

APPENDIX

A GUIDE

**AIR QUALITY
INFORMATION**

FOR THE PUBLIC

Information on air quality is disseminated to the public primarily through Air Quality Advisories during periods of poor air quality and the ongoing Air Quality Health Index. Both are described in the following pages.

Air Quality Advisories

What are Air Quality Advisories?

- Air Quality Advisories are issued by the B.C. Ministry of Environment and Metro Vancouver to inform the public of degraded air quality and to trigger actions (e.g., burn bans, reduction in wood stove use) to prevent or reduce emissions.
- Advisories are issued when measured air pollution levels approach or exceed defined trigger thresholds based on established national or provincial air quality objectives.
- Outdoor air quality objectives have been established for particulate matter (PM), ozone, nitrogen dioxide, sulphur dioxide and carbon monoxide.¹ The objectives incorporate considerations to protect both people and the environment.
- Historically, these objectives were used to calculate Air Quality Index (AQI), a number representing the value of a single pollutant with the highest concentration relative to its outdoor air quality objective.
- The AQI continues to be available for B.C. communities, although the B.C. Ministry of Environment is promoting alternatives to the AQI such as improved public access to **real-time air quality concentrations** for all monitored pollutants, and the **Air Quality Health Index (AQHI)** in the most populated areas of the province.
- Although elevated levels of any of the above pollutants may trigger an air quality advisory, the vast majority of such events in B.C. have resulted from high particulate matter (PM) concentrations. The exception is in the Lower Fraser Valley, where ozone has been the main cause for air quality advisories.
- The number of advisories issued each year varies across the province. For example, between 2003 and 2007, PM-related advisories were issued a total of 28 times (69 days total) in Prince George. In contrast, four ozone-driven advisories and one PM-driven advisory were issued in the Lower Fraser Valley during the same period.

How are Air Quality Advisories issued?

- Air quality meteorologists review current air quality levels along with current and forecast meteorological conditions to assess the expected severity and duration of an air pollution event.
- This information is used together with local knowledge of sources and air dispersion to determine if an advisory should be issued.

How are Air Quality Advisories used?

- Air Quality Advisories may include voluntary and mandatory actions to effect a reduction in emissions.
- Voluntary measures include asking the public to take alternative forms of transportation other than single occupancy vehicles.
- Mandatory actions include burn bans pursuant to the **Open Burning Smoke Control Regulation** and bans or restrictions on wood stove use and backyard burning as required by local bylaws.
- Health messages have traditionally accompanied Air Quality Advisories. However, health effects can occur at pollutant concentrations below those which trigger advisories.



¹ For a listing of current air quality objectives, see: <http://www.metrovancouver.org/services/air/monitoring/Pages/airqualityindex.aspx>.

Air Quality Health Index

Basic information

- The AQHI is a new measure of air quality developed by Health Canada, Environment Canada and a variety of provincial, municipal, health and non-government stakeholders.
- It integrates the effects of three commonly monitored pollutants, namely nitrogen dioxide, ozone, and particulate matter (PM_{2.5}).²
- Air quality is displayed on a scale of 1 to 10+, with index results presented within categories of risk to health (Low, Moderate, High or Very High Health Risk).
- The scale is based on a [study](#) that evaluated increases in daily mortality following short-term fluctuations of pollutants measured in major Canadian cities.⁹
- In British Columbia, ozone and nitrogen oxide levels are generally quite low (with some exceptions).³ This means that the AQHI (based on these two pollutants plus PM) may sometimes be low despite high PM levels or the presence of visible haze.
- The calculation of near real-time AQHI reports and short-term forecasts relies on a continuous air monitoring network that provides hourly concentrations of pollutants.
- The monitoring network is currently available in some British Columbia communities (see airhealthbc.ca or airhealth.ca), including all major centres and covering 80% of the provincial population.
- Air pollution is a risk factor for adverse birth outcomes, such as pre-term birth and low birth weight babies. However, this is more likely due to long-term exposure than to the short-term fluctuations that are reflected in the AQHI.

Using the AQHI in patient care

There is little direct evidence at this time that short-term behaviour change can limit health outcomes related to air pollution exposure. Physicians should therefore view the AQHI as an opportunity to reinforce messages of basic symptom management and pollution avoidance as well as a tool to support patients in pro-

tecting themselves when the AQHI reaches high levels. Points for discussion are suggested below:

- Patients with cardiovascular risk factors or established cardiac or obstructive respiratory disease are at higher risk for adverse effects related to air pollution.
- Patients with chronic respiratory or cardiac health conditions (or risk factors) who are on appropriate medications are relatively resistant to the effects of pollutants.
- Individuals' exposure to air pollution will vary by their location and activity. Individuals can limit exposure by avoiding emissions (such as on busy roads and downwind of industrial facilities) at all times, independent of the AQHI level.
- Exercise increases exposure to air pollutants due to increased volumes of inhaled air and deeper inhalation, which results in more distal pollutant deposition in the lungs. With AQHI values 4 or higher, susceptible individuals are advised to reduce their short-term risk of air pollution health effects by restricting exercise to an indoor space with clean air.
- Susceptible patients may wish to identify a "clean air shelter" in their community for use as the AQHI approaches or is forecast at value 7 or higher (infrequent in most B.C. communities). This should be an indoor space with central air conditioning.
- While outdoor air quality is reflected in the AQHI, indoor air quality is also important. Thus, patients should eliminate indoor sources, such as tobacco smoke, and limit outdoor pollutant entry through the use of HEPA filters and central air conditioning.
- Responses to a given concentration of air pollutant/s and/or AQHI level will vary between individuals and over time within the same individual.
- Although the AQHI focuses on short-term health outcomes, long-term exposure to pollutants is estimated to cause three times as many deaths as short-term fluctuations. Everyone has a role to play in reducing emissions and working for clean air every day to reduce long-term exposures.

² Particles less than 2.5 micrometers in diameter

Comparing BC Air Quality Advisories and the new Air Quality Health Index (AQHI)

Air Quality Advisories	Air Quality Health Index
Issued by the B.C. Ministry of Environment/Metro Vancouver in response to high levels of measured individual air pollutants	An air quality information tool developed by Health Canada/Environment Canada and partners based on a Canadian epidemiologic study relating numbers of daily deaths to same day levels of three pollutants: nitrogen dioxide, ozone, and particulate matter
Issued in more than 35 communities throughout B.C., including the Lower Mainland	Available in Prince George, Quesnel, Kamloops, Vernon, Kelowna, Nanaimo, Victoria, Whistler and Williams Lake, and throughout Metro Vancouver and the Fraser Valley
Only issued when air pollution approaches or exceeds specific trigger levels	Calculated on an ongoing basis; the AQHI scale (0-10+) represents increasing levels of air pollution-related risk to health
Incorporates general health messaging around pollution avoidance, especially for vulnerable persons	Health advice keyed to index level separately for general population and specific vulnerable groups
May trigger voluntary or mandatory actions to reduce emissions	Triggers no specific actions: currently an information tool only

Frequently Asked Questions on Air Quality Advisories and the Air Quality Health Index

1. It's a hazy day, but the AQHI says air quality is a low health risk. What do I tell my patients?

Haze is often due to fine particulate matter (PM) and moisture in the air, and PM is but a minor contributor to the overall index. Because of this, a hazy day may not trigger an increase in the AQHI despite the presence of pollutants in the air. Conversely, a high AQHI level may not be accompanied by reduced visibility.

2. The AQHI is at "low health risk," but the B.C. Ministry of Environment has issued an Air Quality Advisory. What do I tell my patients?

The B.C. Ministry of Environment will continue to issue Air Quality Advisories as it has in the past. These are calculated in a different manner from the AQHI. Advisories are triggered when individual pollutants approach or exceed established national or provincial air quality objectives (comparable to national Maximum Acceptable Levels). Advisories are issued

to protect the environment and to encourage citizens to take actions to reduce emissions. Health messages have traditionally accompanied these advisories because, in general, health effects increase as air quality worsens. Despite the low AQHI, patients should follow recommendations outlined in the advisories.

3. If the AQHI is based on mortality, how can it predict symptom exacerbation?

The link between the AQHI and predicted worsening of patient symptoms can only be assumed on the basis of data on increased mortality. However, other studies have linked increased symptoms to increased air pollution.

4. My patient lives close to a busy road. Will the AQHI reflect his/her exposure?

Only in part. The AQHI reflects regional estimates of short-term air quality based on fixed monitoring

stations, but individual exposure will vary based on proximity to high-pollution areas. Long-term exposure to sources of pollutants can significantly impact a patient's health independent of AQHI levels. Patients, particularly those with cardiovascular or obstructive respiratory disease who live near a significant source of air pollutants such as busy roads may wish to protect their indoor air by using a central air conditioner or HEPA filters.

5. Does the AQHI reflect the air pollution mix in British Columbia?

The AQHI is based on a study using air quality measurements in large cities across Canada, including Vancouver. In the pooled results, health effects correlated most strongly with nitrogen dioxide (NO₂) levels, which is reflected in the AQHI calculation. In most of British Columbia, however, NO₂ concentrations are low and particulate matter is a much more

significant pollutant. In many places in B.C., especially outside of highly urbanized areas, it is likely that the AQHI will not correlate well with high PM levels.

6. What are appropriate physical activity recommendations?

Messages linked to the AQHI advise sensitive individuals to begin reducing outdoor activities at value 4 on the AQHI scale. The risks of exposure to outdoor air pollutants and of physical inactivity should be balanced and all patients should be encouraged to be as physically active as possible.

Keep in mind that outdoor air quality is only one of the contributors to individual patient symptoms. Patients should respond to increased symptoms as they normally would (e.g., by using rescue medications and/or reducing activity). They may also wish to check the AQHI to see if poor air quality could be contributing to their current symptoms.



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