**Appendix. Cost and QALY Analysis**

Costs were assessed from the payer, participant, and societal (sum of payer and participant) perspective at 12 month follow-up. Payer costs include both labor and non-labor costs (see Table 1). Labor costs consist of the market value for staff time associated with delivering the counselor sessions and contact time with participants, such as phone calls or queries. The labor time dedicated to intervention delivery for both arms and the target participant were tracked by counselors at the completion of each study visit

Using this information, labor time was allocated to each individual. This time was multiplied by a wage rate of $25.07 per hour to generate average labor costs per participant. This hourly wage is the average wage rate of a Health Educator based on Bureau of Labor and Statistics (BLS) data[1](#_ENREF_1). In total labor costs for the counselor-delivered and web-based interventions were $129 (CI:122-135) and $38 (CI: 31-44) per participant respectively based on average labor time per participant of 308 minutes and 91 minutes over 12 months.

Non-labor costs from the payer perspective include materials and supplies and rental costs. Rental costs were allocated to each participant by dividing participant counselor time (as estimated in the previous paragraph) by the sum of counselor time for all participants and multiplying by the $1000 cost of rent over the 12 month intervention. In other words, total rental costs were apportioned across participants based on the percentage of total counselor time they consumed. Costs for materials and supplies were also tracked at the participant level and included costs for business and appointment cards, postage, letters sent to participants who could not be reached by phone , reminder cards, pedometers and appointment materials. For the counselor arm, cookbooks and binders were also purchased. Finally, laptops were purchased for each participating practice in the web arm to allow participant navigation of the intervention at the practice site. In total, non-labor costs were estimated to be $ 79 (CI: 78-79) and $72 (CI: 72-73) per Counselor and Web participant respectively.

Summing the labor and non-labor costs generates per participant costs from the payer perspective of $207 (CI: 201-214) for the counselor-delivered intervention and $110 (CI: 103-117) for the web-delivered intervention. These results reveal that the web-delivered intervention is a significantly lower cost intervention from the payer perspective.

 Participant costs include an imputed (opportunity) cost for the time that participants spent in intervention sessions and related travel time and costs. The average travel distance was estimated by taking a random sample of 10 participants from each site and assigning each participant a travel distance based on estimated mileage from their home. Overall travel distances were then calculated assuming distance could be represented by a uniform distribution at each site with minimum and maximum equal to half and twice as far as the estimated average distance based on the ten participants. Average speed to travel to the site was assumed to be 30 miles per hour with 20 minutes extra for each visit for waiting and parking time.

Time using the web program for those that accessed the web site remotely was imputed using the same random uniform distribution method that we used for travel distance. All participant time costs were monetized using an average hourly wage rate of all US working adults from BLS of $20.27 per hour[2](#_ENREF_2). Using these estimates and the data on session attendance, participant costs were estimated to average $186 (CI: 177-194) for the counselor-delivered intervention and $110 (CI:102-119) for the web-based intervention. The societal cost of the intervention, which is the sum of the payer plus the participant cost, is estimated to be $393 (CI: 379-408) for the counselor-delivered and $220 (CI: 206-235) for the web-based intervention. The significantly lower costs for the web-based intervention can be attributed to the reduced reliance on face to face meetings.

Data on health-related quality of life was collected using the SF-12 instrument from participants at baseline, 4 and 12 months (see Table 2). The SF-12 is based on items taken from the SF-36, a standardized questionnaire used to assess patient health [3](#_ENREF_3). Brazier and Roberts [4](#_ENREF_4) have developed an algorithm that converts participant's SF-12 scores into a health related quality of life score that ranges from 0 (death) to 1 (perfect health). We used the change in this score from baseline to 12 months for returnees to estimate quality adjusted life year (QALY) improvements over the one year time interval. For each returning participant, the unadjusted change in the QALY score was estimated by subtracting the 12 month quality of life score from the baseline score.

At 12 months, the average change in QALY is 0.036 (CI: 0.016-0.056) (p<0.001) for the Counselor arm and 0.037 (CI: 0.018-0.056) (p<0.001) for the Web arm. There was no significant difference between the two arms (p=0.92).

Using the cost and effectiveness data presented above and in Table 3, we computed two cost-effectiveness ratios, one that reports costs per percentage point reduction in CHD risk score and the other that reports costs per QALYs saved over the one year time period.

In terms of CHD risk, relative to no intervention (which we assume equates to no change in outcomes over time), the incremental cost effectiveness ratio (ICER) for Web is $73 (payer) and $146 (societal) per percentage point reduction in CHD risk. For counselor-delivered compared to the web-based intervention, the ICER is $162 from the payer perspective and $288 per percentage point reduction in CHD risk for the societal, but we cannot reject the hypothesis of no difference in incremental cost effectiveness.

In terms of QALYs, the lower cost web-based intervention generates an ICER of $2,973 from the payer perspective and $5,946 from the societal, per QALY saved relative to no intervention. This is considered very cost-effective based on international benchmarks [5](#_ENREF_5).

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**Table 1: Cost Summary for 12 Month Intervention**

|  |  |  |
| --- | --- | --- |
|  | **Counselor (SE)** | **Web (SE)** |
| **PAYER** |   |   |   |   |
| **LABOR** |   |   |
| **TIME** |   |   |   |   |
| Counselor Mins | 308 | (7.7) | 91 | (8.0) |
| **WAGE** |   |   |   |   |
| BLS Average Wage - Health Counselor | $25.07  |
| **TOTAL LABOR** | $129 | (3.2) | $38 | (3.3) |
|   |   |   |   |   |
| **NON-LABOR**  |   |   |   |   |
| **MATERIALS** |   |   |   |   |
| Postage, appointment cards, letters, printing | $3 | (0.1) | $1 | (0.1) |
| Counselor Binders  | $30 | (0.0) |   |   |
| Laptops |   |   | $28 | (0.0) |
| Pedometer  | $36 | (0.0) | $36 | (0.0) |
| Cookbooks | $6 | (0.0) | $6 | (0.0) |
| **FIXED COST** |   |   |   |   |
| Rent and Utilities | $4 | (0.1) | $1 | (0.1) |
| **TOTAL NON-LABOR** | $79 | (0.2) | $72 | (0.1) |
|   |   |   |   |   |
| **TOTAL PAYER COSTS (LABOR + NON-LABOR)** | **$207** | **(3.4)** | **$110** | **(3.5)** |
|   |   |   |   |   |
| **PARTICIPANT** |   |   |   |   |
| **TIME (Mins)** |   |   |   |   |
| Counselor time\* | 282 | (8.) | 88 | (7.7) |
| Web time | 26 | (2.9) | 109 | (7.2) |
| **ATTENDANCE** |   |   |   |   |
| Transit Minutes (20 mins prep + 30 miles/hr for average distance) | 242 | (7.9) | 130 | (9.8) |
| Total participant minutes (Transit + Time) | 550 | (12.9) | 326 | (12.8) |
| **WAGE** |   |   |   |   |
|  BLS Average wage  | $20.27  |
|   |   |   |   |   |
| **TOTAL PARTICIPANT** | **$186** | **(4.3)** | **$110** | **(4.3)** |
|   |   |   |   |   |
| **TOTAL SOCIAL COSTS (PAYER + PARTICIPANT)** | **$393** | **(7.4)** | **$220** | **(7.5)** |

**\*** Counselor labor time and participant time are not exact as some participants called while accessing the website remotely, their time was only counted once in web time.

Abbreviation: BLS, Bureau of Labor Statistics.

**Table 2: Imputed QALY, SF Physical and SF Mental Score Unadjusted Results at 12 Month Follow-Up**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Outcome Measure** | **Study Group** | **N** | **Baseline Mean**  | **Follow-up Mean**  | **Change in Mean**  | **p-value for Change** | **Difference in Mean Change**  | **p-value** |
| Imputed QALY | Counselor | 168 | 0.762 | 0.797 | 0.036 | p<0.001 |   |   |
|   | Web | 160 | 0.747 | 0.783 | 0.037 | p<0.001 | -0.001 | p=0.92 |
| SF Physical score | Counselor | 168 | 43.2 | 45.4 | 2.2 | p=0.003 |   |   |
|   | Web | 160 | 42.9 | 44.8 | 1.9 | p=0.02 | 0.30 | p=0.79 |
| SF Mental score | Counselor | 168 | 52.5 | 55.4 | 3.0 | p<0.001 |   |   |
|   | Web | 160 | 51.5 | 54.6 | 3.1 | p<0.001 | -0.12 | p=0.91 |

Abbreviation: QALY, quality adjusted life year.

**Table 3: Incremental Cost-Effectiveness Ratios (ICERs) at 12 Month Follow-up**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CHD Risk** |  **Costs**  |  **Average CHD risk reduction** |  **Incremental cost**  |  **Incremental benefit**  | **ICER** **(CHD risk)** |
| **Payer** |  |  |  |  |  |
|  No intervention  | $0 | 0 | $0 | 0 | $0 |
|  Web  | $110 | 1.5 | $110 | 1.5 | $73 |
|  Counselor  | $207 | 2.1 | $97 | 0.6 | $162 |
|  |  |  |  |  |  |
| **Private** |  |  |  |  |  |
|  No intervention  | $0 | 0 | $0 | 0 | $0 |
|  Web  | $110 | 1.5 | $110 | 1.5 | $73 |
|  Counselor  | $184 | 2.1 | $76 | 0.6 | $127 |
|  |  |  |  |  |  |
| **Societal**  |  |  |  |  |  |
|  No intervention  | $0 | 0 | $0 | 0 | $0 |
|  Web  | $220 | 1.5 | $220 | 1.5 | $146 |
|  Counselor  | $393 | 2.1 | $173 | 0.6 | $288 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **QALYs** |  **Costs**  | **Average QALY change** |  **Incremental cost**  |  **Incremental benefit**  | **ICER (QALY)** |
| **Payer** |  |  |  |  |  |
|  No intervention  | $0 | 0 | $0 | 0 | $0 |
|  Web  | $110 | 0.037 | $110 | 0.037 | $2,973 |
|  |  |  |  |  |  |
| **Private** |  |  |  |  |  |
|  No intervention  | $0 | 0 | $0  | 0 | $0 |
|  Web  | $110 | 0.037 | $110 | 0.037 | $2,973 |
|  |  |  |  |  |  |
| **Societal** |  |  |  |  |  |
|  No intervention  | $0 | 0 | $0 | 0 | $0 |
|  Web  | $220 | 0.037 | $220 | 0.037 | $5,946 |
|  |  |  |  |  |  |

Abbreviations: CHD, coronary heart disease; QALY, quality adjusted life year.