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A Call to Action for Nurses in Canada to Address Climate-Driven Vector-Borne Diseases

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The world's climate is changing, with recent estimates indicating the planet was 1.35°C warmer in 2023 than in the pre-industrial period (Lindsey & Dahlman, 2024). According to latest reports, past and future warming in Canada is double the magnitude of global warming, and in some areas, particularly Northern Canada, changes of 2.3°C have been observed (Bush & Lemmen, 2019; Černý et al., 2021). However, positive developments have occurred in Canada on climate action, such as the recently released National Adaptation Strategy, which includes a framework to reduce risks and promote climate resiliency (Government of Canada, 2023a).

Nurses, as one of the largest groups of health care professionals, have an important role in promoting health equity and mitigating climate-associated health implications by prioritizing the populations most affected by climate effects. There is a wide range of climate health impacts, including vector-borne diseases (VBDs), for which nurses should be prepared. The purpose of this article is to situate nurses' roles in moving from knowledge to action within the Canadian Association of Schools of Nursing (CASN) *Guidelines for Undergraduate Nursing Education on Climate-Driven Vector-Borne Diseases* (2020a). These guidelines were developed based on an environmental scan of required competencies for nurses related to climate change and VBDs. They build on the CASN (2014) *Entry-to-Practice Public Health Nursing Competencies for Undergraduate Nursing Education*. The knowledge-to-action framework is integrated in this manuscript to provide recommendations as to how required nursing knowledge in this area can be translated into practice (Graham et al., 2006). Given that planetary health challenges, including climate change and the spread of VBDs, present emerging health concerns, this content must be integrated into nursing education to better prepare nurses to address these challenges in practice and in an expanded role in planetary health.

Background Literature

Climatic effects, such as increases in rainfall, rising temperatures, drought, longer warm weather seasons, extreme weather events, and declining biodiversity all influence vector distribution (Bouchard et al., 2019; Ludwig et al., 2019; Ogden et al., 2022). Additionally, factors such as urbanization, habitat destruction, and pesticide application can impact vector distribution (Mojahed et al., 2022). The implications of climate change are increasingly visible in Canada and contribute to vector expansion and disease spread (Bouchard et al., 2019; Canadian Public Health Association [CPHA], 2021; Ludwig et al., 2019; Ogden et al., 2022).

According to Mojahed et al. (2022), ticks are considered the most important vector that affects human health and causes disease, including Lyme disease. Mosquitoes are also an important vector in the transmission of diseases, such as West Nile virus. West Nile virus and Lyme disease are considered the most common endemic climate-sensitive VBDs in Canada, and continuing surveillance reveals that the incidences of these diseases are on the rise annually (Bouchard et al., 2019; CPHA, 2021; Carignan et al., 2019; Ludwig et al., 2019). Reported Lyme disease rates in Canada increased from 144 cases in 2009 to 2,634 cases in 2019 (Gasmi et al., 2022). Government of Canada (2023b) data indicate that there were 3,147 cases of Lyme disease in the country in 2021. However, various other VBDs are also present in Canada, such as Cache Valley virus, California serogroup viruses, eastern equine encephalitis, and Powassan virus (Ludwig et al., 2019; Ogden et al., 2022).

In Canada, the rapidly expanding geographical range of vectors is an exigent concern (Khan et al., 2020; Nicol, 2019). This expansion is made possible by shifts in climate, as well as animal migration patterns, deforestation, and globalization (Mojahed et al., 2022; Nicol, 2019).

According to Nuttall (2022), Canada presents the most compelling evidence that climate change influences tick distribution and tick-borne diseases. Ticks now populate more regions of Canada than ever before, and several new tick-borne diseases have emerged as public health concerns (Nicol, 2019).

Climate change has been identified as a public health emergency in Canada, and nurses must take action to address climate-related health challenges (CPHA, 2021). Nurses are highly trusted professionals and therefore suitable to engage in climate change mitigation given their large presence within the health care system. This role can include supporting individuals, families, communities, and populations at risk for and affected by VBDs (Adrian, 2020; CASN, 2020a; Martin & Kaminski, 2021).

According to the Alliance of Nurses for Healthy Environments (ANHE, 2021), practising nurses and nurse educators, as well as those engaging in research and advocacy initiatives, are mandated by professional standards to become involved in mitigating climate change and its subsequent health impacts, such as VBDs. Similarly, Adrian (2020), the Canadian Association of Nurses for the Environment (CANE, 2022), and the International Council of Nurses (ICN, 2018), advocate for nursing leadership and engagement in climate-related programs and activities to mitigate climate health threats, such as VBDs.

Despite the obligation nurses have in climate change mitigation, recent evidence from scholars suggest that nurses may lack knowledge, skills, and resources to adequately prepare them for their role in climate change mitigation and consequential health challenges (Kalogirou et al., 2020; Leffers et al., 2017; Martin & Vold, 2019). A scoping review conducted by Vandenberg et al. (2023) on nurses' knowledge, attitudes, and experiences with VBDs revealed that literature primarily focused on recommendations for nursing competencies and considered nurses' role on the topic; however, an examination of practice readiness was lacking.

Climate justice refers to climate change as a human rights issue, where protecting public health is paramount (LeClair et al., 2022). Climate justice relates closely to social justice, which is a foundational value in nursing. As advocates for health equity and social justice, nurses have a role in climate justice by addressing socioeconomic inequities and considering the unequal power distribution that creates climate vulnerabilities for equity-denied populations (LeClair et al., 2022; Nicholas & Breakey, 2017; Waldron, 2021). Nurses' commitment to social justice offers an opportunity to provide global leadership in human and planetary health and well-being by reducing vulnerability to the harmful effects of climate change and reducing or preventing greenhouse gas emissions (ICN, 2018; Nicholas & Breakey, 2017). Nurses may be considered advocates for social justice, and therefore it is necessary that nurses be prepared to address climate change and VBDs in practice (ICN, 2018; Smith, 2019; Tiitta et al., 2021). A discussion of required competencies for practice preparedness is presented below.

Guidelines for Undergraduate Nursing Education on Climate-Driven VBDs

In response to the escalating risk of climate-related health implications on Canadians, CASN released the *Guidelines for Undergraduate Nursing Education on Climate-Driven Vector-Borne Diseases* in 2020. These guidelines use the CASN (2014) *Entry-to-Practice Public Health Nursing Competencies for Undergraduate Nursing Education* and contain five domains that outline practice competencies on climate-driven VBDs for nurses entering health care practice settings (CASN, 2020a). The guidelines provide targets for achievement and were

comprehensively developed, incorporating evidence, input from involved parties, expert panels, and consultation with gender and Indigenous experts (CASN, 2020a).

The CASN (2020a) *Guidelines for Undergraduate Nursing Education on Climate-Driven Vector-Borne Diseases* provide a blueprint for nursing action in education, research, and practice to move beyond the knowledge, skills, and competencies in the guidelines to create sustainable change. In subsequent sections of this paper, the current knowledge and required competencies necessary for nurses to address VBDs in health care practice settings are presented using the five domains of the CASN (2020a) guidelines. Applying Graham et al.'s (2006) knowledge-to-action framework, we highlight how nurses can move from knowledge to action, incorporating nursing actions within the CASN guidelines.

Domain 1: Public Health—VBDs

The first domain of the CASN (2020a) guidelines specifies the role that nurses have in understanding climate change causes, driving factors, and mitigation efforts. Furthermore, nurses are tasked with recognizing the epidemiology and etiology of climate-sensitive VBDs endemic to Canada and emerging exotic VBDs (CASN, 2020a). This domain also encompasses the role nurses have in interprofessional collaboration and public health initiatives related to VBDs at local, provincial/territorial, and national levels (CASN, 2020a). Nurses in all practice settings should ensure they are knowledgeable about climate change and subsequent health issues (Neal-Boylan et al., 2019). Butterfield et al. (2021) contended that nurses can disseminate climate change messaging to clients and the public that is acceptable and influential.

Currently, climate change is considered the greatest global public health threat, and nurses have a professional responsibility to address both climate change and the subsequent health consequences (Adrian, 2020). According to Martin and Vold (2019), nurses should be knowledgeable on the profile of common VBDs in Canada, including incidence and transmission, to ensure these diseases are recognized and treated appropriately in the health practice environment. To assume these obligations, nurses must be adequately prepared, which involves integrating climate change content into nursing curricula and updating entry-to-practice competencies so nursing graduates are aware of their role within climate health. Nurse researchers are encouraged to identify the gaps in nursing knowledge on climate-driven VBDs and generate evidence that can be incorporated into education and practice. Practising nurses are called to critically reflect on their practice readiness to respond to climate-associated health implications and VBDs in the clinical setting.

According to Gaudreau et al. (2024), nurses' roles in climate change have not been prioritized by nursing associations. Similarly, Nicholas and Breakey (2017) reported lack of clarity from nursing organizations on climate change roles in the profession, while Dossey et al. (2019) advocated that climate change should be integrated into nursing practice requirements and standards of practice. One organization that has provided guidance to nurses on their role in climate change is the Ordre des infirmières et infirmiers du Québec, which published a position paper on the role of nurses in mitigating climate change and subsequent health outcomes. The organization advocates for the integration of climate change content into nursing curricula, as well as nurses assuming leadership and advocacy roles in policy promotion and research (Ordre des infirmières et infirmiers du Québec, 2019).

Climate change is one dimension of planetary health; therefore, we support situating climate change and VBDs content in nursing education within the planetary health education

framework, which is an organized model comprising planetary health knowledge, values, and practice (Guzmán & Potter, 2021; Planetary Health Alliance, 2024). Several authors have discussed the suitability of this framework for nursing education and practice (Astle, 2021; Flaten et al., 2023; Potter, 2021; Vandenberg, 2023). Additionally, a guide developed by Radu (2020) titled *Understanding Climate Change in Nursing Practice* offers climate change educational materials within a planetary health lens and may be a practical tool to incorporate into nursing curricula.

Inclusion of a planetary health lens is lacking in the CASN (2020a) *Guidelines for Undergraduate Nursing Education on Climate-Driven Vector-Borne Diseases*, a foundational document on this topic. The Canadian Nurses Association (CNA, 2017) position statement titled *Climate Change and Health* did not include a planetary health approach; however, this document was recently retired and replaced with a position statement titled *Planetary Health* (CNA, 2024). In addition, CASN revised its *National Nursing Education Framework* (2022) to include a planetary health perspective within the learning outcomes for baccalaureate, master's, and doctoral programs.

Therefore, we advocate for revisions to guiding documents to include a planetary health perspective. Furthermore, responsibilities of practising nurses should include a planetary health lens, and we encourage nursing associations and regulatory bodies to update nursing standards of practice across Canada to reflect current calls to action in planetary health.

Domain 2: Populations Exposed to Potential Risks

Nurses must acknowledge the perspectives of Indigenous Peoples and those with lived experience of VBDs. Respecting and honouring Indigenous Peoples' Ways of Knowing and being is necessary (Brand et al., 2023; Martin & Kaminski, 2021), given their "holistic relationship to the land" (CASN, 2020a, p. 14). This knowledge will enable nurses to understand and appreciate that vulnerability to VBDs and subsequent health outcomes are shaped by the "social determinants of health, historical injustices, public policies, and institutional factors" (CASN, 2020a, p. 13). In addition, appreciating health-equity frameworks and Indigenous Knowledges on climate change and planetary health are necessary for practice (Brand et al., 2023; CASN, 2020a; Martin & Kaminski, 2021). Risk and protective factors for VBDs in Canada must be understood to ensure appropriate care for equity-denied populations (Bardosh et al., 2017; CASN, 2020a).

Nurses must be skilled at identifying populations at greatest risk of climate change-related health consequences and developing strong communication strategies on risk reduction (Levison et al., 2018; Ogden et al., 2022). According to Butterfield et al. (2021), nurses often develop close relationships with equity-denied populations and communities facing barriers related to climate change and its health outcomes. Therefore, nurses have an important role in mitigating climate change, reducing disease burdens, and advocating for health equity for equity-denied populations (CNA, 2024; ICN, 2018; Martin & Kaminski, 2021).

Nurses should ensure priority populations are educated on VBD risk reduction (Dean, 2020). According to a recent study by Aenishaenslin et al. (2022), educational messaging about tick-borne disease prevention in Canada must be improved, as the current top-down messages are not effective in diminishing disease risks in high-risk populations. Butterfield et al. (2021) recommended curricula changes in nursing education to give climate-risk communication equivalent consideration as therapeutic communication. We support this recommendation, with students moving from knowledge to application, increasing their competence in risk

communication in the practice setting. Teaching students about innovative approaches to risk communication, such as the use of games or phone applications, is appropriate to promote effective communication strategies (Aenishaenslin et al., 2022).

Equity-denied populations, such as Indigenous Peoples, are often viewed as at risk or vulnerable to disease because of climate change and planetary decline (Brand et al., 2023). Indigenous Peoples, particularly those in Northern Canada, live in areas experiencing rapid climate change. They face barriers related to climate change and subsequently greater health inequities, including rates of infectious diseases, such as VBDs (National Collaborating Centre for Indigenous Health, 2022). Despite these challenges, Indigenous Peoples possess the wisdom required to mitigate climate change in Canada (Pétrin-Desrosiers et al., 2022). Nurses are called to honour equity and Indigenous approaches, which can assist nurses in observing, responding, and adapting to environmental changes in Canada. Greater collaboration between Indigenous communities and nursing is necessary, in which nurses appreciate and integrate Indigenous Ways of Knowing in climate action. Integrating a Two-Eyed Seeing approach, which values Indigenous Knowledges with one eye while valuing conventional knowledge with the other eye, is appropriate (Bartlett et al., 2012; Redvers et al., 2022).

Domain 3: Prevention (Primary and Secondary)

The third domain encompasses primary and secondary prevention. CASN (2020a) calls on practising nurses to be able to identify key preventive measures to control VBDs, as well as communicate primary and secondary prevention and protection strategies to individuals, families, communities, and populations. Mitigation of VBDs is another important element of preventive nursing practice. This involves an appreciation of the vulnerabilities and protective factors that exist in communities and an attempt to mitigate the impacts of VBDs on health through primary prevention of human exposure to vectors (Bardosh et al., 2017; CASN, 2020a). Additionally, secondary preventive measures, such as early detection of disease, accurate diagnosis, recognition of the signs and symptoms of VBDs, and awareness of how to address VBDs in practice are critical to prognosis and treatment success (Adams et al., 2021; Centers for Disease Control and Prevention [CDC], 2024). Finally, as a crucial component of illness and disease prevention, nurses must thoroughly understand surveillance (CASN, 2020a).

Patient and public health education are important aspects within nurses' scope of practice (Audain & Maher, 2017). As stated earlier in this paper, nurses should be sufficiently prepared to engage in effective risk communication and provide education to patients, families, and communities on climate mitigation and preventive measures necessary to reduce risks. Competent communication on reducing vector habitats and breeding sites; preventing human exposure, such as by covering skin and using insect repellent with DEET; performing tick checks; and ensuring proper tick recognition and removal is important (Adams et al., 2021; CDC, 2018; Government of Canada, 2020a, 2020b; Neal-Boylan et al., 2019).

Currently, the incidence and prevalence of VBDs is underestimated in Canada (Lloyd & Hawkins, 2018), and a robust monitoring and surveillance system for infectious diseases in Canada is lacking (CPHA, 2021). Given this fact, nurses must be knowledgeable on the objectives of surveillance, surveillance measures, correlation of surveillance to practice, and limitations of surveillance (Stamler et al., 2019). Knowledge of surveillance measures for current endemic VBDs will help nurses assess vulnerability of communities and populations; therefore, ongoing high-quality surveillance is necessary (Levison et al., 2018; Ludwig et al., 2019). Ogden et al. (2022)

advocated for using new technologies in surveillance and early warning systems, and a “one health” approach in which human, animal, and environmental health are merged.

Given the lack of research examining nurses’ preparedness in addressing VBDs in practice, nurses’ levels of competence in education and communication on prevention strategies and surveillance are unknown. To ensure nurses are knowledgeable in VBD prevention, these concepts, as well as intersectoral collaboration through a “one health” approach, must be better integrated in nursing education curricula, as well as within professional development or continuing education for practising nurses. Additionally, research examining nurses’ preparedness in addressing VBDs in practice is necessary.

Domain 4: Treatment (Tertiary Prevention)

According to CASN (2020a), nurses should understand how VBDs are currently treated in Canada and engage in patient-centred care “strategies and approaches to improve prognosis and quality of life” for people living with VBDs (CASN, 2020a, p. 15). Nurses are primarily involved in direct patient care, which could include providing treatment to patients with VBDs (Neal-Boylan et al., 2019). Additionally, “an awareness of the inequities and the impact of colonization on health care for Indigenous persons” is necessary (CASN, 2020a, p. 15).

Otten et al. (2020) ranked Lyme disease second on a prioritization tool for endemic diseases in Canada, which confirms that Lyme disease is significant in Canada. Therefore, nurses must be skilled in diagnosing and treating emerging and exotic VBDs; however, according to Boudreau et al. (2018) and CPHA (2021), VBDs are not given priority within Canada’s health care system, which can hinder appropriate diagnosis and treatment for those affected by VBDs. According to the World Health Organization (2017), VBDs contribute to approximately 17% of the overall global burden of disease, disproportionately affecting populations experiencing poverty and creating economic impacts and health inequities, and increasing health care spending.

Appropriate, effective, and patient-centred management of Lyme disease is highly controversial in Canada given the presence of competing international guidelines on the diagnosis and treatment of Lyme disease. The two guidelines include the Infectious Diseases Society of America (IDSA) and the International and Associated Disease Society. Currently, the Government of Canada and the Association of Medical Microbiology and Infectious Disease Canada (AMMI) endorse the IDSA recommendations, which do not support the chronicity or persistence of Lyme disease and ongoing treatment with antibiotics (AMMI, 2019; Government of Canada, 2017; Lantos et al., 2021; Wormser et al., 2006). Davidsson (2018) has shown that Lyme disease patients without effective treatment suffer from a lower quality of life than the general population and are at risk of premature death, which demonstrates the need for nurses to support people with Lyme disease to improve their prognosis and quality of life (CASN, 2020a).

Within tertiary prevention, nurses must be skilled in accurately diagnosing disease, recognizing the signs and symptoms of VBDs, and providing appropriate treatment to patients (Dean, 2020; Gillespie, 2021). Furthermore, given the controversies around Lyme disease treatment in Canada, nurses are called to support and advocate for individuals with VBDs who have difficulty receiving a timely and accurate diagnosis within the conventional Canadian health care system. Greater emphasis on interprofessional collaboration is necessary, in which nurses incorporate appropriate resources and evidence to inform decision-making while maintaining individual needs (CNA, 2020).

Indigenous Peoples in Canada are often hesitant to access conventional health care and are denied culturally safe and relevant treatment and care because of the presence of colonialism and racism (National Collaborating Centre for Indigenous Health, 2024). Nurses are called to demonstrate cultural safety in practice and address the power imbalances that exist between providers and patients (Martin & Kaminski, 2021; Muise, 2019). Providing culturally safe care to Indigenous Peoples first requires nurses to understand their own culture and how it might affect their care (Ward et al., 2016). Nurses are also called to recognize the historical injustices and the continued impact of colonization and racism on Indigenous Peoples, which lead to poor health outcomes, particularly within mainstream health care settings (Muise, 2019; National Collaborating Centre for Indigenous Health, 2024).

There are views that climate change is directly linked to colonialism, resulting from environmental changes inflicted on Indigenous Peoples over time (Jones, 2019; Whyte, 2017). Therefore, nurses are called to acknowledge historical events and continued effects of colonialism in health care settings to develop effective responses to mitigate climate change and subsequent VBDs in practice. This can be achieved by demonstrating cultural safety and honouring the *Truth and Reconciliation Commission Calls to Action* (Truth and Reconciliation Commission of Canada, 2015), particularly those calls to action on reducing health inequities and colonialism in health care settings. Additionally, the National Collaborating Centre for Indigenous Health (2024) recommends cooperative action across structural, systemic, and service sectors, which includes policy development, programs and services, engagement activities, and cultural safety training for health care professionals to improve cultural safety for Indigenous Peoples.

Domain 5: Advocacy

The final domain describes the role of nurses in addressing health inequities of those living with VBDs, identifying culturally appropriate advocacy strategies to promote equitable access to health care, engaging in culturally safe partnerships, and reflecting on relevant public policies (CASN, 2020a). Nurses must be aware of various applicable position statements, policies, ethical guidelines, and practice standards on climate change and VBDs (CASN, 2020; Law et al., 2021). Furthermore, nurses should be adept in addressing climate change and health implications at multiple levels of government, through public and health policy advocacy and development (CASN, 2020a; ICN, 2018; Neal-Boylan et al., 2019).

Advocacy is considered one of the most important responsibilities of the nursing profession; however, many nurses feel unprepared to carry out this role. Hall et al., (2018) found Research that nurses are hesitant to speak up and face multiple barriers to patient, personal, professional, and societal advocacy (Hall et al., 2018). While advocacy may be a key focus of nursing education programs, students may experience difficulties in moving from knowledge to action. Therefore, nurse educators must initiate strategies to enhance student knowledge and skills in advocacy. For instance, students can learn how to engage in climate change advocacy safely and effectively through social media platforms to promote planetary health (Chinta, 2023).

Similarly, leadership is comprehensively taught in nursing education; however, students struggle to perceive how they can become leaders in practice. Nurses are well situated to provide global leadership on climate change mitigation and prevention of associated health outcomes; however, nurses must be sufficiently prepared to do so (Smith, 2019; Tiitta et al., 2021). To bridge the knowledge-to-action gap, nurse educators are tasked with adequately preparing students for advocacy and leadership roles in practice. Hall et al. (2022) created an advocacy toolkit to teach

leadership skills to nursing students, which facilitates development in a safe environment. The free open access e-resource that CASN released in 2020 on nursing and climate-driven VBDs is another tool that aims to facilitate knowledge and skills on climate change and infectious diseases in nursing education and practice (CASN, 2020b). Additional strategies, such as simulation experiences, mentorship, virtual educational resources, and role-playing may promote active learning.

Adrian (2020) called on all nurses to become involved at policy, political, strategic, and national levels to ensure climate change and health threats are addressed through swift policy action to promote and protect human health. Butterfield et al. (2021) believed nurses must assume leadership roles within climate action, where they can actively engage in sustainable initiatives in the practice setting. Additionally, increased funding and support is needed to promote nursing research in climate change mitigation to improve health outcomes (Butterfield et al., 2021). Ensuring nurses are knowledgeable and skilled in caring for individuals, communities, and populations at risk, or affected by climate-driven VBDs, requires competence in advocacy and leadership.

Conclusion

Nurses are integral to Canada's health care system and are invaluable in mitigating climate-related health implications. Nurses in Canada must be prepared to address climate-related health threats, including VBDs, across a variety of health care settings, which involves comprehensive knowledge of climate change and subsequent health effects. In this article, we articulated strategies for moving from knowledge to action within the five domains of the CASN (2020a) *Guidelines for Undergraduate Nursing Education on Climate-Driven Vector-Borne Diseases* to enhance nursing preparedness in education, research, and practice on planetary health and climate-related issues.

CASN's (2020a) guidelines are an appropriate framework to guide nursing curricula and ensure future nurses are prepared to address climate-sensitive VBDs in practice. These guidelines are grounded in social justice and health equity and build on the CASN (2014) *Entry-to-Practice Public Health Nursing Competencies for Undergraduate Nursing Education*. With the recommended integration of planetary health competencies, the guidelines can provide future nurses with the knowledge and skills to engage in effective disease prevention and climate and planetary health advocacy.

Nursing education programs in Canada should consider the calls to action on planetary health and climate change and ensure this content is comprehensively integrated into nursing curricula, incorporating meaningful strategies for advocacy and leadership as emphasized in the updated 2022 CASN *National Nursing Education Framework*. In this article, we discussed strategies for nursing preparedness, which involves comprehensive knowledge and actionable practice in planetary health, climate change, subsequent health effects, endemic and exotic VBDs, risk communication, preventive strategies, mitigation, intersectoral collaboration, diagnostic and treatment practices, and advocacy and leadership roles.

Additionally, we advocate for improved practice preparation for nurses. We encourage practising nurses to critically engage with current calls to action on climate change-related health implications and assume leadership roles in the practice setting to develop sustainable health care initiatives. Finally, nursing research is required to further understand nurses' perceptions of VBDs to promote improved overall health and well-being of Canadians. Evaluative research on nurses'

practice readiness is needed. Nurses across education, research, and practice must have a voice to advocate for climate action to promote human and planetary health.

In conclusion, nurses must be adequately prepared for future nursing practice and expanded roles within planetary health, which involves integrating climate change content into nursing curricula and updating nursing entry-to-practice competencies. It is imperative that nursing graduates are better educated, and subsequently more prepared to address planetary health challenges, such as VBDs, in the practice setting and assume a greater role in leading change to advocate for a climate-resilient future.

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