Smoky air and respiratory health in the 2010 forest fire season, British Columbia

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In 2010 British Columbia had an exceptional forest fire season. The smoke was thicker and the number of communities affected was greater than in previous years. In the Interior, communities experienced two smoky periods, each lasting several days. The first began in late July and the second in early August. The highest measured daily mean fine particulate matter in the province occurred in Williams Lake, with a peak of 258 ug/m^3 on 19 August, more than 20 times normal background levels. Since forest fire smoke travels long distances, populations throughout the province were exposed.

Forest fire smoke contains a mixture of pollutants including fine particulate matter (PM 2.5) and many toxic compounds.[1] Exposure to forest fire smoke has well-documented health effects,[1] including asthma exacerbations[2] and other respiratory complaints.[3] This summer, British Columbia was smoky enough to observe these effects.

Indeed, MSP billings for physician visits for COPD and asthma increased following smoky days. The proportional increase in visits is most pronounced for regions where particulate matter was highest, like Cariboo-Chilcotin Health Service Area (Williams Lake) (**Figure 1**). After almost a week of smoky days in Cariboo-Chilcotin, starting in mid-August, the daily number of visits increased by 100% (four visits) above the 10-year mean. An increase in visits was also observed during the same period in the Fraser North Health Service Area, which includes New Westminster, Burnaby, and Coquitlam, even though PM 2.5 reached only 17.6 ug/m^3 (**Figure 2**). Although the proportional increase in visits above the 10-year mean was lower in Fraser North (14%), the increase in the *number* of visits was greater (15 visits, **Figure 2**). This increase in visits following smoky days was consistently observed in smokier regions (data not shown). While this is only a first glimpse at the data, it does illustrate an important

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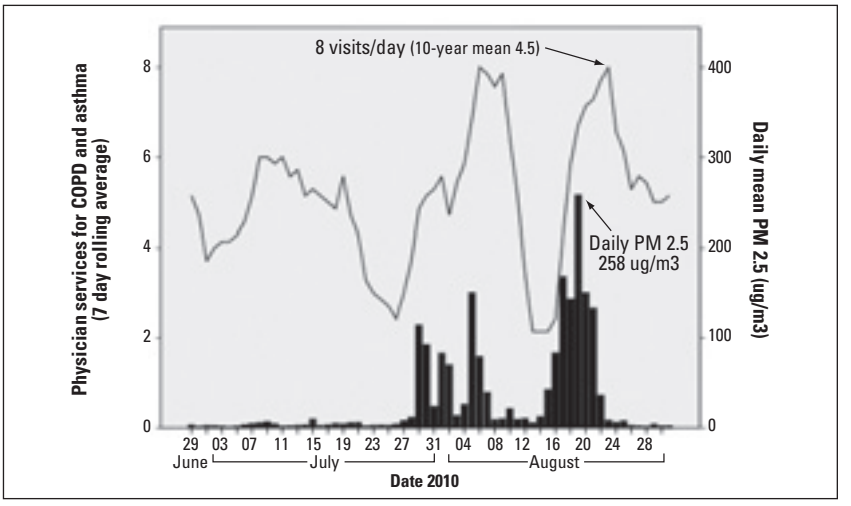

Figure 1. Physician services for respiratory illness and daily mean fine particulate matter in the Cariboo-Chilcolten region of BC, 2010.

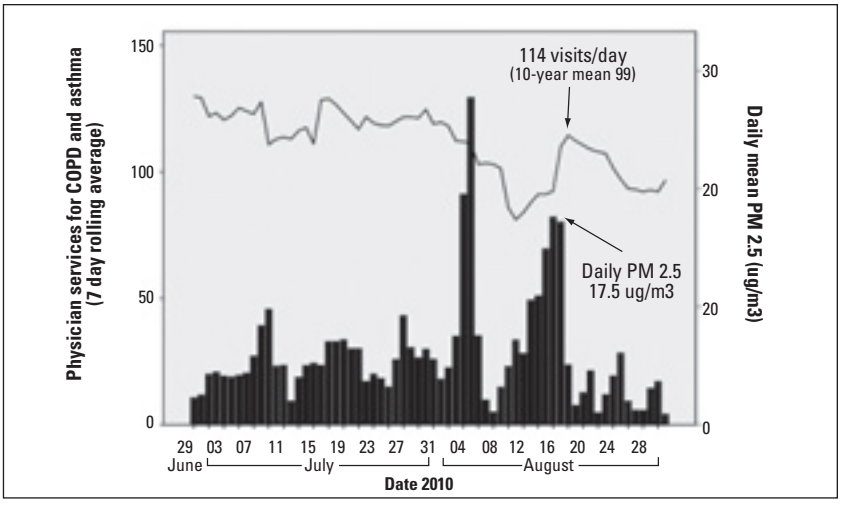

Figure 2. Physician services for respiratory illness and daily mean fine particulate matter in the Fraser North region of BC, 2010.

PM 2.5 = fine particulate matter

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Treatment	Evidence			Comments
	Positive	Negative	Conflicting	
Physical therapy				
Traction or spinal decompression[42,43]		✓		As a single treatment for any low back pain, with or without sciatica
Photonic stimulation[44]		✓		
Interferential stimulation[45]		✓		
Superficial heat or cold[46]	✓			Short-term with small effect
Electromagnetic fields[47]	✓			For knee osteoarthritis; however, the effect is not clinically significant
Electrotherapy[48]			✓	In treating neck pain
Conservative therapy[49]			✓	For active or passive treatments in whiplash-associated disorders, Grades 1 or 2
Transcutaneous electrical nerve stimulation[50-54]			✓	For knee osteoarthritis or chronic low back pain, or in reducing pain among patients with rheumatoid arthritis of the hand
Low-level laser therapy[55,56]			✓	In reducing pain among patients with nonspecific low back or neck pain
Complementary and alternative medicine				
Touch therapy, including healing touch, reiki, therapeutic touch[57]	✓			In reducing pain; however, the effect is not clinically significant
Neuroreflexotherapy[58]	✓			Short-term effect for nonspecific low back pain
Massage[59,60]	✓	✓		For nonspecific neck pain Small effect for subacute or chronic nonspecific low back pain
Acupuncture[61-63]	✓		✓	Evidence, short-term effect in acute headache or chronic nonspecific low back pain In treating shoulder pain
Herbal[64,65]	✓			For rheumatoid arthritis and maybe low back pain
Vitamin D[66]		✓		

References

Available on request by e-mailing kukuh.noertjojo@worksafebc.com or calling 604 232-5883. An extended summary of this review is accessible from the Evidence-based Medicine page on WorkSafeBC.com (www.worksafebc.com/evidence.)

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principle in the relationship between air pollution and health: a small increase in exposure in large populations (Fraser North, population 597 659) can affect larger numbers of people than a large increase in exposures in small populations (Cariboo-Chilcotin, population 26 646).

The evidence we present from this season serves as a reminder that forest fire smoke affects people all over the province, even those distant from the fires. Physicians and public health practitioners across BC can (and did) work together to reduce the health effects of exposure to forest fires, particularly among those most at risk: firefighters, young children, the elderly, and those with chronic respiratory disease. Physicians play a key role in ensuring that patients with chronic respiratory conditions such as COPD and asthma have rescue medication and emergency response plans, and know when to seek medical help. Public health responses include issuing air quality health advisories, establishing air shelters, and evacuating those at risk during severe smoke events. Partnerships between physicians and public health practitioners become particularly advantageous when novel scenarios arise, such as how to manage patients in hospitals when the indoor air becomes smoky.

Forest fires are the norm in British Columbia, and we can anticipate that they will increase with global climate change. Physicians and public health practitioners must continue to work together to reduce the health impacts of forest fires.

Acknowledgments

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