EMERGING ISSUES

Call for action on radon in child care settings

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Abstract: Radon is a naturally occurring radioactive soil gas that can build up to harmful levels in indoor spaces. It is a known carcinogen and the second leading cause of lung cancer in Canada. Despite its known risks and the availability of testing and remediation measures, most child care facilities in Canada are not tested to ensure that radon levels are below the Canadian guideline. We examine recent efforts to promote radon action in the child care sector and conclude that voluntary approaches that rely on child care staff to “go it alone" in ensuring radon safety often fall short. Such approaches are unlikely to achieve radon safety at every child care program and thus could exacerbate health inequities given uneven resources and capacity. A review of the regulatory landscape reveals specific requirements for radon testing in child care facilities remain scarce in Canada, despite their existence elsewhere. Other available legal instruments that address radiation more generally, and that could apply to radon in child care facilities, are underutilized. We argue that, whether through regulations, licensing requirements or ministry-funded programs, a comprehensive approach to radon safety in child care settings is needed to protect both children and staff.

Key words: Radon, child care, environmental health, child health, occupational health.

Issue

Radon is a colourless, odourless radioactive gas that arises from the gradual breakdown of uranium in soil and rock. As radon gas is released into the air, it decays and emits alpha particles, a short-lived but powerful form of radiation. Radon poses little risk when it is diluted in outdoor air. However, radon can build up indoors, exposing people to much higher levels of radiation. When inhaled, alpha radiation from radon and its decay products can damage the lung tissue cells and DNA, leading to the development of lung cancers.

Despite being a well understood and serious health risk, most child care facilities in Canada are not tested for radon, thereby leaving children and staff potentially exposed to harmful levels of a known carcinogen.

Discussion

Radon is a potent and preventable lung cancer risk

Radon is the second-leading cause of lung cancer in Canada and the leading cause among non-smokers, linked to more than 3,200 deaths per year (Chen et al., 2012). As shown in Figure 1, the lifetime excess cancer risk from radon is orders of magnitude greater than other known carcinogens that can be present in indoor air. Recent Ontario research identifies radon as the second-leading cause of cancer from environmental sources (CCO and PHO, 2016). Reducing radon in indoor environments is a sound strategy for reducing the overall population risk of lung cancer.

The World Health Organization recommends radon levels in homes should be under 100 Bq/m³. In Canada, the guideline level is 200 Bq/m³. Health Canada estimates long-term exposure at the 200 Bq/m³ level poses a 2% risk of lung cancer for a non-smoker, and a 17% risk for a smoker; risk estimations increase with increased concentration and time exposed (Health Canada, 2014). While epidemiologic evidence of disproportionate radon risk for children is emergent, it is well established that, for radiation in general, exposures in utero and in childhood pose a greater risk than for adults given the vulnerability of developing systems through rapidly dividing cells (Agency for Toxic Substances and Disease Registry (ATSDR), 2010; US EPA, 2005). Moreover, the World Health Organization states that key elements of any national radon program should include radon control measures in any building where people spend a lot of time, including child care settings (World Health Organization, 2009).
Radon in child care settings

More than half of parents with young children in Canada report using child care, with most of these children (ages 0–4 years) spending at least 30 hours a week in care (Sinha, 2014). Many child care programs are in residential settings or in public spaces (schools, churches, community centres). A considerable proportion of these are at ground level or in basements where radon levels tend to be higher (Health Canada, 2012).

Knowledge of radon levels in child care settings is limited, with only a few systematic testing efforts conducted to date. In British Columbia, a radon awareness program was led by the Interior Health Authority. In 2010, a letter promoting testing was sent to every licensed child care facility. In early 2014, free test kits were mailed to 800 licensed child care providers, followed by repeat contact to many. The voluntary program met with challenges associated with child care staff capacity and responsiveness. To date, 850 facilities were mailed a detector, with fewer than half of the detectors (392, or 46%) returned for laboratory analysis. Nevertheless, the testing results are cause for concern. Nearly 11% (43) of the analyzed detectors recorded radon levels above the Canadian guideline, with 9 facilities (2.3%) measuring above 600 Bq/m³, of which 5 (1.3%) were above 1,000 Bq/m³ (G. Baytalan, pers. comm., January 27, 2017).

This initiative resulted in lessening radon exposure for many children through successful mitigation or relocation (G. Baytalan, pers. comm., May 29, 2017).

In Quebec, a radon testing initiative was conducted in child care facilities in two regions of the province. Unlike in BC, nearly all of the recruited facilities (which also received free test kits and guidance) successfully completed the testing. The fact the testing program was carried out under the auspices of the provincial Ministry of Health and Social Services in collaboration with the Ministry of Families—the ministry that oversees child care facilities—likely contributed to its success. The other notable feature was the up-front commitment to fund remediation if elevated radon levels were detected (P. Poulin, pers. comm., November 27, 2015). This commitment removed a barrier that many facilities encounter when considering whether to test. Two of the 36 child care centres (5.5%) had at least one test result above the Canadian guideline (Gagnon et al., 2016). As part of the federal building radon testing program led by Health Canada, approximately 144 buildings in six provinces and territories that contain child care and (or) preschool facilities had been tested. Of these, almost one in ten (9%) had radon levels at or above the Canadian guideline (K. Bush, pers. comm., January 26, 2017).
These results, which reveal elevated radon in some child care facilities, run counter to the public’s and parents’ expectation all such facilities are rendered safe through the licensing process. Given the significant time young children spend in child care environments combined with the cumulative nature of radon exposure, ensuring radon levels are below the guideline in all early learning settings would be well justified.

Recent experiences suggest, however, that we are far from attaining such a goal.

**Challenges**

**Voluntary approaches to radon action often fall short**

Despite the significant nature of the health risk, radon awareness in the child care sector is low, mirroring that of the general population (Statistics Canada, 2016). About half of respondents to a 2013 survey of child care professionals had heard of radon, but they did not know much about it, and nearly a quarter had never heard of it (CPCHE and CCCF, 2013). The Quebec study described above found 57% (approx. 29) of child care facility managers had never heard of radon before their recruitment into the program (Poulin et al., 2014).

A 2013–14 radon pilot project conducted by the Canadian Partnership for Children’s Health and Environment (CPCHE) and the Canadian Child Care Federation (CCCF) with support from Health Canada looked at the motivators and capacity of child care professionals to take action on radon. Staff from six child care facilities in Winnipeg were given free test kits and outreach materials to raise awareness among client families about radon. The aim was to explore the influence that child care professionals could have in protecting children from radon.

Top motivations cited by staff who elected to take part were their desire to learn more about radon, to get their centres tested free of charge, and to protect the children in their care as well as themselves and other staff. Despite these motivations, only four completed the testing. Feedback provided in the exit interviews suggest that for a sector in which staff have multiple competing demands on their time, and in which funding constraints are a day-to-day reality, a recommendation to test—and even the provision of free test kits—is not likely to be enough. When responding to a question about a do-it-yourself approach, one participant noted:

*What I see in child care tends to be... people don't take action unless they're forced to, unfortunately... It's like carbon monoxide detectors, right? We never had them before and then finally we were forced to have them and so everybody got them. And meanwhile they're only like $40 or $50, and yet people didn't do that before it was made... expected of us. So... unless [radon testing] was made mandatory or there was some kind of assistance in ensuring that it was done, I think it would be unlikely to get done... when it should be.* (CPCHE/CCCF, 2014)

Other attempts to encourage child care centres to test for radon have shown similar results. The Manitoba division of the Canadian Cancer Society also concluded there was a lack of capacity amongst child care staff to voluntarily test their facilities for radon. This program offered free test kits by sending emails to 60 child care facilities in the province. Only 27 test kits were requested, and as of 2015, 14 test kits had been submitted for analysis (E. Crawford, pers. comm., March 4 and November 18, 2015).

These experiences suggest a voluntary approach to radon testing will fall short, and may heighten the potential for increased health inequities. It stands to reason better-resourced facilities are more likely to have the staff capacity to conduct the testing and the financial resources to remediate, if needed, whereas facilities in “have-not” communities or those struggling to make ends meet may go untreated and (or) be unable to afford remediation.

Comments from participants in the Winnipeg pilot also underscored the issue of radon in child care settings as a workplace safety concern for staff, in addition to posing a health risk for children. In the words of one participant:

*I wouldn't want to work in a centre that had [high radon] and didn't do anything about it. I wouldn't work there. And I wouldn't put my children in the centre either.* (CPCHE/CCCF, 2014)

**Specific legal requirements lacking, other legal tools underutilized**

There are no legal requirements for radon testing in child care settings in Canada, but general health and safety requirements in several areas of law are potentially applicable. Jurisdiction rests at the provincial/territorial (P/T) level and could arise under laws governing child care, schools (where these host child care centres), public health, building codes (only applicable to new construction or major renovations), or occupational health and safety since the centres are workplaces.

Most directly, general health and safety requirements in laws governing child care licensing arguably could be used to require radon testing, and remediation where warranted, as proposed by environmental and health organizations (Canadian Environmental Law Association et al., 2015). However, radon is not considered proactively as part of the child care licensing process or during occupancy. In contrast, a number of US states specifically include radon requirements in child care settings such as in Illinois (IEMA, 2013), Iowa (Iowa Department of Education, 2015), New Jersey (State of New Jersey Department of Environmental Protection, undated), and Rhode Island (State of Rhode Island Department of Health, 2012). Building codes that address radon also fall short. For example, British Columbia’s code addresses rough-in radon remediation provisions in all new buildings intended for human occupancy. Yet, there is no requirement to test for radon prior to or during occupancy, even for child care or school buildings.

Notably, child care centres are workplaces. General provisions in occupational health and safety (OHS) laws are relevant to radon, but only Yukon’s OHS law refers to radon specifically. As well, applicable guidance arises in the Naturally Occurring Radioactive Materials (NORM) Guidelines, developed by the Federal–Provincial–Territorial Radiation Protection Committee. A survey of radon law and policy in Canada found confusion and uncertainty about radon rules for workplaces. Some P/T compliance officials apply the NORM Guidelines to workplaces, whereas others do not consider radon an OHS issue. Such variability in enforcement means inconsistent worker protection (Dunn and Cooper, 2014). Moreover, under OHS laws and the pan-Canadian NORM Guidelines, workers must file a complaint...
about radon risk; OHS inspectors do not otherwise proactively test for it. The fact radon is undetectable to the senses means complaints and, therefore, inspections generally do not occur.

**Future directions**

Despite the lack of legal requirements that specifically address radon in child care settings in Canada, there are encouraging signs that radon in learning environments is increasingly recognized as an important issue. Saskatchewan, New Brunswick, Nova Scotia, and Yukon tested all schools at least once in the past decade (CAREX Canada, 2016). In 2011, the Quebec Ministry of Education mandated testing of all schools by 2014 (Gagnon et al., 2016). Most recently, in British Columbia the May 2017 Interior Health newsletter to all licensed child care facilities announced that Interior Health is requiring radon testing by all licensees and licence applicants (BC Interior Health, 2017). This progressive move, although only applicable to a portion of the province, is relying on authority in existing legislation that requires licenses, via general language, to protect children from harm. These examples demonstrate that action on radon can be achieved.

Indeed, it is our position that a mandatory approach is imperative to ensure child care facilities and other early learning environments are not a source of preventable lung cancer risk for both children and staff. Options to achieve a mandatory approach could include regulations, licensing requirements and (or) ministry-organized and funded radon testing and remediation programs.

We would not send our children to a child care facility where the well water had not been tested or where pathogens exceed safety standards. Why then do we allow our children to spend time in child care facilities that have not been tested for a known carcinogen? Radon testing is easy and inexpensive, and we know what to do if levels are high. What is needed now is the leadership and investment to ensure a safe learning and work environment for children and staff.

It is time, Canada, for comprehensive and mandatory radon safety in child care programs.

**Disclaimer**

The views expressed herein are those of the authors and do not necessarily represent the official positions of their organizations and (or) funders.

**References**


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