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Regional differences in pediatric pneumococcal vaccine schedules for Indigenous children in Canada: an environmental scan

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Abstract

Background Streptococcus pneumoniae bacteria causes substantial morbidity and mortality worldwide, especially in children under 5 years of age. Prevention of these outcomes by pneumococcal conjugate vaccines (PCV) is an important public health initiative, supported by publicly funded vaccination programs in Canada. While the National Advisory Committee on Immunization (NACI) provides national recommendations for vaccination schedules, decisions on vaccination program delivery are made regionally, creating potential for variability across the country. In addition, defining the groups that are most at risk has become a complex endeavor for provinces and territories in Canada, specifically considering Indigenous children.

Methods In this environmental scan, we reviewed policy documents, provincial/territorial and international PCV schedules, and scientific literature, and consulted with vaccination program stakeholders and experts from across the country, in order to understand the evolution of PCV vaccination guidelines and policies in Canada and identify whether and how the needs of Indigenous children are addressed.

Results As of March 2023, most regions do not specify particular vaccination requirements for Indigenous children; however, three provinces identify Indigenous children as “high risk” and use varying language to recommend a four dose, rather than the routine three dose, schedule. Our results also draw attention to evidence gaps supporting a differing practice for Indigenous populations.

Conclusions Future PCV program innovation requires inclusive and clear policies as well as definitive evidence-based policies and practices in order to improve equitable population health.

Keywords Indigenous health, Vaccine policy, Pneumococcal vaccine, Immunization schedule, Immunization programs

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Introduction

Streptococcus pneumoniae bacteria can cause a range of illnesses, from mild (e.g. sinusitis, otitis media) to more serious invasive diseases such as meningitis, bacteraemia, and pneumonia, resulting in substantial morbidity and mortality worldwide [1, 2]. Young children are particularly at high risk for invasive pneumococcal disease (IPD); the World Health Organization estimates that almost 500,000 children under 5 years of age die each year worldwide as a result of pneumococcal disease [2]. Among the 92 recognized serotypes of *S. pneumoniae*, 24 serotypes that cause IPD can be prevented by vaccination, and 15 of these are known to cause the majority of disease [1]. Antimicrobial resistance to some serotypes makes prevention through the use of vaccination even more vital [1].

Higher rates of IPD have historically been reported among some Indigenous populations in developed countries around the world [1, 3]. Lower immunization coverage and increased delays in the timeliness of vaccine receipt have also been recognized for Indigenous children in both the United States [4] and Australia [5], though studies from Canada indicate mixed results [6, 7]. Indigenous Peoples are defined internationally as descendants of those who originally inhabited a land, and retain their diverse cultural and political characteristics, despite consistent violations of their rights and identities by colonizing societies [8]. In Canada, there are distinct groups of Indigenous Peoples (including First Nations, Inuit and Métis Peoples) who share a historical and ongoing experience of colonization alongside stigmatizing experiences within the healthcare system [9]. These stigmatizing experiences act to reduce the accessibility and quality of health care, contributing to distrust of healthcare institutions and ultimately avoidance or delay of health care, and has been shown to lead to vaccine hesitancy [9–11].

Since 2002, the National Advisory Committee on Immunization (NACI) in Canada has recommended that infants less than two years of age be vaccinated with pneumococcal conjugate vaccines (PCV) [2]. Four pneumococcal conjugate vaccines (initially PCV-7, followed by PCV-10, PCV-13, and most recently PCV-15) have been licensed for use in infants, with vaccine availability varying based on changing recommendations. Since the introduction of the PCV into routine schedules for Canadian pediatric populations, there have been many changes in NACI recommendations due to vaccine developments and changes in dosing schedules, including which populations are considered at high risk for IPD and may require different PCV dosing.

While NACI provides ongoing and timely public health guidance to inform immunization schedules, Canada's thirteen provinces and territories are individually responsible for the implementation of vaccination programs

within their jurisdiction [12]. In First Nations reserve communities, delivery of health services is a patchwork of federal, provincial/territorial, and Indigenous government jurisdictions. Funding for these health services is provided through various sources, including provincial health authorities and Indigenous Services Canada (including coverage for non-insured health benefits) [13], varying according to where the services are accessed. Health program funding on reserve communities is provided by Indigenous Services Canada under the purview of the First Nations and Inuit Health Branch (FNIHB), with health care services being provided by either FNIHB or the communities themselves [14]. Indigenous Peoples living outside of reserve communities can access health care services provided by provincial/territorial programs. These overlapping systems have the potential to result in significant variation in immunization practices for Indigenous populations between and within the provinces and territories. Thus, clear, transparent, and evidence-informed policies that support, rather than stigmatize, the needs of Indigenous children are required to achieve equitable population health.

Given these complexities, an evaluation of infant PCV vaccination policies specific to Indigenous children in Canada is warranted. This information is required to better understand the context of pediatric pneumococcal disease and PCV coverage, facilitating program evaluation and improvement. These findings may provide insights relevant to other colonized countries with significant Indigenous populations, and assist with international comparisons. Thus, the purpose of this study was to investigate changes in Canadian pediatric PCV recommendations over time, and compare current schedules used in different jurisdictions across the country and internationally, with particular consideration for whether and how the needs of Indigenous children are addressed. In addition, we sought to identify evidence supporting a high risk routine PCV schedule for Indigenous children. Throughout this paper we respectfully use the term “Indigenous,” unless using language cited directly from the literature. Although “Aboriginal” is another general term that collectively refers to First Nations, Métis and Inuit Peoples, it is historically linked to Canadian government policies and is no longer the preferred terminology [15].

Methods

Between January and April 2023, we conducted an environmental scan of published literature, publicly available vaccination policy documents, and expert consultation. Environmental scans are recognized as a useful approach to examining a health issue in order to direct decision making, and involve acquiring relevant and credible information from various sources [16]. The

environmental scan was informed by Wilburn et al. [17] and included the stages of: determining the information to be collected, identifying and engaging stakeholders, and analyzing and synthesizing results from the scan into a concise summary. This environmental scan was exempt from ethics review, given that it involved collection and analysis of publicly available documents.

The initial search strategy for peer-reviewed literature was created in consultation with a librarian at the University of Alberta (Additional file 1). Identified literature was limited to North American studies, and those available as full text. We also searched references of relevant documents for additional literature. Current and historical NACI documents pertaining to pediatric PCV vaccination recommendations were retrieved via the Public Health Agency of Canada website, and all provincial and territorial government health websites were reviewed for current policies, immunization manuals, or publicly available PCV schedule guidelines. These websites were further searched using the terms “First Nation”, “Indigenous”, or “Aboriginal” to identify any differences in PCV guidelines for this group and any evidence supporting PCV vaccine practices. For international comparison, PCV guidelines were also retrieved from other high-income countries with similar histories of colonization of Indigenous populations (United States, Australia, and New Zealand).

Next, we identified immunization program stakeholders in each province and territory, including regional immunization coordinators from FNIHB (who cover multiple jurisdictions) and/or provincial/territorial health ministries. Stakeholders were emailed a

questionnaire asking them to identify differences in PCV immunization delivery in Indigenous communities and for Indigenous Peoples (Additional file 2). All stakeholders were asked to forward the questionnaire to those in their organization with knowledge of vaccination programs in Indigenous communities. Specifically, we asked if Indigenous communities within their jurisdiction followed provincial/territorial immunization schedules, and if there was potentially variation in schedules between Indigenous communities in their jurisdiction. Respondents were also asked to clarify how immunization programs in Indigenous communities were funded in their jurisdiction.

Results

Evolution of national recommendations

The timeline of Canadian national PCV recommendations is summarized in Fig. 1 and detailed in Additional file 3. The first national recommendation regarding PCV vaccination for children under 2 years of age was released by NACI in 2002 [18]. This statement recommended four doses of PCV-7 for all children, with additional doses of 23-valent pneumococcal polysaccharide vaccine (PPV-23) for those at high risk of pneumococcal disease. The statement also identified Indigenous populations as medically high-risk (along with children with chronic medical conditions and those who attend group day care), based on higher reported IPD incidence rates among some American Indian populations and Alaska Native populations, and among Indigenous populations in northern regions of Canada, compared to non-Indigenous populations. The statement qualified the risk for Indigenous

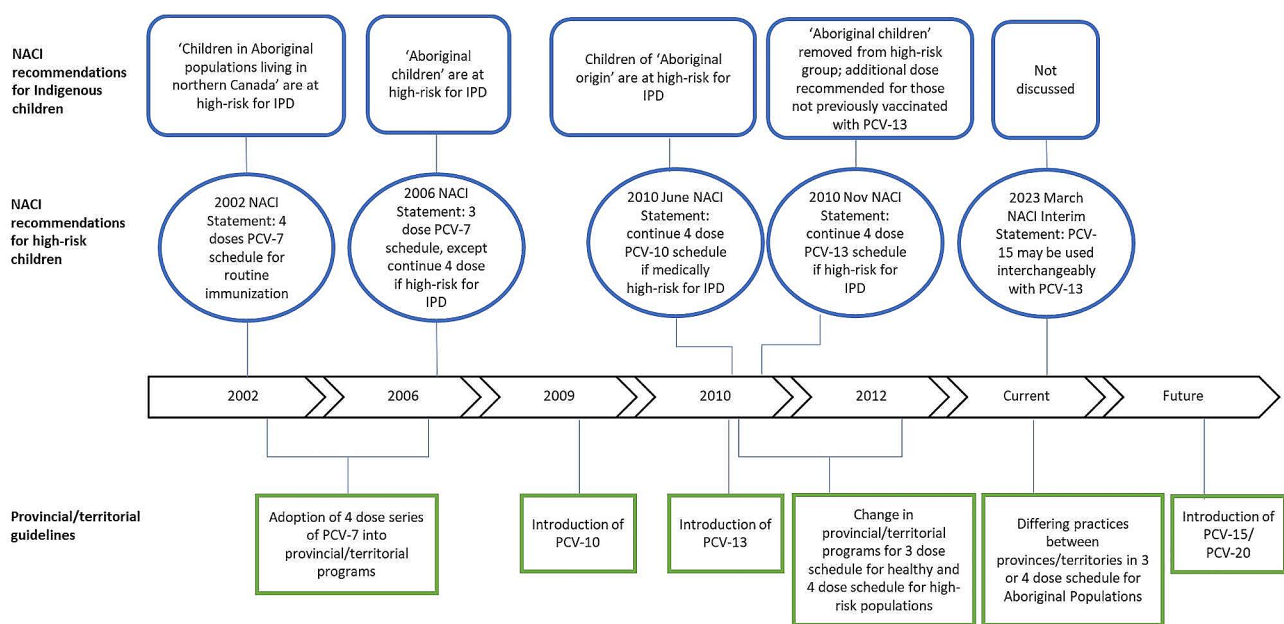


Fig. 1 Timeline of childhood pneumococcal conjugate vaccine (PCV) recommendations and schedules in Canada [1, 2, 18–22]

children as moderate, with low strength of evidence (grade C, insufficient evidence or include or exclude).

In their 2006 statement, NACI recommended that routine PCV-7 vaccination for healthy children be decreased from four to three doses. However, they noted that “as studies evaluating the three-dose schedule were not conducted among children at high-risk of invasive pneumococcal disease, NACI emphasizes that such children should continue to receive 4 doses” [19, p.3]. Indigenous children remained included in the medically high-risk group.

In June 2010, NACI released a statement outlining recommendations for the newly approved ten-valent pneumococcal conjugate vaccine (PCV-10) [20]. In this statement, Indigenous children were still identified as medically high-risk and thus eligible for a four-dose series, referencing previous statements and surveillance data from northern Quebec, Nunavut, and Northern Labrador reporting a decrease in IPD post- introduction of PCV programs [21]. Then, in November 2010, NACI released a statement introducing the thirteen-valent pneumococcal conjugate vaccine (PCV-13); Indigenous children were no longer included in the medically high-risk group [22]. However, the statement recommended that healthy children of Indigenous origin or children who attend group childcare receive an extra dose of PCV-13 at 36–59 months of age if the child had appropriate pneumococcal vaccination but had not previously received PCV-13 [22]. The Canadian Immunization Guideline continues to reflect this recommendation [1].

Most recently, NACI released an interim statement in March 2023 regarding the introduction of the fifteen-valent pneumococcal conjugate vaccine (PCV-15) to the pediatric population [23]. In this statement, NACI recommended that PCV-15 vaccine may be used interchangeably with PCV-13 in children less than 18 years of age, with no changes to the dosing schedule for either healthy (three-dose series) or medically high-risk children (four-dose series) [23]. Indigenous children are not discussed within this interim guideline.

Differences in immunization guidelines across Canada

Canadian provinces and territories have taken varying approaches to how they identify Indigenous children in their PCV guidelines (Table 1 and Additional file 2).

As per current publicly available provincial/territorial guidelines in Canada, most jurisdictions (British Columbia, New Brunswick, Nova Scotia, Ontario, Prince Edward Island, Quebec, Saskatchewan, and Yukon) recommend a three-dose vaccine series for healthy children, and do not specify any special vaccination requirements for Indigenous populations. Conversely, there are three provinces that specify Indigenous children require a fourth dose of PCV at 6 months of age (Alberta, Manitoba, and Newfoundland and Labrador). In Alberta, the language used is that “Indigenous children (defined as having at least one parent who is indigenous; includes First Nations, Inuit, and Métis) beginning immunization at younger than seven months *should* receive four doses of vaccine” [24, p.5]. Manitoba’s provincial guideline

Table 1 Canadian provincial and territorial childhood pneumococcal conjugate vaccine (PCV) guidelines for Indigenous children [24–36]

Province/ Territory	Differing PCV schedule from non-Indigenous	Indigenous population description	Doses	Language for extra dose	Schedule timing (in months)
Alberta	Y	“Indigenous children (defined as having at least one parent who is indigenous; includes First Nations, Inuit, and Metis)”	4	“should” receive 4 doses of vaccine	2, 4, 6, 12
British Columbia	N	NA	3	NA	2, 4, 12
Manitoba	Y	“Children living in First Nations communities”	4	“eligible” to receive 4 doses	2, 4, 6, 18
New Brunswick	N	NA	3	NA	2, 4, 12
Newfoundland and Labrador	Y	“Aboriginal children who live in remote and rural communities”	4	“provide” an extra (4th) dose	2, 4, 6, 12
Nova Scotia	N	NA	3	NA	2, 4, 12
Northwest Territories	N	NA	4 ^a	NA	2, 4, 6, 18
Nunavut	N	NA	4 ^a	NA	2, 4, 6, 15
Ontario	N	NA	3	NA	2, 4, 12
Prince Edward Island	N	NA	3	NA	2, 4, 12
Quebec	N	NA	3	NA	2, 4, 12
Saskatchewan	N	NA	3	NA	2, 4, 12
Yukon	N	NA	3	NA	2, 4, 12

NA: not applicable

^a no differentiation for Indigenous population as *all* children receive 4 doses

states that children living in First Nations communities are *eligible* to receive four doses [26]. Both of these provinces differentiate Indigenous populations from those who are medically at-risk. Lastly, Newfoundland and Labrador guidelines include Indigenous children who live in remote and rural communities within their medically high-risk group and state that they *provide* an extra dose of PCV-13 to this population [28].

The routine PCV vaccination guidelines for the Northwest Territories and Nunavut both specify four doses of PCV-13 for all populations of infants. While all other jurisdictions offer the three-dose series at 2, 4, and 12 months of age, with an extra dose at 6 months for specified at-risk groups, the Northwest Territories offers a four-dose series at 2, 4, 6, and 18 months of age and Nunavut offers their four-dose series at 2, 4, 6, and 15 months of age. There is no specific mention of Indigenous populations within the Northwest Territories' publicly available information. Nunavut guidelines affirm that Indigenous children living in northern Canada have a three times higher incidence rate of IPD than non-Indigenous children, though Indigenous populations are not listed in their medically high-risk group [31].

Immunization delivery in Indigenous communities

Information regarding PCV delivery in Indigenous communities was gathered through a targeted survey of regional immunization coordinators from each Canadian province and territory. A total of twelve responses were obtained from immunization program experts (namely, immunization coordinators or immunization practice consultants) in all jurisdictions except Nunavut. In most jurisdictions, respondents indicated that immunization programs are delivered in partnership with Indigenous governments and funded by federal programs. However, there are some exceptions. Notably, reserve communities do not exist to the same degree in the Northwest Territories, Yukon, or Nunavut due to differing agreements for Inuit and, therefore, health service delivery in these jurisdictions is the sole responsibility of the territorial government. British Columbia uniquely operates under a tripartite agreement with the federal, provincial, and First Nations governments, where the responsibility for planning, management, service delivery, and funding of health programs falls under the British Columbia First Nations Health Authority (FNHA) [37]. All respondents indicated that Indigenous communities follow guidelines for the jurisdiction in which they reside.

Guidelines from other high-income countries

In the United States, the Advisory Committee on Immunization Practices (ACIP) recommends a four-dose series for the general population at 2, 4, 6, and between 12 and 15 months [38]. They currently recommend PCV-13

or PCV-15 vaccine for all populations, and do not identify any increased disease risk for Indigenous children within their publicly available information [38]. New Zealand and Australia both recommend a three-dose series of PCV-13 for their general population. The Australian Technical Advisory Group on Immunisation (ATAGI) recommends a fourth dose at 6 months of age for their Indigenous population, stating that Aboriginal and Torres Strait Islander children are at increased risk of pneumococcal infection and *should* receive four doses at 2, 4, 6, and 12 months of age (compared to three doses at 2, 4, and 12 months for non-Indigenous populations) [39]. However, they do not consider these Indigenous populations within their medically high-risk group. The New Zealand Immunisation Advisory Centre specifies a 3-dose PCV schedule at 6 weeks, 5 and 12 months for all children [40].

Rationale for differing schedule

The literature search identified limited evidence supporting the rationale for a differing PCV schedule for Indigenous children. The available literature refers to higher incidence rates of IPD among both Canadian and American Indigenous populations [3, 21, 41–46]. However, only two studies included data from after 2010 [44, 45], when PCV-13 was introduced and provinces/territories began to decrease recommended dosing for healthy children from 4 doses to 3 doses. Most literature focused on circumpolar northern Indigenous populations [3, 21, 41, 43–46].

Two studies identified potential biological risk factors for increased risk of pneumococcal disease in Indigenous children. First, an article from 1980 described eustachian tube differences between Indigenous and non-Indigenous children in the United States as a potential contributor to higher prevalence of otitis media among Indigenous children [47]. Second, a 2018 study done in the Canadian provinces of Manitoba and Saskatchewan identified a rare primary immunodeficiency occurring in certain Cree populations, which increased infant susceptibility to early-onset bacterial, viral, and fungal infections including streptococcus pneumonia [48].

In addition to potential biological risk factors, the social determinants of health and other impacts of ongoing colonization have been proposed as risk factors contributing to higher rates of IPD among Indigenous populations [49, 50]. However, few studies have attempted to quantify these relationships, and there is no evidence that these social determinants lead to decreased vaccine effectiveness, necessitating a higher dose schedule. A total of seven studies examined the impact of living conditions on IPD risk, including household crowding [51–53], water quality [52–55], and air quality due to wood burning stoves or tobacco exposure [52, 56, 57]. Overall, these

studies found relationships between the determinants listed and higher risk of IPD, increased risk of pneumococcal carriage, and severity in hospital outcomes.

The limited information ascertained from this literature search was validated by personal communication with practice experts representing provincial and territorial immunization programs. The immunization practice experts we consulted in Alberta, where a fourth dose of PCV is recommended for all Indigenous children, reported that the rationale for this dosing schedule was not included in training and information material accessed by frontline staff.

Discussion

This study provides a comprehensive overview of PCV recommendations in Canada, thereby drawing attention to factors that could contribute to uncertainty for both healthcare providers and families about vaccine needs of Indigenous children. We identified changes in national recommendations over time, guideline differences between Canadian jurisdictions, and limited published evidence exploring the potential cause(s) of elevated pneumococcal disease risk among Indigenous children. Moreover, the apparent assumption that the additional fourth dose for Indigenous populations will improve health outcomes in pneumococcal disease was not supported by published evidence regarding the effectiveness of a fourth PCV dose among these children.

Due mainly to changes in pneumococcal vaccine products over time, numerous NACI statements related to PCV have been released since 2002. In these statements, the risk categorization of Indigenous populations has evolved. In June 2010 and previous years, Indigenous children were considered to be within NACI's high-risk group; however, they were removed from that category in November of the same year without explicit rationale or reference to evidence [20, 22]. Within that same November statement there is a differing recommendation for "healthy (not high risk) children who are of Aboriginal origin" to receive an additional dose of PCV-13 for the age group of 36–59 months of age that have age-appropriate PCV vaccination (PCV-7, PCV-10), but have not been vaccinated with PCV-13 [22, p.9].

As of March 2023, three Canadian provinces (Alberta, Manitoba, Newfoundland and Labrador) specify different PCV dosing for Indigenous children compared to non-Indigenous children, while two territories (Northwest Territories, Nunavut) specify a four-dose schedule for all children in the region. Approximately 5% of Canada's total population identifies as Indigenous; however, the proportion of Indigenous Peoples living in these jurisdictions is the highest in Canada, with the highest proportion in Nunavut (85.7%) followed by the Northwest Territories (49.6%) [58]. Among the provinces, Manitoba

has the highest proportion of Indigenous populations (18.1%), with Newfoundland and Labrador (9.3%) and Alberta (6.8%) representing the third and fourth highest proportions [59].

The provinces with different dosing schedules for Indigenous children have taken different approaches to defining risk-related eligibility. For example, Alberta guidelines specify that Indigenous children in the province should receive four doses of PCV to ensure they are fully immunized regardless of where they live [24]. This differs from Manitoba, where children living in rural First Nations communities are eligible for four doses [26]; and for Newfoundland and Labrador, where Indigenous children are considered medically high-risk (i.e. eligible for a four-dose series) only if living in remote and rural communities [28]. However, distinctions in immunization practice for Indigenous Peoples based solely on living in an urban setting versus living on a rural reserve may not align with the potential impacts of the social determinants of health. While certain social risk-factors that contribute to elevated pneumococcal disease risk (e.g. lack of clean water) are more common in rural or remote living environments in Canada, other risk factors (e.g. overcrowding) can be present in urban, rural, or remote settings.

Healthcare professionals and parents in jurisdictions where different PCV schedules for Indigenous children are in place require clear rationale for this need. Without this information, immunization providers may feel unequipped to deal with questions from Indigenous parents regarding the need for a fourth dose, and Indigenous families may feel as if they are unfairly treated differently (i.e. stigmatized) with this immunization schedule. It has been shown that differential treatment/policies have the potential to lead to vaccine hesitancy, which can negatively impact vaccine uptake [10, 11]. For Indigenous Peoples, negative experiences with vaccination may also reinforce the history of their interactions with westernized healthcare that has been shaped by unsafe care, lack of respectful treatment, racism, and discrimination [60]. In addition to exacerbating barriers to accessing healthcare resources, these negative experiences have also been directly linked to chronic stress and poor coping behaviors, contributing to negative mental and physical outcomes [9]. In order to fully address the Truth and Reconciliation Commission calls to action, there is a need to advocate for evidence-based immunization practice and empower Indigenous Peoples to achieve their full health potential [61].

To support the development of clear policies and informational resources, updated research supporting regional vaccination needs (i.e. surveillance data) is required. Research clarifying the impact of potential biological and/or social risk factors on disease risk and/or

vaccine efficacy would help to appropriately target a four-dose schedule. By comparing the impact of differing PCV schedules on IPD prevalence across the country, it may also be possible to develop insights on the effectiveness of a fourth PCV dose in this population.

Immunization guidelines for communicable disease prevention are the responsibility of provincial and territorial governments. Therefore, given the differences in schedules across Canada, it is advisable that governments examine PCV policies and ensure they are based on evidence and reflect their unique provincial and territorial populations, allowing for greater public transparency in provincial immunization policy decisions. Further to this, a review of the language within the policy that outlines the differing schedules to ensure inclusivity and recognition of the potential stigmatizing outcomes is crucial. The responsibility falls on governing organizations to reflect on historical contexts and challenge current practice inequities, especially for groups that experience stigma and discrimination within the healthcare system.

While clarity around the PCV needs for Indigenous children is required, newer NACI recommendations acknowledge the complexity of adult Indigenous healthcare needs in Canada. The current NACI pneumococcal vaccination recommendation for adults states that “First Nations, Métis, or Inuit communities in Canada have a younger age distribution compared to the general Canadian population but have also been observed to have increased risk for severe pneumococcal disease due to a variety of intersecting factors including underlying medical conditions and potential decreased access to healthcare. Therefore, age-based recommendations may need to be modified to offer effective protection to individuals in these communities. Autonomous decisions should be made by Indigenous Peoples with the support of healthcare and public health partners in accordance with the United Nations Declaration on the Rights of Indigenous Peoples” [62, p.25]. This support for personal empowerment will encourage provinces and territories to seek unique solutions in collaboration with Indigenous groups, in order to tailor vaccination needs. Additional knowledge on how vaccination providers, and the Indigenous parents/caregivers they serve, navigate differential vaccination requirements is required.

Limitations

As Indigenous healthcare delivery is complex in Canada, it was not feasible to locate and contact immunization program providers in each Indigenous community to identify their current practices, policies, and guidelines. However, by exploring both national and provincial health websites, and obtaining input from regional-level program administrators, we were able to obtain a clear picture of broad practices across Canada. Because we

were unable to independently identify the individuals most appropriate to target to ask about Indigenous vaccination delivery, we depended on higher level managers to distribute the questionnaire accordingly, and thus could not capture information on response rate. However, responses represented 12 of 13 target regions.

Our ability to understand the rationale for differing regional guidelines for Indigenous children was limited to published literature and publicly available guideline documents. This search was targeted, rather than comprehensive, so it is possible that relevant publications were missed in our search. However, we confirmed our findings with experts in immunology, infectious disease, and immunization programming in order to ensure we were accurately representing the state of the literature. In addition, diversity in general immunization advice and guidance across provinces and territories is often driven by local expert knowledge of community needs. For instance, provinces and territories may internally conduct analysis of regional disease patterns to inform immunization schedules, but may not share this information with the general population. Therefore, justification for the fourth dose may not have been captured in this scan.

Conclusion

PCV recommendations have necessarily changed over time, and there are inconsistencies in PCV dosing guidelines for Indigenous children across the jurisdictions of Canada. Evolving guidelines and unclear rationale for changes can cause uncertainty for healthcare providers. Differing treatment that is not supported by evidence may lead to stigmatizing practices and overall mistrust and apprehension by Indigenous Peoples in accessing health services, which ultimately impacts their health and wellbeing. Developing clear and inclusive policies, with transparent rationale, that reflect necessary immunization practices should be a priority for governments in order to improve health outcomes for Indigenous children. There is a need to advocate for evidence-based practice while addressing the Truth and Reconciliation Commission calls to action by acknowledging the persistent and deep health inequalities in Canada.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12913-024-11400-6>.

Additional file 1. Appendix A: Medline and EMBASE Search Strategy

Additional file 2. Appendix B: Questionnaire for Immunization Program Stakeholders

Additional file 3. Appendix C: Summary of Recommendations and Immunization Schedules

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Author contributions

SM, LR, SEM conceptualized and designed the study; SM completed data acquisitions; all authors contributed to interpretation of the data; SM, LR, LK drafted the manuscript; SEM supervised the study. All authors contributed to critical revision of the manuscript and approved the final version.

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Data availability

Data presented in this manuscript are publicly available.

Declarations

Ethics approval and consent to participate

Ethics approval was not sought for this project, as data collected was publicly available; no personal opinions were solicited. Thus, ethics review was unnecessary as per the Canadian Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS 2, 2022).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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