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# **Report: The Business Case for Coverage of Tobacco Cessation**



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**Prepared by Leif Associates Inc.**

Leif Associates, Inc., a health care actuarial consulting firm, performed this study on behalf of the Colorado Clinical Guidelines Collaborative. The purpose of the study was to establish whether or not smoking cessation programs result in sufficient health care cost savings to make the case for health insurance programs to include them as a covered benefit.

## Health Insurance and The Cost of Smoking

### The Impact of Smoking on Health

The fact that the use of tobacco products has detrimental effects on the health of those who use them has been known for almost forty years. In 1964, the U.S. Department of Health Education, and Welfare issued its first report on the impact of smoking on health<sup>1</sup>. The conclusion of this study was that cigarette smoking is a health hazard of sufficient importance in the United States to warrant appropriate remedial action. The evidence proved that cigarette smoking contributes substantially to mortality from certain diseases and to the overall U.S. death rate. Based on scientific evidence gathered from numerous sources, the 1964 Surgeon General's report cited the following items as its principal findings<sup>2</sup>:

- Cigarette smoking is associated with a 70 percent increase in the age-specific death rates of males.
- Cigarette smoking is causally related to lung cancer in men; the magnitude of the effect of cigarette smoking far outweighs all other factors. The data for women, though less extensive, point in the same direction. The risk of lung cancer attributable to cigarette smoking is 90% for men and 79% for women.
- Cigarette smoking is the most prevalent cause of chronic bronchitis in the United States, and increases the risk of dying from chronic bronchitis and emphysema.
- Male cigarette smokers have a higher death rate from coronary artery disease than non-smoking males.
- Cigarette smoking is a significant causal factor in cancer of the larynx. The risk attributable to cigarette smoking is 81% for males and 87% for females.
- The evidence also supports an association between tobacco use and cancer of the esophagus. The risk attributable to cigarette smoking is 78% for males and 75% for females.

Nearly forty years later, tobacco use remains the number one cause of preventable disease and death in the United States.<sup>3</sup> Efforts continue to reduce the prevalence of smoking. The Healthy People 2010 initiative sponsored by the U.S. Department of Health and Human Services has set nationwide goals to reduce the percentage of adults who smoke from 24% to 12% and to reduce the percentage of adolescents who smoke from 35% to 16% by 2010.<sup>4</sup>

### Insurance Coverage Issues

Despite the known cost impact of smoking on health, treatments for tobacco use (both pharmacotherapy and counseling) are not consistently provided as paid services for subscribers of health insurance packages, although significant progress has been made in expanding coverage. A 2002 survey of 152 health plans covering more than 33 million people conducted by the American Association of Health Plans (AAHP)<sup>5</sup> revealed the following key indicators regarding smoking cessation coverage:

- 88% of health plans provide full coverage for at least one type of pharmacotherapy. Zyban<sup>®</sup> was the most commonly covered pharmacotherapy specifically for the purpose of tobacco cessation.
- Only 33% of health plans provide full coverage of nicotine replacement therapy purchased over the counter.
- 58% of health plans reported that they provide full coverage for at least one type of behavioral intervention (such as counseling, classes, and self-help material). The most common form of behavioral intervention was self-help material.
- Between 1997 and 2002, the percentage of health plans that provide full coverage for Zyban<sup>®</sup> increased from 17.5% to 69%.

- 89.5% of health plans require providers to ask new patients about smoking status, while 82% require them to ask about smoking status at every visit.
- 72% of plans reported that they require providers to strongly advise all patients who smoke to quit.
- 85% of the health plans reported having a specific strategy to address smoking cessation during pregnancy.
- 57% of plans reported having a specific strategy for addressing smoking cessation during adolescence, and 75% reported having a specific strategy for post-MI patients.

In the AAHP survey, health plans reported the following barriers that limit their ability to address tobacco control more fully:

- Resource barriers, such as insufficient staff, inadequate funding, and competing priorities.
- System barriers, such as poor data collection and reporting.

## Quantifying the Actuarial Impact

### Methodology

Ideally, the actuarial impact of smoking cessation programs could be determined by compiling health care utilization and cost data for a large number of tobacco users who subsequently participate in a smoking cessation program. Unfortunately, most insurers have not historically gathered data regarding the smoking status of their insured members. As a result, the data to perform such an actuarial study is not generally available.

This analysis presents an actuarial assessment of the benefits derived from smoking cessation programs as compared to their cost. Since the actuarial impact of smoking cessation programs will be different for each insurer, based on the unique distribution of its members, program features, and corporate practices, an estimated actuarial impact was developed based on average assumptions for a typical insured population.

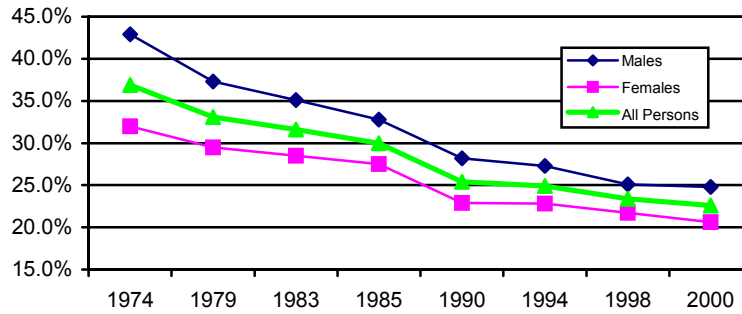
Methods included the following steps:

1. Estimate the smoking prevalence in a typical insured population.
2. Estimate the average monthly medical cost for population categories of smokers and non-smokers.
3. Estimate the expected cost of smoking cessation approaches and the likely participation and success rates of each.
4. Estimate the improvement in health when smoking ceases.
5. Estimate the cost savings that will be realized by implementing smoking cessation programs

Each of these steps is discussed in the following sections of the report.

### Step One -- The Prevalence of Smoking in a Typical Insured Population

In spite of all that is known about the serious health consequences of smoking, the prevalence is still quite high. Cigarette smoking declined quite rapidly after the 1964 Surgeon General's Report, but in recent years the decline has slowed. The most recent data indicate that 22.6% of all persons 25 years and over are smokers. The percentages are 24.8% for males and 20.6% for females. The following table depicts the prevalence of smoking in the United States over the last 30 years, as reported by the Centers for Disease Control and Prevention.<sup>6</sup>



Other pertinent smoking prevalence statistics include the following:

- Among mothers with a live birth, the percent reporting smoking during pregnancy declined every year between 1990 and 1999. However, in 1999, 12.3% of women giving birth still reported smoking during pregnancy. For women 15 to 19 years of age, the rate of smoking during pregnancy has increased since 1994 and reached 17.5%.<sup>7</sup>
- Children who smoke create lifelong habits that are hard to break. Only 1 in 5 current smokers started smoking on or after their 21<sup>st</sup> birthday, and almost one-third of smokers started younger than 16 years of age.<sup>8</sup> It is estimated that approximately 3,000 additional children and adolescents become regular users of tobacco each day.<sup>9</sup>
- Among high school students, 28.5% currently smoke cigarettes, down from 36.4% in 1997.<sup>10</sup>

Based on the available data and Leif and Associates long history in providing actuarial expertise to commercial insurers in Colorado, the following estimate of the smokers versus non-smokers in a typical under age 65 insured population was developed:

<i>Population Category</i>	<i>Population Distribution</i>
Male Non-Smokers	26.3%
Male Smokers	8.7%
Female Non-Pregnant Non-Smokers	26.7%
Female Non-Pregnant Smokers	6.9%
Female Pregnant Non-Smokers	1.1%
Female Pregnant Smokers	0.3%
Children Non-Smokers	28.1%
Children Smokers	1.9%
<b>Total</b>	<b>100.0%</b>

To develop this distribution, Leif and Associates used a typical distribution for a Colorado under age 65 commercially insured population: 50% male and 50% female, 30% children, and 3.8% of the adult females are pregnant. Distributions will vary from carrier to carrier.

This table shows that for a typical insured population, approximately 17.8% of the members are smokers.

**Step Two – How Smoking Affects Medical Costs**

Many studies have been performed to quantify the medical costs of smoking in the United States. The estimated proportion of total medical expenditures attributable to smoking for the United States was determined in a 1993 study<sup>11</sup> to be 11.8%, with a range across states from 6.6% to 14.1%. The range was due to differences in smoking prevalence, health status, and other socioeconomic variables. Colorado’s proportion was estimated to be 12.1%.

A more recent study based on the same model<sup>12</sup> projected 2001 costs attributable to smoking using revised information regarding smoking prevalence for each state. This study showed the estimated proportion of total medical expenditures attributable to smoking to be 6.7%. Colorado's proportion was estimated to be 8.3%.

Lung cancer is now the leading cause of cancer death among U.S. women. It surpassed breast cancer in 1987. One in every four cancer deaths among women is the result of lung cancer. There are approximately 68,000 lung cancer deaths in U.S. women each year, substantially more than the 41,000 who die each year from breast cancer. In 1999, approximately 165,000 women died prematurely from smoking-related diseases, such as cancer and heart disease.<sup>13</sup>

Smoking during pregnancy is associated with adverse outcomes, including low birth weight, intrauterine growth retardation, and infant mortality, as well as negative consequences for child health and development. Women who smoke during pregnancy (12.1%) are more likely to have an infant that weighs less than 2,500 grams (5 pounds, 8 ounces) than those who do not smoke (7.2%).<sup>14</sup>

In addition, the U.S. Environmental Protection Agency (EPA) has concluded that exposure to environmental tobacco smoke presents a serious and substantial public health impact.<sup>15</sup> Their findings include the following:

- Environmental tobacco smoke is a human lung carcinogen, responsible for approximately 3,000 lung cancer deaths annually in U.S. nonsmokers.
- In children, secondhand smoke exposure is causally associated with an increased risk of lower respiratory tract infections such as bronchitis and pneumonia, increased prevalence of fluid in the middle ear, additional episodes and increased severity of symptoms in children with asthma, and is a risk factor for new cases of asthma in children who have not previously displayed symptoms.

In addition to the health related costs of cigarette smoking, there are also non-healthcare costs of reduced productivity resulting in economic losses to society. In 2002, the Centers for Disease Control (CDC) reported the annual estimates of the impact of smoking in the United States during 1995-1999.<sup>16</sup> CDC's report calculates the national estimates of Years of Potential Life Lost (YPLL) and productivity costs for adults. Smoking attributable YPLL and productivity costs are estimated by multiplying age- and sex-specific Smoking Attributable Mortality (SAM) by remaining life expectancy and lifetime earnings data, respectively. The annual estimates reported by CDC on productivity losses are conservative because they do not include the value of lost work time from smoking-related disability, absenteeism, excess work breaks, and secondhand smoke-related disease morbidity and mortality. Highlights of the CDC report include:

- Adult male and female smokers lost an average of 13.2 and 14.5 years of life, respectively, because they smoke.
- The average annual mortality-related productivity losses attributable to smoking for adults were \$81.9 billion.
- Reported 1995-1999 annual productivity losses are larger than previous estimates of \$43 billion. The larger productivity-loss figure reflects increases in the number of smoking-attributable deaths and in average earnings since the mid-1980s.

New research ties smoking to workplace absenteeism and productivity losses. Data indicate that nonsmokers are more productive, take fewer sick days per year, and use fewer health care resources than smokers.<sup>17</sup> These findings provide evidence that both productivity and employee health are enhanced through successful worksite smoking cessation. These studies conclude the following:

- Current smokers had significantly greater absenteeism than did never smokers.

- Among former smokers, absenteeism showed a significant decline with years following cessation.
- Productivity among former smokers increases over time toward values seen in never smokers.
- Former smokers' total productivity was greater than current smokers by 1-4 years following cessation.
- Compared with never smokers, men and women who were current smokers had higher short-term rates of hospitalization and lost workdays for a broad range of conditions.

Based on the sources referenced above and the work of Lief and Associates, the estimated 2003 monthly medical costs for the population categories listed above was determined. The estimate is based on an average cost of \$200.00 a month, which represents actual medical costs not reduced for member cost sharing. Insurers may have costs that are higher or lower based on a variety of factors such as contractual provider reimbursement arrangements, geographic cost differentials, and demographic distribution.

Based on the quoted sources that indicate that smoking adds approximately 7% to the total cost of health care and in general 22.6% of the population smokes, it is concluded that smokers have health care costs that average 31% higher than non smokers ( $.226 \times 1.31 + .774 \times 1.00 = 1.07$ ).

The following table shows the estimated per member per month average medical cost and the annual cost for 10,000 members for each of the population categories.

<i>Population Category</i>	<i>Distribution per 10,000 Members</i>	<i>Average 2003 Monthly Medical Cost</i>	<i>Annual Cost for 10,000 Members</i>
Male Non-Smokers	2,630	\$170.29	\$5,378,394
Male Smokers	870	\$223.08	\$2,323,581
Female Non-Pregnant Non-Smokers	2,670	\$247.77	\$7,948,649
Female Non-Pregnant Smokers	690	\$324.58	\$2,701,540
Female Pregnant Non-Smokers	110	\$333.33	\$422,408
Female Pregnant Smokers	30	\$436.67	\$143,566
Children Non-Smokers	2,810	\$123.29	\$4,160,113
Children Smokers	190	\$161.51	\$364,557
Average	10,000	\$200.00	\$23,443,000

The following table shows the expected cost if none of the members were smokers and demonstrates that savings of approximately \$1.3 million per year could be achieved per 10,000 members if none of the members smoked.

<i>Population Category</i>	<i>Distribution per 10,000 Members</i>	<i>Average 2003 Monthly Medical Cost</i>	<i>Annual Cost for 10,000 Members</i>
Male Non-Smokers	3,500	\$170.29	\$7,152,119
Female Non-Pregnant Non-Smokers	3,370	\$247.77	\$10,010,893
Female Pregnant Non-Smokers	140	\$333.33	\$532,000
Children	3,020	\$123.29	\$4,438,401
Average	10,000	\$184.45	\$22,133,413

### Step Three – Smoking Cessation Programs: Their Cost and Success Rates

The percent of current smokers aged 18 years and older who tried to quit smoking in the past year is approximately 42%.<sup>18</sup> Data suggest that more than 70 percent of the 50 million smokers in the U.S. today have made at least one prior attempt to quit. Unfortunately, most of these efforts are unsuccessful. Only about 5.7 percent who attempt cessation without assistance are

still abstinent 1 month later.<sup>19</sup> Estimated annual rates of use of smoking cessation services range from 2.4% to 10%.<sup>20</sup>

Tobacco dependence is a chronic condition that often requires repeated intervention. However, effective treatments exist that can produce long-term or permanent abstinence. The U.S. Department of Health and Human Services Public Health Service, in conjunction with a consortium of experts, developed Clinical Guidelines for Treating Tobacco Use and Dependence.<sup>21</sup> Much of the information included in this section is from those guidelines.

Tobacco cessation programs include a range of approaches, with varying costs and success rates. The following paragraphs list some of the recommendations from the Clinical Practice Guideline.

### **Behavioral Intervention**

- All physicians should strongly advise every patient who smokes to quit because evidence shows that physician advice to quit smoking increases abstinence rates.
- All clinicians should strongly advise their patients who use tobacco to quit. Although studies have not independently addressed the impact of advice to quit by all types of non-physician clinicians, it is reasonable to believe that such advice is effective in increasing their patients' long-term quit rates.
- There is a strong dose-response relation between the session length of person-to-person contact and successful treatment outcomes. Intensive interventions are more effective than less intensive interventions and should be used whenever possible.
- Person-to-person treatment delivered for four or more sessions appears especially effective in increasing abstinence rates.
- Smoking cessation interventions that are delivered in multiple formats (telephone counseling, group counseling, individual counseling) increase abstinence rates and should be encouraged.

The following table shows the estimated abstinence rate for various behavioral interventions:

<i>Behavioral Intervention</i>	<i>Estimated Abstinence Rate</i>
Physician advice to quit	10.2%
Self-help (pamphlets, videotapes, audiotapes)	12.3%
Person-to-person contact 4 - 30 minutes	18.8%
Person-to-person contact 31 - 90 minutes	26.5%
Person-to-person contact 90 - 300 minutes	28.4%
Person-to-person contact >300 minutes	25.5%
Quit lines	23.3%

Assuming an average cost of \$50 per hour for person-to-person contact, these results show that success rates of 25% to 30% can be achieved with an expenditure of under \$250.

### **Pharmacotherapy**

The Clinical Guidelines recommend that all patients attempting to quit smoking be encouraged to use effective pharmacotherapies for smoking cessation, except in the presence of special circumstances, such as pregnancy.

There are six FDA-approved pharmacotherapies for smoking cessation. Each has been documented to significantly increase the rates of long-term smoking abstinence. The following

table includes the name of the drug, its availability, an estimated April 2003 cost based on Internet drug sources, and the estimated abstinence rate. Drug costs will vary based on individual carriers' negotiated drug discounts.

<i>Pharmacotherapy</i>	<i>Availability</i>	<i>Estimated Cost</i>	<i>Estimated Abstinence Rate</i>
Bupropion SR (Zyban®)	Prescription only	\$2 per tab, 2 per day, 12 weeks = \$336	30.5%
Nicotine gum	Over the counter	\$0.56 per piece, 12 per day, 12 weeks = \$564	23.7%
Nicotine inhaler	Prescription only	\$1 per cartridge, 12 per day, 12 weeks = \$1,008	22.8%
Nicotine nasal spray	Prescription only	\$0.45 per dose, 24 per day, 12 weeks = \$907	30.5%
Nicotine patch	Over the counter or prescription	\$2.85 per day, 1 per day, 8 weeks = \$160	17.7%
Nicotine lozenge	Over the counter	\$0.56 per lozenge, 12 per day, 12 weeks, = \$564	

This information leads us to the following conclusions:

- With a combination of behavioral interventions and pharmacotherapy, smoking cessation success rates can be as high as 30%.
- The cost for smoking cessation programs can range up to as much as \$1,000 per person per attempt, but favorable results can be achieved for under \$500.

**Step Four --- Health Improvement when Smoking Ceases**

The health benefits of quitting smoking are enormous. Smoking cessation prevents a variety of chronic diseases, including heart disease, cancer, and pulmonary disease.<sup>22</sup>

Short-term health improvements include the following:

- The excess risk of developing heart disease as a result of smoking may be reduced by as much as half in the year or two after quitting.<sup>23</sup>
- The risk of total stroke incidence among former smokers approaches the level of never-smokers during the interval of 2 to 4 years following cessation.<sup>24</sup>
- Former smokers remove one-third of the excess risk of total coronary heart disease incidence within 2 years of cessation.<sup>25</sup>
- Pregnant women who quit smoking reduce the risk of adverse fetal outcomes, including stillbirths, spontaneous abortions, decreased fetal growth, premature births, low birth weight, placental abruption, sudden infant death syndrome, cleft palates and cleft lips, and childhood cancers.<sup>26</sup> Clinical trials of women who stop smoking during pregnancy resulted in a benefit/cost ratio of 2.8 to 1.<sup>27</sup>
- Hospitalized patients who quit smoking promote their recovery.<sup>28</sup> Among cardiac patients, second heart attacks are more common in those who continue to smoke. Lung, head, and neck cancer patients who are successfully treated, but who continue to smoke, are at elevated risk for a second cancer. Smoking also negatively affects bone and wound healing.
- Men who quit at age 35 increase their life expectancy by 7 to 9 years. Women who quit at age 35 increase their life expectancy by 6 to 8 years. Quitting at age 45 increases life expectancy by 6 to 7 years. Quitting at age 55 increases life expectancy by 3 to 6 years. Quitting at age 65 increases life expectancy by 1.4 to 4 years.<sup>29</sup>

Long-term health improvements include the following:

- The risk of total coronary heart disease incidence among former smokers declines to the level of never-smokers during the interval of 10 to 14 years following cessation.<sup>30</sup>
- The risk of total mortality among former smokers approaches the level of never-smokers 10 to 14 years after cessation.<sup>31</sup>
- Quitting reduces the risk of lung cancer; 10 years after quitting the risk for lung cancer is 30% to 50% that of the risk of those who continue to smoke.<sup>32</sup>

While it is difficult to accurately predict the year-by-year cost reductions associated with quitting smoking, the evidence supports a conclusion that over time, the health risk of a former smoker returns to the non-smoking level. If there is a gradual improvement over that time, it can be assumed that during the first three years (the typical amount of time a person stays in the same health insurance plan), a former smoker's health care costs will be at least 10% less than if they had continued smoking. This is based on the assumption that smoking adds approximately 31% to the cost of health care.

**Step Five --- Cost/Benefit Analysis**

Summary of the first four steps:

- Approximately 17.8% of a typical insured commercial population smokes.
- Smokers' health care costs are approximately 31% higher than non-smokers.
- Although approximately 42% of smokers try to quit smoking each year, only 2.4% to 10% participate in smoking cessation programs.
- Smoking cessation initiatives have successful quit rates ranging from 10% to 30%.
- Smoking cessation programs can cost as much as \$1,000 per person, but quit rates can be maximized with an expenditure of \$250 to \$500.
- During the first three years after ceasing smoking, health care costs decrease by 10%.

For a hypothetical insured population of 10,000 members, based on the assumptions noted above, the following range of results could be expected within the first three years after smoking has ceased:

	<i>Low</i>	<i>Medium</i>	<i>High</i>
Number of smokers	1,780	1,780	1,780
Per smoker annual cost of health care	\$3,150	\$3,150	\$3,150
Average annual cost of health care	\$5,600,000	\$5,600,000	\$5,600,000
Three year health care costs	\$16,800,000	\$16,800,000	\$16,800,000
Percent of smokers attempting to quit	2.4%	7%	10%
Number of smokers attempting to quit	43	125	178
Success rate	10%	20%	30%
New non-smokers	4	25	53
Health care annual cost savings per success	\$315	\$315	\$315
Total 3 year annual health care cost savings	\$4,037	\$23,549	\$50,463
Break even smoking cessation cost per attempt	\$95	\$189	\$284

Research shows that the savings potential is greater for pregnant women and persons with coronary heart disease, as described below:

- A 1990 study published in the American Journal of Preventive Medicine<sup>33</sup> based on randomized trials concluded that women who quit smoking early in pregnancy reduce their risk of delivering a low birth weight infant. This study estimated that smoking cessation programs for pregnant women would save approximately \$3.31 for each \$1 spent. The ratio of savings to costs increases to more than six to one when including reducing long-term care for infants with disabilities resulting from low birth weight.
- A 1997 study published by the American Heart Association<sup>34</sup> analyzed the short-term cost savings due to a decline in risk of acute myocardial infarction and stroke after smoking cessation. The study concluded that because the excess risk of a myocardial infarction or stroke falls by nearly 50% within the first 2 years after stopping smoking, a reduction in the prevalence of smoking produces substantial short-run savings, both in terms of events avoided and dollars saved. In 1997 dollars, the study concluded that creating a new nonsmoker would reduce anticipated medical costs associated with myocardial infarction and stroke by \$47 in the first year, with a discounted present value of \$853 during a 7-year period.

### Conclusion

This analysis indicates that over a three-year period, expenditures for smoking cessation programs in the range of \$100 to \$300 per smoker attempting to quit should be fully offset by health care cost savings in a typical commercial population. Greater cost savings will likely occur within special populations such as pregnant women and persons with cardiac conditions. Greater cost savings will also likely occur for persons who remain in the health plan longer than the average of three years assumed in this study. ***In summary, the research indicates that an investment in programs designed to reduce adult smoking will lead to improved health outcomes, resulting in lower health care costs and more affordable health insurance premiums.***

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