

Medical Guidelines

Hazards of Cigarette Smoking and Its Cessation Techniques

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More than 16 million Americans are living with a disease caused by smoking. For every person who dies because of smoking, at least 30 people live with a serious smoking-related illness. Smoking causes cancer, heart disease, stroke, lung diseases, diabetes, and chronic obstructive pulmonary disease (COPD), which includes emphysema and chronic bronchitis. Smoking also increases risk for tuberculosis, certain eye diseases, and problems of the immune system, including rheumatoid arthritis.

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Secondhand smoke exposure contributes to approximately 41,000 deaths among nonsmoking adults and 400 deaths in infants each year. Secondhand smoke causes stroke, lung cancer, and coronary heart disease in adults. Children who are exposed to secondhand smoke are at increased risk for sudden infant death syndrome, acute respiratory infections, middle ear disease,

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respiratory infections, middle ear disease, more severe asthma, respiratory symptoms, and slowed lung growth.

In high-income countries, the biggest cause of premature death, defined as death before 70 years, is smoking of manufactured cigarettes. Smoking-related disease was responsible for about 41 million deaths in the United States, United Kingdom and Canada, cumulatively, from 1960 to 2020. Every million cigarettes smoked leads to one death in the US and Canada, but slightly more than one death in the UK. The 21st century hazards reveal that smokers who start smoking early in adult life and do not quit lose a decade of life expectancy versus non-smokers. Cessation, particularly before age 40 years, yields large reductions in mortality risk. Up to two-thirds of deaths among smokers are avoidable at non-smoking death rates, and former smokers have about only a quarter of the excess risk of death compared to current smokers. The gap between scientific and popular understanding of smoking hazards is surprisingly large.

I summarize the causative role of smoking for the most common causes of death among adults in high-income countries, drawing on data from Canada, the United States (US) and the United Kingdom (UK). The main objective of this analysis is to review the hazards of smoking and the benefits of cessation. I do so by examining the cause, nature and extent of tobacco-related diseases in high-income countries between 1960 and 2020. The review has seven main conclusions.

First, in much of Europe and North America, the biggest cause of premature death, defined as death before 70 years, is smoking of manufactured cigarettes.

Smoking as an important cause of many diseases in many populations has been recognized widely in the scientific literature for the last five decades. However, three surprising features of health hazards of smoking have been established reliably only since about 2012. The first feature is that risk of developing disease among smokers is big. The second feature is that for smokers to develop these big risks, they need to start smoking early in adult life and to continue smoking. If smokers don't start early in life, their risks are substantially smaller. Third, if smokers stop smoking before they develop some serious disease, then their risks are substantially reduced.

However, most smokers whom start early in adult life and who continue to smoke are eventually killed by their tobacco use. This is because in every year during middle age (defined here as ages 30–69 years), the death rates among smokers are about three-fold higher than that of similar non-smokers (considering differences between smokers and non-smokers in heavy alcohol use, obesity patterns or different educational or economic status). So two-thirds of the mortality among smokers would not be happening if they had the non-smoker death rates. Most of this excess risk arises from diseases that are caused by smoking. This includes disease such as lung cancer, emphysema, heart attack, stroke, cancer of the upper aerodigestive areas, bladder cancer and various other conditions. Thus this excess risk of disease and death is a cause and effect relationship.

Second, despite substantial declines in the proportion of adults who smoke in most high-income countries, cigarette smoking remains a common exposure in many countries. There were approximately 34 million smokers in the US, 7 million in the

UK and 5 million in Canada in 2017 and the number of cigarettes sold in recent years has remained mostly unchanged for the past decade in Canada, while it has declined in the US and the UK. In recent years, electronic cigarettes appear to have accelerated the decline in smoking among younger adults. E-cigarettes are far less hazardous than cigarettes, but do carry some risks, most notably the risk of addiction to nicotine among youths.

Third, a proper understanding of the hazards of smoking requires due consideration of the lag of decades between onset of smoking and the development of disease(s). For both individuals and populations to experience increases in the risk of death, prolonged smoking from early adulthood without cessation is required. The increases in the risk of death can be gauged reliably by studying trends in national lung cancer mortality of different generations. The age-specific health hazards can also be documented in large prospective studies, which monitor groups of smokers and non-smokers for the development of disease(s) over time. Conservatively, smoking-related disease was responsible for about 41 million deaths in the US, UK and Canada, cumulatively, from 1960 to 2020. Every million cigarettes smoked causes approximately one death in the US and Canada, but about 1.3 deaths in the UK.

Fourth, the hazards of smoking are much bigger than was documented just two decades ago. Differences in death rates among smokers and non-smokers imply that smokers lose on average at least a decade of life. About half of all smoking-attributable deaths occur in middle age. The specific conditions caused by smoking include vascular, respiratory and neoplastic (cancer) disease (which account for approximately

75% of all causes of death in most high-income countries). Smoking is increasingly linked to conditions such as diabetes, rheumatoid arthritis, age-related macular degeneration of the eye, orofacial clefts and ectopic pregnancy. Indeed, the list of smoking-attributable diseases continues to expand with additional studies and monitoring. Hence, total mortality differences between otherwise similar smokers and non-smokers are a robust yet simple way to estimate the effects of smoking.

Fifth, cessation is effective in reducing the increased risks of developing smoking-related disease. Smokers who successfully quit before age 40 avoid nearly all increased mortality risks of continued smoking. Smoking cessation yields specific benefits of reducing fatal and non-fatal vascular, respiratory and neoplastic disease. Former smokers have about only a quarter of the excess risk of death than do current smokers. Studying cessation provides further evidence about the causal nature of smoking and disease development.

Sixth, the biological evidence about particular carcinogens and other toxins found in manufactured cigarettes and the possible mechanisms that trigger heart attacks and strokes are consistent with the epidemiological evidence. Genetics is an important factor in disease susceptibility but does not negate the substantial importance of smoking in explaining the marked changes in cause-specific mortality and total mortality attributable to smoking over the last few decades.

Finally, there continues to be gross underestimation of the health hazards of smoking by the public, non-experts and even some experts. The large health risks inherent

in smoking are often wrongly equated with the far smaller risks of other health exposures. For example, smoking remains far more hazardous to the individual adult in high-income countries versus moderate obesity, heavy alcohol use and other factors. Most adults surveyed in the US remained surprisingly unaware of the high levels of disease risk that occur today from smoking. I summarize the causative role of smoking for the most common causes of death among adults in high-income countries, drawing on data from Canada, the United States (US) and the United Kingdom (UK). The main objective of this analysis is to review the hazards of smoking and the benefits of cessation. I do so by examining the cause, nature and extent of tobacco-related diseases in high-income countries between 1960 and 2020. The review has seven main conclusions.