was valued according to the women's self-reported income levels, time costs averaged just over $14. Raising the earnings of women with hourly wages below the lower bound for their age and gender peers to the age- and gender-adjusted minimum wages increased the average time costs by nearly $2.50. Using the national age- and gender-adjusted wages as the method of valuation yielded an average time cost of approximately $20 per visit. In conclusion, we found that patient time costs associated with cervical cancer screening in this particular population averaged between $14 and $20 per visit, depending upon the method of valuation.

Few empiric studies have directly measured the amount of time patients expend participating in healthcare interventions. Some studies have used clinic scheduling practices to determine clinic time costs and have ignored actual travel time (13;14;18;21;32), while others have measured time in the clinic but have omitted waiting and travel time (1;7). Our results were based upon actual experiences rather than assumptions about the average length of clinic appointments and incorporated travel times. We found that the total travel

plus clinic time was nearly 20 minutes longer than generally presumed or reported in other studies (13;19). As a consequence, our time cost estimates are also higher than previously reported. A recent review of 14 studies that assessed the direct medical costs associated with cervical cancer screening reported an average cost of $62.57 in 1996 dollars (14). Our patient time costs add between 22% and 32% to these direct costs.

There are several limitations to our study. The Panel for Cost-Effectiveness in Health and Medicine recommended using age- and gender-specific wage rates to reflect the population that would be targeted for the intervention (12). We used a relatively small urban sample that was younger and poorer than the general target population for cervical cancer screening and may therefore have underestimated time costs. Since the survey was completed in the clinic, women with shorter waiting times (e.g., women who went into the exam room immediately) may not have had time or taken time to participate. We also assumed that the travel time to the clinic equaled one-half of their total travel time. Some women may have traveled to a different destination after the visit rather than returning to where they originated, and we may have under- or overestimated their total travel time. Finally, the Pap smear was part of a regular check-up for most of the women, so allocating all of the clinic time to cervical cancer screening may overestimate the costs. A more detailed observational or time-and-motion study would be required to distinguish the actual time spent performing just the Pap smear.

POLICY IMPLICATIONS

Women's time costs associated with cervical cancer screening represent an important and substantial opportunity cost. These costs should be considered and quantified in studies whose objective is to identify barriers to cervical cancer screening adherence. In addition, these costs may account for a significant proportion of Pap smear screening costs and should therefore be included in cost-effectiveness analyses of this preventive intervention (12).

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