

Smoking and respiratory disease

Introduction

Respiratory diseases (e.g., Chronic Obstructive Pulmonary Disease (COPD), asthma, TB and lung cancer) are a major health burden worldwide. For example, COPD affects more than 200 million people and is the fourth leading cause of death.¹ The World Health Organization predicts that by 2030, COPD will have risen to the third most common cause of death, accounting for 8.6% of all deaths worldwide.²

Smoking is the most important factor contributing to the development of respiratory disorders. In England alone, one-third of all deaths from respiratory disorders are attributable to cigarette consumption,³ while current smokers are 25 times more likely to die from lung cancer compared to those who have never smoked.⁴

This fact sheet provides an overview of smoking and different types of respiratory diseases.

Lung cancer

Lung cancer has been the most common type of cancer in the world for a number of decades and is the leading cause of cancer-related death in both genders worldwide.⁵ Until recently, lung cancer was also the most frequently occurring cancer in the UK but it has now been overtaken by breast cancer among women and prostate cancer among men.⁶

In 2011, 43,463 people in the UK were diagnosed with lung cancer and it remains the most common cause of cancer death in both men and women, with an estimated 35,371 individuals dying from lung cancer in 2012.⁷ Fewer than 16 percent of people with lung cancer will survive five years beyond diagnosis.⁸

By far the biggest cause of lung cancer is smoking, with more than four in five UK lung cancer cases attributable to tobacco use.⁹ People who smoke were first shown to be more likely to develop lung cancer relative to non-smokers in the 1950s. This study found that people who smoked around 20 cigarettes a day had 26 times the lung cancer risk of non-smokers, and those who smoked three cigarettes a day had 6 times greater risk.¹⁰ After this study, UK scientists began a large longitudinal study of smoking among British doctors. This study found similarly huge risks associated with smoking.¹¹

Stopping smoking reduces the risk of lung cancer compared to continuing to smoke. The sooner a smoker quits the better. People who stop smoking, even well into middle age, avoid most of the subsequent risk of lung cancer.¹² After 10 years, an ex smoker's risk is about a third to a half that of continuing smokers.¹³ However, many smokers diagnosed with lung cancer continue to smoke even after treatment, with estimates ranging from 13% to 60%.¹⁴ Smoking cessation also improves the life expectancy of those who have been diagnosed with lung cancer¹⁵ and the quality of life of patients receiving lung cancer treatment.

Benefits may also be obtained through attempts to reduce cigarette intake. However, benefits are likely to only emerge if smokers reduce their cigarette consumption by a significant amount (i.e. 75-80%).¹⁶ This is because smokers have a tendency to compensate by smoking each remaining cigarette harder.

- The more a person smokes, the more likely they are to get lung cancer. However, the length of time spent smoking is the most important predictor.¹⁷ Smoking one pack of cigarettes a day for 40 years is more hazardous than smoking two packs a day for 20 years.¹⁸
- Lung cancer risk is higher in those who start smoking at a younger age.¹⁹ A cohort study of women showed that lung cancer death risk is 37% higher per each five years younger at smoking initiation.²⁰
- Data pooled across a number of studies has shown that smoking is most strongly linked with risk of small cell lung cancer and squamous cell carcinoma than other types of lung cancer.^{21,22}
- An estimated 15% of lung cancer cases in never-smokers are linked to second-hand smoke.²³ However, the evidence for a link between second-hand smoke exposure in childhood and lung cancer risk in adulthood is not as strong.²⁴

Besides lung cancer, tobacco use also increases the risk for cancers of the mouth, lips, nose and sinuses, larynx (voice box), pharynx (throat), oesophagus (gullet), stomach, pancreas, kidney, bladder, uterus, cervix, colon/rectum, ovary, and acute myeloid leukaemia.²⁵

For more information see [ASH Fact Sheet on Smoking and Cancer](#)

Chronic Obstructive Pulmonary Disease (COPD)

The Global Initiative for Chronic Obstructive Lung Disease (GOLD) has defined COPD as a progressively disabling disease characterised by airflow obstruction that interferes with normal breathing.²⁶ Typical symptoms include increased breathlessness, a persistent phlegm based cough and frequent chest infections. Latest statistics suggest that 64 million people have COPD worldwide, and that 5% of all deaths globally are attributable to the disease.^{27,28} COPD is more common in men than women and is associated with socioeconomic deprivation.²⁹ Individuals of low socio-economic status are more likely to be diagnosed and to die from COPD than those of higher socio-economic status.³⁰

It is estimated that more than 3 million individuals are living with COPD in the UK alone, of which only 900,000 have been diagnosed.³¹ This is partially due to individuals dismissing the symptoms as a common cough. COPD is also one of the most common causes of emergency admission and readmission to hospital.³² The National Institute for Health and Care Excellence (NICE) reports that COPD accounts for 30,000 UK deaths every year. This is almost double the European average.³³

The two main types of COPD are chronic bronchitis and emphysema. People with chronic bronchitis have intermittent attacks of obstructed breathing during which their airways become inflamed, narrowed and clogged with mucus. Emphysema refers to the destruction of the alveoli (air sacs) in the lungs. Alveoli are essential for the exchange of oxygen in the blood: when they break down the lung loses its elasticity and there is less surface area of the lung to absorb oxygen. The onset of the disease is very gradual and breathlessness only becomes troublesome when about half of the lung has been destroyed.

Although COPD can be the result of exposure to occupational hazards and air pollution,³⁴ across the world, smoking (active and passive) is the most commonly cited risk factor. Cigarette smokers not only have a higher prevalence of respiratory symptoms and lung function

abnormalities, but also a higher mortality rate.³⁵ Other forms of tobacco (e.g., cigars and water pipes) also increase the risk of COPD.³⁶ Smoking causes COPD through its irritant and inflammatory effects on the lungs. Subsequently, the inflammation causes the airways to thicken and narrow and larger amounts of mucus to be produced. Evidence shows that:

- About half the number of cigarette smokers develops some airflow obstruction and 10-20% develop clinically significant COPD.³⁷
- The risk of developing COPD is increased if a person smokes from a young age.³⁸ The findings of a retrospective cohort study of adult smokers suggest that women are particularly at risk of COPD if they start to smoke before the age of 16.³⁹
- 80% of COPD deaths are caused by smoking.⁴⁰
- Secondhand smoking is also a major independent risk factor for COPD.⁴¹ Evidence published in 2009 found an association between childhood exposure to secondhand smoke and the development of emphysema in adulthood. The findings suggest that the lungs may not recover completely from the effects of early-life exposure to second-hand smoke.⁴²
- Data from the Health Survey for England show that smokers with COPD tend to be more addicted to cigarettes but show no greater desire to stop smoking than other smokers.⁴³

Quitting smoking when COPD is already developed cannot reverse the disease but can help to decelerate its worsening.^{44,45,46} Smoking cessation is more effective than all known pharmacological treatments for COPD and can also reduce the severity of COPD symptoms.^{47,48} However, the best way to prevent COPD is to have never started smoking.

The most effective way to quit smoking is by using a combination of treatment, which includes both behavioural therapy and pharmacotherapy.⁴⁹ Recent evidence suggests that when using medication and counselling, people with COPD can achieve quit rates which are comparable to those observed in the general population.⁵⁰

For further information see the ASH Research Report: [Secondhand Smoke: The Impact on Children](#)

Pneumonia

Pneumonia is an inflammatory condition of the lung that can be caused by infection (from viruses, bacteria and other microorganisms), drugs and autoimmune diseases. The World Health Organization estimates reveal that pneumonia is the most common infectious cause of death in the world (the third most common cause overall), accounting for almost 3.5 million deaths each year.⁵¹ Community-acquired pneumonia (CAP) - pneumonia which develops outside of a hospital or health care facility - has been associated with excess mortality over subsequent years following survival.⁵²

Smoking is a well-known independent risk factor for CAP^{53,54,55} probably due to its adverse effects on respiratory epithelium and the clearance of bacteria from the respiratory tract.⁵⁶ Smokers account for approximately half of healthy adult patients with invasive pneumococcal disease.⁵⁷ Some studies have also demonstrated a higher risk of respiratory infections in children whose parents smoke and in adults exposed to second-hand smoke.⁵⁹

- A dose-response relationship has been demonstrated between current number of cigarettes smoked per day and invasive pneumococcal disease (causes pneumonia, bacteraemia and meningitis).⁶⁰
- Smokers have an increased risk of developing pneumonia after surgery as well as a greater chance of suffering a collapsed lung after undergoing anaesthesia and surgery.^{61,62}
- Pneumonia is the leading cause of childhood death world-wide and parental smoking is a known risk factor for childhood pneumonia.^{63,64,65}

The risk of CAP can be decreased through smoking cessation. In fact, studies have shown that the risk of CAP is reduced by 50% 5 years after stopping.⁶⁶ The British Thoracic Society Guidelines for the Management of Pneumonia also recommends that smoking cessation advice is offered to all CAP patients,⁶⁷ with evidence that this may decrease the chances of hospitalisation.⁶⁸

Tuberculosis

Tuberculosis (TB) is an infectious disease caused by the *Mycobacterium tuberculosis* bacteria. In 2013, 9 million people contracted TB and 1.5 million died from the disease world-wide.⁶⁹ In the UK, a total of 7,892 cases of TB were recorded in 2013, an incidence of 12.3 per 100,000 residents.⁷⁰ TB is generally concentrated in lower socio-economic populations, with 70% of cases identified in the 40% most deprived areas of the UK, while 44% of those diagnosed with TB are not in employment.⁷²

The disease is spread by the inhalation of droplets coughed into the air by a patient with TB or through the inhalation of dust laden with the bacteria. Symptoms include a persistent cough, chest pain, weakness and fatigue, weight loss and other flu like symptoms.

In the past decade, a number of epidemiological studies and meta-analyses have implicated smoking as a risk factor in the acquisition of TB infection, the development of active TB and death from TB.^{71,72,73,74} It is thought to contribute to TB infection, through its effects on the weakening of anti-TB immunity.⁷⁵

- A study published in 2008 found that smoking was associated with relapse after successful treatment for TB.⁷⁶ A study conducted 6 years later, in 2014, also established that smoking adversely affected baseline disease severity, bacteriological response and treatment outcome.⁷⁷
- TB patients who smoke are more likely to transmit the infection to children in their household.^{78,79}
- Most cases of TB occur in places where tobacco use is extremely common or rising rapidly. China and India alone which have high smoking rates, account for 40% of all cases of tuberculosis in the world.⁸⁰

Although there have been only a handful of studies looking at smoking cessation in TB patients - for example, a large cohort study of nearly 500,000 adults in Taiwan, found that TB mortality rate decreased by 65% following abstinence from smoking⁸¹ - the World Health Organization recommends that in addition to improving TB diagnostics, drugs and vaccinations, smoking cessation should be included in treatment regimes.⁸²

Asthma

Asthma is a chronic inflammatory disease that affects the airways and is characterised by respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation. Asthma is the most common chronic disease of childhood and the leading cause of childhood morbidity from chronic disease as measured by school absences, emergency department visits and hospitalisation.⁸³

During an asthma “attack”, the walls of the airways tighten and narrow, and the lining of the airways become inflamed and swollen.⁸⁴ Some 235 million people currently suffer from asthma around the world, with the disease being more common in low- and lower-middle income countries.⁸⁵ In the UK, around 5.4 million people are currently receiving treatment for asthma; the equivalent of 1 in every 12 adults and 1 in every 11 children.⁸⁶

The airways of individuals with asthma are sensitive to a variety of triggers, including tobacco smoke. Exposure to cigarette smoke (directly or second-hand) is known to trigger the development of asthma and exacerbate symptoms.^{87,88,89} Studies report an accelerated decline in lung function and severe obstruction of airflow in asthmatic smokers.⁹⁰

Worsening asthma symptoms and lung function changes can be reversed with smoking cessation.⁹¹ However, asthmatic patients who are more dependent, had late-childhood onset asthma but early smoking onset, find abstinence more difficult.⁸⁹

- The severity of asthma appears to be dependent somewhat on the duration of smoking, with a greater severity among those with a history of 20 pack-years.⁹²
- Asthma patients who smoke have an impaired response to treatment.^{93,94}
- Parental smoking is a cause of asthma in children and the prevalence of asthma increases with the number of smokers in the home.^{95,96}
- Smoking during pregnancy has been associated with reduced lung function, increased risk of asthma and exercise-induced wheezing offspring.^{97,98}
- Children who suffer from asthma, and whose parents smoke, are twice as likely to suffer asthma symptoms all year round compared to the children of non-smokers. Wheeze and physician-diagnosed asthma is more common in children who live with a smoker.⁸⁷
- A review by the Royal College of Physicians notes that household smoking increases the risk of asthma in children by about 50%.⁹⁹

For further information see ASH's [Research Report on Asthma and Smoking](#)

Morbidity in the young

Second-hand smoke is responsible for a significant proportion of deaths from asthma, lower respiratory infections, lung cancer and ischemic heart disease. Thirty-percent of all deaths from second-hand smoke occur in children, with the largest disease burden from lower respiratory infections in those younger than 5 years of age.¹⁰⁰ Indeed, children of smoking parents have more respiratory illnesses than those of non-smokers.^{101,102} For example, a review by the World Health Organization concluded that exposure to second-hand smoke is a major cause of bronchitis, pneumonia, coughing and wheezing and asthma attacks in children.¹⁰³

Smoke-free laws banning smoking in enclosed public places have been introduced in over 109 countries.¹⁰⁴ However, such legislation does not cover smoking in private residences. Indeed, parental smoking is one of the major predictors of second-hand smoke exposure, in addition to low socio-economic status, being less educated and attitudes towards second-hand smoking.¹⁰⁵ In the 2006 Global Youth Tobacco Survey 46.8% of never smoking young people aged 13-15 years were exposed to smoking in the home within the past week, with the highest level of exposure being in Europe (71.5%).¹⁰⁶

For further information see:

ASH Research Report. [Secondhand Smoke: The Impact on Children](#)

ASH Fact Sheet on [Young people and smoking](#)

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