- Assist patients to understand how modifying their behaviour can help reduce exposure to pollutants. For example, people with asthma sensitive to ozone are better to exercise in the early morning in summer, or exercise indoors. On HIGH fine particle days, a patient with emphysema may be better to shop at an air-conditioned mall than the local shops.

Extreme events

Bushfires can result in pollutant levels that may remain HAZARDOUS for several days. A sensitive patient can take further measures such as covering the nose and mouth with a mask rated P2 or P3 (available from hardware stores) and staying in air-conditioned places. It is inadvisable for patients with asthma or chronic cardiac or respiratory conditions to exercise during prolonged periods of high air pollution.

Other air pollution issues to discuss with your patients

The motor vehicle is a major source of air pollution in the Sydney region. Choosing an active form of transport such as walking, cycling or using public transport, helps to reduce air pollution, provides benefits of increased cardiovascular fitness and can reduce obesity.

Environmental tobacco smoke, which consists of fine particles and many gases, remains a major source of exposure to air pollutants for some people. Patients with asthma and chronic cardiac or respiratory disease should avoid being in enclosed places where there is tobacco smoke.

Unflued gas appliances produce large amounts of nitrogen dioxide and carbon monoxide. Elderly people and parents of children with asthma should be made aware of the potential health impacts associated with unflued gas heating and cooking.

Resources

- Air pollution health alerts – What they mean to you – an information sheet for patients
  http://www.health.nsw.gov.au/living/airpollution.html
- Air pollution reports and health alerts –
  http://www.environment.nsw.gov.au/airqual/aqupd.asp
- NSW State of the Environment Report
  http://www.environment.nsw.gov.au/soe/soe2003/chapter3/
- Bushfire Smoke fact sheet
  http://www.health.nsw.gov.au/pubs/factsheet/pdf/bushfire_fs.pdf
- Wood Smoke fact sheet
  http://www.health.nsw.gov.au/pubs/factsheet/pdf/wood_smoke_pub.pdf
- Unflued Gas Heater fact sheet
  http://www.health.nsw.gov.au/pubs/2004/pdf/gas_heaters_fs.pdf
- Smokefree Zone – Best Practice Guidelines:
  http://www.smokefreezone.org/site_files/s1001/downloads/GPFactSheet.pdf
- Asthma & Air Pollution. A guide for health professionals. Australian Government Department of Health and Ageing
  Access at www.NationalAsthma.org.au or contact your local Asthma foundation on 1800 645 130 (Publication date February 2005.)
- Asthma Foundation of NSW
  http://www.asthmansw.org.au/ or 1800 645 130 (toll free)
- The Australian Lung Foundation
  http://www.lungnet.com.au
- The National Heart Foundation
  http://www.heartfoundation.com.au/

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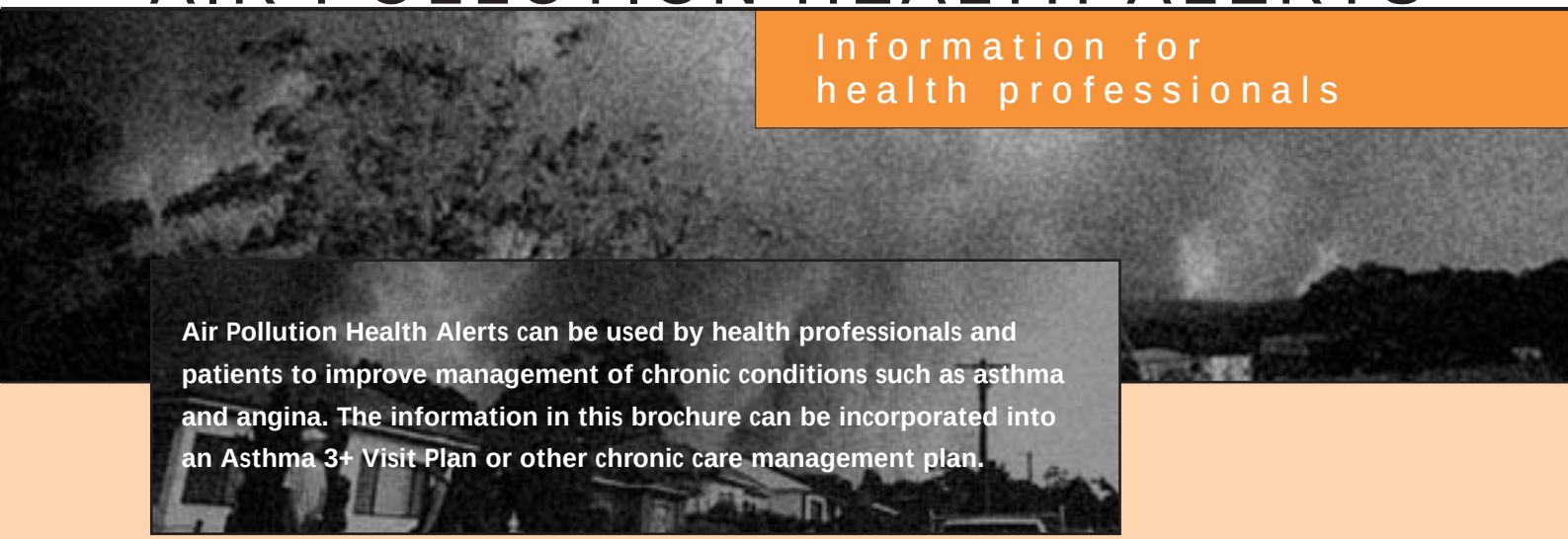
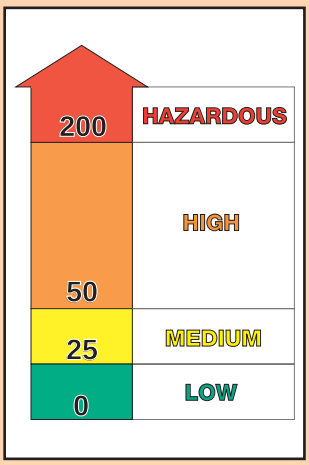
AIR POLLUTION HEALTH ALERTS

Information for health professionals



Air Pollution Health Alerts can be used by health professionals and patients to improve management of chronic conditions such as asthma and angina. The information in this brochure can be incorporated into an Asthma 3+ Visit Plan or other chronic care management plan.

NSW Health and the NSW Department of Environment and Conservation[1] (DEC) have developed a system of air pollution health alerts to better inform the community about how air pollution may affect their health and to assist in the management of conditions exacerbated by air pollution.



The health alert system is linked to the routine reporting of air pollution in the Sydney region, the Regional Pollutant Index (RPI) that is issued twice daily by the DEC. The RPI reports whether air pollutant levels have been LOW, MEDIUM or HIGH, and forecasts likely pollutant levels for the next day. The health alerts are based on the forecast, and also take account of extreme pollution events, such as bushfires.

The RPI rates air pollution as LOW, MEDIUM or HIGH by comparing pollutant levels to health guidelines or environmental goals. On clear windy days the RPI is usually in the LOW range (0-24). When the air is still in hot weather or on cold nights, the RPI is often in the MEDIUM range (25-49), and on several days a year is in the HIGH range (50 or higher). The RPI is usually only considered HAZARDOUS for health when pollutant levels are very high, such as during bushfires.

Air pollution in the Sydney Greater Metropolitan Region

Over the past few decades air pollution levels in our cities have generally improved. DEC routinely monitors and reports against national standards for six pollutants – fine particles, ozone[2], nitrogen dioxide, carbon monoxide, sulfur dioxide and lead. Of these, fine particles and ozone sometimes reach levels across the region that are associated with adverse health effects. The RPI is calculated by comparing fine particle, ozone and nitrogen dioxide levels to national standards and environmental goals and the health alerts relate to these three pollutants.

Fine particles are generated by combustion or wind-blown dust. Principal sources in the Sydney Greater Metropolitan Region (GMR) are wood heaters, motor vehicles and industrial emissions. Fine particles readily penetrate indoors unless buildings are well sealed and air-conditioners or filters are used. Fine particles can cause irritative effects on the upper airways and eyes; some reach the lower airways and produce inflammation and reduced lung function. Recent research has also demonstrated that fine particles are associated with increased serum inflammatory markers, increased blood coagulability and effects on cardiac conductivity. Population studies demonstrate increasing cardiac and respiratory morbidity and mortality as fine particle levels increase.

Ozone in the lower atmosphere is a secondary pollutant, formed by the action of sunlight on other pollutants such as nitrogen dioxide and volatile organics (eg: unburnt petrol and solvents). The main sources of these pollutants in the Sydney GMR are motor vehicles. As sunlight drives the formation of ozone, it is more of a problem in summer,

1 The Environment Protection Authority (EPA) is now part of the new Department of Environment and Conservation.

2 The 'ozone layer' is in the stratosphere, 10 to 15 kilometres above the surface of the earth, and protects humans from the effects of the sun; ozone that is found closer to the ground, in the air that people breathe, has adverse health effects.

Australian Government
Department of the Environment and Heritage

Department of
Environment and Conservation (NSW)

NSW HEALTH

and levels tend to peak later in the day. Due to its reactivity, ozone does not persist indoors. Ozone is also a respiratory irritant. There is a wide range of sensitivity to ozone in the population. The effects of reduced lung function, cough, chest tightness and pain on deep inspiration increase over hours in high ozone areas, especially during exercise. During periods of high concentrations of ozone, hospital admissions for asthma and other respiratory conditions increase.

Nitrogen dioxide is mainly formed through fuel combustion in motor vehicles and industry. High levels are also found indoors when unflued gas appliances are used. People with asthma are more sensitive to the effects of nitrogen dioxide – increased bronchoconstriction when exposed to allergens, increased susceptibility to respiratory infection, and direct impairment of lung function. On a population level, increased levels of nitrogen dioxide are associated with increased rates of mortality and morbidity.

Air pollution and health

Patients with asthma, COPD or cardiovascular disease are most likely to be affected by air pollution. Population studies show there is often a delay of one to several days between high pollution days and associated increases in hospital admissions and deaths. The association between these conditions and the three key air pollutants differs:

- **Asthma** can be exacerbated by any of the three pollutants in the reporting system. People with asthma have a wide range of sensitivities that vary between individuals and the pollutants – for example, an individual may cough and wheeze on days when ozone levels are around 50, but not notice the effects of fine particle pollution when the RPI is 100. The impacts of air pollution may manifest in people with asthma as reduced exercise tolerance, coughing, wheezing, shortness of breath or increased need for reliever medication.
- Patients with **COPD** such as emphysema or chronic bronchitis are most likely to be affected on days with high levels of fine particles, but are also susceptible to high levels of ozone and nitrogen dioxide. Symptoms related to fine particles include coughing and increased dyspnoea. The long-term effects of ozone on COPD patients include accelerated decline in lung function.
- People with **cardiovascular disease** are also most likely to be affected on days with high fine particle pollution. Potential effects include arrhythmias, heart failure, angina, acute myocardial infarction, sudden death and stroke.

People who do not have these pre-existing conditions can also be affected by air pollution. Healthy adults exercising on high ozone days may have significant reductions in FEV_1 or pain on deep inspiration, and reduced exercise capacity. When any of these pollutants are at hazardous levels, the general population can experience respiratory or cardiac effects similar to those found in more sensitive people at lower levels.

The health alert system

When levels of one of the three pollutants are rising, and likely to be HIGH or HAZARDOUS on the following day, an alert is issued with the RPI to electronic and print media outlets. Information on current pollutant levels and health alerts is also available via a freecall-line[3] or on the NSW DEC website.

The alert specifies the pollutant and whether it is likely to be at HIGH or HAZARDOUS levels. During bushfires, both fine particles and ozone may be elevated, and if this is likely the alert covers both pollutants. When pollutant levels are predicted to be HIGH, the alert indicates that air quality is likely to be 'unhealthy for sensitive individuals' the next day; specifies which groups are sensitive; and suggests simple ways to reduce exposure and manage impacts. Alerts on days when pollutants are likely to be HAZARDOUS apply to everyone; however patients with pre-existing disease are more likely to suffer adverse effects.

An example of a health alert

'The Department of Environment and Conservation report that air pollution levels today were HIGH with an index of 52 due to ozone in Sydney's South West. Ozone levels are predicted to be HIGH tomorrow. NSW Health advise that this level of air pollution is unhealthy for sensitive people, and could cause symptoms, especially in people with asthma. Levels will be lower indoors. People with asthma should avoid exercising outdoors. If you have symptoms of asthma, shortness of breath or coughing, you should rest and use your reliever medication. If symptoms persist, seek medical advice.'

[3] Sydney: 1300 130 520 – Newcastle: 1800 817 838 – Wollongong: 1800 819 112.

The health alerts used are shown in this table:

OZONE	
Band	**Health alert**
HIGH	Unhealthy for sensitive people, and could cause symptoms, especially in people with asthma. Levels will be lower indoors. People with asthma should avoid exercising outdoors. If you have symptoms of asthma, shortness of breath or coughing, you should rest and use your reliever medicine. If symptoms persist, seek medical advice.
HAZARDOUS	Anyone could develop symptoms, especially people with asthma. Levels will be lower indoors. Everyone should avoid outdoor exertion and stay inside as much as possible. If you have coughing, wheezing or shortness of breath you should rest, take your reliever medicine or seek medical advice.

NITROGEN DIOXIDE	
Band	**Health alert**
HIGH	People with asthma should watch for symptoms. If you have symptoms of asthma, shortness of breath or coughing, rest and use your reliever medicine. If symptoms persist, seek medical advice.
HAZARDOUS	Levels may be lower indoors. Everyone should avoid outdoor exertion and stay inside as much as possible. If you have coughing, wheezing or shortness of breath you should rest, take your reliever medicine or seek medical advice.

FINE PARTICLES	
Band	**Health alert**
HIGH	Unhealthy for sensitive people and could cause symptoms, especially people with heart or lung disease. Levels may be lower indoors. People with heart or lung disease should avoid exercising outdoors. If you have chest pain, shortness of breath or coughing, use your reliever medicine. If symptoms persist, seek medical advice.
HAZARDOUS	Anyone could develop symptoms, especially people with heart or lung disease. Levels may be lower indoors. Everyone should avoid outdoor exertion and stay inside as much as possible. If you have chest pain, shortness of breath or coughing, you should rest, take your reliever medicine or seek medical advice.

OZONE and FINE PARTICLES	
Band	**Health alert**
HIGH	Unhealthy for sensitive people and could cause symptoms, especially people with heart or lung disease. Levels may be lower indoors. People with heart or lung disease should avoid exercising outdoors. If you have symptoms of asthma, chest pain, shortness of breath or coughing, use your reliever medicine. If symptoms persist, seek medical advice.
HAZARDOUS	Anyone could develop symptoms, especially people with heart or lung disease. Levels may be lower indoors. Everyone should avoid outdoor exertion and stay inside as much as possible. If you have symptoms of asthma, coughing, chest pain, wheezing or shortness of breath you should rest, take your reliever medicine or seek medical advice.

No threshold for adverse effects from fine particles and ozone has been established. Thus, some patients may experience adverse health effects from air pollution on days when the RPI is in the medium range.

Improving patient care using air pollution health alerts

- Encourage sensitive patients to regularly check the RPI, so that its fluctuation becomes familiar, like the temperature or the UV index. Many patients will be able to learn which pollutant at what level is likely to be a problem for them.
- Reinforce the message that patients should ensure they have ready access to reliever medications on air pollution health alert days. When air pollution is likely to be elevated for several days due to still hot weather, still cold nights or bushfires, an increase in preventer medications may be required. This adjustment could be included in their personal management plan.