Costs and Benefits of Bundled Community-Based Screening for Carotid Artery Stenosis, Peripheral Artery Disease, and Abdominal Aortic Aneurysm

Steven M. Weisman, PhD; Independent Consultant; Morristown, N.J. and Elizabeth A. Brooks, PhD; Independent Consultant; Asheville, N.C.

ABSTRACT

Purpose: Perform an initial formal assessment of the costs and benefits of bundled cardiovascular screening. Primarily, determine the relative importance of data uncertainties to the integrity of modeled outcomes associated with bundled screening for carotid artery stenosis (CAS), peripheral artery disease (PAD), and abdominal aortic aneurysm (AAA); secondarily, establish parameters around potential costs and outcomes benefits of this screening bundle.

Design: A decision-analysis framework composed of four decision tree submodels with transition probabilities specific to four age- and gender-specific subgroups. Model transition probabilities for each of the four submodels are based on the prevalence of all possible combinations of the presence or absence of moderate CAS, significant CAS, PAD, and AAA, and the likelihood of appropriate or inappropriate medical follow-up.

Methodology: Evaluates a hypothetical self-funded employer with 10,000 beneficiaries and who is considering whether to provide bundled cardiovascular health screenings. Screenings would be performed in addition to any other medical screenings commonly performed by physicians to assess cardiovascular risk. Determine costs and catastrophic events (death, myocardial infarction, stroke, other cardiovascular-related events, amputation events) for these self-funded hypothetical beneficiaries aged ≥50 years and <65 years.

Results: The model predicts approximately $54 million in health care costs over 10 years for the control cohort and $51 million for the screening cohort, representing a 5.2% reduction in 10-year health care spending due to screening.

Conclusion: This initial analysis predicts robust cost and health benefits associated with the decision to provide bundled cardiovascular health screening to a self-funded employer’s beneficiaries aged ≥50 years and <65 years. Further analyses are necessary to better quantify the magnitude of the cost and health benefits.

INTRODUCTION

Community-based screening for vascular disease is of growing popularity. Nevertheless, the cost-effectiveness of such consumer-directed screenings has been hotly debated (Rooke 2007). In this paper, we provide an analytical framework as well as a preliminary assessment of 10-year costs and health benefits associated with a bundled package of cardiovascular health screenings. Cost-effectiveness analysis is used to examine the value, in terms of a combined measure of cost and clinical benefit (e.g., cost per correct diagnosis of disease) of one or more interventions designed to improve health (Gold 1996). These analyses are then used in the decision-making process for physicians, insurance companies, and many others (Gold 1996). Well-known examples of cost-effectiveness analyses have examined the value of screening for at-risk populations, such as the value of mammograms to detect breast cancer in women over 40 years old (vs. women over 50) and of colonoscopies or other screening methods to detect colorectal cancer in men and women over 50 (Eddy 1989, Pharoah 2013, Barouni 2012, Austin 2013). Newer analyses examine the benefits of other health screenings, such as lung cancer screenings (Goullart 2013), in populations whose risk is less defined. Because new screening programs must be in place for many years before impacts on patients’ lives and health care system costs can be measured, assumption-driven cost-effectiveness analyses are an appropriate step in determining screening interventions that have promise and should be investigated further.

Additionally, it is important to identify co-occurring diseases, as it has been demonstrated that the occurrence of multiple disease conditions is associated with health care cost escalation (Bhattacharjee 2013,
Bundled Community-Based Screenings

Choi 2014, Joyce 2009). Earlier identification of co-occurring conditions to enable co-management of chronic conditions, especially those whose treatments may overlap, may reduce health care expenditures (Ajmera 2014, Brilleman 2013, DeLorenze 2014). In addition to detecting co-occurring disease, possible benefits of bundled medical screening include the potential to improve cost-effectiveness over screening for individual diseases (due to lower costs of bundled screening compared to individual screening). However, if multiple screening indications are rarely co-occurring, individual, targeted screening for at-risk populations may be more cost-effective than bundled screening.

To date, there appears to be a gap in understanding the potential benefits of bundled screening. Only one cost-effectiveness analysis was identified that has examined the possible benefits of simultaneous screening. This analysis examined the feasibility of mobile cancer screening vans that would screen for multiple types of cancer in urban settings (O’Malley 2002).

Community-based cardiovascular screenings have been conducted throughout the United States, with over 8 million of these screenings performed between January 2005 and August 2013, forming the largest database of its kind of health-related information. The characteristics and representativeness of this screening database to the U.S. population as a whole are the subject of a recent article by Weisman (2013).

Screenings performed include ultrasound assessment of peripheral artery disease (PAD) (determined by ankle-brachial index [ABI]), ultrasound assessment of carotid artery stenosis (CAS), and ultrasound assessment of the abdominal aorta for abdominal aortic aneurysm (AAA). PAD is defined as an ABI <0.9 (Rooke 2011); possibly clinically significant CAS is defined as an internal carotid artery peak systolic velocity of ≥140 cm/sec (moderate CAS defined as peak systolic velocity 110–139 cm/sec); and all patients with an outer diameter of the abdominal aorta ≥3 cm were considered to have an AAA.

Guidelines for conducting cardiovascular screening have been mixed. Screening for AAA has been generally accepted to be beneficial in a stratified population (recommended most strongly for men aged 65 to 75 years who have smoked while not recommended in women who have never smoked) (LeFevre 2014a, Hirsch 2006, Lim 2011). AAA screening has also been recommended in younger men (≥55 years) with a family history of AAA (Chaikof 2009).

ABI has been found to be a reasonable tool for screening for PAD (Greenland 2010) and has been recommended for adults ≥65 years of age (Rooke 2011). PAD screening has also been recommended in individuals aged ≥55 who have risk factors for PAD, including smoking and diabetes (Rooke 2011). However, most recently, the United States Preventive Services Task Force (USPSTF) has found insufficient evidence to recommend for or against the use of ABI for PAD screening (Moyer 2013).

Individual screening for CAS in asymptomatic populations is particularly controversial. The USPSTF has found insufficient evidence to recommend against screening in the general population entirely (LeFevre 2014b). The American Heart Association and American College of Cardiology Foundation have come to similar recommendations for asymptomatic individuals (Goldstein 2011, Brott 2011). Despite the recommendations regarding cardiovascular screening, what is clear from the screening data utilized in this analysis is that disease still exists in individuals beneath the recommended screening thresholds. Therefore, an exploration of the cost-effectiveness of screening these individuals (cohort ages ≥55 to <65 years) is still warranted.

Previous cost-effectiveness analyses of CAS, PAD, and AAA screening (as individual assessments) have been conducted and have demonstrated mixed results. Some analyses have found benefits of these screening tests in some patient demographic groups, while others have found screening to not be cost-effective for any patient group (Cull 2011, Jacobowitz 2003, Lee 1997, Mark 2003, Meenan 2005, Silverstein 2005, Søgaard 2012).

Based on these previous studies and a lack of studies on the cost-effectiveness of bundled screening, the screening database utilized provides a unique opportunity for preliminary exploration of the costs and outcomes associated with the decision to provide bundled vascular screening and provides a necessary platform on which rigorous cost-effectiveness analyses can be performed.

The primary objective of this study is to determine, through sensitivity analyses, those variables for which small changes in value result in changes in the nature of the modeled result (i.e., that change the evaluation of bundled screening as the lower-cost scenario to the higher-cost scenario). Secondarily, the analysis establishes parameters around the potential cost and outcomes benefits of bundled screening from the perspective of an employer-funded health plan. Owing to the preliminary nature of this model, only direct clinical costs (procedures, hospitalizations, etc.) and outcomes (identification of disease, progression of disease, and catastrophic events associated with disease) are explored.

Unlike fully insured plans, self-funded employers may assume direct risk for payment of claims for benefits. As costs of health care escalate, self-funded employers, particularly those that offer continued medical benefits
to retirees, are increasingly at risk, particularly for self-funded employers that offer the lowest deductible health plans. For this preliminary model, it is assumed that the self-funded employer bears the full risk of payment on behalf of their beneficiaries.

In 2014, median employee tenure was 4.6 years (U.S. Bureau of Labor 2014), a time frame that may be too short to experience long-term net cost savings resulting from many health screenings. However, workers aged ≥55 years had 10.4 median years of tenure in 2014 (U.S. Bureau of Labor 2014). Longer employee tenures may allow self-funded employers to benefit more from earlier identification of disease, particularly cardiovascular disease, through disease screening programs. For these reasons, the current analysis was designed to examine the costs and outcomes associated with the decision to provide or not to provide bundled screening for a self-funded employer's employees, dependents, and retired beneficiaries aged ≥50 years and <65 years.

**METHODS**

This analysis considers a single cohort of employees receiving (or not receiving) bundled screening at baseline and examines their expected costs and outcomes over either a 10-year period, or until the employee turns 65, whichever occurs first. For the purpose of this initial analysis we have assumed all eligible employees will choose to receive the bundled screening benefit available to them.

Ten decision tree submodels, each with the model structure shown in Figure 1 but with transition probabilities specific to each of four age- and gender-specific subgroups, compose the overall decision analysis. Two of the four subgroups correspond to men (and two to women) aged 50 to 64 and women aged 55 to 64.

Men and women progress through the submodels according to transition probabilities based on prevalence of all possible combinations of the presence (or absence) of AAA, moderate CAS, significant CAS, and PAD and on the likelihood that patients will appropriately seek medical treatment if AAA, moderate CAS, or possibly clinically significant CAS or PAD, or both, is identified by the bundled screening diagnostics, or will inappropriately seek medical intervention if all 3 diagnostics are negative. Table 1 (Appendix*) provides the baseline values for transition probabilities in two of the four submodels (men aged 55 to 64 and women aged 55 to 64 years). Although the likelihood of either appropriately or inappropriately seeking medical treatment following knowledge of screening results is dependent on both age and gender, for this initial assessment we have assumed these values are consistent across all age and gender subgroups.

As participants progress through the appropriate submodels, they accrue both costs and outcomes. Modeled results include those derived from a standard expected value decision analysis as well as from a series of one-way sensitivity analyses, examining the dependence of the modeled costs and outcomes on key variable uncertainties.

**Participants**

A hypothetical self-funded employer with 10,000 beneficiaries forms the basis of the modeled population. From the assumed beneficiary base, the modeled population consists of 1,351 men and 1,406 women, with age demographics drawn from 2011 U.S. Census Bureau data (U.S. Census Bureau 2012). This screening population consists only of individuals aged ≥50 years and <65 years.

Current smokers or tobacco users comprise 23.9% of all men and 17.9% of all women, with former smokers or tobacco users comprising another 8.0% and 8.3% of men and women, respectively (CDC 2013).

It is assumed for the initial analysis that all beneficiaries eligible for bundled screening are naïve to CAS, PAD, and AAA screening and are not being treated for CAS, PAD, or AAA.

**Main outcome measures**

**Costs**

For the purposes of this analysis, costs are defined as treatment costs for the identified conditions (e.g., AAA repair, endarterectomy, peripheral bypass graft) and relevant postoperative and medical management costs up to Year 10 (or until a patient is 65 years old).

For each patient, costs are estimated over a 10-year window (or until that patient is 65 years old) to coincide with the time frame for the primary clinical outcomes measure described below. Base case values for cost variables utilized in the analysis are provided in Table 2 (Appendix). An annual distribution of treatment costs is assumed to be 5% for Years 1–4, 10% in Year 5, 20% in Years 6 and 7, and 10% in Years 8–10. These costs are exclusive of catastrophic events (stroke, myocardial infarction [MI], cardiovascular-related death, and amputation) and bundled screening cost. The clustering of costs in Years 6 and 7 is based on an assumption that major surgical procedures for AAA, CAS, and/or PAD would occur most frequently in this time frame.

Because precise cost data for each variable were not available in the literature, many base case costs are assumption-driven. This is certainly a limitation to the model that should be addressed in future claims database analyses. Table 2 includes details regarding data sources and assumptions for each cost variable.

Finally, although costs would certainly vary by age and by gender, for the initial analysis we have assumed that costs are not age- or gender-dependent.

*Appendix is published online at managedcaremag.com/archives/2015/1/screening-appendix
FIGURE 1
Subset of decision tree transition possibilities

Population eligible for health screening

Life line screening not performed

No AAA, or AAA < 3 cm

Undetected enlarged AAA (≥ 3 cm)

Life line screening performed

Enlarged AAA (≥ 3 cm)

No CAD, no PAD

P1

No CAD, undetected PAD

P3

Undetected moderate CAD, no PAD

P4

Long Term Costs \ Long Term Outcomes

Undetected moderate CAD, undetected PAD

P5

Long Term Costs \ Long Term Outcomes

Undetected possibly significant CAD, no PAD

P6

Long Term Costs \ Long Term Outcomes

Undetected possibly significant CAD, undetected PAD

P11

Inappropriate follow-up with MD

Long Term Costs \ Long Term Outcomes

Appropriate no follow-up with MD

Long Term Costs \ Long Term Outcomes

Appropriate follow-up with MD

Long Term Costs \ Long Term Outcomes

Inappropriate no follow-up with MD

Long Term Costs \ Long Term Outcomes

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up

Clone 1: Appropriate follow-up
**Catastrophic events**

**Death, MI, stroke, or other cardiovascular-related events**

An individual’s Reynolds Risk Score (RRS) is the likelihood that the individual will experience death, MI, stroke, or other cardiovascular-related events within 10 years. An RRS is calculated utilizing a subject’s age, blood pressure, cholesterol levels, smoking status, high-sensitivity C-reactive protein (hsCRP) testing (a marker of inflammation), and parental history of heart attack. The inclusion of hsCRP and parental history in the calculation of the RRS has created an improved predictive model of cardiovascular risk compared with other existing models that do not take these factors into consideration (Ridker 2007, Ridker 2008). Screening data provided mean RRS for patients with each possible combination of the presence (or absence) of AAA, moderate CAS, significant CAS, PAD, and smoking history. To arrive at the values in Table 3 (Appendix), the expected RRS was calculated using the screening data, weighted according to the model’s assumptions regarding current and past smoking status of model participants. Like Table 1, Table 3 provides only the subset of variables corresponding to the 2 submodels of men and of women aged 55 to 64 years.

**Amputation Events**

Individuals with PAD are at risk of amputation. For the current analysis, we utilized the following assumptions: individuals without PAD at baseline are not at risk of amputation in the 10-year model timeframe; individuals with unidentified PAD at baseline (i.e., patients with PAD who did not receive baseline screening) have a 3% likelihood of amputation within 10 years (Fintel 2008; individuals with PAD identified by screening at baseline have a 1% likelihood of amputation within 10 years (Fintel 2008).

**Distribution of catastrophic events**

It is generally assumed that the number of catastrophic events, as defined previously, will increase from Year 1 through Year 10. The assumed annual distribution of catastrophic events is 5% for Years 1–3, 7.5% for Year 4, 10% for Year 5, 12.5% for Years 6–8, and 15% for Years 9 and 10.

**RESULTS**

**Expected value analysis**

The primary analysis utilizes average variable values (a subset of which are provided in Tables 1, 3, and 5) to determine: expected numbers of beneficiaries with AAA, moderate CAS, possibly significant CAS, and/or PAD who are either identified (bundled screening cohort) or whose disease remains latent (nonscreening or control cohort); expected number of disease occurrences receiving treatment through appropriate follow-up with the traditional health care system; and expected direct costs of the bundled screening and control cohorts.

Across all age and gender groups, the primary analysis shows an expected 2,580 beneficiaries (93.5%) without any of the diseases of interest, an expected 89 individuals (3.2%) with AAA, 54 individuals (2%) with CAS, and 52 cases (1.9%) of PAD.

The base case analysis depicts an opportunity afforded by bundled screening, namely, identification of latent disease, providing an opportunity for disease treatment. In the analysis, it is assumed that for the bundled screening cohort, 90% of patients with identified disease will seek appropriate medical treatment from the traditional health care system. Appropriate medical treatment is defined as follow-up with a primary care physician as an initial step to discuss screening results. This results in 80, 49, and 49 cases of AAA, CAS, and PAD, respectively, receiving treatment vs. no patients receiving treatment in the control cohort. Additionally, the model’s assumed RRS reduction of 20% due to treatment results in four fewer cardiovascular-related catastrophic health events over 10 years, a 2% reduction.

The modeled cost implications of early identification and treatment of AAA, CAS, and PAD are also determined from the base case analysis results. For patients in the control cohort, approximately $54.1 million in health care costs are expected over 10 years (or until they reach the age of 65). For the bundled screening cohort, health care costs of approximately $51.3 million are expected, representing a 5.2% reduction in health care spending.

Finally, Table 4 (Page 50) provides an expected annual distribution of costs for the bundled screening and the control cohorts. These results take into account the appropriate longitudinal costs, as well as the assumed annual cost and event distributions. Table 4 also separates noncatastrophic event treatment costs, catastrophic event costs, and bundled screening costs (as applicable) to provide a more detailed breakdown of expected direct costs for the two modeled cohorts. From a budgetary impact perspective, the model predicts the hypothetical self-funded employer will recoup all screening costs and begin showing cost savings in the second year post-screening.

**Sensitivity analysis**

To determine the robustness of the modeled cost and benefit findings, one-way sensitivity analyses were performed on three key model variables: (1) the likelihood of inappropriate health care follow-up for normal bundled screening findings (base value 0.2), (2) percent reduction in RRS for patients receiving appropriate disease treatment (base value 20%), and (3) the likelihood of appropriate health care follow-up for
abnormal bundled screening results (base value 0.8).

Sensitivity analyses on the likelihood of inappropriate health care follow-up for normal bundled screening findings showed that modeled cost savings are robust to any level of inappropriate health care follow-up for normal screening results. Even if all bundled screening patients receiving normal results have an additional standard health care visit, the model still predicts over $2.5 million in cost savings over 10 years.

The modeled results are similarly robust to changes in the assumed percent reduction in RRS for patients receiving appropriate disease treatment. Even if no reduction in RRS is assumed, the model predicts 10-year cost savings of approximately $2.8 million for the bundled screening cohort.

The modeled results are similarly robust to changes in the assumed percent reduction in RRS for patients receiving appropriate disease treatment. Even if no reduction in RRS is assumed, the model predicts 10-year cost savings of approximately $2.8 million for the bundled screening cohort.

DISCUSSION

This cost-benefit analysis predicts significant, robust cost and health benefits associated with the decision to provide bundled cardiovascular disease screening to a cohort of self-funded employer's beneficiaries aged ≥50 years and <65 years. As demonstrated, the modeled cost benefits are due to the avoidance of very costly emergency and/or major medical procedures once latent disease becomes symptomatic. While it is established that current, published cardiovascular screening recommendations do not all recommend AAA, CAS, and PAD screening in the cohort examined in this analysis, it is clear from the screening data that form the basis of the model that disease does exist in this cohort, and is identified by screening. Presence of disease implies not only direct cost benefits but also individual and public health benefits.

The precise magnitude of this benefit remains unknown, however, due to limitations of the initial analysis. First, while the bundled screening strategy resulted in cost savings even if very few patients with disease received appropriate disease treatment, the cost savings varied from approximately $2.8 million (if 90% of patients seek treatment) to approximately $6,000 (if only about 5% of patients seek treatment). For this reason, it is important for providers of bundled screening outside the traditional health care environment (e.g., community-based screening where participants self-select to screen) to perform follow-up surveys to gauge likelihood of physician follow-up following a positive finding of AAA, CAS, and/or PAD as well as likelihood of physician follow-up following negative findings.

To this end, the screening provider has conducted preliminary follow-up surveys to investigate post-screening
interaction with health care providers, details of which are provided in the previously mentioned article by Weisman (2013). Seventy-five percent of survey respondents shared their screening results with a physician or health care provider (unweighted, n=1,477). Respondents with abnormal test results (defined as a positive test result for PAD, CAS, AAA, atrial fibrillation, or osteoporosis) (unweighted, n=524) were more likely to share results than those respondents with normal test results (82% vs 74%). If we utilize these preliminary survey results in our model, the predicted 10-year cost savings of approximately $2.55 million reinforces the cost savings potential of bundled cardiovascular screening for a cohort group aged ≥50 years and <65 years.

Second, while all health care costs were drawn from published sources, the timing and selection of treatment procedures across the patient groups are assumption-driven. Therefore, collection of post-screening medical resource utilization such as additional diagnostics, medications, office visits, emergency department visits, and hospitalizations also will be important. Similarly, post-screening behavioral changes such as modified diet, increased exercise, etc., should be collected to inform future cost-benefit analyses.

Third, the current analysis provides only initial assessments of the cost and health benefits of bundled disease screening to a single cohort of beneficiaries of a self-funded employer who assumes complete risk for its beneficiaries. However, the initial analysis serves an important purpose: to highlight the cost-saving potential of bundled screening for cardiovascular disease within an appropriately defined population. More rigorous cost-benefit analyses should be conducted from a number of perspectives (e.g., self-funded employer [including varying models of benefits such as high-deductible plans], self-pay population, private payer, CMS, societal).

Fourth, future cost-benefit analyses should compare the costs and benefits of employer-provided bundled CAS, AAA, and PAD screening to the costs and benefits of more traditional screening for cardiovascular disease and diabetes.

Additionally, future cost-benefit assessments should be built as Markov models, rather than as simple decision analyses, and should incorporate elements such as:

- Rolling patient populations, with bundled screening assessments provided for new individuals entering/leaving the model on an annual basis
- Discounting of future cost and health benefits
- Implications of repeated bundled screening at predefined intervals (e.g., 5 years or 10 years)
- Patients choosing to opt out of the bundled screening benefit
- Lifetime health care costs
- All-cause mortality
- Expected survival and/or quality-adjusted survival benefits for patients receiving bundled screening
- Calculation of either incremental cost per year of survival or incremental cost per quality-adjusted life years (QALYs) (or assessment of dominance if the more effective strategy also results in lower costs as is suggested by the current analysis)
- The impact of reductions in early compliance with necessary medication and/or lifestyle changes on the incremental benefits of bundled screening
- The impact of additional comorbid conditions (e.g., diabetes) on the occurrence of catastrophic events and on RRS reductions achievable through CAS, PAD, and/or AAA treatments only.

While a preliminary survey of post-screening health care follow-up has been conducted, in advance of further prospective survey data regarding post-screening medical resource utilization, analyses could utilize social science research to refine the likelihood of appropriate or inappropriate follow-up across the different age and gender subgroups. Claims-based data analyses could also be used to determine actual reduction in costs due to early treatment of latent disease as compared to later treatment of symptomatic disease.

Finally, while additional research is necessary to fully characterize the cost-benefit profile of community-based bundled cardiovascular screening, this initial analysis suggests that future, definitive cost-effectiveness analyses will demonstrate clear value in the provision of bundled screening to appropriately selected populations.

REFERENCES


Brileman SL, Purdy S, Salisbury C, et al. Implications of comorbidity for pri-
Bundled Community-Based Screenings


Ridker PM, Buring JE, Rifai N, Cook NR. Development and validation of improved algorithms for the assessment of global cardiovascular risk in women: the Reynolds Risk Score. JAMA.
Bundled Community-Based Screenings


### TABLE 1
Subset of decision tree transition probabilities

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Variable description</th>
<th>Base case value</th>
<th>Men 55–64</th>
<th>Women 55–64</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Likelihood that patient will not have AAA</td>
<td>0.9380[^d]</td>
<td>0.9989[^b]</td>
<td></td>
</tr>
<tr>
<td>1−P1</td>
<td>Likelihood that patient will have AAA</td>
<td>0.0620</td>
<td>0.0011</td>
<td></td>
</tr>
<tr>
<td>P2</td>
<td>Likelihood that patient without AAA will not have CAS or PAD</td>
<td>0.9599[^c]</td>
<td>0.9551[^c]</td>
<td></td>
</tr>
<tr>
<td>P3</td>
<td>Likelihood that patient without AAA will not have CAS but will have PAD</td>
<td>0.0134[^e]</td>
<td>0.0210[^f]</td>
<td></td>
</tr>
<tr>
<td>P4</td>
<td>Likelihood that patient without AAA will have moderate CAS but not PAD</td>
<td>0.0144[^f]</td>
<td>0.0139[^g]</td>
<td></td>
</tr>
<tr>
<td>P5</td>
<td>Likelihood that patient without AAA will have moderate CAS and PAD</td>
<td>0.0010[^i]</td>
<td>0.0010[^i]</td>
<td></td>
</tr>
<tr>
<td>P6</td>
<td>Likelihood that patient without AAA will have possibly significant CAS but not PAD</td>
<td>0.0096[^i]</td>
<td>0.0073[^i]</td>
<td></td>
</tr>
<tr>
<td>1−(P2+P3+P4+P5+P6)</td>
<td>Likelihood that patient without AAA will have possibly significant CAS and PAD</td>
<td>0.0017</td>
<td>0.0010</td>
<td></td>
</tr>
<tr>
<td>P7</td>
<td>Likelihood that patient with AAA will not have CAS or PAD</td>
<td>0.8375[^c]</td>
<td>0.7430[^c]</td>
<td></td>
</tr>
<tr>
<td>P8</td>
<td>Likelihood that patient with AAA will not have CAS but will have PAD</td>
<td>0.0722[^c]</td>
<td>0.1020[^c]</td>
<td></td>
</tr>
<tr>
<td>P9</td>
<td>Likelihood that patient with AAA will have moderate CAS but not PAD</td>
<td>0.0258[^c]</td>
<td>0.0543[^c]</td>
<td></td>
</tr>
<tr>
<td>P10</td>
<td>Likelihood that patient with AAA will have moderate CAS and PAD</td>
<td>0.0088[^c]</td>
<td>0.0185[^c]</td>
<td></td>
</tr>
<tr>
<td>P11</td>
<td>Likelihood that patient with AAA will have possibly significant CAS but not PAD</td>
<td>0.0391[^c]</td>
<td>0.0517[^c]</td>
<td></td>
</tr>
<tr>
<td>1−(P7+P8+P9+P10+P11)</td>
<td>Likelihood that patient with AAA will have possibly significant CAS and PAD</td>
<td>0.0170[^c]</td>
<td>0.0300</td>
<td></td>
</tr>
<tr>
<td>P12</td>
<td>Likelihood that patient without CAS, without PAD, and without AAA will appropriately not follow up with MD</td>
<td>0.8000</td>
<td>0.8000</td>
<td></td>
</tr>
<tr>
<td>1−P12</td>
<td>Likelihood that patient without CAS, without PAD, and without AAA will inappropriately follow up with MD</td>
<td>0.2000</td>
<td>0.2000</td>
<td></td>
</tr>
<tr>
<td>P13</td>
<td>Likelihood that patient with AAA and/or with CAS and/or with PAD will appropriately follow up with MD</td>
<td>0.9000</td>
<td>0.9000</td>
<td></td>
</tr>
<tr>
<td>1−P13</td>
<td>Likelihood that patient with AAA and/or with CAS and/or with PAD will inappropriately NOT follow up with MD</td>
<td>0.1000</td>
<td>0.1000</td>
<td></td>
</tr>
</tbody>
</table>

[^a]: See the corresponding variable names in the decision tree structure shown in Figure 1; [^b]: data from DeRubertis 2007; [^c]: Life Line Screening data 2005–2008; [^d]: data from Singh 2001.

AAA = abdominal aortic aneurysm, CAS = carotid artery stenosis, PAD = peripheral artery disease.
### TABLE 2  
Cost variables

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Variable description</th>
<th>Base case value</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>Average health care cost of untreated no AAA, no CAS, no PAD</td>
<td>$21,940</td>
<td>Average health care costs for 10 years</td>
</tr>
<tr>
<td>C2</td>
<td>Average cost of untreated no AAA, no CAS, PAD</td>
<td>$49,205</td>
<td>Assumes: cost of peripheral bypass graft; average health care costs for 5 years; costs of PAD treatment for 5 years; 3% of patients require amputation</td>
</tr>
<tr>
<td>C3</td>
<td>Average cost of untreated no AAA, moderate CAS, no PAD</td>
<td>$72,558</td>
<td>Assumes: cost of endarterectomy and extensive 2-year post-op medical management; average health care costs for 5 years; cost of CAS treatment for 3 years; cost of medical management of CAS similar to cost of medical management of PAD</td>
</tr>
<tr>
<td>C4</td>
<td>Average cost of untreated no AAA, moderate CAS, PAD</td>
<td>$105,933</td>
<td>Assumes: cost of endarterectomy and extensive 2-year post-op medical management; average health care costs for 5 years; cost of peripheral bypass graft; cost of CAS and PAD treatment for 3 years; cost of medical management of CAS similar to cost of medical management of PAD</td>
</tr>
<tr>
<td>C5</td>
<td>Average cost of untreated no AAA, possibly significant CAS, no PAD</td>
<td>$73,502</td>
<td>Assumes: cost of endarterectomy and extensive 2-year post-op medical management; average health care costs for 1 year; cost of CAS treatment for 7 years; cost of medical management of CAS similar to cost of medical management of PAD</td>
</tr>
<tr>
<td>C6</td>
<td>Average cost of untreated no AAA, possibly significant CAS, PAD</td>
<td>$116,597</td>
<td>Assumes: cost of endarterectomy and extensive 2-year post-op medical management; average health care costs for 1 year; cost of peripheral bypass graft; cost of CAS and PAD treatment for 7 years; cost of medical management of CAS similar to cost of medical management of PAD</td>
</tr>
<tr>
<td>C7</td>
<td>Average cost of untreated AAA, no CAS, no PAD</td>
<td>$70,770</td>
<td>Assumes: cost of emergency repair for ruptured AAA; average health care costs for 10 years</td>
</tr>
<tr>
<td>C8</td>
<td>Average cost of untreated AAA, no CAS, PAD</td>
<td>$98,035</td>
<td>Assumes: cost of emergency repair for ruptured AAA; cost of peripheral bypass graft; average health care costs for 5 years; and cost of PAD treatment for 5 years; 3% of patients will require amputation</td>
</tr>
<tr>
<td>C9</td>
<td>Average cost of untreated AAA, moderate CAS, no PAD</td>
<td>$121,388</td>
<td>Assumes: cost of emergency repair for ruptured AAA; cost of endarterectomy and extensive 2-year post-op medical management; average health care costs for 5 years; cost of CAS treatment for 3 years; cost of medical management of CAS similar to cost of medical management of PAD</td>
</tr>
<tr>
<td>C10</td>
<td>Average cost of untreated AAA, moderate CAS, PAD</td>
<td>$154,763</td>
<td>Assumes: cost of emergency repair for ruptured AAA; cost of endarterectomy and extensive 2-year post-op medical management; peripheral bypass graft; average health care costs for 5 years; cost of CAS and PAD treatment for 3 years; cost of medical management of CAS similar to cost of medical management of PAD</td>
</tr>
<tr>
<td>C11</td>
<td>Average cost of untreated AAA, possibly significant CAS, no PAD</td>
<td>$122,332</td>
<td>Assumes: cost of emergency repair for ruptured AAA; cost of endarterectomy and extensive 2-year post-op medical management; average health care costs for 1 year; cost of CAS treatment for 7 years; cost of medical management of CAS similar to cost of medical management of PAD</td>
</tr>
<tr>
<td>C12</td>
<td>Average cost of untreated AAA, possibly significant CAS, PAD</td>
<td>$165,427</td>
<td>Assumes: cost of emergency repair for ruptured AAA; cost of endarterectomy and extensive 2-year post-op medical management; peripheral bypass graft; average health care costs for 1 year; cost of CAS and PAD treatment for 7 years; cost of medical management of CAS similar to cost of medical management of PAD</td>
</tr>
<tr>
<td>C13</td>
<td>Average cost of AAA diagnostic</td>
<td>$416</td>
<td>Cost of abdominal CT (with contrast)</td>
</tr>
<tr>
<td>C14</td>
<td>Average cost of CAS diagnostic</td>
<td>$405</td>
<td>Cost of carotid duplex scan</td>
</tr>
<tr>
<td>C15</td>
<td>Average cost of PAD diagnostic</td>
<td>$234</td>
<td>Cost of arterial evaluation of extremity</td>
</tr>
<tr>
<td>C15A</td>
<td>Cost of bundled AAA, CAS, and PAD diagnostic screening</td>
<td>$110</td>
<td>Cost of bundled cardiovascular screening (includes AAA, CAS, and PAD)</td>
</tr>
</tbody>
</table>
### TABLE 2  Cost variables (continued)

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Amount</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>C16</td>
<td>Average cost of treated no AAA, no CAS, no PAD</td>
<td>$21,940</td>
<td>Assumes average health care costs for 10 years&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>C17</td>
<td>Average cost of treated no AAA, no CAS, PAD</td>
<td>$27,725</td>
<td>Assumes: cost of 10 years of average PAD treatment costs; &lt;sup&gt;g&lt;/sup&gt; &lt;sup&gt;h&lt;/sup&gt; 10% of patients will require percutaneous intervention for PAD and 1% will require amputation&lt;sup&gt;j&lt;/sup&gt;</td>
</tr>
<tr>
<td>C18</td>
<td>Average cost of treated no AAA, moderate CAS, no PAD</td>
<td>$24,300</td>
<td>Assumes: cost of 10 years of average CAS treatment costs; &lt;sup&gt;a&lt;/sup&gt; &lt;sup&gt;h&lt;/sup&gt; medical management of CAS similar in cost to medical management of PAD</td>
</tr>
<tr>
<td>C19</td>
<td>Average cost of treated no AAA, moderate CAS, PAD</td>
<td>$52,025</td>
<td>Assumes: cost of 10 years of average PAD and CAS treatment costs; &lt;sup&gt;a&lt;/sup&gt; medical management of CAS is similar in cost to medical management of PAD; 10% of patients will require percutaneous intervention for PAD and 1% will require amputation&lt;sup&gt;j&lt;/sup&gt;</td>
</tr>
<tr>
<td>C20</td>
<td>Average cost of treated no AAA, possibly significant CAS, no PAD</td>
<td>$38,719</td>
<td>Assumes: cost of endarterectomy and extensive 2-year post-op medical management; &lt;sup&gt;a&lt;/sup&gt; average health care costs for 8 years&lt;sup&gt;c&lt;/ supp&gt;</td>
</tr>
<tr>
<td>C21</td>
<td>Average cost of treated no AAA, possibly significant CAS, PAD</td>
<td>$41,079</td>
<td>Assumes: cost of endarterectomy and extensive 2-year post-op medical management; &lt;sup&gt;a&lt;/sup&gt; annual costs associated with PAD medical management; &lt;sup&gt;a&lt;/sup&gt; &lt;sup&gt;g&lt;/sup&gt; 10% of patients will require percutaneous intervention for PAD and 1% will require amputation&lt;sup&gt;j&lt;/sup&gt;</td>
</tr>
<tr>
<td>C22</td>
<td>Average cost of treated AAA, no CAS, no PAD</td>
<td>$49,985</td>
<td>Assumes: cost of elective AAA surgery; &lt;sup&gt;a&lt;/sup&gt; 10 years of average health care costs&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>C23</td>
<td>Average cost of treated AAA, no CAS, PAD</td>
<td>$55,270</td>
<td>Assumes: cost of elective AAA surgery; &lt;sup&gt;a&lt;/sup&gt; 10 years of average PAD treatment costs; &lt;sup&gt;a&lt;/sup&gt; 10% of patients will require percutaneous intervention for PAD and 1% will require amputation&lt;sup&gt;j&lt;/sup&gt;</td>
</tr>
<tr>
<td>C24</td>
<td>Average cost of treated AAA, moderate CAS, no PAD</td>
<td>$51,845</td>
<td>Assumes: cost of elective AAA surgery; &lt;sup&gt;a&lt;/sup&gt; 10 years of average CAS treatment costs; &lt;sup&gt;a&lt;/sup&gt; medical management of CAS similar in cost to medical management of PAD</td>
</tr>
<tr>
<td>C25</td>
<td>Average cost of treated AAA, moderate CAS, PAD</td>
<td>$79,570</td>
<td>Assumes: cost of elective AAA surgery; &lt;sup&gt;a&lt;/sup&gt; 10 years of average PAD and CAS treatment costs; &lt;sup&gt;a&lt;/sup&gt; 10% of patients will require percutaneous intervention for PAD and 1% will require amputation; &lt;sup&gt;a&lt;/sup&gt; medical management of CAS similar in cost to medical management of PAD</td>
</tr>
<tr>
<td>C26</td>
<td>Average cost of treated AAA, possibly significant CAS, no PAD</td>
<td>$62,839</td>
<td>Assumes: costs of endarterectomy, and extensive 2-year post-op medical management; &lt;sup&gt;a&lt;/sup&gt; elective AAA surgery; &lt;sup&gt;a&lt;/sup&gt; average annual health care costs for 8 years&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>C27</td>
<td>Average cost of treated AAA, possibly significant CAS, PAD</td>
<td>$68,624</td>
<td>Assumes: costs of endarterectomy, and extensive 2-year post-op medical management; &lt;sup&gt;a&lt;/sup&gt; elective AAA surgery; &lt;sup&gt;a&lt;/sup&gt; 10 years of average PAD treatment costs; &lt;sup&gt;a&lt;/sup&gt; 10% of patients will require percutaneous intervention for PAD and 1% will require amputation&lt;sup&gt;j&lt;/sup&gt;</td>
</tr>
<tr>
<td>C28</td>
<td>Average cost of general practitioner office visit</td>
<td>$78</td>
<td>American Academy of Family Practice&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>C29</td>
<td>Average cost of specialist physician visit</td>
<td>$366</td>
<td>Harvard Pilgrim Healthcare&lt;sup&gt;m&lt;/sup&gt;</td>
</tr>
<tr>
<td>C30</td>
<td>Cost of surgical intervention for PAD</td>
<td>$22,584</td>
<td>Cost of peripheral bypass graft&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
<tr>
<td>C31</td>
<td>Cost of ischemic amputation</td>
<td>$116,700</td>
<td>Cost of ischemic amputation and associated 2-year costs&lt;sup&gt;n&lt;/sup&gt;</td>
</tr>
<tr>
<td>C32</td>
<td>Average cost of stroke, myocardial infarction, or CV-related death</td>
<td>$47,178</td>
<td>Assumes average of: cost of stroke (hospitalization cost and 90-day post-hospitalization cost); cost of myocardial infarction (hospitalization cost and 180-day post-hospitalization cost); and cost of CV-related death&lt;sup&gt;e&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup>All costs assume a 10-year time period; <sup>a</sup>all costs are in 2012 U.S. dollars; <sup>c</sup>CDC 2013; <sup>d</sup>data from Mahoney 2008; <sup>g</sup>data from Hirsch 2008; <sup>i</sup>data from Fintel 2008; <sup>j</sup>data from Ryan 2009; <sup>k</sup>data from Lee 2002; <sup>l</sup>data from Healthcare Blue Book Web site, 2012; <sup>m</sup>data from Cull 2011; <sup>n</sup>data from Life Line Screening (Independence, Ohio); <sup>o</sup>data from American Academy of Family Physicians Web site, 2004; <sup>p</sup>data from Harvard Pilgrim Health Care Web site, 2012; <sup>q</sup>data from Mackenzie 2007; <sup>r</sup>data from Lyden 1996; <sup>s</sup>data from Kramer 2006; <sup>t</sup>data from Kauf 2006; <sup>u</sup>data from Sloss 2004; <sup>v</sup>data from Naccarelli 2010.

AAA=abdominal aortic aneurysm, CAS=carotid artery stenosis, CT=computed tomography, CV=cardiovascular, PAD=peripheral artery disease.
### TABLE 3
Baseline Reynolds Risk Scores (RRS)\(^a\)

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Variable description</th>
<th>Base case value(^a)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Base case value(^a)</td>
<td>Men 55 to 64</td>
<td>Women 55 to 64</td>
</tr>
<tr>
<td>RR1</td>
<td>RRS for patient with untreated or treated no AAA, no CAS, no PAD</td>
<td>0.1092</td>
<td>0.0413</td>
<td></td>
</tr>
<tr>
<td>RR2</td>
<td>RRS for patient with untreated no AAA, no CAS, PAD</td>
<td>0.1551</td>
<td>0.0650</td>
<td></td>
</tr>
<tr>
<td>RR3</td>
<td>RRS for patient with untreated no AAA, moderate CAS, no PAD</td>
<td>0.1320</td>
<td>0.0622</td>
<td></td>
</tr>
<tr>
<td>RR4</td>
<td>RRS for patient with untreated no AAA, moderate CAS, PAD</td>
<td>0.1069</td>
<td>0.0585</td>
<td></td>
</tr>
<tr>
<td>RR5</td>
<td>RRS for patient with untreated no AAA, possibly significant CAS, no PAD</td>
<td>0.1541</td>
<td>0.0581</td>
<td></td>
</tr>
<tr>
<td>RR6</td>
<td>RRS for patient with untreated no AAA, possibly significant CAS, PAD</td>
<td>0.1850</td>
<td>0.1046</td>
<td></td>
</tr>
<tr>
<td>RR7</td>
<td>RRS for patient with untreated AAA, no CAS, no PAD</td>
<td>0.1376</td>
<td>0.0632</td>
<td></td>
</tr>
<tr>
<td>RR8</td>
<td>RRS for patient with untreated AAA, no CAS, PAD</td>
<td>0.0895</td>
<td>0.0177</td>
<td></td>
</tr>
<tr>
<td>RR9</td>
<td>RRS for patient with untreated AAA, moderate CAS, no PAD</td>
<td>0.2981</td>
<td>0.0622</td>
<td></td>
</tr>
<tr>
<td>RR10</td>
<td>RRS for patient with untreated AAA, moderate CAS, PAD</td>
<td>0.1069</td>
<td>0.0585</td>
<td></td>
</tr>
<tr>
<td>RR11</td>
<td>RRS for patient with untreated AAA, possibly significant CAS, no PAD</td>
<td>0.1403</td>
<td>0.0581</td>
<td></td>
</tr>
<tr>
<td>RR12</td>
<td>RRS for patient with untreated AAA, possibly significant CAS, PAD</td>
<td>0.2837</td>
<td>0.1046</td>
<td></td>
</tr>
<tr>
<td>RR Reduction</td>
<td>Percentage reduction in RRS due to treatment of AAA, CAS, and/or PAD</td>
<td>20%</td>
<td>20%</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\)Life Line Screening data, 2005–2008