Radon: public health professionals can make a difference

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Radon is a colourless, odourless, radioactive gas emitted naturally from uranium in Canadian rocks and soils. Outdoor concentrations of radon are almost always low, but levels can build up indoors, especially in the lower levels of a building, because radon gas is heavier than air. Once inhaled, the radioactive decay products of radon can adhere to cells lining the lungs and can lead to lung cancer. Health Canada cites radon gas exposure as the second leading cause of lung cancer in Canada, accounting for about 3000 deaths each year, and it is the leading cause of lung cancer among nonsmokers (Chen 2012). Fortunately, exposure to radon is preventable; levels in current structures can be reduced through mitigation, and new buildings can be constructed to prevent radon from entering in the first place.

A major challenge for public health is that radon is astonishingly under-recognized as a health hazard. Since 2007, Health Canada has actively engaged in radon messaging; surveys reflect a slow increase in radon knowledge over time. However, a recent Statistics Canada “Household and the Environment” survey found that over 80% of Canadians did not correctly identify radon as a health hazard (Statistics Canada 2012).

Knowledge about radon is key, but action is needed to reduce exposure. The next steps for adequate risk reduction are to obtain and use home test kits, to correctly interpret test results, and to plan remediation when indicated. Unfortunately, the evidence that the public is taking these steps is also not encouraging: in 2014, the Canadian Cancer Society found that only 4% of Canadians had ever tested their homes for radon, even though testing for radon is relatively straightforward and inexpensive (Canadian Cancer Society 2014). Radon test kits that are simple to use can be purchased for \$30–\$75 and can be obtained through hardware stores, online retailers, lung associations, and other groups. Certified radon professionals can also test homes. Given that all Canadians are exposed to indoor radon (sometimes at very high levels), more work needs to be done, by more agencies, to encourage testing.

Public health inspectors (PHIs), medical health officers (MHOs), and other environmental health (EH) professionals are well situated to help Canadians reduce their risk to radon

exposure. Raising awareness is a good place to start. Because the highest concentrations of radon are generally found in the lowest levels of a building, PHIs who carry out on-site inspections should discuss radon with owners and operators of ground- and basement-level facilities. Visits to ground- and basement-level daycares, long-term care homes, correctional facilities, restaurants, and social housing developments are opportunities to speak about the importance of radon testing and provide information on accessing test kits. Raising awareness among building inspectors and expanding discussions to include home inspectors can encourage testing in newer and older buildings. PHIs can also promote awareness of the Canadian National Radon Protection Program (<http://c-nrpp.ca/>), which offers contact information for certified radon testing and remediation professionals.

Public health professionals can play a role in advocating for regulatory and legislative change to reduce the health impact of radon. Given that radon exhibits genotoxic carcinogenicity (Gustavino et al. 2014) (i.e., it is considered not to have a minimum exposure threshold for effects), we need to consider and regulate it as an ALARA (as low as reasonably achievable) substance. Although the current Canadian guideline is 200 becquerels per metre cubed (Bq/m³, a measure of radioactivity), Public Health Ontario’s recent burden of disease estimate illustrates that Ontario could prevent more than twice as many lung cancer deaths by lowering its radon regulations to the World Health Organization guideline (100 Bq/m³), and four times as many if it uses 50 Bq/m³ as a benchmark (Peterson et al. 2013). This is likely applicable across Canada in provinces with similar distributions of radon levels. Reducing radon through mitigation is very effective. Research shows that it is feasible to reduce even high radon levels in homes to lower levels without significant added expense. Health Canada estimates that professional remediation costs between \$1500 and \$3000 per home, whereas passive systems that vent radon outside cost less.

Public health professionals can also catalyze action by championing the issue. Radon became a sustained story in the public realm only after Health Canada’s radon awareness program took off in 2007. Since then, there has been a consistent, albeit low, level of media coverage (Nicol et al. 2014), with increases during the recent National Radon Action Month (November 2014). Public health professionals, together

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with nongovernmental organizations and other stakeholders, can further advance awareness, testing, and remediation. Frontline professionals such as physicians and nurses could raise awareness about radon when interacting with patients who smoke or live with smokers, given the multiplied risk of lung cancer from exposure to both radon and tobacco smoke.

EH professionals can also support those who are less able to access resources or make changes, particularly renters and people who live on reserves or in rural and remote regions. Renters do not have the right to require that their premises be tested or remediated for radon (Health Canada 2014). PHIs can help by providing tenants with short-term advice on how to immediately reduce radon exposure (e.g., moving sleeping quarters to upper floors) and encouraging them to make formal complaints or request relief under provincial and territorial Rental Tenancy Acts. The Canadian Environmental Law Association recommends that tenants contact local public health staff if landlords are reluctant to take action on radon. PHIs and other EH professionals can also work with local authorities to encourage testing and remediation in Aboriginal communities, particularly those in high radon areas. In rural and remote regions, most people live in single-family homes rather than apartment or condominium buildings, so these areas have more ground-level dwellings than urban areas. Rural residents may also have less local access to radon information, test kits, and remediation services.

Intersectoral collaboration, particularly with architects, planners, builders, and engineers, can also help raise awareness and make change. The National Building Code includes measures to reduce radon in newly constructed homes, although these codes have not been adopted in all provinces. Public health professionals can encourage adherence to these codes by bringing construction professionals together to discuss the importance of designing and implementing effective building codes to prevent radon entry.

As awareness rises, public health practitioners may be called upon to provide information and guidance about radon. The National Collaborating Centre for Environmental Health has resources for public health professionals seeking information on radon testing and remediation (National Collaborating Centre for Environmental Health 2009). We know there are regions in the country where public health professionals are working on radon, and we encourage you to send us your experiences so that we can add them to our evidence base. Radon exposure is one of the few issues in environmental public health with an effective and feasible solution. Public health professionals can lend their expertise and authority to ongoing initiatives to increase awareness and help people reduce exposure to radiation in their homes.

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