RESEARCH COMMUNICATION

Cost Effectiveness of Cervical Cancer Screening among Chinese Women in North America

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Abstract

Background. Chinese North American women have high invasive cervical cancer rates and low screening rates. The cost-effectiveness of strategies to improve Pap testing rates for Chinese women living in Seattle, Washington and Vancouver, British Columbia was examined. Objectives. To calculate the costs and cost-effectiveness of implementing two strategies to motivate women to obtain a Pap smear. Research Design. A three-armed randomized, controlled trial was conducted. Women in each of two interventions (high-intensity outreach and low-intensity mailing intervention) were compared to a group of women who received usual care. Measures. Costs were captured via a group discussion of costs, accounting records, sampling of staff time logs, and estimation of costs and task times. Effectiveness was measured as the proportion of women in each intervention arm who reported receiving a Pap smear since the trial began. Cost-effectiveness was calculated as the incremental cost of screening each additional woman between an intervention arm and the control arm. Results. A greater percentage of women who received the outreach intervention had a Pap test than women who received mailed materials or women who were in the usual care arm. The intent-to-treat cost for each additional woman to be screened for a Pap test was $ 415 in the Outreach arm and $ 676 for the Direct Mailing arm. The outreach worker intervention, though more expensive overall, was more cost-effective than the mailing intervention. Conclusions. Outreach intervention is cost-effective for sponsors and should be considered as a strategy to motivate Chinese women living in North America to seek cervical cancer screening.

Key Words: Cost effectiveness - cervical cancer screening - Chinese-Americans

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Introduction

Studies on cervical cancer among North American Chinese women indicate that such women in both Canada and the United States (US) have higher rates of invasive cervical cancer than the general population (Archibald et al., 1993; Parkin et al., 1992). In 1993, a study found that Chinese women in Vancouver, British Columbia, Canada had a cervical cancer rate of nearly 30 per 100,000 compared to only half as much for non-Hispanic white women (Archibald et al., 1993). In Los Angeles, the rate of cervical cancer for Chinese women is 12.3 per 100,000 compared to 7.2 per 100,000 non-Hispanic white women (Parkin et al., 1992). At least one reason for such high rates may be attributed to a lack of screening.

Surveys have shown that Chinese women in North America have lower cervical cancer screening rates than the general population. A behavior risk factor survey conducted in Oakland, California found 45% of Chinese women never had a Pap smear, compared to 5% of the total California female population (Center for Disease Control and Prevention, 1992). In San Francisco, only 37% of Chinese women routinely had cervical cancer testing. Canadian studies showed that women born in Asia were 11 times more likely than Canadian-born women to never have had a Pap test (Maxwell et al., 2001).

Health promotion interventions can effectively improve cancer screenings in a population. Successful strategies have included door-to-door canvassing, in-home educational sessions, and directly mailing materials (Bowman et al., 1995; Byles et al., 1995; McAvoy & Raza, 1991; Sung et al., 1992). However, less is known about the cost-effectiveness of interventions to improve cancer screening. As part of this project, we collected cost data to conduct a cost-effectiveness analysis of the different treatment arms. Increasingly, the cost of care is an important issue in today's clinics. Interventions to increase use of medical services, such as cervical cancer screening, are often mediated by the costs of motivating women to receive screening. To provide clinics with

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estimates of the cost-effectiveness of such interventions, we separately evaluated the cost-effectiveness of the low intensity and high intensity interventions in the two cities in which the project took place. In this paper, we present the results of a cost analysis for the randomized control trial to promote cervical cancer screening among Chinese women living in the two cities in North America.

Materials and Methods

Setting

Previously we reported the results of a randomized controlled trial conducted with Chinese women residing in Vancouver, BC, Canada and Seattle, Washington, US (Taylor et al., 2002). Two approaches were used to increase cervical cancer screening among the Chinese women. A "low intensity" intervention consisted of culturally and linguistically appropriate direct mailing of materials, including a cover letter, video, motivational pamphlet, educational brochure, and a fact sheet. A "high intensity" intervention consisted of home visits by outreach workers. The workers provided support, acted as role models, and served as cultural mediators. They watched an educational, motivational video with the woman, used visual aids to educate the woman, and provided tailored responses to individual barriers regarding screening. A "usual care" group also was assessed. The intervention design and methods have been described in detail elsewhere (Taylor et al., 2002). Both the low intensity and high intensity groups were effective in increasing cervical cancer screening rates over usual care. Further, the high intensity intervention was significantly superior to the low intensity intervention.

To assess the cost-effectiveness of the intervention, we gathered cost data and effectiveness data of the three interventions in each of the two cities. For this analysis, only the costs associated with delivering the intervention to the population were collected. Research costs were excluded under the rationale that another facility that used these interventions would not have to incur those costs. Similarly, the costs were related only to the costs of motivating women to obtain Pap testing. Therefore, we did not include the costs of the Pap smear itself, processing of the smear, or following-up of abnormal results. Cost data were collected in both U.S. and Canadian currency. Once the data were collected and entered into the model, the Canadian dollar was converted to U.S. dollars at the June 1, 1999 conversion rate of $0.68. Cost data for this project were collected between 1999 - 2000 and analyzed in 2004.

Data collection

Cost data were collected using four methods: a modified Delphi technique where we asked staff to estimate a priori how much each activity was likely to cost, accounting records, sampling of staff time logs, and estimation of costs.

The modified Delphi technique uses staff estimates of cost and time to complete tasks. Project staff members separately created lists of tasks completed for each activity. These lists were collected by cost analysts, combined, and redistributed to staff. Staff then placed an estimate of time to do each activity on the task list. The estimates were averaged and the lists returned to individual staff. When agreement consensus was reached on the lists of tasks, the time estimates were considered fairly accurate.

About midway through the project, we asked staff to keep task logs for a one month period. This was done midway rather than at the beginning so the start-up time, or "learning curve" could be completed before task times were tracked. These times were then compared with the estimated times from the modified Delphi technique which were developed a priori. The logs were considered to be most accurate as staff were requested to keep track of time in 15 minute intervals. Nevertheless, we found no substantial differences between the logs and the previous estimates.

Accounting records were used to record the purchase of supplies, materials, and other goods required for the project. Accounting records also produced payroll reports that went into the cost spreadsheets. Capital expenditures also were captured this way.

Estimates of certain costs, such as miscellaneous and overhead costs were modeled based on historical accounting data for miscellaneous costs. This ensured that we captured costs of shared telephone, fax equipment, copiers, and other office supplies. Finally, each institution clinic is likely to have its own overhead charges for rent and similar costs; thus, we used our own institutional off-site rate for overhead costs.

Intervention Costs

Intervention costs are divided into personnel and non-personnel costs. Personnel costs included all the time spent on training and conducting an activity and placing a dollar value on those activities. For the direct mailing, personnel activities included time spent training intervention staff, in intervention-related meetings, mail-merging, and assembling packets. Non-personnel costs included the production of handbooks and manuals, the envelopes and letterhead going into the mailed packet, the project video, two educational and motivational brochures and a fact sheet, and postage.

For the outreach intervention, personnel costs also included training and assembling an initial mailing to introduce the project to the participants. Other personnel tasks included contacting the participant for home visits, traveling to the neighborhood, spending time with the woman, and assisting women with scheduling. Non-personnel costs included VCR equipment, the video, a Pap test kit to demonstrate the procedure, a speculum to demonstrate the equipment used, and the three motivational and educational brochures.

No activities were done with the usual care arm, thus, the costs for that arm were calculated as $0.00.

Cost areas

Costs were collected from each of the intervention components. Discounting was not used because the time interval between intervention delivery and cervical cancer screening was less than twelve months. Costs are divided into fixed and variable costs.

Fixed costs

Direct costs included staff training and project meetings, VCR equipment, the videotape, a Pap test kit, the three brochures, and a speculum. The total cost was depreciated for the useful life of the VCR and specula, as was suggested by research staff. The annual amount was converted into a monthly cost then multiplied by the number of months of the intervention period. The pro-rated, depreciated cost for each item was then charged to the intervention.

Variable costs

The remaining costs of the intervention are variable and dependent on the number of staff and participants. These include staff training time, staff training materials, travel time, time spent on each component of the intervention, postage, staff salaries, and miscellaneous costs.

Salaries of the paid positions were used where appropriate. Annual time worked per year was based on 2080 hours (40 hours x 52 weeks) in the U.S. and 1950 hours (37.5 hours x 52 weeks) in Canada. Deducting time for vacations, breaks, walking, and other non-productive purposes yield a productive time rate of 0.7348 per one hour worked (Andersen et al., 2002; Thompson et al., 2002).

Miscellaneous Costs

Costs of supplies required for the day-to-day operations, such as office and computer supplies or faxing were also calculated, based on historical accounting data and consist of a monthly charge per full time employee as described elsewhere (Thompson et al., 2002).

Overhead Costs

Overhead costs include those incurred by regular running of a business, such as administrative costs, rental of space, and other overhead costs. In this analysis, we applied an indirect cost rate of 28.7%. This was the average of two institutional rates. This rate has been used in previous literature and is within the range (24%-37% of direct cost) of other screening program studies (Thompson et al., 2002).

Cost effectiveness calculation

To assess the cost-effectiveness of each intervention arm against the control arm, all relevant costs as described were used. The formula for calculation used:

For the Direct Mail arm: Let CM = cost per woman in the Direct Mail arm; let EM = effectiveness of the intervention (percent of women who received a Pap smear) Then :Cm = total fixed plus variable costs per woman in the Direct Mail arm, Cc = total fixed plus variable costs per woman in the control arm, Em = effectiveness (percent of intervention group women who reported receiving a Pap smear within six months of randomization) in the intervention arm.Ec = effectiveness (percent of control group women who reported receiving a Pap smear within six months of randomization) in the control arm.

To compare this intervention arm with the control arm, we calculated the incremental cost per additional woman screened for cervical cancer was calculated: (Cm-Cc)/(Em-Ec)

For the Outreach arm: Let CO = cost per woman in the Outreach Arm; Let EO = effectiveness of the intervention per woman in the Outreach Arm Then: Co = total fixed plus variable costs per woman in the intervention arm, Cc = total fixed plus variable costs per woman in the control arm, Eo = effectiveness (percent of intervention group women who reported receiving a Pap smear within six months of randomization) in the intervention arm. Ec = effectiveness (percent of control group women who reported receiving a Pap smear within six months of randomization) in the control arm.

To compare this intervention arm with the control arm, we calculated the incremental cost per additional woman screened for cervical cancer was calculated: (Co-Cc)/(Eo-Ec)

Results

A total of 482 women were randomized to the three arms. The study sample for the cost-effectiveness analyses included 199 women in Seattle and 283 women in Vancouver.

Figure 1 summarizes the study design with the number of participants randomized to each arm and the number of respondents to the follow-up survey, from which effectiveness was ascertained. Both an intent-to-treat analysis and a cost to sponsor analysis were conducted. Costs were calculated separately for Seattle and Vancouver as well as for both cities combined.

Costs

Table 1 shows details for costs per activity derived from the intervention components of both cities. This table shows the materials, staff, tasks, salary, cost of materials, and time required to complete each component

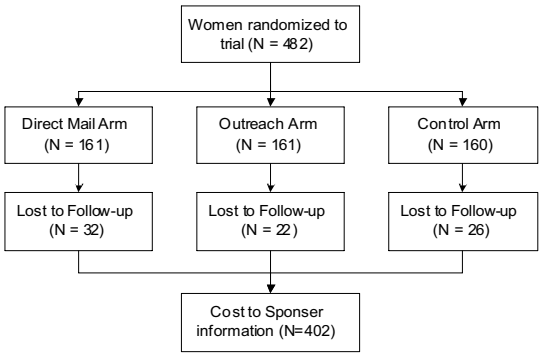

Figure 1. Study Design and Follow-up

Table 1a. Activity Costs to Sponsor for Direct Mailing Arm of the Cervical Cancer Intervention

Cost	Seattle Total	Seattle /Woman (63)	Vancouver Total	Vancouver /Woman (76)	Combined Cities Total	Combined Cities /Woman (139)
Personnel						
Staff Training and Project Meetings						
Time spent training intervention staff	445.44	7.07	326.40	4.30	771.84	5.55
Time spent in intervention-planning meetings	946.56	15.01	153.60	2.02	1100.16	7.91
Time spent in intervention-related meetings	59.40	0.94	31.05	0.41	90.45	0.65
Mailing						
Time spent mail-merging & printing introductory letter	0.34	0.01	349.60	4.60	349.94	2.52
Time spent assembling mailing packet	42.84	0.68	524.40	6.90	567.24	4.08
Time spent copying intervention forms	1.70	0.03			1.70	0.01
Total cost of staff training and meeting	1496.28	23.74	1385.05	18.23	2881.33	20.73
Non-Personnel						
Training Manual	13.48	0.21	9.50	0.13	22.98	0.17
Resource Manual	40.95	0.65	41.04	0.54	81.99	0.59
Mailing label	1.26	0.02	1.52	0.02	2.78	0.02
Return envelope	22.68	0.36	31.16	0.41	53.84	0.39
Letterhead	3.15	0.05	1.52	0.02	4.67	0.03
Postage (Outgoing)	145.53	2.31	175.56	2.31	321.09	2.31
Postage (Return)	117.81	1.87	162.64	2.14	280.45	2.02
Video	393.75	6.25	651.32	8.57	1045.07	7.52
Brochure 1	113.40	1.80	136.80	1.80	250.20	1.80
Brochure 2	87.57	1.39	105.64	1.39	193.21	1.39
Brochure 3	10.71	0.17	12.92	0.17	23.63	0.17
Total non-personnel costs	966.03	15.33	1343.12	17.68	2309.15	16.62
Indirect cost@28.7%	706.68	11.21	782.98	10.31	1489.66	10.72
Miscellaneous Charges	54.60	0.87	10.50	0.14	65.10	0.47
TOTAL COST-DIRECT MAILING	3223.59	51.15	3521.65	46.36	6745.24	48.54

of the intervention. All Canadian personnel and materials purchased in Canadian dollars were converted to US dollars. All costs are in 1999 US dollars. Canadian dollars were converted to U.S. using the Interbank exchange rate on June 1, 1999 of $1 Canadian = $0.68 U.S. Personnel costs were routinely higher in the US than in Canada.

As can be seen in Table 1, costs are divided into personnel and non-personnel costs. For the direct mail intervention, personnel costs include staff training and meetings, and creating and assembling mailings. Non-personnel costs included the development and production of training manuals, resource manuals, envelopes, postage, a copy of the video, and educational brochures.

Costs for the outreach intervention involved more personnel time than the direct mailing. Again, costs include non-personnel costs, such as a video, motivational brochures, pamphlets, and other materials. A video cassette recorder (VCR) was purchased for the outreach worker to use if the woman did not have a VCR in their home to watch the video; and because this is considered a durable good, this cost was depreciated. A speculum was purchased to show woman the instrumentation that would be used in a Pap test. It too was depreciated.

Tables 2 through 4 show the costs to the sponsor (in this case, the research institutes) for women receiving the two interventions, and the intent-to-treat costs. For the two cities combined (Table 2), the direct mailing intervention cost per women (sponsor's cost) was $48.54. The effectiveness of the intervention was 10% for the sponsor-treated women or $485 for each additional woman motivated to receive cervical cancer screening. The completion rate drops in the intent-to-treat condition because women were lost to follow-up and we assumed that they were not compliant with screening. For that analysis, there was a 7% effectiveness rate or an additional cost of $676 per woman who was motivated to receive screening.

The outreach intervention was more effective than the direct mailing intervention, and it was also more cost-effective. Of the 129 women who received the intervention, 39% received cervical cancer screening. This was 24% higher than the control group, yielding a cost per additional woman motivated to be screened of $304. Using the same number for the intent-to-treat analysis resulted in a cost of $415.

The major costs are summarized for each of the two cities. Two models are presented for each city: a model using the group receiving the intervention; and a model using an intent-to-treat analysis. Table 3 shows the cost-effectiveness analysis for Seattle. There, the direct mailing intervention was not effective, but the outreach intervention was more effective than the control (37% compared to 22%, respectively). The intent-to-treat rate of effectiveness was .33. Table 4 shows the cost-effectiveness of the interventions in Vancouver where both interventions were effective.

As can be seen, of the 181 women in Seattle who were considered to have completed the intervention, 59 women received the high-intensity outreach worker intervention, 63 women received the direct mailing only, and 59 women received usual care. More women in the outreach arm (37%) reported having a Pap test than in either the mailing

Table 1b. Activity Costs to Sponsor for the Outreach Arm of the Cervical Cancer Intervention

Cost	Seattle Total	Seattle /Woman (59)	Vancouver Total	Vancouver /Woman (70)	Combined Cities Total	Combined Cities /Woman (129)
Personnel						
Staff Training and Project Meetings						
Time spent training intervention staff	445.44	7.55	326.40	5.58	771.84	5.99
Time spent in intervention-planning meetings	946.56	16.05	153.60	2.63	1100.16	8.53
Time spent in intervention-related meetings	59.40	1.01	31.05	0.45	90.45	0.71
Initial Mailing						
Time spent mail-merging & printing introductory letter	20.06	0.34	13.80	0.20	33.86	0.27
Time spent assembling packets	20.06	0.34	13.80	0.20	33.86	0.27
Time spent copying forms	25.50	0.43	0.00	0.00	25.50	0.20
Outreach Activities						
Update tracking data base	1.76	0.03	1.61	0.02	3.37	0.03
Track woman who moved	0.88	0.01	1.61	0.02	2.49	0.02
Contact woman for home visit (including attempts)	181.72	3.08	58.88	0.84	240.60	1.96
Travel to women's home	467.28	7.92	220.80	3.15	688.08	5.34
Park at woman's home	181.72	3.08	44.16	0.63	225.88	1.76
Time spent with woman during home visit	1116.28	18.92	794.88	11.36	1911.16	14.82
Assist woman with scheduling appointment	1038.40	17.60	5.52	0.08	1043.92	8.10
Total cost of staff training,mailing,and home visits	4505.06	76.36	1666.11	25.16	6171.17	47.84
Non-Personnel						
Training Manual	13.48	0.23	9.50	0.14	22.98	0.18
Resource Manual	15.74	0.27	13.50	0.19	29.24	0.23
4" x 9" mailing envelopes	5.90	0.10	28.70	0.41	34.60	0.27
Return envelope	0.00	0.00	0.00	0.00	0.00	0.00
Mailing label	0.59	0.01	0.70	0.01	1.29	0.01
Letterhead	5.90	0.10	2.80	0.04	8.70	0.07
Postage (Outgoing)	19.47	0.33	43.40	0.62	62.87	0.49
Postage (Return)	0.00	0.00	0.00	0.00	0.00	0.00
VCR (depreciated)	40.00	0.68	40.00	0.57	80.00	0.63
Speculum (depreciated)	20.00	0.34	20.00	0.29	40.00	0.31
Pap Test Kit	5.00	0.08	5.00	0.07	10.00	0.08
Video	6.25	0.11	8.57	0.12	14.82	0.12
Brochure 1	106.20	1.80	115.20	1.65	221.40	1.72
Brochure 2	106.20	1.80	88.96	1.27	195.16	1.52
Brochure 3	10.03	0.17	10.88	0.16	20.91	0.17
Travel Assistance (bus fare)	1.50	0.03	0.00	0.00	1.5	0.02
Total non-personnel costs	356.26	6.05	387.21	5.54	743.47	5.77
Indirect cost@28.7%	11395.20	23.65	589.30	8.42	1984.5	15.39
Miscellaneous Charges	168.21	2.85	84.42	1.21	252.63	4.06
TOTAL COST-OUTREACH	6424.73	108.91	2727.04	40.33	9151.77	73.06

arm (22%) or the control arm (22%). Because there was no increase in effectiveness in the direct mail arm over the usual care arm in Seattle, the cost per additional woman screened was not calculated separately for the Seattle direct mail condition.

In Vancouver, of the 221 women for whom we had information in the three arms, 70 received high-intensity outreach worker intervention, 76 women received direct mailing only, and 75 women received usual care. Again, more women in the outreach arm (40%) reported having a Pap test than in either the mailing arm (19%) or the control arm (9%). In Vancouver, the direct mail arm

Table 2. Cost Effectiveness of the Interventions to Motivate Cervical Cancer Screening

	Direct Mail			Outreach		
	Intent-to-treat (eligible) group	Group known to receive intervention	Control group	Intent-to-treat (eligible) group	Group known to receive intervention	Control group
Number of Women	161	139	160	161	129	160
Number (%) receiving a Pap test	35 (22)	35 (25)	24 (15)	47 (29)	47 (39)	24 (15)
Efficacy of intervention	7	10	0	14	24	0
Total cost of intervention women screened	$7618.51	$6745.24	$0	$9350.47	$9,151.77	$0
Cost per woman	$47.32	$48.54	$0	$58.08	$73.06	$0
Cost per additional woman**	$676.00	$485.40	$0	$414.86	$304.42	$0

* Percent difference between intervention women and control group women ** intervention over control motivated to be screened

Table 3. Cost Effectiveness of the Interventions to Motivate Cervical Cancer Screening in Seattle

	Intent-to-treat (eligible) group	Direct Mail Group known to receive intervention	Control group	Intent-to-treat (eligible) group	Outreach Group known to receive intervention	Control group
Number of Women	66	63	59	67	59	59
Number (%) receiving a Pap test	14 (22)	14 (22)	13 (22)	22 (33)	22 (37)	13 (22)
Efficacy of intervention				11	15	0
Total cost of intervention women screened	$3,288.76	$3,223.59	$0	$6,353.23	$6,424.73	$0
Cost per woman	$49.81	$51.15	$0	$94.79	$108.91	$0
Cost per additional woman**	N/A	N/A	$0	$861.73	$726.07	$0

* Percent difference between intervention women and control group women ** intervention over control motivated to be screened

Table 4. Cost Effectiveness of the Interventions to Motivate Cervical Cancer Screening ion Vancouver

	Intent-to-treat (eligible) group	Direct Mail Group known to receive intervention	Control group	Intent-to-treat (eligible) group	Outreach Group known to receive intervention	Control group
Number of Women	95	76	75	94	70	75
Number (%) receiving a Pap test	21 (22)	21 (28)	7 (9)	22 (23)	22 (40)	7 (9)
Efficacy of intervention	13	19	0	12	31	0
Total cost of intervention women screened	$4331.56	$3521.65	$0	$2796.24	$2727.0	$0
Cost per woman	$45.59	$46.36	$0	$31.91	$40.33	$0
Cost per additional woman**	$350.69	$309.07	$0	$265.92	$130.10	$0

* Percent difference between intervention women and control group women ** intervention over control motivated to be screened

produced higher screening rates than the usual care arm.

Discussion

The cost-effectiveness of promoting Pap testing among Chinese women in Seattle, Washington and Vancouver, BC was explored. Intervention effectiveness in both cities was greater among women in the high intensity outreach arm, followed by the low intensity mailing arm, and the usual care arm in both cities. The results indicate that although the intensive outreach worker intervention is more expensive, it is more cost-effective in motivating Chinese American women who are under-screened for cervical cancer to get a Pap test.

It has been nearly a decade since Drummond and colleagues recommended guidelines for cost analysis modeling and presentation in articles,yet inconsistencies remain in the literature, making comparisons of similar interventions difficult (Drummond et al., 1997). Gold and colleagues also urge more rigor in presentation of cost-analysis factors(Gold et al., 1996). Drummond's and Gold's guidelines were followed; thus, the costs presented here are complete in terms of direct and indirect costs associated with motivating women to be screened for cervical cancer. Other studies described below did not necessarily adhere to those guidelines.

A few other studies have published cost-effectiveness analyses of cervical cancer screening interventions in the U.S. (Hyndman et al.,1996; Lantz et al., 1996; Chirikos et al., 2004; Lynch et al., 2004). Lantz and colleagues (1996) examined the costs and effectiveness of a physician screening reminder letter and reminder call. The authors note their analysis includes only the direct costs of the intervention, so the cost per additional woman screened, $15.63, is roughly comparable to our direct mail arm in Seattle of $15.59, excluding cost categories not reported in the Lantz article. Lynch et al (1996) conducted a cost-effectiveness analysis on a four-arm intervention: tailored letters with pre-scheduled appointments, interventionist-led personal contact with women already at the clinic; both; and usual care.(Lynch et al.,1996; Valanis et al., 2002). Lynch and colleagues report outcomes and a cost model design similar to this intervention and present the cost per additional woman screened and the cost-effectiveness analysis of the outreach arm at $818, (2000 US dollars) (Lynch et al., 1996).

Some other studies have taken place outside of North America, making comparisons difficult (Hristova & Hakama, 1997; Hyndman et al., 1996) A research group in Australia assessed the cost-effectiveness of four randomly assigned interventions to improve cervical cancer screening rates in the general population. The researchers found that, compared to the control group (who received no letters recommending an appointment to receive a Pap test), the incremental cost-effectiveness for those who received a generic letter, but no specific appointment was $97.75, while for those who received a letter with a specific appointment it was $86.50 (1991 Australian dollars) (Hyndman et al., 1996). Another group of researchers found that a church-based intervention using telephone and mailing counseling to improve mammography screening rates cost $188 per additional woman screened; however, volunteers were used to implement the intervention (1997 US dollars) (Stockdale et al., 2000). In another intervention to improve mammography screening, researchers found the cost-effectiveness to be $289 per additional woman screened (1996 US dollars)(Thompson et al., 2002). In an

intervention to improve mammography screening among women living in rural communities, the overall cost-effectiveness for a community activity intervention was $1953 compared to $1,984 for an individual counseling intervention; the combined individual and community intervention was $2451 (1995 US dollars).(Andersen et al., 2002).

There are several limitations to this study. Pap testing behavior was self-reported and may be over-reported as it is a socially favorable screening activity. If over-reporting of the event occurred, then the estimated cost-effectiveness would appear to be better than expected. Medical chart abstraction in this study, however, indicated that self-reports were reliable.

The difference in the cost per intervention at the two sites is a concern; however, possible factors exist between the two countries, including the health care system and the difference in salaries. The salaries for comparable positions are different between Vancouver and Seattle, with Seattle staff receiving an average of 30% more per year than their Canadian counterparts. These factors may have contributed to the differences in cost-effectiveness.

The intervention teams in both cities provided identical materials and logistical support to participating women. Canadian women can receive Pap testing at no cost through their primary care provider (BC Cancer Agency, 2005). In the U.S., women are eligible for health care coverage through Medicaid, charity insurance, or private insurance; however, some are not insured and are not eligible for charity care.

If either of these interventions were to be implemented in a clinic, certain costs would be reduced over time; these include training and meetings and the purchase of training and resource manuals that would be required at the start-up phase. The bulk purchase of project materials, such as brochures and video tapes, would further reduce direct costs.

In summary, this cost-effectiveness analysis demonstrated that an intensive intervention, though more costly to implement, is more cost-effective than a direct mail, or less intensive, intervention in motivating women to receive cervical cancer screening.

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