Demystifying the Air Quality Health Index

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AIR QUALITY CAN BE MEASURED BY 2 METHODS—FIRST, BY estimating the amount of emission from pollutant sources and, more accurately, by estimating the amount of pollutants in the air. Air quality can fluctuate seasonally, by time of day, by location and by changing weather conditions.¹⁻⁴ The Air Quality Health Index (AQHI) is a national, simplified communication tool to measure and forecast air quality.¹ The AQHI allows for individuals to take action to protect their health and support active living. The index can help patients to predict their exposures based on location and activity.

Pharmacists can use the Air Quality Health Index tool to counsel their high-risk patients with asthma, chronic obstructive pulmonary disease, cardiovascular disease or diabetes, as well as seniors and families with children on how they can reduce their exposure to air pollution.^{1,5,6} Reducing exposure can in turn lead to a decrease in health risk in terms of morbidity and mortality. Every year, Health Canada estimates that air pollution in 8 Canadian cities causes nearly 6000 premature deaths. Long-term exposure to air pollution accounts for more than 70% of these deaths.¹ The Canadian Medical Association estimated the yearly national economic costs from the health impacts of air pollution to be approximately 8 billion dollars (including lost productivity, health care costs, loss of life, pain and suffering).^{1,7}

The Air Quality Health Index measures 3 specific pollutants. The first component measured by the AQHI is ground-level ozone. Ground-level ozone is an odourless, colourless gas and a major component of smog during the summer. Ground-level ozone levels are highest in the summer and afternoons, as formation of ozone requires heat and light. The major sources of ground-level ozone are fuel combustion from vehicles and from industry. Second, the AQHI measures particulate matter (PM). These particles are too small to see and can deposit deep into the lung alveoli, leading to systemic inflammation and changes in heart rate and blood pressure and accelerating the progression of atherosclerosis. Third, the AQHI measures the amount of nitrogen dioxide (NO₂) in the air. Nitrogen dioxide is a major air pollutant found in smog and acid rain. Nitrogen dioxide forms mainly from the combustion of vehicles, combustion in fossil fuel power plants and industrial processes.^{1,4}

The effects of short-term exposure to pollution include exacerbation of preexisting respiratory disease, including asthma and chronic obstructive pulmonary disease. Worsening of cardiovascular diseases such as ischemia, including increased rates of myocardial infarction, increased incidence of cardiac arrhythmia, exacerbation of heart failure and stroke can also occur.⁸ The effects of long-term exposure to pollution include the increased incidence of lung cancer and pneumonia, as well as the increased development of atherosclerosis. Long-term exposure may also lead to the development of new asthma and may delay lung development in children.¹

The Air Quality Health Index is a scale designed to help your patients understand what the quality of air means to their health. The index is a counselling tool to show patients how to limit their exposure to air pollution.¹ Pharmacists can educate their patients on how to adjust their activities so as to reduce intense outdoor activity during episodes of increased air pollution and to encourage outdoor physical activity on days when the index is low (Figure 1).² The higher the number on the index, the greater the health risk. Numbers 1 to 3 indicate a low health risk. At this low level, the population is able to enjoy their usual outdoor activities and should be encouraged to be physically active outdoors. Numbers 4 to 6 on the scale indicate a moderate health risk, when the at-risk population should consider reducing or rescheduling their outdoor activities. Numbers 7 to 10 indicate a high risk. At these levels, children and the elderly and those with preexisting respiratory or cardiac disease should reduce or reschedule their outdoor activities. Levels on the scale above 10 rarely occur and are usually associated with forest fires. At these levels, the general population should also consider reducing or rescheduling outdoor activities, especially if experiencing symptoms of coughing or throat irritation (Table 1).⁹

The AQHI tool provides Canadians with information that is consistent across Canada.¹ All Canadians are able to check the quality of air prior to engaging in activities outside. Although there is no direct experimental evidence to support the effectiveness of the AQHI, there is indirect evidence that supports the short-term health benefits. A recent epidemiologic study in Ontario has shown that each unit

BOX 1 The Air Quality Health Index: Implications for the pharmacist

- The Air Quality Health Index is a Canadian counselling tool that can be used to advise high-risk patients on how to reduce exposure and health risk from air pollution.
- Pharmacists can teach vulnerable patients this self-management tool so they can reduce or reschedule their strenuous outdoor activities.
- Pharmacists should counsel their patients on how to reduce their outdoor activities during increased air pollution and encourage outdoor activities when air pollution levels are low.

FIGURE 1 The Air Quality Index Scale²

What is the scale for the AQHI?

The AQHI is measured on a scale ranging from 1-10+. The AQHI index values are grouped into health risk categories, as shown below. These categories help you to easily and quickly identify your level of risk.

- 1-3 Low health risk
- 4-6 Moderate health risk
- 7-10 High health risk
- 10+ Very high health risk

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TABLE 1 Air Quality Health Index (AQHI) categories and health messages⁹

The AQHI uses a scale to show the health risk associated with the air pollution we breathe.

The following table provides the health messages for “at-risk” individuals and the general public for each of the AQHI health risk categories.

Health risk	AQHI	Health messages	
		At-risk population*	General population
Low	1-3	Enjoy your usual outdoor activities.	Ideal air quality for outdoor activities.
Moderate	4-6	Consider reducing or rescheduling strenuous activities outdoors if you are experiencing symptoms.	No need to modify your usual outdoor activities unless you experience symptoms such as coughing and throat irritation.
High	7-10	Reduce or reschedule strenuous activities outdoors. Children and the elderly should also take it easy.	Consider reducing or rescheduling strenuous activities outdoors if you experience symptoms such as coughing and throat irritation.
Very high	Above 10	Avoid strenuous activities outdoors. Children and the elderly should also avoid outdoor physical exertion.	Reduce or reschedule strenuous activities outdoors, especially if you experience symptoms such as coughing and throat irritation.

*People with heart or breathing problems are at greater risk. Follow your doctor’s usual advice about exercising and managing your condition.

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increase in daily AQHI value is associated with a substantial increase in emergency and outpatient department visits for asthma, which can occur up to 2 days later. In addition, the Air Quality Health Index also gives advice on how Canadians can reduce personal and household emissions.¹

In conclusion, the Air Quality Health Index is a Canadian counselling tool that can be used to advise high-risk patients to

reduce exposure and health risk from air pollution by reducing or rescheduling their strenuous outdoor activities. Pharmacists can easily teach vulnerable patients this self-management behaviour. For more information on where to find the Air Quality Health Index, pharmacists and patients can check the Weather Network (www.theweathernetwork.com) and www.airhealth.ca.³ ■

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