Cancer Screening: Payer Cost / Benefit thru Employee Benefits Programs

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ABOUT C-CHANGE

C-Change is a nonprofit organization comprised of Members including the nation's key cancer leaders from government, private business, and nonprofit sectors – whose missions relate to cancer research, control, and/or patient advocacy. These cancer leaders share the vision of a future where cancer is prevented, detected early, and cured or is managed successfully as a chronic illness. Other individuals with a deep concern about cancer and who have achieved prominence in the entertainment, news, and other industries or endeavors also are engaged in C-Change.

C-Change Members include representatives from:

- Governmental agencies with federal funding devoted to cancer research and/or applications
- Academic cancer centers
- Private, for-profit companies
- Nonprofit advocacy/consumer organizations
- Professional organizations representing groups of individuals and/or organizations with a common interest in cancer
- Congressional, administration, and state government officials
- The media

FORWARD

Some of the biggest successes and most effective weapons in the War on Cancer – screening (early detection) and prevention – are not being used as effectively as they should be. Leading authorities have established that cancer screenings for breast, cervical and colorectal cancers are effective at reducing these cancers' incidence, severity and mortality. This paper demonstrates that covering and promoting full compliance with established screening recommendations thru employer sponsored programs is low cost and cost effective for employee benefit programs.

Employers exert some control over the cost of healthcare thru benefit design, and today's healthcare cost crisis has forced employers to reduce benefits. Benefit designs define which services are covered by insurance, which providers can perform those services, and the share of cost the patient pays (copays, deductibles, etc.). As employers redesign benefits, we hope the information on screening provided here will contribute to wise benefit decisions.

This report shows that employers and insurers can use employee benefits effectively to fight cancer. We believe that better information leads to better decisions and we hope that the information contained here will help all interested parties craft policies that will most effectively improve the population's health.

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EXECUTIVE SUMMARY

Background

This report presents estimated costs and benefits of cancer screening / early detection for employee benefit programs. This report focuses on breast, cervical and colorectal cancer screening, because the United States Preventive Services Task Force (USPSTF) has established evidence-based screening recommendations for these three cancers, which are supported by a leading health plan trade organization.[1] Although USPSTF has not taken a position on the benefits of prostate cancer screening, we report current prostate cancer screening costs because it is commonly covered by health plans. We also present information about the cost of cancer for employee benefit programs.

To accurately represent an employer's perspective, we use actual insurer and employer data to produce cost estimates. Our goal is to produce costs estimates that reflect actual clinical, billing and reimbursement practices, under the assumption that employers succeed in increasing screening.

Large, detailed, multi-year databases of insurer and employer claims provided important information for our analysis, as did published literature, the SEER[2] database and disability and life insurance data. No single database captures the information needed to produce this report. Consequently, we created actuarial models that combine elements from many different sources. These are described more fully in the Appendices.

Findings

In summary, we find that:

- Cancer Prevention and Early Detection is Low Cost. The medical expense of achieving 100% compliance with USPSTF guidelines for breast, cervical, and colorectal cancer is relatively low. These costs could be easily offset by modest improvements in utilization management or by modest reductions other benefits. These costs are lower than some ancillary benefits routinely covered by health plans.

- The Cost of People with Cancer is High. Cancer is expensive for employers. The medical costs of people with cancer are high on an individual and aggregate basis, and additional employer costs include lost productivity, short-and long-term disability and life insurance.

- Investment in Prevention and Early Detection Makes Financial Sense. Across a broad population, savings in medical and non-medical benefits costs from early detection of breast, cervical and colorectal cancer essentially equals the costs of screening.

Making These Findings Relevant to Employers and Payers

In developing cost estimates, the authors have sought to provide estimates consistent with approaches used by employers and insurers.

- We model actual clinical practice, not what "should" happen according to clinical trials or protocols. For example, the portion of patients actually having biopsies following diagnostic imaging may be higher (perhaps reflecting higher false positives) or lower (perhaps reflecting lower compliance) than controlled studies suggest. For costs, we favored insurance claims data over controlled studies.
- Costs are based on standard, defined reimbursement practices for a commercial population, not charges or Medicare data. Costs also reflect an actual insurance benefit package with typical cost sharing, utilization management and administrative costs.
- Results are presented as per-member-per-month costs for a typical employer-sponsored population.

Actuaries bear responsibility for setting premium rates, analyzing risk, and guarding the financial solvency of insurance and benefit programs. For private insurers, Medicare, employers and others, actuaries often provide advice on the financial impact of changes in covered benefits or changes in how healthcare providers are paid for particular services. In this work, we combined actuarial techniques with a broad body of clinical and epidemiological scientific findings to produce information that should be relevant and accessible to health insurers and employers.

Limitations

Actuarial financial projections and estimates cannot capture unforeseen forces or all relevant factors; for these reasons and because our analysis is not customized for any particular employer or health plan, actual results are likely to differ from those we present here. Other researchers can produce estimates that differ from ours because they use different assumptions, different data or are producing figures for different purposes.

For the costs of prevention and early detection, we followed typical actuarial practices such as those used by insurers in estimating premium or rider rates or for data analysis. For the savings generated by improving screening compliance, we assumed that medical inflation would be balanced by the time value of money. Because recent medical inflation has exceeded some widely used discount rates, this assumption may be considered to understate savings. In addition, we did not explicitly consider the impact of employee turnover. Appendix B discusses other sources of variability.

This report, which is commissioned by C-Change and the American Cancer Society, contains the findings of the authors and does not represent the endorsement of any particular position by Milliman, Inc., and Milliman does not intend to benefit any third party. If this report is copied, it must be distributed in its entirety, as pieces taken out of context could cause misinterpretation.

COST OF SCREENING / EARLY DETECTION

The medical cost of achieving 100% compliance with USPSTF guidelines[3] for breast, cervical, colorectal cancer screening is relatively low and compares favorably to ancillary benefits routinely covered by health plans. Similarly, the current cost of elective prostate cancer screening is low. Our estimates include the cost of follow up to the point of diagnosis.

As presented in Table 1, the employer's per member per month (PMPM) cancer screening benefit cost for 100% compliance with USPSTF cancer screening guidelines is estimated to be $7.50 PMPM for 2006. Using recent data on current compliance[4], we estimate the average incremental cost of increasing compliance to 100% is about $2.95 PMPM for 2006. We show the employer/payer cost, which includes typical administrative costs and reductions due to amounts paid by the patient or member.

Table 1: Screening Costs* PMPM with 100% Compliance for a Typical Employer

Cancer Type	***Summary Screening*** *(see Appendix C for details)*	***Estimated 2006 Employer/Payer Cost PMPM***	***Estimated Current Spending***	***Increment to Reach 100% Compliance***
Breast	21-39 CBE**, 40-65 Mammogram	$3.60	$2.50	$1.10
Cervical	21-65 Pap	$1.25	$1 .10	$ .15
Colorectal	50-65 & High Risk – Colonoscopy or FOBT & Flexible Sigmoidoscopy	$2.65	$.95	$1.70
All 3 above* **		$7.50	$4.55	**$2.95**

* Costs are net of cost sharing: $15 primary care or specialist care office visit copay, $75 outpatient hospital copay. Costs include 15% administration. Lower copays or cost sharing would increase an employer's benefit costs.
** USPSTF guidelines do not include 21-39 CBE. It is included here because it is commonly covered and included as part of a well-woman or annual exam.
*** All numbers are rounded; total uses average of the two colorectal screening methods.

We compare the $2.95 PMPM incremental cost with other benefit choices in Table 3 and note this amount is less than employers or insurers often pay for other benefits such as chiropractic care.

In addition to the above costs for USPSTF recommended screening, Table 2 shows current spending on prostate cancer screening. Although USPSTF recommendations do not include prostate cancer screening, we include it here because much prostate cancer screening is occurring in actual practice.

Table 2: Current Spending on Elective Prostate Cancer Screening

Cancer Type	***Summary Screening***	***Employer/Payer Cost PMPM***
Prostate	50+ and High Risk	$0.30

Employers have great discretion in choosing particular benefits or coverages and they can use this discretion to make benefit trade-offs. Even without considering potential savings from increased screening, employers who promote screening can stay cost-neutral by choosing to reduce other benefits. In Table 3, we offer comparisons to the $2.95 incremental spending to reach 100% compliance (from Table 1) to typical, national average costs for some commonly used benefits:

Table 3: Potential Trade-Offs to Pay for Increased Screening

Health Coverage Benefit Decision	**Typical Cost*** (Estimated 2006 PMPM)
Cost of coverage for chiropractic services	$1.35 to $4.00
Increase generic utilization by 10%	$2.65 to $3.05
Reduce inpatient days/1,000 by 20 days thru improved medical management	$3.60 to $8.00

*The ranges reflect differences in national average reimbursement. Actual costs may vary depending on reimbursement, utilization, benefit limits and cost sharing.

To put the $2.95 figure from Table 1 for 2006 into perspective, the 2005 Milliman *Group Health Insurance Survey* reports average 2005 premium rates at $288 and $312 PMPM for HMO and PPO coverage respectively. Recent years' trends have increased at over 10% per year. The additional $2.95 PMPM spending to achieve 100% compliance will be 1% or less of a typical employer's health benefits program cost. The section below, Benefits of Cancer Screening, shows the expected cost savings that essentially erase the incremental cost of screening.

COST OF PEOPLE WITH CANCER

Cancer is the leading cause of death for ages 20-65 – the prime working ages. Not surprisingly, medical expenditures for people with cancer are high on an individual and aggregate basis; employers bear additional costs thru lost productivity, short- and long-term disability and life insurance. We report national average costs of a population covered thru typical employer programs based on our examination of large employer databases. These figures can, of course, vary greatly from employer to employer depending on demographics, benefits covered, random fluctuations and locale.

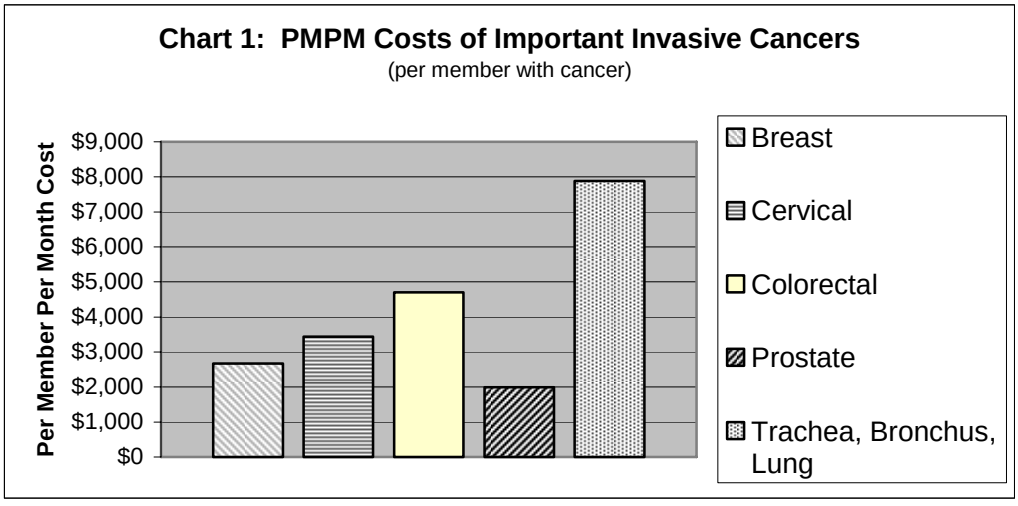
Medical Costs of People with Cancer

People with cancer only represent about 1.6% of the commercial population but generate about 10% of an employer/insurer's annual medical claim costs. For perspective, maternity care typically represents about 5% of total medical cost for an employer population, although that can vary considerably with demographics. Table 4 shows that people with cancer cost a lot for a typical employer or insurer.

Table 4: Comparing Costs of People with Cancer to People without Cancer

	Estimated 2006 PMPM Claim Costs (net of cost sharing)
People without cancer	$360
People with cancer	$2,390

Cancer costs vary by type of cancer as seen below in Chart 1.



To put these 2006 cost figures into perspective, the 2005 Milliman *Group Health Insurance Survey* reports average 2005 premium rates at $288 and $312 PMPM for HMO and PPO respectively.

BENEFIT OF CANCER SCREENING

For the medium term and across the employer-covered population, employer investment in prevention and early detection makes financial sense. Medical plus non-medical benefit savings related to early detection of breast, cervical and colorectal cancer essentially pays for the costs of these cancer screenings. Because USPSTF does not recommend routine prostate cancer screening, we did not evaluate the potential financial benefit of prostate cancer screening.

For breast, cervical and colorectal cancer, medical literature demonstrates screening can lead to earlier detection, which can lower disease severity and result in fewer deaths. Cancer screening can also reduce the incidence of some cancers thru identification and management of pre-cancerous or in-situ (generally easily curable) conditions. This leads to lower cost and fewer deaths.

People with more advanced cancers cost more than people with less advanced cancers. People with cancer who die cost more than cancer survivors – for both medical insurance and non-medical insurances such as disability and life insurance. Thus, screening for breast, colorectal, prostate and cervical cancers can reduce costs.

We compare the incremental costs of achieving 100% screening compliance to the incremental savings. Our models, using a range of conservative or aggressive assumptions for the clinical benefits of screening, show the incremental medical savings of screening do not cover the incremental cost of reaching 100% screening. However, adding estimates of non-medical costs (disability, life insurance and replacing lost employees) yields a savings range of $2.35 to $3.75, as shown in Table 5. This savings essentially meets the $2.95 incremental cost of 100% compliance with screening from Table 1.

Table 5 shows savings figures that include the impact of reducing deaths. Our model shows that a population of 50,000 employees would have 3 to 5 fewer deaths per year for employees and dependents.

Table 5: Moving to 100% Compliance: Medical and Non-Medical Employer Savings for a Typical Employer*

Cancer Type	PMPM Medical Cost Savings	PMPM Disability, Life Insurance Savings	PMPM Total Savings
Breast	$0.20 to $0.30	$0.15 to $0.25	$0.35 to $0.55
Cervical	$0.05 to $0.10	$0.05 to $0.10	$0.10 to $0.20
Colorectal	$1.35 to $2.15	$0.55 to $0.85	$1.90 to $3.00
Total	$1.60 to $2.55	$0.75 to $1.20	$2.35 to $3.75

* Figures are rounded. Totals may not equal sums due to rounding.

SUMMARY

Our models show that the direct employer costs of cancer screening are relatively modest when compared to total plan costs. Furthermore, for whole populations, cancer prevention and early detection will pay for itself over several years.

APPENDIX A: Actuarial Modeling Details

We constructed separate actuarial models for the screening, cancer costs and savings calculations. These models capture key elements of each process in ways that allow us to estimate relevant costs. We used standard actuarial methods to develop the information about frequency and unit cost.

We note the debate over some studies on the effectiveness of screening and reference our sources. Our models do not address potential complications resulting from screening procedures or the costs related to treatment for cancers that without screening would have gone undetected for some period. Likewise, we do not address timing issues such as the time value of money or the likelihood that a sudden, large increase in screening will result in a corresponding surge in the costs of treating detected cancers.

Costs of Cancer Screening

We built actuarial models to estimate for a typical employer population the cost of 100% compliance with screening procedures and frequencies based on USPSTF recommendations and actual practices for breast, cervical and colorectal screening. The 100% compliance approach allows us to estimate the cost of less than full compliance.

We modeled the cost of the current prostate cancer screening levels since the USPSTF does not recommend routine screening.

We did not explicitly estimate the cost of screening for certain high-risk populations, as these are relatively small in the context of total screening costs. Appendix B describes the screening compliance we modeled in more detail.

Model Structure

From an actuarial standpoint, we think of most cancer screening as having two steps:

1. Screening: the screening procedure, for example, a screening mammogram

2. Follow up procedures or care generated by positive or suspicious screening results. These may include, for example, a follow up mammogram, ultrasound and breast biopsy including the procedure, pathology studies, and possible facility use.

For each age category that has distinct screening recommendations (e.g., breast cancer screening ages 40+), we created a model that captures following elements:

1. Frequency of recommended screening

2. Distribution of procedures that providers might bill as associated with the recommended screening and follow up (e.g., pathology or anesthesia)

3. Distribution of follow up procedures along with associated procedures

4. Unit costs and cost-sharing for all procedures including professional, technical and facility fees using defined, standard national average reimbursement

5. The population from a typical employer-sponsored plan relevant to the model

Model Development Process

As depicted on the flow charts in Appendix C, we analyze all services from the initial screen to cancer diagnosis. Using medical literature, we identified procedures appropriate for medical follow up to a positive or suspicious screen.

Using maternity frequencies in Milliman's *Health Cost Guidelines*[5], we excluded pregnant women since screening and follow up is considerably different in this population.

Cancer screening and follow up exhibit wide variation. For example, mammography follow up can include different kinds of biopsies or ultrasound followed by a biopsy or repeat mammographies. To capture this variability, we used large insurer claims databases to identify the distribution of screening and follow up procedures by CPT-4 code.

We captured actual practice rather than protocols. Actual practice reflects the fact that providers do not always bill or perform the theoretically ideal or correct procedure code. For example, providers may have wide latitude to bill a CPT-4© code for a shorter or longer office visit. Similarly, claims data show wide variation in the follow up diagnostics, pathology tests, procedures or imaging physicians may order as a consequence of screening.

The site of a screening or follow up service can impact the cost. A breast biopsy conducted in a hospital outpatient setting generally costs more than the same biopsy performed in an office setting, because the facility's outpatient fee generally exceeds the physician's surgical tray fee. We analyzed insurer claims databases to identify a typical mix of settings and built this mix into our model.

A procedure may generate more than one medical claim. For example, a colonoscopy may generate separate bills for the colonoscopy, anesthesia and pathology. Therefore, we followed individuals undergoing screening and follow up using trigger procedures (e.g., a colonoscopy) and we model ancillary services associated with the triggers (e.g., anesthesia and pathology).

In order to reflect the costs of screening and not other medical care, our methodology involved the following:

1. In order to capture the spectrum of claims associated with follow up procedures for positive or suspicious screening results, we selected data generated by screened people with a minimum number of months of eligibility before and after the screening.

2. We explored the claims generated by the screened population for a number of months before and after screening, which vary by screening procedure.

3. When a provider obtains a tissue sample during the procedure, we assumed 100% frequency for associated pathology work.

4. An office visit is an integral part of some screening (e.g., clinical breast exam). Otherwise, we assumed the follow up to screening required one office visit (e.g., a breast ultrasound, ductogram or repeat mammogram would have an associated office visit). For the follow up to screening, we assumed at most, one associated office visit for the most frequent follow up procedure (i.e., breast ultrasound).

Model Details

The following sections describe important issues about particular screening tests and populations.

Breast Cancer Screening

1. We develop two submodels by age:

    a. Women 20-39

    b. Women 40+

2. For the clinical breast exam, we allocate one half of the office visit cost to breast cancer screening. The other half is related to other preventive care (e.g., Pap smear). We note that USPSTF does not recommend CBE for women under 40.

3. Follow up of an abnormal or suspicious breast cancer screening is any or all of the following:

    a. Diagnostic mammography

    b. Ultrasound, ductogram and/ or biopsy

    c. Post biopsy mammography

    We analyze a large claims database to determine the frequencies of these different procedures.

4. To avoid double counting, we defined mammography resulting from an abnormal or suspicious clinical breast exam, repeat mammography and post biopsy mammography using the following logic:

    a. Mammography resulting from an abnormal clinical breast exam (age 20-39): A mammography with no mammography or breast biopsy within the prior 6 months

b. Repeat mammography: a mammography within the 4 months after another mammography and no breast biopsy in the prior 6 months

c. Post biopsy mammography: A mammography with a breast biopsy within the prior 6 months

5. Since the CPT codes for fine needle aspiration biopsy (FNAB) are not specific to breast, we determined the frequency for screening follow up by cross-referencing breast diagnosis ICD9 codes in the FNAB procedure claims data.

Colorectal Cancer Screening

1. We counted one tenth of an office visit for each FOBT since it takes only a few minutes to explain the procedure. We assumed an associated office visit for each FOBT, but assumed the office visit consultation for a colonoscopy would be covered under the surgical fee.

2. We accounted for costs associated with recommended screening of high-risk individuals under age 50 by increasing the screening of the population over 50 by 1%.

3. We separately priced two screening methods: (1) FOBT annually plus sigmoidoscopy every 5 years or (2) colonoscopy every 10 years. We developed the costs for the two methods separately and then blended the costs.

Cervical Cancer Screening

1. We assumed every screened woman has both a screening office visit and a Pap smear

2. We allocated one half office visit and a Pap every three years for every screened woman. We assumed the other half of an office visit is related to clinical breast examination.

3. We assumed follow up of an abnormal Pap is any or all of the following, distributed according to frequencies in claims data:

   a. Follow up Pap smear

   b. HPV testing

   c. Colposcopy or biopsy (cervical biopsy, curettage and/or cervical conization)

   d. Post colposcopy or biopsy Pap smear

4. To avoid double counting Pap smears, we defined repeat Pap smear and post biopsy Pap smear using the following logic:

a. Repeat Pap smear: another Pap smear was done within the prior 6 months and there was no colposcopy or biopsy in those 6 months

b. Post biopsy Pap smear: a Pap smear done within the 6 months after a colposcopy or biopsy procedure

We determined the frequencies of these different procedures from analysis of a large claims database.

Elective Prostate Cancer Screening

1. We counted one tenth of an office visit for each PSA since it takes a few minutes to explain the procedure

2. We assumed follow up of an abnormal PSA is any or all of the following:

   a. Repeat PSA

   b. Transrectal ultrasound

3. To avoid double counting PSAs, we defined repeat PSA using the following logic:

   a. Repeat PSA: another PSA was done within the prior 5 months

4. We assumed all biopsies also have an ultrasound and pathology procedure

Costs

Reimbursement varies widely by both locale and health plan. To reflect a standard national average reimbursement, we applied 100% of national Medicare Resource Based Relative Value Scale (RBRVS) fees and average Medicare Ambulatory Payment Classification (APC) rates to the utilization figures described in the preceding sections to calculate the per member per month cost.

Medicare, as the single largest payer, has become a standard for payers. In some areas and for some services, commercial payers may pay more or less than Medicare. Actual reimbursement may range from 25% below to more than 100% higher than the local Medicare fees. Health plan and employee benefits professionals can adjust our cost levels to reflect the reimbursement in their programs. The following sections identify cost issues that influence our results in important ways.

Service Cost

1. We applied RBRVS to CPTs using facility and non-facility adjustments according to place of service where available

2. We used a commercial published source for RBRVS fees[6]

3. We applied $50 per 15 minute anesthesia unit

4. We applied the corresponding APC charge to the portion of procedures occurring in an outpatient hospital setting

Copayment

We applied an office visit copayment of $15 to professional services and an outpatient hospital copayment of $75 to the procedures performed in the outpatient hospital We did not apply copayments to pathology and anesthesia.

Demographics

We used the typical demographic characteristic of the employed population and their dependents covered under a typical employee health benefits plan. Our source was the Milliman *Health Cost Guidelines* standard population, which is typical of large employer sponsored employee benefits health plans.

Financially, most large employers operate self-funded or experience rated benefit programs. Under these arrangements, the employer, rather than the insurer, ultimately pays the costs and retains savings from reduced medical, disability, or life insurance costs.

Current Compliance

We used the American Cancer Society Cancer Prevention and Early Detection Facts and Figures 2005[7] indicating:

Mammogram: 60.5% of women age 40-64 years having a mammogram in the past year

Clinical Breast Exam (CBE): We applied standard demographics to the ACS data and assume that everyone getting a Pap also gets a CBE. This produced a figure of 88.7% for women age 21 – 39.

Pap test: 88.0% of women age 18 to 64 with an intact uteri having a Pap test in the past 3 years

Colorectal: 35% of people age 50 to 64 having a sigmoidoscopy or colonoscopy within the past 5 years

Prostate: 49% of men age 50 to 64 having a prostate specific antigen test within the past year

Medical Savings (Breast, Colorectal, Cervical)

General Methodology

For breast, colorectal, and cervical cancer, we estimated current medical costs given current cancer prevalence. We changed applicable variables for the impact of screening. Variables include 5 year survival rates by year since diagnosis, incidence, and the percent of cancer patients with invasive cancer. These three variables were developed from SEER data.[8]

Prevalence, Incidence and Survival

We used age-sex adjusted SEER five year survival data on people who developed cancer and SEER incidence data for the number of new cancers per year. We used SEER prevalence data, as a reasonability check on our database's prevalence and on the model's implied prevalence; the latter was developed from incidence and survival information.

Incidence.

We incorporated the results of published research that suggests early detection can reduce the portion of invasive cancers and increase the portion of in situ cancers or precancerous lesions. See section on "Application of Clinical Benefits of Screening," below.

Cost

Using five years of claims data, we identified people and the first date of new diagnosis for people with breast, cervical or colorectal cancer. We exclude people with AIDS or solid organ transplants as their cancer and costs may be related to the underlying condition. We used claims data ICD-9 codes to split current cancer costs into two levels: "in situ" and "invasive."

We analyzed all claims for these people to determine frequency and total medical costs of:

- The year of diagnosis and up to four years thereafter
- The year of death

Cancer cohorts have cost relativities assigned by the following factors:

- Whether or not that patient has in situ or invasive cancer,
- If that patient will die in the current year.

Although we believe the benefits of cancer screening will affect cancer patients beyond the 5 year period we modeled, we did not attribute any savings to the period after 5 years.

The incidence and survival rates, together with the annual cancer costs, produce PMPM costs for a one year "snapshot" period. We calibrated these PMPM costs to match to the trended PMPM costs shown in the claims database.

Application on Clinical Benefits of Screening

We estimated reduced employer costs for the medical and non-medical costs of cancer. We apply USPSTF cited medical literature as well as more aggressive literature estimates of screening related reduction in cancer deaths, incidence, and stage.

Breast cancer

Conservative: The meta-analysis performed for the USPSTF found in seven trials a 23% reduction in breast cancer death among women older than 50.

Aggressive: Tabar et al found a 41% reduction in breast cancer mortality in women aged 40–69 years.[9]

Colorectal cancer

Conservative: Frazier reported a 58% incidence reduction and 61% mortality reduction related to screening colonoscopy every 10 years.[10]

Aggressive: Winawer's analysis of The National Polyp Study Workgroup data estimates the incidence rate of colorectal cancer was reduced as much as 90 percent.[11]

Cervical cancer

Conservative: Sasieni estimates a 57% reduction in the number of cases of invasive cervical cancer.[12]

Aggressive: In an analysis done for the USPSTF, data from 8 cervical cancer screening programs found screening at an interval of 3years to reduce incidence of invasive disease by 91%.[13]

Non-Medical Savings

Aside from medical costs, cancer's "hard costs" include disability income and life insurance costs and "soft costs" such as loss of productivity. Our model captures the following hard costs only:

- Short term disability (STD)
- Long term disability (LTD)
- Mortality savings consisting of life insurance and employee replacement costs

Our analyses do not address "presenteeism" of employees with cancer (reduced productivity although work is not missed), or a similar impact on coworkers and working family members. We used the sources in Appendix E as a guide to typical benefit designs. The costs for these benefits are tied to average wages, and we used the sources described in Appendix E to determine wages.

Large employers frequently operate disability income and life insurance programs on an experience rated or self-insured basis. In these cases, reductions in morbidity or mortality will accrue as reduced costs to the employers. Smaller employers typically fully-insure these benefits, and would less directly retain savings from improvements in morbidity or mortality.

Short Term Disability Savings

We based STD costs on data that shows the portion of short term disability costs attributable to cancer. In keeping with industry standards, we built our estimates of the cost of STD claims using cost per $100 STD monthly coverage. We allocated estimates to breast, cervical and colorectal cancer types based on the incidence rates of these cancers relative to all cancers.

Our analysis assumes an STD replacement of 80% of wages until LTD benefits begin with a premium rate of 1.00 per $100 of covered monthly salary.

For STD, for breast and cervical cancer, savings were generated by reductions in severity among employees. For colorectal cancer, savings were generated by reductions in incidence among employees.

We also applied the reduction in 5 year post-diagnosis prevalence to a lost time benefit of 10 days per year, which resulted in negligible savings.

Long Term Disability Savings

We based LTD savings on data that shows the portion of long term disability cases that are attributable to cancer. Because cancer patients tend to survive shorter periods than most disability cases, we attributed 50% of the average disability case to these patients. We allocated costs to the three relevant cancers based on the portion of cancer prevalence associated with these cancers for the working age population, according to SEER data.

Our analysis assumes LTD covers the period following the STD period until the earliest of full recovery, normal retirement age or death. It assumes a $1.24 LTD premium per $100 of covered monthly salary for 80% replacement of wages, integrated with Social Security disability benefits.

For LTD, for breast, cervical and colorectal, savings were generated by reductions in death, severity and incidence, respectively, among employees. We did not add the cost of replacing workers who go on LTD permanently, other than those who die (see section on Mortality Savings).

Mortality Savings

Reduced deaths (mortality) savings include the face value of a life insurance policy, administrative costs, and the cost of replacing a worker who has died from cancer.

The medical savings cost models include estimates of annual deaths. The reduction in these annual deaths due to prevention and screening drives our estimates of mortality savings.

We model two types of employer savings due to decreased mortality.

1. Employee Life Insurance: The covered employee life insurance is usually a function of employee salary. The covered life insurance may be one times or as high as four times the annual salary. We have assumed that a typical employer has life insurance coverage of 3 times annual salary. We applied an administrative load of 15% (loss ratio of 85%).

2. Replacement Costs: Employers incur a cost to replace workers who die from cancer. Saving lives should reduce this cost. Based on the sources in Appendix E, we assumed a replacement cost of 1.5 times annual salary.

We did not assume any spousal life insurance coverage.

Potential Benefit Trade-Offs

We built actuarial models to estimate, for a typical employer population, the cost savings of potential benefit changes that could offset the cost of the increased compliance. The following assumptions were used in our estimates.

Chiropractor

This benefit provides for visits to a licensed chiropractor's office including visits involving manipulations with a $15 copay per visit. Radiology services are not included. We projected 2006 charges ranging from 100% national average RBRVS (low) to national average charges (high). We projected 2006 utilization for a loosely managed health plan based on the Milliman 2005 *Health Cost Guidelines*.

Increased Generic Utilization

Increasing the portion of generics generally reduces cost. We assumed a 10% increase in the portion of generic utilization (from about 45% of scripts) for a benefit design with copays of $10 generic / $20 on-formulary brand / $30 off-formulary brand. To produce the range shown we applied typical ranges of prescription utilization and discount.

Reduction of Inpatient Days thru Improved Medical Management

To produce the range shown for reducing 20 inpatient days per 1,000, we developed average charges by trending two different sources to 2006. The high estimate was based on national average per diem charges from the 2005 Milliman *Health Cost Guidelines*, while the low estimate was based on national average allowed per diem cost from the Milliman 2004 *Group Health Insurance Survey*.

APPENDIX B: Sources of Variability for Employers

Medical cost savings for particular employers will likely vary from those shown in this report. Employee benefits or actuarial professionals can consider how each of these will affect a particular program, although, in some cases, the adjustment will involve a large degree of subjective judgment.

Demographics

- Age and gender mix of employee and dependent population: Because of the higher incidence of cancer at higher ages, an older employee population will have greater savings from prevention / detection benefits than a younger population. The savings for cancers differ with gender mix of the employee populations because some cancers are predominately or completely gender specific.

- Average number of children per employee: When the dependent population is heavily weighed toward children, the total cancer rates are lower and the PMPM savings are lower.

- Socioeconomic characteristics. Ethnic and economic forces impact both the prevalence of certain cancers and access to medical care.

Benefits, Cost and Utilization Levels

- If an employer has richer or poorer coverage than the labor pool from which it recruits replacement workers, the employer can have greater or lesser benefit.

- Cost and practice patterns vary by geography, by the provider networks an employee benefits program uses, and the channels for various administrative tasks.

- Benefit design, including copay, cost sharing and deductibles impact cost, but can also impact utilization.

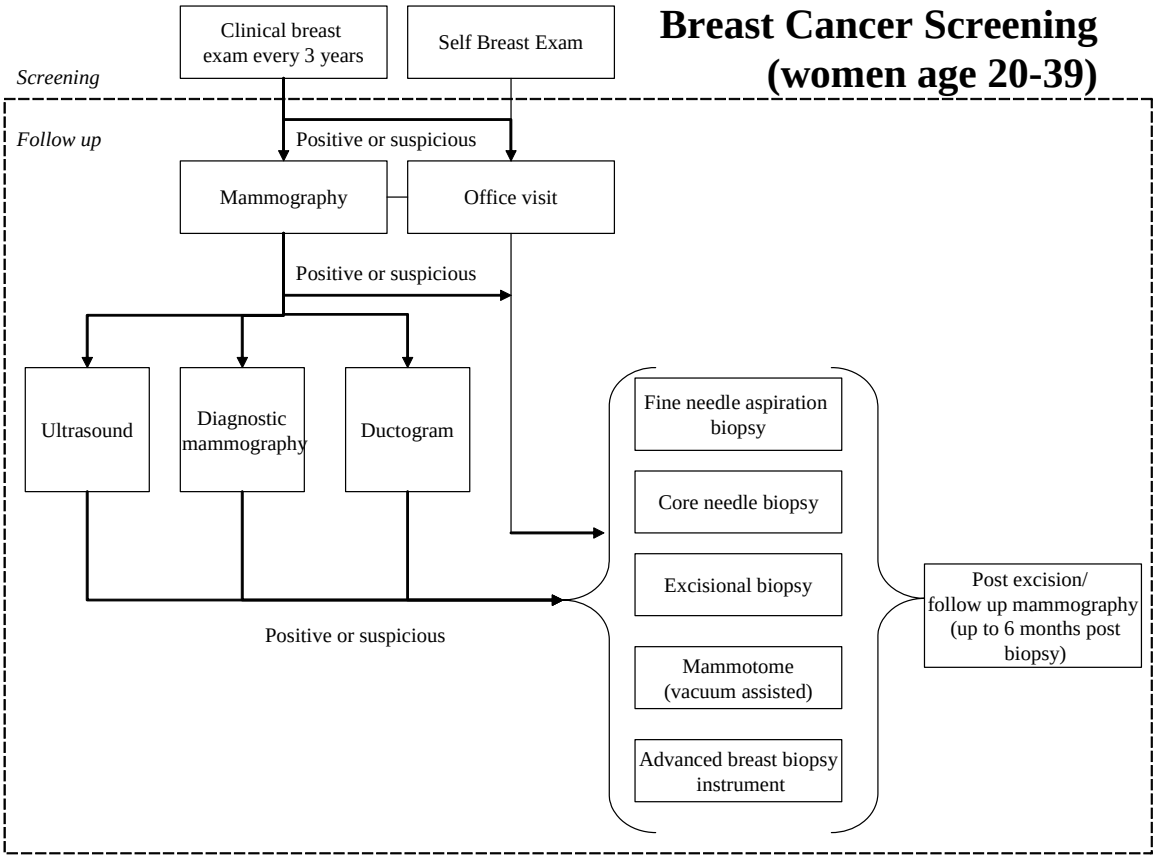
We have assumed that new hires were hired from previous employers who covered similar prevention and early detection benefits. In essence we are assuming that all U.S. employers will have similar benefits and compliance levels and the impact of turnover is minimal. This assumption is more important in older age categories with their more intense screening recommendations.

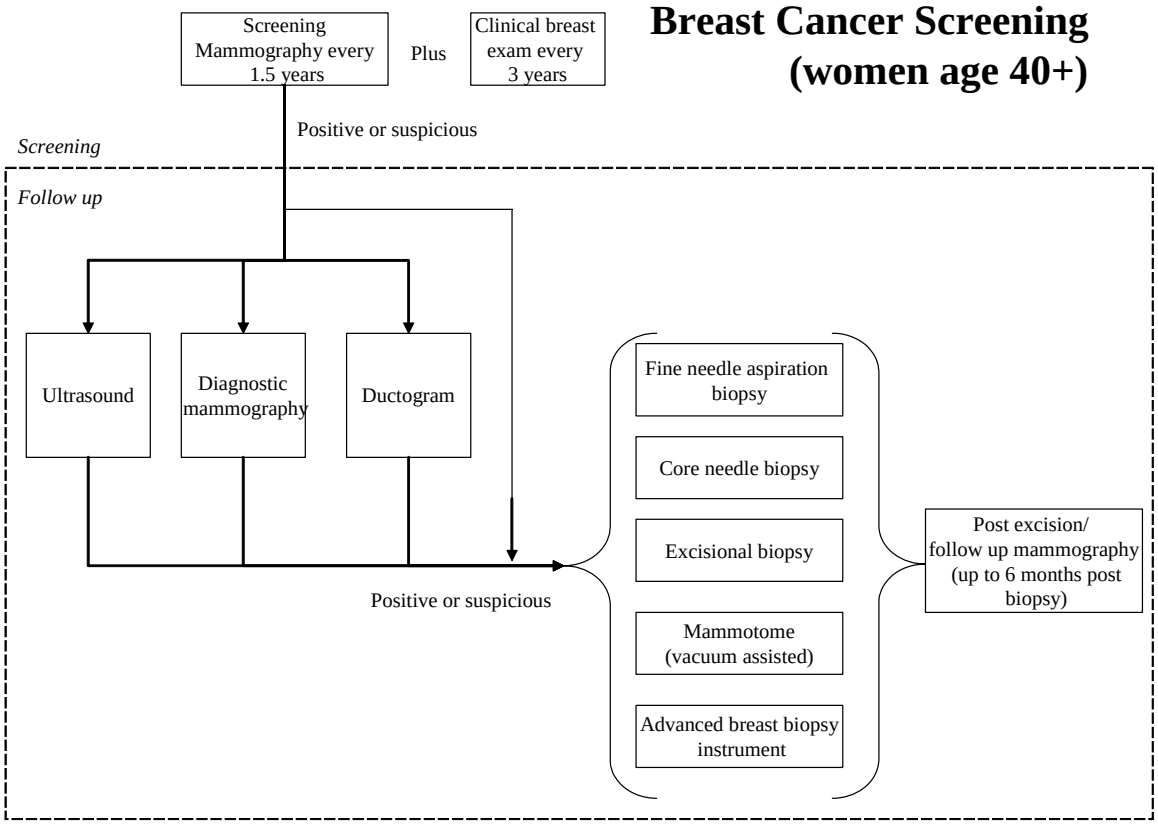
Estimates of the impact of partial improvements in screening may be calculated based on interpolating between 100% compliance and current compliance. Such estimates should produce reasonable estimates for the costs of screening. However, this method may overstate or understate the impact of cost savings.

APPENDIX C: Screening Modeled as 100% Compliance

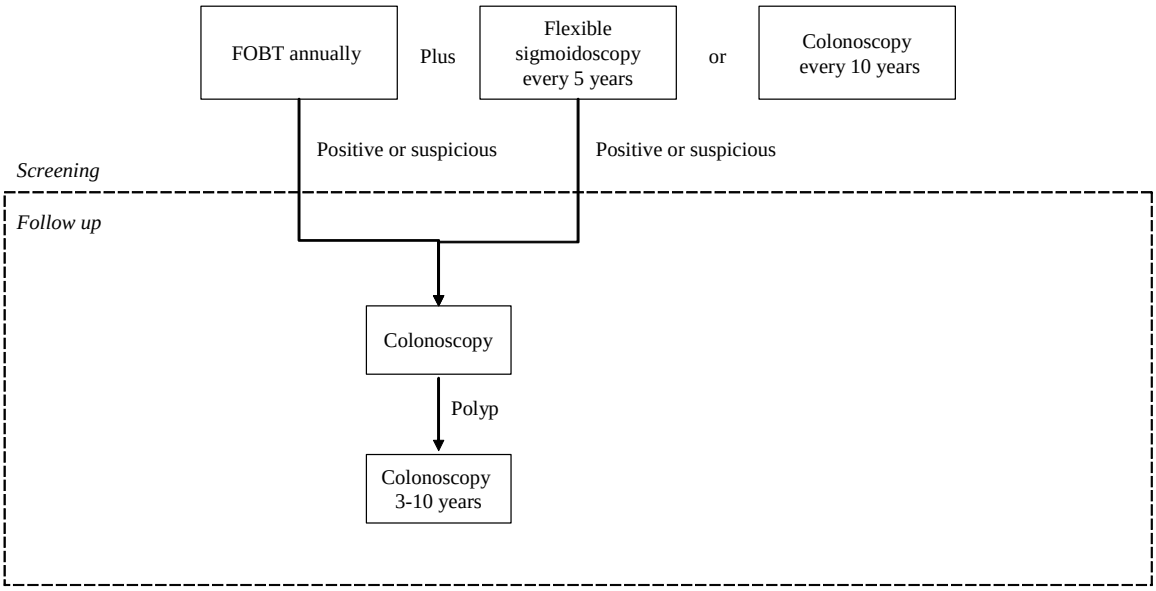
Screening	100% Compliance	Current Compliance[14]
Breast ages 21-39	Clinical Breast Exam every 3 years. As noted above, this is not consistent with USPSTF recommendations.	88.70%
Breast ages 40+	Self Breast Exam and Clinical Breast Exam every 3 years and Mammography every 1.5 years	60.50%
Colorectal ages 50+ and high risk	Annual FOBT and Sigmoidoscopy every 5 years (25%) or Colonoscopy every 10 years (75%)	35.00%
Cervical ages 21+	PAP smear and pelvic exam every 3 years	88.00%

APPENDIX D: Screening Models

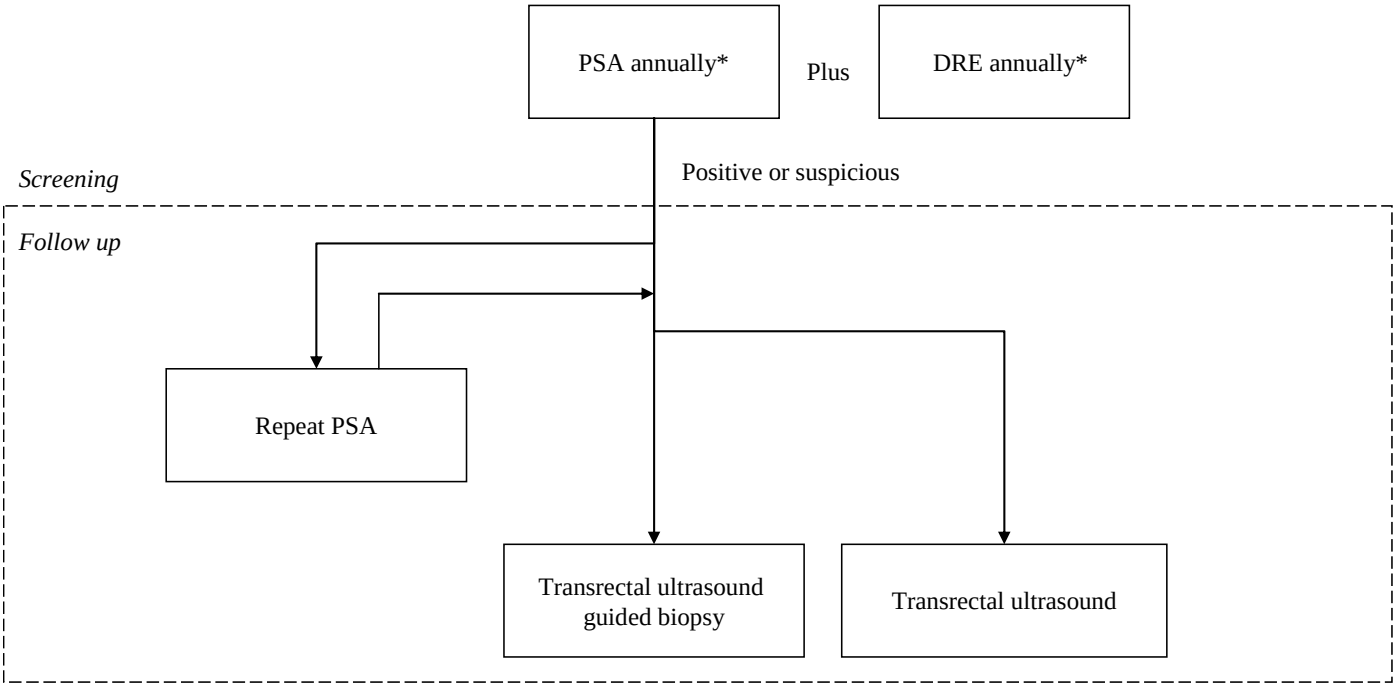



Breast Cancer Screening
(women age 40+)
Screening Mammography every 1.5 years
Plus
Clinical breast exam every 3 years
Positive or suspicious
Screening
Follow up
Ultrasound
Diagnostic mammography
Ductogram
Positive or suspicious
Fine needle aspiration biopsy
Core needle biopsy
Excisional biopsy
Mammotome (vacuum assisted)
Advanced breast biopsy instrument
Post excision/ follow up mammography (up to 6 months post biopsy)

Colorectal Cancer Screening (50+ and increased risk population)

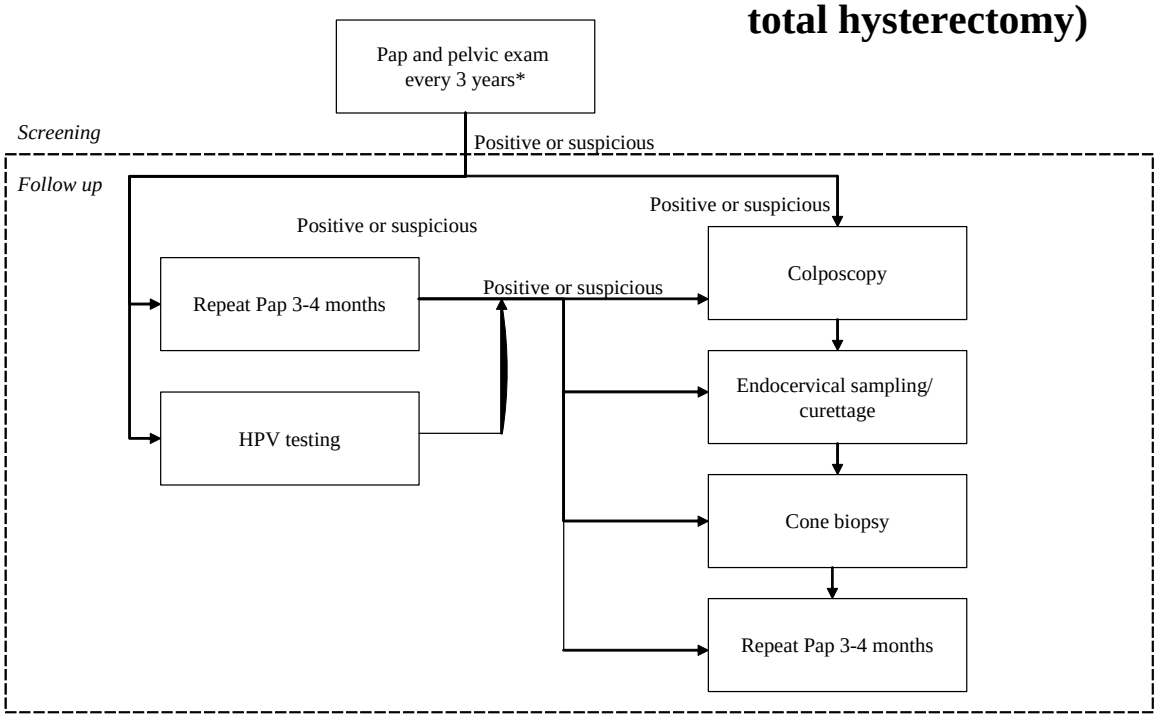


Elective Prostate Cancer Screening (average risk men age 50 + and increased risk population 45-49)



* Optimal screening rates based on current compliance

Cervical Cancer Screening (women age 21-65 without a total hysterectomy)



* High risk (DES exposure, history of CIN II/III, immunocompromized) annually and beyond age 65

APPENDIX E: Data Sources

Data Source for Estimating Medical Costs

Medstat MarketScan Database: The MarketScan database represents the inpatient and outpatient healthcare service use at the patient level nationwide of individuals who are covered by the benefit plans of large employers, health plans, and government and public organizations. The MarketScan database links paid claims and encounter data to detailed patient information across sites and types of providers, and over time. The annual medical database includes private sector health data from approximately 100 payers. The database contains demographic information and claim information. Claim information includes DRG, ICD-9, CPT-4, paid amount, and type of service. Demographic information includes age and gender. We used only those elements of the MarketScan data base that correspond to the commercial marketplace in non-capitated environments.

Data Source for Incidence and Survival Rates

Cancer incidence, prevalence and survival rates by age and sex are from SEER.

Ries LAG, Eisner MP, Kosary CL, Hankey BF, Miller BA, Clegg L, Mariotto A, Feuer EJ, Edwards BK (eds). *SEER Cancer Statistics Review, 1975-2002*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2002/, based on November 2004 SEER data submission, posted to the SEER web site 2005.

Data Source for Estimating Labor Force Demographics

Milliman 2005 Health Cost Guidelines: The Guidelines provide a flexible but consistent basis for the determination of health claim costs and premium rates for a wide variety of health plans. The Guidelines are developed as a result of Milliman's continuing research on health care costs. First developed in 1954, the Guidelines have been updated and expanded annually since that time. The Guidelines are continually monitored as they are used in measuring the experience or evaluating the rates of health plans, and as they are compared to other data sources. An extensive amount of data is used in developing these Guidelines, including published and unpublished data. The Standard Demographics in the Guidelines were developed to represent the age and sex distribution for a typical large insured group. The Standard Demographics were developed using data from large insurers combined with Department of Labor Sources. We used the standard demographics to represent the age and sex distribution for typical insured group. We used this demographic distribution to adjust SEER incidence rates and to develop the frequencies for 100% compliance with age-related screening recommendations.

Data Sources for Salary Information

Department of Labor Usual Weekly Earnings of Wage and Salary Workers: Third Quarter 2004. These median weekly wages were annualized by multiplying by 52. The Department of Labor National Compensation Survey: Occupational Wages in the United

States, July 2003 contains information by employer size. From this source, the median salary for employers with over 2,500 employees in private industry is 147% of all private industry employers. The salaries from the Usual Weekly Earnings were increased by 47% to reflect the large private employer market and trended to 2006.

Data Sources for Life Insurance Plan Design

Department of Labor Study, National Compensation Survey: Employee Benefits in Private Industry in the US, March 2004: Aggregate information regarding amount of life insurance for private industry. Contains information by worker (i.e. blue-collar, white collar), establishment characteristics (employer size), and geographic area.
http://www.bls.gov/ncs/ebs/sp/ebsm0001.pdf

Department of Labor Study, Employee Benefits in Medium and Large Private Establishments, 1997: Aggregate information regarding amount of life insurance for private industry. Contains information by worker (i.e. blue-collar, white collar), establishment characteristics (employer size), and geographic area.
http://www.bls.gov/ncs/ebs/sp/ebsm0001.pdf

The Hay Benefits Report: Since 1969, Hay Group has maintained an ongoing study of the benefits practices of mid- to large-size organizations throughout the United States. Findings appear annually in the Hay Benefits Report (HBR), a multi-use reference source and planning tool, and are integrated into the world's largest benefits comparison database. Over 1,000 organizations participate in the HBR, including a wide range of employers in each geographic region, industry sector, and revenue category. http://www.haysgroup.com/surveys_and_data/benefits_benchmarking_surveys.asp

Data Sources for Estimating Life Insurance Costs

American Council of Life Insurance, 2003 Life Insurance Fact Book: Summarizes information obtained from the National Association of Insurance Commissioners (NAIC). Contains national aggregate data regarding average face amount of group life insurance policies.
http://www.acli.org/NR/rdonlyres/et4pl4ao3z3w4ccfufvrv5z4r2yuz2ksljb45i3fpuftt2cmmaqi5fdef4d5vfw6dxozy5ialorvfl/Life%2bInsurance.pdf

Data Sources for Estimating Disability Insurance Costs

The following sources provided important baseline data that we used to allocate typical group disability premium rates.

> "Cancer Tops Most Frequent Causes of Long Term Disability Claims in 2004," UnumProvident Press Release, March 2, 2005.
>
> *A Year in the Life of a Million Workers*, Met Life, 2003,
>
> Met Life Group Disability Research, *Conclusions and a Call to Action*, 2004

Data Sources for Estimating Costs of Replacing Lost Worker

Employment Policy Foundation's HR Benchmarks
http://www.epf.org/pubs/newsletters/2002/hb20021203.pdf

The Hay Working Paper – The Retention Dilemma (2001). The Hay Group is a global organizational and human resource consulting firm.

http://www.haygroup.com/library/working_papers/The_Retention_Dilemma.asp

FOOTNOTES

[1] America's Health Insurance Plans, "Public Health and Prevention Statements of Support," http://www.ahip.org/content/default.aspx?bc=38|65|285, accessed on December 18, 2005.
[2] Ries LAG, Eisner MP, Kosary CL, Hankey BF, Miller BA, Clegg L, Mariotto A, Feuer EJ, Edwards BK (eds). *SEER Cancer Statistics Review, 1975-2002*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2002/, based on November 2004 SEER data submission, posted to the SEER web site 2005.
[3] United States Preventive Services Task Force. chttp://www.ahrq.gov/clinic/prevenix.htm
[4] American Cancer Society. *Cancer Prevention and Early Detection Facts & Figures 2005*, Atlanta: American Cancer Society, 2005.
[5] *Health Cost Guidelines*, 2005, Milliman, Inc.
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[7] American Cancer Society. Cancer Prevention & Early Detection Facts & Figures 2005. Atlanta: American Cancer Society, 2005
[8] Ries LAG, Eisner MP, Kosary CL, Hankey BF, Miller BA, Clegg L, Mariotto A, Feuer EJ, Edwards BK (eds). *SEER Cancer Statistics Review, 1975-2002*, National Cancer Institute. Bethesda, MD, http://seer.cancer.gov/csr/1975_2002/, based on November 2004 SEER data submission, posted to the SEER web site 2005.
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[14] American Cancer Society. *Cancer Prevention and Early Detection Facts & Figures 2005*, Atlanta: American Cancer Society, 2005.

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