Introduction

Respiratory disease is a term that is used to describe a number of problems that affect the organs of the respiratory system [1]. The respiratory system is made up of the organs that are involved in breathing. These include the nose, throat, larynx, trachea, and lungs, which are made up of the bronchi, and arterioles. The lungs are located within the chest, and there is a right lung and a left lung. This pair of breathing organs removes carbon dioxide (a waste product) from the blood, and puts oxygen back into the blood so that it can travel in the bloodstream to where it is needed. When the function of the lungs is affected, they cannot exchange gases, such as oxygen, like they normally do. When this happens, a person may develop a disabling cough, breathlessness, chest tightness, lung infections, and may also produce large amounts of sputum (the mucus material from the lungs that a person coughs up). Respiratory conditions are caused by a number of factors, as well as medical problems.

Conditions of the respiratory tract

The World Health Organization (WHO) has classified diseases of the respiratory system in the International Classification of Diseases (ICD) [2]. According to the ICD, respiratory diseases are categorised according to whether they affect the upper or lower part of the respiratory system. Within these two categories, respiratory diseases are further classified according to whether they are acute (lasting a short time, such as acute respiratory infections - ARIs), or chronic (lasting a long time, usually longer than 3 months).

More detailed information about respiratory health in Indigenous people can be found at:

http://www.healthinfonet.ecu.edu.au/lung_review
Upper respiratory tract conditions

Respiratory conditions affecting the upper portions of the respiratory system are nearly always acute - lasting a short time - and most are infectious. Most common are upper respiratory tract infections (URTIs). URTIs can be caused by viral or bacterial organisms, but most are viral. They usually affect the areas of the respiratory system above the lungs, such as the throat, sinuses, larynx, trachea, or major bronchi. URTIs in any of these regions in infants and young children can contribute to serious ear conditions, such as otitis media (view EarInfoNet web page). Chronic upper respiratory infections are relatively rare, and there is little information on these conditions.

Acute sinusitis

Acute sinusitis is a common condition that can be caused by any number of factors that interfere with airflow into the sinuses (hollow areas in the facial bones), which connect to the nasal cavities [3]. When the membranes lining a sinus become inflamed, the sinus passages may become obstructed affecting the drainage of mucus out of the sinuses. Sinusitis can be caused by bacterial, viral and fungal infections, as well as substances that irritate the sinuses (such as cigarette smoke, seasonal allergens, abuse of over-the-counter nasal sprays, and illegal substances that may be ‘snorted’ through the nose). In less common cases, the sinuses can become obstructed by tumors or growths in the nasal cavities, which may then have to be removed.

Acute pharyngitis

Acute pharyngitis is inflammation of the membranes of the pharynx - commonly known as a sore throat. The pharynx is the hollow passage at the back of the throat that starts behind the nose and ends at the top of the trachea. Acute pharyngitis usually causes pain when swallowing, and occasionally blisters at the back of the throat and dryness [3]. Pharyngitis is usually caused by viral infections, but it can sometimes be caused by bacteria, usually Streptococcus.

Acute nasopharyngitis

Acute nasopharyngitis - more usually known as the ‘common cold’ - is usually caused by a viral infection of the upper respiratory tract [3]. It is a contagious condition and can be caused by a variety of viruses. Children tend to catch colds at a higher rate than adolescents and adults. Colds are a common and continuing problem because the body can never build up immunity to all the different viruses that cause the condition. The common cold can be contracted in a number of ways, but usually involves the transmission of the virus through water droplets (such as those found in the breath).

Exposure to cold weather does not affect the spread of a cold. Clinical symptoms of a cold can include inflammation of part or all of the airways, including the nose, sinuses, throat, larynx, trachea and bronchi. Not everybody is affected by a cold in the same way, which depends also on the cold-causing virus. More apparent symptoms of a cold include a sore throat, tiredness, sneezing, occasionally fever, nasal secretions, and a cough that can last up to 2 weeks. There is no cure for the common cold, but some medications can be used to help alleviate symptoms. Antibiotics do not cure a cold, but may be used if a bacterial infection develops. In most cases, a cold usually lasts between 4 and 10 days.

Acute tonsillitis

Acute tonsillitis - also known as acute sore throat - is an inflammation of the tonsils. The tonsils are tissue masses at the back and on either side of the throat. They act as a part of the body’s purification system, and produce white blood cells to fight against disease [3]. The tonsils can become inflamed due to bacterial infection (usually Streptococcal infection), and, less commonly, due to viral infection. Symptoms of tonsillitis include sore throat, pain when swallowing, referred pain in the ears, and, occasionally, high fever, tiredness, headache, and vomiting. In children, a sore throat may not be present, but there may be a lack of appetite.

Acute laryngitis and tracheitis

Acute laryngitis is the inflammation of the larynx [3]. The larynx is the section of the respiratory tract between the pharynx and the trachea that contains the vocal cords. The ‘Adam’s apple’ at the front of the neck is formed by the outer wall of the larynx’s cartilage. Acute laryngitis is usually caused by viral infections, but chronic laryngitis can be caused by excessive use of the voice, allergies, smoking, and substance inhalation. Laryngitis can also occur as a condition in people who have bronchitis, pneumonia, influenza, pertussis, measles, and diphtheria. Accompanying a sore throat, common symptoms of laryngitis include hoarseness or loss of voice, a tickling throat, rawness, an urge to clear the throat, fever, and tiredness.

Acute obstructive laryngitis (croup) and epiglottitis

Acute obstructive laryngitis and epiglottitis are usually considered together because both conditions generally affect the same location within the respiratory system. Croup is a respiratory problem that occurs mainly in children between 2-4 years of age [3]. It is usually caused by a viral infection of the voice box, windpipe and bronchial tubes. Common symptoms of croup include a fever, difficult and strained breathing, hallucinations, and a characteristically harsh cough that
sounds like a barking seal. Stridor (wheezing on inspiration) and respiratory distress are common but may or may not be severe. Usual treatment includes moist air and fluid administration, nose drops, decongestants, cough and pain medication, and occasionally antibiotics. Croup usually only lasts up to a week, but close monitoring is essential and around 5% of children with croup may require hospitalisation. Very occasionally, the narrowing of the airway may be severe enough to require intubation (insertion of a tube to enable sufficient air to enter the lungs).

Epiglottitis is a serious condition that can affect adults and children alike [3]. It is a progressive infection, usually caused by bacteria such as Streptococcus and Haemophilus. Infection leads to the inflammation of the epiglottis (the fleshy flap that covers the windpipe at the back of the throat so that food does not enter the lungs) and surrounding tissues. When the epiglottis becomes inflamed it increases in size, physically obstructing the airway and causing the work of breathing to increase. If the condition is not monitored, carbon dioxide levels in the blood may increase and, in extreme cases, asphyxiation may result. Common symptoms include high fever, sore throat, hoarseness, difficulty swallowing, and difficult and noisy breathing. Usually, the person is hospitalised immediately, and specialist care is required. The condition is usually treated with antibiotics.

Lower respiratory tract infections

Respiratory infections affecting the lower portions of the respiratory system are known as lower respiratory tract infections (LRTIs). They affect the respiratory system from the bronchi down. Depending on the duration of the symptoms, the conditions are classified as acute or chronic.

Acute lower respiratory tract infections

Acute lower respiratory tract infections are similar to upper respiratory tract infections, in that they are characterised usually by rapid-onset with severe symptoms, and last generally for up to a week (and less than three months) [4]. They are usually viral, but can result in secondary bacterial infections and chronic LRTIs. The most common acute LRTIs include acute bronchitis, acute bronchiolitis, influenza and pneumonia.

Acute bronchitis

Acute bronchitis is the acute inflammation and swelling of the airway linings, leading to narrowing and obstruction of the airways [5]. This inflammation stimulates the production of mucus (or sputum) which can obstruct the airways even further. When the lungs and airways become obstructed with mucus, the chance of developing a bacterial infection increases greatly. Symptoms of acute bronchitis include tiredness, hot and cold flashes, back and muscle pain, sore throat, as well as a dry cough, developing occasionally into a productive cough. Bronchitis can be either acute or chronic, with classification based mainly on the duration of the condition. Acute bronchitis lasts for three months or less, with high fever usually for no longer than 3-5 days. It usually develops after a bacterial or viral infection that affects the nasal passages, throat or bronchial regions, such as a common cold, but occasionally can also be caused by substances that have irritated the airway passages in people susceptible to allergies [3]. Acute bronchitis usually resolves completely and normal lung function resumes. There are occasional situations, however, where there is the possibility of serious complications resulting in chronic lung or heart disease. Depending on the cause of bronchitis, the condition can be treated with antibiotics, expectorants, and aspirin.

Acute bronchiolitis

Acute bronchiolitis is an inflammation of the bronchioles, and occasionally bronchi [3]. The bronchioles are tiny tubes within the lungs that branch from the bronchi to the alveoli forming a sort of tree shape. Acute bronchiolitis tends to affect children and infants at a high rate, with infants being the most vulnerable [6]. The condition is caused by respiratory syncytial virus (RSV), most commonly caught like the common cold during winter and early spring. Symptoms of bronchiolitis include coughing, breathlessness, and cracked breathing. Current opinion indicates that the condition responds favourably to treatment with corticosteroids.

Influenza

Influenza and pneumonia are closely linked conditions, and for this reason are often considered together. Both affect the lungs and are usually short-lived, lasting less than three months. Influenza is exclusively a viral condition, whereas pneumonia can be viral and/or bacterial. Influenza also known as the flu, is caused by a number of viruses of three types - influenza A, influenza B, and influenza C [3]. These viruses can occasionally cause serious complications - such as pneumonia (which can sometimes be life-threatening). General flu symptoms include fever, cough, headache, tiredness, inflamed respiratory mucous membranes, and head cold symptoms such as a runny nose and watery eyes. Occasionally, a person may experience nausea and vomiting. The majority of people recover from the flu in 1 to 2 weeks and, being a viral condition, it doesn't need antibiotics. Many of the complications and illnesses caused by the flu can now be prevented by influenza vaccinations, and it is specifically recommended that certain groups of people (such as older people) are vaccinated annually.

Pneumonia

Pneumonia, an inflammation of one or both of the lungs may affect an entire lobe (lobar pneumonia), a segment of a lobe, alveoli
contiguous to bronchi (bronchopneumonia), or interstitial tissue [3]. It can be caused as a result of a previous respiratory infection, or can develop in conjunction with other respiratory diseases [2]. Symptoms of pneumonia include fever, chills, cough with mucus production, and, sometimes, pleuritic chest pain and shortness of breath. Symptoms can sometimes be mistaken initially for the common cold, but pneumonia usually develops over days or weeks and lasts longer than a cold.

Pneumonia can be bacterial, viral, fungal or parasitic, but bacterial and viral pneumonia are the most common. The type of pneumonia is usually named and diagnosed according to the pneumonia-causing organism. Bacteria are the most common cause of pneumonia in adults aged 30 years of older, with Streptococcus pneumoniae (also known as pneumococcal disease) being the most common pneumonia-causing organism [3]. Some bacterial pneumonia can be avoided, as there are now a wide variety of pneumonia vaccines available. However, when a person has already developed pneumonia, the usual treatment is with antibiotics. Occasionally, pneumonia-causing bacteria can become resistant to a number of antibiotics, which then makes the condition much harder the treat [7].

Sometimes, pneumonia-causing bacteria can cause a number of conditions more serious than pneumonia. Examples are Burkholderia pseudomallei bacterium (causing meliodosis) [8, 9]; and Mycobacterium tuberculosis (causing tuberculosis) [10] (view HealthInfoNet tuberculosis page).

Viruses are the most common cause of pneumonia in children, but the influenza A and B viruses and rarely varicella-zoster virus have been known to cause pneumonia in adults. Viral pneumonia develops when viruses invade the tissues of the bronchioles causing bronchiolitis and occasionally affect the alveoli. The common symptoms of viral pneumonia are headache, fever, tiredness, coughing, and mucus production.

**Chronic lower respiratory tract infections**

Chronic lower respiratory tract conditions include chronic bronchitis, emphysema, asthma, and bronchiectasis (because of the rarity of bronchiectasis in the general populations of developed countries, the condition is often not considered along with the other three conditions). Together, these conditions are known collectively as chronic obstructive pulmonary disease (COPD) [5]. COPD refers to any of these conditions that persistently limits gas exchange, either by obstruction to airflow or by alveolar damage (see below under emphysema). The effects can be permanent and irreversible.

**Chronic bronchitis**

Chronic bronchitis is inflammation and swelling of the airway linings, leading to narrowing and obstruction of the airways [5]. The inflammation stimulates the production of mucus (or sputum) which can obstruct the airways even further. When the lungs and airways become obstructed with mucus, the chance of developing a bacterial infection increases greatly. Bronchitis can be either chronic or acute. Clinically, chronic bronchitis is defined as a daily cough and sputum production for a period of three months within a period of two years.

**Emphysema**

Emphysema is a condition affecting the alveoli of the lungs, in which air accumulates abnormally (as noted above, alveoli are tiny air sacs in the lungs that help in gas exchange) [5]. When air abnormally accumulates in the alveoli, they become enlarged and may break or be damaged, forming scar tissue. This process makes the lungs less elastic, so that the person has to work harder to breathe. As this gradually happens, the person may experience breathlessness, chest tightness, and wheezing because there is a loss in the amount of space in the lungs needed to obtain oxygen. In severe cases, a person may have to use an oxygen machine to assist breathing. Emphysema is most commonly caused by smoking, but can also be caused by repeated lung infections (such as chronic bronchitis) (view HealthInfoNet tobacco use page). A cure for emphysema does not exist, but medication may be helpful to ease symptoms or to treat infection in already-damaged lungs.

**Asthma**

Asthma is a disorder that involves inflammation of the bronchial tubes (large air tubes that begin at the bottom of the windpipe and branch into the lungs, and have thick, muscular walls) and does not affect other part of the lungs [11]. Inflammation of the bronchial tubes causes them to swell, which narrows the airways. This is usually accompanied by spasms of the bronchial walls, which causes coughing and wheezing as the person tries to gasp for air. This process can often be amplified if the bronchi are extra-sensitive to environmental factors. Symptoms of asthma include shortness of breath, chest tightness, coughing, and wheezing. Asthma is diagnosed based on the presence of these symptoms. Breathing tests and chest x-rays are used to assist in diagnosis of the condition. If wheezing is absent, then the condition is not considered generally as asthma [12]. Generally, the airway narrowing in asthma can be prevented or reversed with proper treatment and use of ventilators or puffers [13]. Environmental factors too, can irritate or aggravate asthma and lead to asthma attacks in some people. These factors include heavy exercise, cigarette smoke, diet, outdoor and indoor air pollution, viral infections, and exposure to cold air. Genetics have also been shown to play a role in the development of asthma.
- People with a family history of asthma have a greater chance of developing asthma [14]. This may be because of similarly inherited genes for lung function and volume, small airways, responsiveness to allergens, and proneness to infections. This does not necessarily mean that a person with a positive family history will definitely get asthma. It means that their genes make them more susceptible to the condition. This, combined with environmental and lifestyle factors, may increase the likelihood of development of asthma.

**Bronchiectasis**

Bronchiectasis is a progressive and irreversible condition that involves the inflammation and dilation or widening of the bronchi, caused by bacterial or viral infections [11]. The bronchi are the large air tubes that begin at the bottom of the windpipe and branch into the lungs, and have thick, muscular walls. The clinical symptoms of bronchiectasis are fever, persistent disabling coughing, shortness of breath and large amounts of mucus production, occasionally tinged with blood. Bronchiectasis can also develop into any number of recurrent respiratory infections. It is unclear how bronchiectasis develops, but research has shown that chronic respiratory infections, together with the way in which the body responds to this infection, play key roles in the development of the condition [11]. Cystic fibrosis, inability to mount a normal immune response, rheumatoid arthritis, and inflammatory bowel disease also predispose individuals to bronchiectasis. Short-term bronchiectasis is usually treated immediately with antibiotics. In some cases, surgery to remove parts of a lung that are causing irritation may occur. In more prolonged cases, chest physiotherapy may be suggested, which involves thinning, loosening, and drainage of secretions in the airways, and administration of a bronchodilator.

**References**

The Australian Indigenous HealthInfoNet is an innovative Internet resource that contributes to ‘closing the gap’ in health between Indigenous and other Australians by informing practice and policy in Indigenous health.

Two concepts underpin the HealthInfoNet’s work. The first is evidence-informed decision-making, whereby practitioners and policy-makers have access to the best available research and other information. This concept is linked with that of translational research (TR), which involves making research and other information available in a form that has immediate, practical utility. Implementation of these two concepts involves synthesis, exchange and ethical application of knowledge through ongoing interaction with key stakeholders.

The HealthInfoNet’s work in TR at a population-health level, in which it is at the forefront internationally, addresses the knowledge needs of a wide range of potential users, including policy-makers, health service providers, program managers, clinicians, Indigenous health workers, and other health professionals. The HealthInfoNet also provides easy-to-read and summarised material for students and the general community.

The HealthInfoNet encourages and supports information-sharing among practitioners, policy-makers and others working to improve Indigenous health – its free online yarning places enable people across the country to share information, knowledge and experience. The HealthInfoNet is funded mainly by the Australian Department of Health and Ageing. Its award-winning web resource (www.healthinfonet.ecu.edu.au) is free and available to everyone.