

LITERATURE REVIEW

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Nurse Practitioner Allyship: Strengthening Trauma-Informed POCUS Care in Rural Indigenous Communities

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Received: November 10, 2025, Accepted: April 4, 2026, Published: May 18, 2026

Abstract

Purpose: Indigenous Peoples in rural Canadian communities experience numerous health inequities related to accessing and receiving culturally safe, trauma-informed health care. Colonialism has caused systemic racism within the health care system leading to insurmountable traumas. The Truth and Reconciliation Commission Calls to Action and the In Plain Sight Report clearly articulate health care system changes required to ensure Indigenous people experience safe and culturally appropriate experiences at points of care. Nurse Practitioners (NPs) have dual roles of being allies that can provide culturally safe care while advocating systemic changes. Additionally, NPs can improve health care access in rural communities with the use of Point of Care Ultrasound (POCUS).

Aim: The aim of this scoping review was to examine the question: How is trauma-informed care being integrated into POCUS care delivery by NPs in rural and Indigenous communities in British Columbia?

Method: Arksey and O'Malley's scoping review approach was used to guide this review. The five stages of this approach were: problem identification; identifying relevant studies; study selection; extracting and charting data; and finally, collating, summarizing and reporting the results.

Findings: Twenty studies were included in this scoping review. Results found no studies between POCUS and trauma-informed care but found that ultrasound can be re-traumatizing for some patients. Trauma-informed approaches were not found to be integrated into POCUS education or guidelines. Many providers do not have trauma-informed care training, and those that have the training do not have confidence in their knowledge.

Conclusions: To improve culturally safe approaches to POCUS implementation, this paper recommends increased funding to support rural NP certification for POCUS, completion of mandatory cultural safety and trauma-informed care training, and that institutions offering POCUS training embed trauma informed approaches to POCUS application within their curricula.

Keywords: Nurse Practitioner Allyship: Strengthening Trauma-Informed POCUS Care in Rural Indigenous Communities

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Canada is known for its vast geography and diverse population. Despite the expansive land mass, most of the population lives in urban centers, with fewer than one in five living in rural communities (Statistics Canada, 2022b), and Indigenous Peoples representing 35% of the rural population (Government of Canada, 2022). Those living in rural and remote communities have access to fewer healthcare resources and diagnostic services, negatively impacting healthcare outcomes (Canadian Institute for Health Information [CIHI], 2021). In recent years, point-of-care ultrasound (POCUS) has gained popularity in rural communities as an accessible, portable bedside ultrasound modality. It is used by trained practitioners, including nurse practitioners and physicians, to support clinical reasoning and management planning (Fraleigh & Duff, 2022; Morton et al., 2024). Befittingly, POCUS use originated in rural emergency settings; however, it has since expanded into other practice and specialty areas, such as primary care and inpatient settings (Morton et al., 2024), cardiology and pulmonology (Baid et al., 2022; Fraleigh & Duff, 2022), obstetrics and gynecology, as well as musculoskeletal and dermatology specialties (Fraleigh & Duff, 2022; Morton et al., 2024). It has been shown to be a useful tool that assists clinicians in diagnosing a wide range of conditions, including pericardial effusion, heart failure, pneumonia, abdominal aortic aneurysm, acute cholecystitis, soft-tissue injuries, and fetal cardiac activity (Fraleigh & Duff, 2022). The use of POCUS may lead to early-stage disease detection (Shaddock & Smith, 2022) and a significant reduction in time to final composite diagnosis (Baid et al., 2022). The use of POCUS in rural communities shows promise for improving health care access and outcomes for those who need it most.

With increased uptake of POCUS use in rural areas, it is important to consider that Indigenous People represent a third of rural populations (Government of Canada, 2022). Indigenous-specific experiences of racism and discrimination are well-documented, with many Indigenous people identifying traumatic health care experiences, and many feeling unsafe in

accessing health care services (Turpel-Lafond, 2020). Various examinations using POCUS often require probe placement application to sensitive areas of the body, such as the chest, abdomen, and pelvic structures. Given the provider/patient proximity and probe placement during a POCUS examination, it is possible that the experience may evoke feelings of being unsafe or may re-trigger memories of past traumatic personal or health care experiences. These considerations inspired the authors to explore the intersection of trauma-informed care (TIC) and the experiences of Indigenous peoples at point of care provision using POCUS, particularly those situated in rural and remote communities.

The first author of this scoping review is a nurse practitioner student at Thompson Rivers University in British Columbia. Nurse practitioners (NPs) are autonomous, regulated health professionals who provide comprehensive person-centered care across the lifespan and practice in diverse settings (Nurses and Nurse Practitioners of British Columbia [NNPBC], n.d.). The majority of NPs are actively engaged in direct patient care (CIHI, 2023), making them an integral part of the healthcare workforce. As the number of NPs across Canada increases, so too does the number of NPs working in rural communities (CIHI, 2024; Fraleigh & Duff, 2022), with an opportunity to improve health outcomes in rural and Indigenous communities. Given that scoping reviews are used to explore complex and emerging topics (Peters et al., 2018), the aim of this scoping review is to explore the literature on cultural safety, TIC, and POCUS use by NPs working in rural, and remote communities.

Methodology

Arksey and O'Malley's (2005) scoping review approach was determined to be the most appropriate for this review. This design enables the examination of both quantitative and qualitative elements of the targeted field of study. It aims to examine the phenomena, with a focus on identifying their related aspects. The following five stages were used to approach the phenomenon of culturally safe, trauma-informed POCUS use by NPs working in rural, remote, and Indigenous communities in Canada capturing literature within the past five years: problem identification, which entails a clear description of the research question and aim; identifying relevant studies; literature search, which encompasses a comprehensive and well-defined search strategy to enhance the rigor of the review; study selection; charting the data, which involved critical appraisal of the methodologies of the studies included, data analysis, which consists of data reduction, display and comparison; and finally, collating, summarizing and reporting the results which included synthesizing the findings, drawing implications, and articulating a conclusion.

Stage 1: Establishing the Research Question

The first stage of the framework involves the identification of a broad, clearly articulated research question that serves as the basis for the subsequent stages of the review. In this state of the scoping inquiry, (the definition of the concept, target population, and outcomes of interest) is determined to provide guidelines in the identification and inclusion of studies in subsequent stages (see Table 1: Key Definitions). Our scoping review is structured around what is the current

knowledge of the following research areas: British Columbia College of Nurses and Midwives (BCCNM; 2022a) Indigenous Cultural Safety, Cultural Humility and Anti-Racism Practice Standard, the role of TIC, and advocating for POCUS use by Canadian NPs in rural, remote and Indigenous practice contexts. Please refer to Table 1 for key definitions used within the scoping review.

Primary Research Question. The primary research question is: How is trauma-informed care being integrated into POCUS care delivery by NPs in rural and Indigenous communities in British Columbia?

Secondary Research Questions. The secondary research questions are: What is the current state of POCUS usage in rural, remote areas? How is TIC enacted in nursing practice settings? What are the intersections of allyship and cultural safety?

Table 1
Key Term Definitions

Key Term	Definition
Cultural Safety	A culturally safe approach ensures health care delivery is provided in an environment that feels safe and is free from racism and discrimination (First Nations Health Authority [FNHA], n.d.). It is based on respectful engagement with others with consideration of and attention to the power imbalances prevalent within the health care system (FNHA, n.d.).
Cultural Humility	Cultural humility is enacted when an individual engages in self-reflective practices to better understand and mitigate personal and systemic biases (FNHA, n.d.). Humility in this context involves humbly acknowledging the learner's role in understanding the personal experiences of others (FNHA, n.d.).
Trauma-Informed Care	A trauma-informed approach considers that every person has a possible history of trauma, even if the trauma is not disclosed (BCCNM, 2022b; Isobel, 2021). TIC is a supportive approach, strengthened further through allyship and is fundamental to building relationships with Indigenous individuals, families and communities.
Allyship	Being identified as an ally is never self-appointed; it must come from Indigenous leaders (McGuire-Adams, 2021). An ally is someone who actively works to fight oppression (Montreal Urban Aboriginal Community Strategy Network, n.d.). It requires critical self-reflection, education, and relationship-building (Montreal Urban Aboriginal Community Strategy Network, n.d.). Through critical self-reflection, one considers one's own thoughts, actions, and behaviors towards Indigenous Peoples (McGuire-Adams, 2021).
POCUS	Point-of-care ultrasound (POCUS) is an accessible, portable, bedside ultrasound, completed by certified providers, including nurse practitioners (NPs) and physicians (Fraleigh & Duff, 2022; Morton et al., 2024).
Nurse Practitioner Scope and POCUS	The use of POCUS is not considered an NP entry-to-practice competency meaning that NPs interested in using POCUS in their practice must follow the Standard for Advanced Procedures and

Key Term	Definition
Rural	Activities to ensure they have the education and skills required to provide safe care (BCCNM, n.d.). Rural is defined as the areas situated outside the populated centers and can be described as populations less than one thousand people as well as a population density of fewer than four hundred persons per square kilometer (Statistics Canada, 2022a & 2022b).
Remote	The National Collaborating Centre for Indigenous Health defines remote communities as geographic areas located over 350 km from the nearest centre (providing physician, hospital, and pre-hospital care). These locations typically lack year-round access by land or water, often requiring air travel for access (Government of Canada, 2020).
Indigenous Peoples	The terms 'Indigenous' and 'Indigenous peoples' in this paper refers to the First Nations, Inuit and Métis peoples of Canada, as defined in Section 35 of the Canadian Constitution of 1982.
Indigenous communities	Indigenous communities are distinct groups descending from original, pre-colonial inhabitants who maintain strong, ancestral ties to their lands, cultures and self-governance. In Canada, 60% of the Indigenous population resides in rural and remote regions- they are deeply connected to rural and remote areas, practicing and enacting their tribal rights to the lands and water (OECD, 2020; Vodden & Cunsolo, 2021)

Stage 2: Identification of Relevant Studies

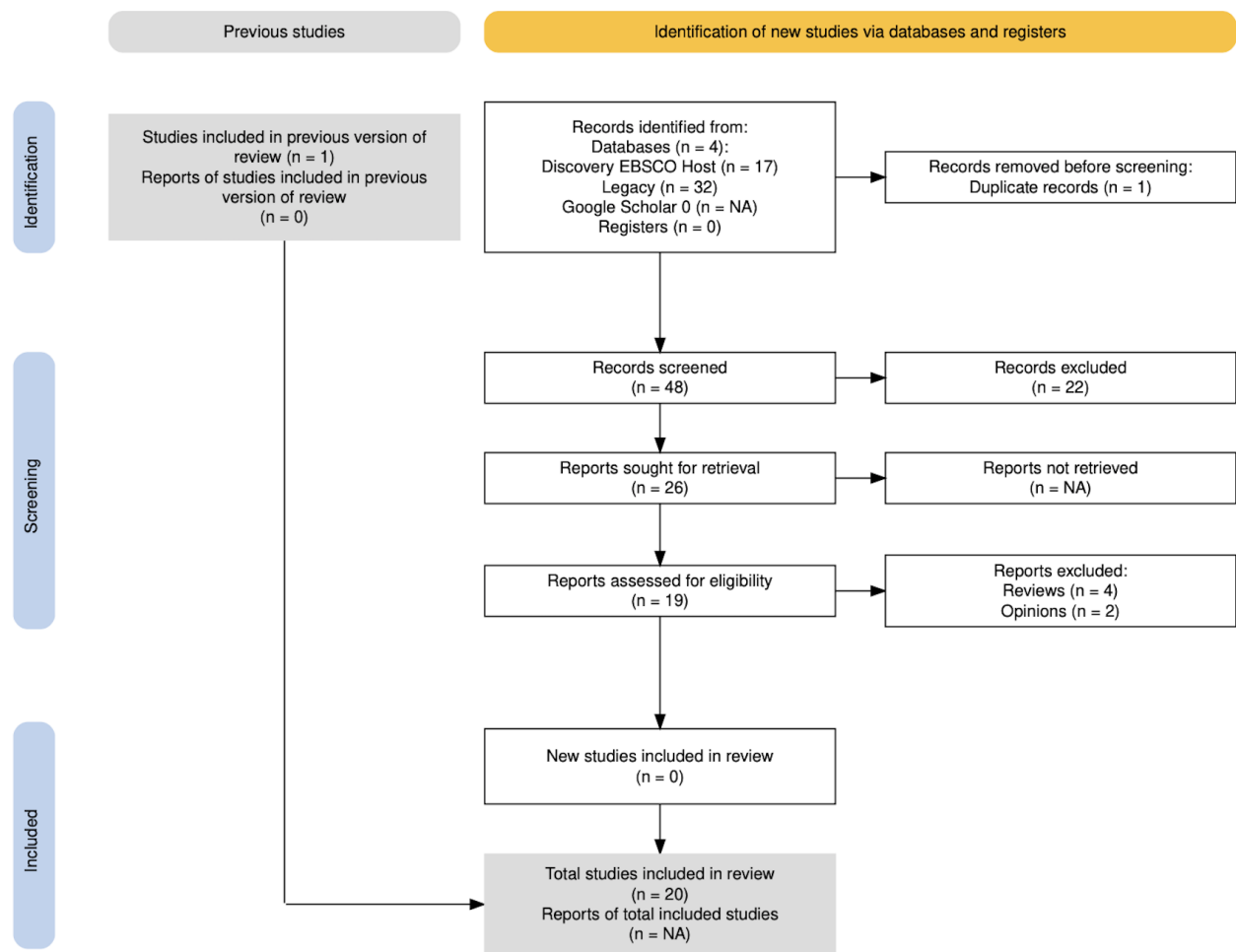
This stage of the framework involves balancing the depth of a scoping review with feasibility. To increase the comprehensiveness of the search, the inclusion of multiple literature sources was expanded. A systematic search of the literature was completed using six databases: Discovery EBSCO host (Academic Search Complete, CINAHL, PsycINFO, Canadian Content [CBCA], and TRUSpace) and Google Scholar. The keywords used were: (Point of care ultrasound or POCUS or Ultrasound) and (Nurse Practitioner or Advanced Practice Nurse or APN or NP) and (Indigenous or Native or Aboriginal or Indians or First Nations) and (Rural) and (Trauma-Informed Care or Trauma-Informed Approach). The operators used were AND, OR, and the truncation tools of each database. The search was restricted to articles published within the past five years to concentrate on the most recent, relevant, and up-to-date information on the subject. In addition, we were interested in the impacts of the BCCNM (2022a) nursing practice standards on Indigenous cultural safety, cultural humility and antiracism practices.

Stage 3: Selection of Studies: Inclusion and Exclusion Criteria

The inclusion criteria were established using an iterative process (see Table 2). The initial selection criteria were based on the research question, focusing on primary research on cultural safety and humility, trauma-informed care and POCUS use in rural practice in Canada. During the initial search, the authors screened titles and reviewed abstracts found in electronic databases. The findings were captured using the COVIDENCE platform (Veritas Health Innovation, n.d.). Documents from citations, and key journals were reviewed for relevance according to predetermined inclusion and exclusion criteria as noted prior. The search was limited to: English, full text, quantitative, qualitative and mixed methods research, published in peer-reviewed journals

with populations of health care professionals, NPs, claiming to describe or explore factors possibly influencing culturally safe, trauma-informed practice and the use of POCUS in rural practice contexts. Non-English articles, dissertations, books and conference papers were excluded. Further, this review excluded papers published before 2021. Table 2 provides a complete list of inclusion and exclusion criteria. The authors sought to identify all published articles on NPs, cultural safety or trauma-informed care in Canada and then broadened to North America and Australia. Australia was included given similar Indigenous specific approaches and universal health care. Once the search was completed (see Figure 1 PRISMA Flow Chart), the publications were screened for eligibility based on relevance by reviewing the title and abstract, followed by full-text analysis, and synthesis process.

Figure 1
PRISMA Flow Chart



(Moher et al., 2015)

Quantitative, qualitative, mixed methods, and literature review articles were included. The review methods were based on the Preferred Reporting Items for Systematic review and Meta-analysis

Protocols (PRISMA-P) 2015 criteria for reporting a scoping review protocol (Moher et al., 2015) and a flowchart was created demonstrating the process (See Figure 1).

The titles and abstracts of the extracted reviews were independently screened by the three authors. First, through the COVIDENCE team site, the authors were invited to screen the articles and determine if they should be included based on the criteria (See Table 2). There were no conflicts in the voting process. Second, each author conducted full-text screening of the articles. Covidence (Veritas Health Innovation, n.d.) was also used to generate a PRISMA Flow Chart (See Figure 1).

Table 2

Inclusion and Exclusion Criteria for Identifying Relevant Studies

Inclusion Criteria	Exclusion Criteria
Peer Reviewed English Publication	Published in a language other than English
Full-text Research, Systematic Review or Scoping Review Articles	Papers focused on other sources of POCUS; cultural safety and humility; trauma-informed care; rural practice
Papers published between 2012 and 2023	Papers published after 2021
Papers focused on	Books, conference proceedings, theses, and editorials.

Stage 4: Extracting and Charting the Data

Charting data is also an iterative process in that it involves extracting data from the included studies. Data was extracted from the full-text journal articles by one reviewer and embedded into a table, based on the inclusion criteria. The data directly corresponds to the stated research question. An analytic frame was developed to document the selected studies into a table including study characteristics (Author, year, level of evidence, study design, study population, sample size, major findings [themes, conceptualization of the issues; gaps in the literature], and study limitations). The characteristics of the studies are detailed in Table 3.

Table 3
Study Characteristics

Author/Year/Country	Design/ Framework	Aim/Objective/Research Question	Sample Size	Key Findings
Adams et al. / 2021/ Canada	Qualitative interpretive description Semi-structured interviews. Framework: Levesque et al.’s conceptualisation of access to care was used as a theoretical framework for this study.	There is a paucity of data regarding access to medical imaging and limited understanding of how access to imaging is conceptualised, particularly in northern, remote, Indigenous communities in Canada. Research question: what are the perceptions of access, and factors which shape access, to ultrasound imaging among northern, remote, Indigenous community members in Saskatchewan, Canada?	n=15 Individuals from 2 remote, northern Indigenous communities who had ultrasounds done. Pregnant in the last 10 years. Completed non- obstetrical U/S in the last 10 years.	In northern Canada – large geographic region makes accessing ultrasound locally challenging; Many patients must travel long distances for ultrasound this geographic isolation from medical services leaves participants vulnerable. Participants had to wait for sonographer to come to community once a month or leave and go to larger centre to receive care. Challenges with travelling: wait times, fear, isolation, unfamiliarity with city, financial costs, inadequacy of accommodations, feelings of guilt. Competing responsibilities was a barrier – i.e.. Childcare responsibilities and work conflicts. Ultrasound accepted as an important tool for health, however need for patient education. Emphasis on the importance of having ultrasound available in one’s own community. Need increased availability of ultrasound in rural communities. Possible solution: telerobotic US; proactively call patients to rebook cancelled appts; reach out to patients who missed appts to identify barriers; embrace strategies for culturally safe practice.
Aldred et al. /2025/ Canada	Action-oriented methodology and incorporated Indigenous methods into the analysis.	Aim: This study aims to demonstrate how and where people are being treated inequitably in the healthcare system and to highlight racism	n=382 44 First Nations community meetings; 24 combined	The research team performed iterative thematic analysis on all Rural Site Visits Project data and continuously revisited, compared and modified codes to accommodate incoming data. The use of NVivo 12 (QSR International) facilitated effective data organisation. Five

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	Participants and focus groups were identified using Boelen's Partnership Pentagon Model, and the data were collected using an appreciative inquiry approach. The data were analysed using thematic analysis	and its negative impact on patient care.	partner meetings that included Indigenous partners. 382 interviews with Indigenous and non-Indigenous participants were conducted in 107 Rural Subsidiary Agreement communities	themes: Forms of racism appearing in healthcare; Impacts of racism on healthcare; Disconnect between physician and community perceptions; Disconnect between healthcare practitioners and Indigenous community members; Culturally safe health care - community proposed solutions and innovations; Culturally safe health care – examples for providers [5Rs; Healthcare services need to respect Indigenous cultural knowledge, core values, and traditions; Adopt healthcare practices that are culturally relevant and affirming of Indigenous peoples' identities and experiences; Develop reciprocal connections with others that situate health care as a two-way, non-authoritarian partnership between the patient and provider; Responsibility means implementing healthcare practices and policies that empower Indigenous participation and leadership in health care; Relationship an essential 5th R' in health care].
Baid et al. /2022/ Northern India.	Clinical Intervention Study. Pts were clinically evaluated and necessarily investigated, and a provisional diagnosis was made. Another EP, trained in PoCUS, performed the	Aim: To determine the utilization of point of care ultrasound in patients with acute dyspnea as an initial diagnostic tool in our settings. Our gold standard was the final composite diagnosis made by two Emergency Medicine consultants (who had access to all	n=237 Adult emergency department patients presenting with acute dyspnea were prospectively enrolled.	The PoCUS and final composite diagnosis showed good concordance ($\kappa = 0.668$). PoCUS showed a high sensitivity for acute pulmonary edema, pleural effusion, pneumothorax, pneumonia, pericardial effusion, and low sensitivity for acute exacerbation of chronic obstructive pulmonary disease (AECOPD) and acute respiratory distress syndrome (ARDS)/acute lung injury (ALI). High overall specificity was seen. A high positive predictive value for all except left ventricular dysfunction, pericardial effusion, non-cardiopulmonary causes of dyspnea, and a low negative

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	scan, blinded to the laboratory investigations (not the clinical parameters), and made a PoCUS diagnosis. Gold standard used in final composite diagnosis made by two Emergency Medicine consultants.	investigations). Accuracy and concordance of the ultrasound diagnosis to the final composite diagnosis were calculated. The time to formulate a PoCUS diagnosis and final composite diagnosis.		predictive value was seen for pneumonia. The median time to make a PoCUS diagnosis was 16 (5–264) min compared to the 170 (8–1346) min taken for the final composite diagnosis. Thus, time was significantly lower for PoCUS diagnosis (p value <0.001). By combining the overall accuracy of PoCUS, the concordance with the final composite diagnosis, and the statistically significant reduction in time taken to formulate the diagnosis, PoCUS shows immense promise as an initial diagnostic tool that may expedite the decision-making in ED for patients' prompt management and disposition with reliable accuracy.
Bidner et al. / 2022	Systematic Review	Review investigated international literature on POCUS antenatal education from 2000 to Jan 2021, focusing on evaluating the efficacy of training models.	n=27	Curricula – course duration from 3 hours to 2 years Variety of types of curricula including online and mixed with intensive practical training; Over 2/3 of the studies detailed US physics and instrumentation; Total 903 trainees across all the studies. Over half the studies had less than 20 trainees: Delivering a program to students with mixed US experience was a challenge: Multidisciplinary groups trained together in nearly half the studies Barriers to POCUS following training – longer term follow up training and skills assessment, poor internet, poor US equipment, difficulty finding time to scan “Only one article reported on patient experience, reporting they felt trainee performed POCUS during antenatal care was safe, convenient and reassuring, providing a

Author/Year/Country	Design/ Framework	Aim/Objective/Research Question	Sample Size	Key Findings
Bidner et al. / 2023	Descriptive, exploratory cross- sectional study.	Healthcare Clinicians in two rural Australia regions including clinic managers, doctors, nurses, midwives, Aboriginal healthcare workers and community healthcare workers. Purpose: To perform an exploratory needs-analysis survey investigating the availability, accessibility and use of antenatal ultrasound in rural Australia, exploring rural clinicians' interest in and access to ultrasound training opportunities.	n=114	better antenatal visit experience, increased confidence in care delivery and increased spouse attendance”.....”investigating patient and partner’s perspective on trainee provided antenatal US would be beneficial to inform curriculum development with an aim to providing culturally sensitive patient centred care.” Two main barriers to providing antenatal ultrasounds in rural Australia were identified: lack of trained staff and inaccessibility of ultrasound equipment. Survey results - many rural clinicians are interested in undertaking training to increase skill set. Incentives towards upskilling -Subsidizing ultrasound training to cover course and travel costs. Provision of both training and ultrasound equipment to rural staff is important to improve service delivery. Ultrasound use during antenatal care improves patient satisfaction, the patient and clinician rapport, and increase the patient attendance.
Clark / 2025	Descriptive Survey A ten-question survey was sent by email to sonographers	Objective: To identify patient preferences of using a chaperone from the literature, survey the chaperone preferences of sonographers, and to	n=193	Chaperone supervises and witnesses during a medical examination. -should be a health care provider who remains neutral -should be same sex as the patient Patient perspective

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	concerning their preference of using a chaperone during examinations,	discover the legal implications of not having a chaperone present during examinations from the literature. Sonographers: program official and clinical instructors/staff sonographers		-Female going for ultrasound with male sonographer – half prefer chaperone -Female patients prefer female sonographers Most survey respondents were female, with <20 years experience ;53% felt the need for chaperones during exam; 52% believed they would be more comfortable if they had a chaperone available.
Clark and Sonsiadek, 2023	Systematic Review	Purpose: To provide an overview of trauma-informed care, including the neurobiology of trauma, interventions to reduce retraumatizing patients who have experienced trauma, and implications of trauma-informed care in medical imaging and radiation therapy.	n=18 12= peer reviewed articles 2=conference papers 1=behavioral science book 1=trauma neurobiology textbook 1=professional conference presentation 1=government report.	Medical care, including routine imaging and ultrasound can be an unintentional reminder of traumatic experiences. Trauma informed means realizing the prevalence of trauma, recognizing the signs and symptoms of trauma, integrating knowledge of trauma into practice, and resist retraumatizing patient. Definitions of Trauma Informed Care: -gathering a trauma hx from patients can be helpful in designing individualized care plans, but many survivors of trauma cannot recount or choose not to recount their experiences. -trauma informed care principles and systematic interventions can be used to minimize harm and re-traumatization. -Key concept: ongoing informed concept Neurobiology of Trauma: Pillars of Trauma Informed Care for Intervention: Implications in Medical Imaging and Radiation Therapy: many aspects of care in medical imaging can be unintentional reminders of a traumatic experience.

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DeAndrade et al. /2025/ Trauma informed care in US and Canada.	Cross-Sectional Study. Identified eligible participants using the electronic database of residency program directors (PDs) maintained on the Association of Professors of Gynecology and Obstetrics (APGO) website to identify all Ob/Gyn residency programs.	Survey of Ob/Gyn residency programs to describe the availability, frequency, and content of current TIC curricula, and to determine the need for and components of further curriculum development. OB/Gyn residency programs in US and Canada. Objective: To understand the gap in knowledge around TIC training in Ob/Gyn, programs.	n=92	When patients are retraumatized, they may disassociate. Signs of disassociation include: absorbed by a flashback or memory, does not respond to questions, has tunnel vision, shuts eyes, spaces out or appears dazed, unable to see or hear clearly. -Grounding strategies – effective tools to help a patient who is being retraumatized – help them to recenter with the present, avoid a panic attack/flashback/unpleasant emotion. To calculate the true prevalence of TIC training, programs may need to be surveyed during national meetings or other opportunities when most or all can be reached simultaneously. Another limitation is that this survey queried programs with TIC training on whether facilitators were “experts” in the field or otherwise but did not specify criteria for expertise, therefore the response to this question is very subjective. Furthermore, this study is limited to Ob/Gyn training in the United States and Canada; additional information is needed on how Ob/Gyn providers are trained to care for this patient population in other parts of the world. Trauma-informed care - the provider approaches each encounter with an understanding of the social and health effects of trauma
Doig et al. / 2022/ South Australian Healthcare	Internal Pilot Test Then an external Survey administered to	Rural Australian Health Care Facilities Aim: To investigate the availability,	N=82 targeted n=31 responses;	Antenatal Care delivered avg 50 hrs/month – 15/26 respondents used ultrasound during routine antenatal care. Common indications of US: fetal position, identification of fetal heart,

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	rural Australian Health Care Facilities.	accessibility and use of obstetric PoCUS services [antenatal care] in regional, rural and remote communities of South Australia.	26 responses used.	<p>and loss of fetal movement; Unlikely to be used for abnormalities of mother illness</p> <p>Reasons for non-use: no equipment, no trained staff, broken equipment, or US “unnecessary.”</p> <p>Methods used to integrate US into ANC care: having trained staff, time for training existing staff, financial support, additional time for scanning during consultation, employer support, accredited staff.</p> <p>Barrier: lack of financial support, travelling long distances, infrequent public transport.</p> <p>Also, availability of appointment times, lack of family support or limited childcare options, inability to leave work; 12/14 were interested in completing POCUS training – but needed funding to do so.</p> <p>Telehealth available in some facilities but not used for ultrasound. Provision of specialist interpretation and support of locally performed scanning through telehealth could additionally improve accessibility for rural mothers.</p> <p>Telehealth platforms for rural pre-natal care have been implemented in other countries with fewer resources than Australia. It is unacceptable that rural Australian women are receiving inferior care due to the under-use of available equipment and technology.</p>
Groos et al. /2024/ Germany.	Scholarly Curriculum Development using Kern’s 6 step approach and then Implementation.	German ultrasound-naïve midwifery students Objective: to discuss the development and implementation of an introductory obstetric	n=27 ultrasound-naïve midwifery students participated in the newly	<p>Integrated approach that combined theoretical learning with practical demonstration. Hands on experiences; 7 modules.</p> <p>Students have ability to engage in obstetric ultrasound course independently</p> <p>Theoretical instruction covers ultrasound physics and technology, basic antepartum</p>

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Hoppmann et al. / 2022/ International	A modified Delphi consensus method was used that included a systematic literature search, evaluation of the quality of literature by the GRADE system, and the RAND appropriateness method for panel judgment and consensus decisions. The process included four in-person international	Nationally and internationally recognized clinicians, basic scientists, educators, researchers. Purpose: To provide expert consensus recommendations to establish a global ultrasound curriculum for undergraduate medical students.	developed obstetric ultrasound course. 64 individual panelists 50 consultants 21 medical students and residents	exams, fetal presentation and fetal count, the evaluation of placental positioning and amniotic fluid volume. Also: inclusion of essential intrapartum sonography elements and the focused assessment with sonography for trauma (FAST, including the four standard exam views (the right upper quadrant, left upper quadrant, subcostal cardiac, and pelvis). Evaluation and feedback: pre and post-course OSCE; pre- and post-course Knowledge test; pre and post-course questionnaire. Results: Increase in confidence in: handling transducer, visualizing fetus, measuring amniotic fluid, conducting FAST exam. Conference to provide global expert recommendations on ultrasound curriculum for medical students. Wide range of medical specialties represented on voting panel. Total of 332 consensus conference statements in 4 curricular domains; 145 consensus statements were recommended, 126 were strongly recommended and 61 were not recommended. Important aspects of an undergraduate ultrasound curriculum identified include curricular integration across the basic and clinical sciences and a competency and entrustable professional activity-based model. The curriculum should form the foundation of a life-long continuum of ultrasound education that prepares students for advanced training and patient care.

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	discussion sessions and two rounds of online voting.			The curriculum should complement and support the medical school curriculum with enhanced understanding of anatomy, physiology, pathophysiological processes and clinical practice without displacing other important undergraduate learning. Curriculum content should be appropriate for the medical student level of training, evidence and expert opinion based, and include ongoing collaborative research and development to ensure optimum educational value and patient care. There should be integration across the basic and clinical sciences. Model should be professional, activity based.
Matschl et al. / 2022 / United States	Scoping Literature Review	Objective: To outline the current state of OB/GYN ultrasound education.	126 articles – 46 reports, 80 studies	All Ob/Gyn should receive at least a minimum of foundational ultrasound theory and skills training. Hands-on teaching, and Student-led teaching are very effective learning methods. Dyadic learning in simulated settings enhances skill retention and boosts confidence. Variety of learning approaches used in Ob/Gyn. Reinforcement and regular use of ultrasound is needed to maintain skill level. Ultrasound confidence is influenced by: technical proficiency, image interpretation and integration of the scan into patient care. POCUS: use in obstetrics – promotes rapid diagnosis and decision making; Differentiating ultrasound training based on education level of learners is critical to optimize the learning outcomes; Use innovative and flexible learning strategies and consistent educational approaches inclusive of diverse learners.

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Maxwell et al. / 2022 / United States	Qualitative – Story Inquiry Method. Theories of becoming a mother, historical- trauma framework, and reproductive justice as they relate to Indigenous women’s personal and historical trauma to assess their lived experiences of becoming a mother.	Alaskan Native, Keetoowah mothers from one tribe. Aim: Focused on the Becoming a Mother (BAM) experience for one tribe, the Keetoowah, through a lens of reproductive justice and historical trauma.	n=8	Two themes [Maternal Mental Health and Inadequacy of Perinatal Care] and subthemes. Maternal Health (Prevalence of PPD experiences; Historical trauma exacerbates mental health challenges; We have to be strong). Inadequacy of Perinatal Care (Supportive focus on mothers, please; Revolving door of providers; A Colonized birth experience). The subthemes illuminate the intersection of historical trauma and the perinatal experience, continued colonization of mothering, and the resilience of tribal culture during the postpartum period. Implications include advocacy for increasing culturally derived perinatal interventions, increased healthcare coverage of culturally appropriate birthing practices, and future research evaluating the correlation between historical trauma and maternal mental health challenges.
Morton et al. / 2024/ Canada	Online Survey The survey consisted of 50 questions assessing clinical practice characteristics, POCUS experience and training, access to an ultrasound device, scope of POCUS use, attitudes about	Rural Physicians, Nurse Practitioners and Midwives practicing in British Columbia. Objective: To determine the scale and scope of use of point-of- care ultrasound (POCUS) in rural British Columbia (BC).	n=227 completed in fall 2021, corresponding to a response rate of 11.9% of all rural practitioners in BC. Survey respondents were asked to estimate what proportion of	A total of 227 responses were received, with 214 from GPs and 13 from specialists, for an aggregate response rate of 11.9%. The GP group included 10 family medicine residents based in rural areas, 3 nurse practitioners, and 1 midwife. The specialist group (n=13) included individuals specializing in anesthesia (n=1), emergency medicine (n=2), surgery (n=1), obstetrics (n=1), orthopedics (n=1), pediatrics (n=3), and internal medicine (n=4). A review of specialist responses did not reveal a material difference in response characteristics compared with those of GPs. As the specialist cohort was small, their responses were pooled

Author/Year/Country	Design/ Framework	Aim/Objective/Research Question	Sample Size	Key Findings
	POCUS use, and barriers to POCUS use.		patients in their practices were Indigenous.	with those of the GP group for analysis. Survey assessed the state of POCUS use among providers in rural BC. Half of the respondents worked in communities with less than 10,000 people; Reported high POCUS use in ED as well as some use in primary care and inpatient settings. Most reported: at least daily POCUS use with high availability of machines; using POCUS for a range of diagnostic and procedural applications. Barrier – lack of training, funding and availability of courses, along with a lack of image feedback and review.
Osborn et al. / 2022/ Australia	Case Study: Mixed-Methods co-designed with the community.	Aboriginal and non- Aboriginal health and educational professionals who provide various roles in community healthcare – in a remote South Australian Community. Objective: To assess the accessibility, availability and utilisation of a comprehensive range of community-based healthcare services for Aboriginal people and describe contributing factors to providing effective healthcare	n=11 Participants across 3 local health services (n = 4), 2 of whom were from an Aboriginal Community Controlled Health Organisations (ACCHO), 2 local schools (n = 5), and 2 Fly-in-fly-out (FIFO) services (n = 2).	40 health care centers. Data was gathered through structured interviews. Descriptive statistics were used to analyze the availability of 40 health services in the community, whilst quotations from the qualitative research were used to provide context for the quantitative findings. Three key themes emerged from the analysis: (1) there are instances of both underservicing and overservicing which give insight into systemic barriers to interagency cooperation; (2) nurses, community health workers, Aboriginal health workers, teachers, and administration staff have an invaluable role in healthcare and improving patient access to health services and could be better supported through further funding and opportunities for specialised training; and (3) visiting and telehealth services are critical components of the system that must be linked to existing

Author/Year/Country	Design/ Framework	Aim/Objective/Research Question	Sample Size	Key Findings
		services from the provider perspective.		community-led primary care services. Conclusion: The study identified factors influencing service availability, accessibility and interagency cooperation in remote healthcare services and systems that can be used to guide future service and system planning and resourcing.
Recker et al. / 2022 /	Systematic Review SWOT Analysis.	Objective: SWOT Analysis. Strengths/Opportunities: practical aspects- In addressing strengths and opportunities, we emphasized practical aspects, such as the usefulness of tele-ultrasound and the cost efficiency of it. Aspects of medical education in tele-ultrasound were considered. Weaknesses and threats, they focused on issues that may not be solved immediately, and that require careful consideration or further development, such as new software that is not yet available commercially.		Telemedicine – improve healthcare access and reduce costs Tele-ultrasound- cost savings – eliminates long distance travel and extra doctor visits. Themes: Practicality (affordable; easy to use; use in urban and rural communities); Cost efficiency (cost savings; real-time tele-ultrasound vs transporting patient); Medical learning (e-modules make learning anywhere possible; connection through the internet; many possible teaching and learning platforms); Image Quality (Quality assessment tool used to standardized images; data is sent quickly now with internet speeds i.e. 5G network) and Safety of data and data storage remains a concern.
Reid et al. / 2023 / Rural Australia.	Qualitative – Cross-sectional	Primary healthcare workforce in rural Victoria, Australia	n=63	91% respondent's female; 2/3 client's low SES Those who had trauma-informed-care training were more likely to report higher self-efficacy.

Author/Year/Country	Design/ Framework	Aim/Objective/Research Question	Sample Size	Key Findings
Ross et al. / 2025 / Canada	This mixed-methods prospective cross-sectional study employed Kern's six-step approach for curriculum development. A needs assessment was conducted via an online questionnaire for HCPs and semi-structured interviews with individuals from the three participant groups: HCPs, patients, and leadership staff. The questionnaire assessed knowledge, skills,	Objective: This study assessed perceptions towards TIC among multidisciplinary HCPs, patients, and leadership staff at two urban hospitals in Canada. 3 Groups: Health Care Providers Patients Leadership Staff	n=106 HCP Questionnaire Interviews: n=10 HCPs n=10 Patients n=8 Leadership Staff	Rural workforce typically ranked their knowledge, attitudes and practices for trauma-informed care as positive. Perceived Barriers: External structures – referral pathways, access to therapeutic services; Need for context-relevant training; Could benefit from collaboration within team members. Need for rural primary care trauma-informed-care implementation strategy. 106 HCP questionnaire respondents including Medical Doctors, Social Workers and Registered Nurses, 96 (90.6%) identified as women, and 97 (91.5%) as providers of direct patient care. Despite 93 (87.7%) having prior TIC education, 77 (72.6%) reported low confidence in applying TIC knowledge in clinical practice. Results: This study revealed a strong interest in a TIC course for multidisciplinary HCPs, supports the translation of knowledge into practice and incorporates a focus on cultural humility. Integrating insights from key stakeholders in this needs assessment phase resulted in the development of a TIC curriculum inclusive of diverse voices and viewpoints and strengthened the understanding of contextual factors that will support effective TIC implementation.

Author/Year/Country	Design/ Framework	Aim/Objective/Research Question	Sample Size	Key Findings
Shaddock and Smith, 2022	and attitudes regarding TIC. Semi-structured interviews explored perspectives on TIC, including curriculum priorities and potential implementation barriers. Systematic Review	Aim: was to explore the use of POCUS in under- resourced health care settings, such as rural and remote locations in Australia and other countries.	23 articles reviewed after screening.	The majority were from developing countries, with only one performed in Australia. Echocardiographic screening in schools was common. Others included emergency department (ED) patients, abdominal aorta screening, obstetric scans, and intensive care unit (ICU) management. Operators included ED doctors, medical students, nurses, community healthcare workers and general practitioners, who received limited training in protocol-driven scanning, often monitored by experts. In comparison to clinical assessment, standard ultrasound or other imaging, accuracy was of the order of 70– 95%, depending on the condition, with high efficacy in improving patient care. Conclusion: Lack of studies of POCUS in Australia and other developed countries suggests a need for further research. Current evidence supports use of limited ultrasound using portable machines in locations with limited access to diagnostic ultrasound

Author/Year/Country	Design/ Framework	Aim/Objective/Research Question	Sample Size	Key Findings
Suyemoto et al. / 2021 /	Reflective Case Study	Aim: To explore the ongoing process of developing and fostering allies and accomplices across privilege, considering how individual and systemic levels interact within interpersonal relationships.		performed by sonographers, which has the potential to improve health outcomes in under-resourced communities in Australia and elsewhere. Advances in ultrasound have allowed for more mobile, accessible and affordable ultrasound units. Systemic change requires vision and personal commitment to vision. Accomplice: term re-focuses attention to challenging systemic/institutional oppression – both in interpersonal and institutional interactions. Ally: step toward becoming accomplice provides foundation of awareness and action against harm/oppression; foundation supports risk-taking of more systemic focused actions as accomplice; Allied behavior requires action against oppression – can take different forms

Stage 5: Synthesizing and Reporting Key Findings

The final stage involved analysis of the charted data, reporting the results, and critically determining the implications of the findings. The results are reported as a narrative summary of the study findings beginning with a description of the types of studies included, followed by a thematic analysis, and concluding with a discussion of the implications of the findings. To facilitate the review of the literature findings, the results were themed into the following categories: Healthcare from an Indigenous Lens; NPs in Rural and Remote Indigenous Practice; Cultural Safety, Humility and TIC; NPs as Allies; Point of Care Ultrasound and Recommendations.

Findings

The broader electronic searches yielded a total of 49 potentially relevant citations. After removing duplicates (n=1), 48 records were screened with 22 articles excluded leaving 26 articles sought for retrieval. The articles were screened independently resulting in six articles being excluded leaving 19 articles assessed for eligibility. One study was included in a previous version of the review resulting in a total of 20 studies included in the review (See Figure 1). The results did not yield any studies examining the integration of TIC into NP POCUS practice, however, one literature review conducted in the field of radiology demonstrated findings that ultrasound can be re-traumatizing for some patients (Clark & Sonsiadek, 2023).

Study Characteristics

Of the 26 reviewed studies, two were quantitative, eight qualitative, three were mixed methods, there were three systematic reviews, one scoping review, one reflective case study, one approach for curriculum development, one international conference recommendations, one Indigenous Health Model review were included. Six review articles and commentaries were removed, leaving a total of 20 articles included in this scoping review

Quality Assessment

A formal assessment of the quality is generally not performed in scoping reviews, some claim it should be incorporated in the methodology (Daudt et al, 2013), as assessing study quality will assist in identifying gaps in qualitative and quantitative literature (Levac et al., 2010). Arksey and O'Malley's framework does not provide an assessment of the quality of the literature (Daudt et al., 2013); thus, the authors are conducting the scoping review as a basis for the next stages of research and will take measures to address this in future studies.

Thematic Analysis

The included articles were grouped into eight categories by the authors, including: healthcare from an Indigenous lens; social determinants of health within the Canadian context; NPs in rural and remote Indigenous practice; cultural safety and humility and TIC; NP allies; Point

of Care Ultrasound; POCUS use; and recommendations. The next section of this article highlights the findings by themes.

Discussion

Healthcare from an Indigenous Lens

Drawing on five relevant articles, this theme highlights the importance of considering healthcare through an Indigenous lens (Adams et al., 2021; Aldred et al., 2025; Doig et al., 2022; Maxwell et al., 2022; Osborn et al., 2022). As study findings and healthcare perspectives from an Indigenous lens may vary across settings, it is important to provide a contextual background to demonstrate the relevance of the study findings, as this review sought to understand the literature within the Canadian context.

Social Determinants of Indigenous Health within the Canadian Context

Social determinants of health are widely recognized as social and economic factors that contribute to health inequities influencing both individual and population health (Government of Canada, 2024a; Loppie & Wien, 2022). The Social Determinants of Indigenous Peoples' Health Model categorizes social determinants into three layers, capturing the compounding factors that influence the health outcomes of Indigenous Peoples (Loppie & Wien, 2022). A Tree Metaphor is used to represent the 3 layers of social determinants: the tree roots represent the root determinants, the tree trunk represents the core determinants, and the tree branches and leaves represent the stem determinants.

Root Determinants. Similar to the metaphorical tree roots, root determinants are the foundational structures that provide the architecture for other determinants and, consequently, have the most significant impact on individual and population health and health equity (Loppie & Wien, 2022). The infiltration of settlers, invading and colonizing Indigenous lands, has led to systemic oppression and inequality (Loppie & Wien, 2022). Consequently, Indigenous Peoples faced loss of lands, children, culture, autonomy and self-determination, impacting generations. The lasting impacts of historical colonialism and the continuation of persistent colonial structures, systems and ideologies represent one of the most profound and impactful root determinants impacting Indigenous health. Indigenous-specific racism and discrimination stemming from the impacts of colonialism are pervasive, demonstrating impacts on both health system performance metrics as well as individual and population health outcomes for Indigenous Peoples (Aldred et al., 2025; Maxwell et al., 2022; Osborn et al., 2022; Turpel-Lafond, 2020).

Core Determinants. Much like the metaphorical tree trunk, the core determinants encompass systems such as infrastructure, education, health, justice, and social welfare (Loppie & Wien, 2022). In rural and Indigenous communities where infrastructure is limited or barriers to access care exist, inequities endure. Studies within this review highlighted many system challenges that, when compounded, can lead to poorer health care outcomes for rural and Indigenous

communities. A study by Osborn et al., (2022) found health service delivery in rural and remote Australian communities was fragmented, with evidence of overservicing (i.e., dieticians, speech pathologists, counsellors) and underservicing (i.e., cancer care, chronic healthcare) in some communities compared to others. Over and underservicing variances in accessibility to primary and specialist care were found, driven by human health resources and funding structures creating inequitable opportunities for care accessibility in these rural areas (Osborn et al., 2022). Further system barriers impacting access were seen when services are only made available for those individuals meeting minimum set criteria for care access, for example Indigenous persons with evidence of a chronic disease limiting access to care for Indigenous people without chronic disease and non-Indigenous people with or without a chronic disease (Osborn et al., 2022).

It is equally important to examine the core socio-economic determinants that further impact health and wellness for rural and Indigenous populations. The geographic barriers of living in rural and remote areas further complicate access to health care. The need to travel long distances to access primary and/or specialist care and other allied and investigative health services was a common theme across many studies (Adams et al., 2021; Doig et al., 2022; Osborn et al., 2022). Several studies highlighted socio-economic factors that may not only affect a person's ability to travel, such as lack of transportation and home or work responsibilities) but may also have social or financial consequences if travel is undertaken (Adams et al., 2021; Doig et al., 2022).

Stem Determinants. The metaphorical branches and leaves represent the stem determinants, which directly influence a person's health and include education, employment, social support, and resources (Loppie & Wien, 2022). In the tree metaphor, manifestations in the branches and leaves (stem determinants) often result from the health of the tree trunk (core determinants) and tree roots (root determinants). The intergenerational trauma experienced by Indigenous People and the persistent exposure to traumatic experiences, including racism and discrimination, create health inequalities that significantly impact health and wellness.

Racism continues today, with reports of stereotyping, reduced access to care and discrimination at points of care (Aldred et al., 2025; Turpel-Lafond, 2020). As a result, Indigenous Peoples experience increased negative health outcomes, leading to increased rates of chronic disease, higher stress levels, and poorer life expectancies (Turpel-Lafond, 2020). Analysis of Indigenous health outcomes within British Columbia, Canada, revealed increased adverse outcomes for infants, higher prevalence and earlier progression of chronic conditions, higher prevalence of multi-morbidities (acute, chronic), higher prevalence of leaving against medical advice, and an association between the experience of racism and poorer health outcomes (Turpel-Lafond, 2020). The health care system is failing Indigenous Peoples and systematic changes are required to improve health outcomes. "To be truly trauma-informed requires consideration of the social and political contexts in which trauma occurs and recognition of social and health policy inequities that sustain its effects" (Isobel, 2021, para 10).

Using the tree metaphor, NP practice can be framed as intervening across the roots, trunk, and branches advocating against colonial structures that shape root determinants, navigating and

strengthening core health and social systems, and addressing immediate stem determinants through culturally safe, trauma-informed care to advance positive Indigenous health outcomes.

In rural practice contexts, NPs are uniquely positioned to address Indigenous health inequities by providing accessible, continuous, and culturally responsive primary care within communities where systemic barriers to care are most pronounced. Grounded in an understanding of the social determinants of Indigenous health and the ongoing impacts of colonialism, NP practice must extend beyond clinical care to include advocacy, trauma-informed approaches, and relational practice that respects Indigenous self-determination and ways of knowing. As health professionals working within colonial systems, NPs also hold an explicit responsibility to act as allies, challenging racism, supporting Indigenous-led solutions, and leveraging their roles within rural health systems to advance equity and reconciliation.

NPs in Rural and Remote Indigenous Practice

While no specific studies examined NPs in rural and remote Indigenous practice, three studies included participants who were nurses and/or NPs, or findings that pertain to nursing roles within rural Indigenous communities (Doig et al., 2022; Morton et al., 2024; Osborn et al., 2022). NPs practicing in rural and remote communities are often caring for Indigenous Peoples. Two studies listed nurses or nurse practitioners as participants and examined provider perspectives on POCUS availability and use in rural areas (Doig et al., 2022; Morton et al., 2024). These studies took place in rural Australia (Doig et al., 2022) and in northern rural British Columbia, Canada (Morton et al., 2024), and both areas identified care provision to Indigenous persons within their communities. Most studies examining rural POCUS use are physician-centric, so while the nurse and NP participant representation numbers were minimal ([3 registered nurses, 4 registered nurse/midwife] Doig et al, 2022; [3 NPs] Morton et al., 2022), it may represent an uptake in POCUS use in nursing and NP disciplines within rural health systems.

A study by Osborn et al. (2022) found that nurses, among other allied professions, were perceived as essential for quality care provision, demonstrating resilience, advocacy, and flexible approaches to addressing service delivery barriers. Respondents in this study further acknowledged the importance of nursing and other professionals in building therapeutic relationships and trust with Indigenous patients and their families, the foundations of which are vital for providing culturally safe care (Osborn et al., 2022). This study, while not specific to NPs, speaks to the profession of nursing in general, of which NPs belong. Nurses and NPs alike receive training to provide holistic, patient-centered, culturally safe care. In British Columbia, nursing and NP practice are guided by the Regulatory Standards of Practice, including the Indigenous Cultural Safety, Cultural Humility and Anti-Racism standard (BCCNM, 2022a). When partnering with rural and Indigenous communities, NPs must possess the foundation tenets of culturally safe TIC and demonstrate continual self-reflection, humility and an openness to learn and grow.

Cultural Safety and Humility and Trauma-Informed Care

This theme highlights the importance of integrating cultural safety, humility and TIC approaches to healthcare delivery through an Indigenous lens, using findings from 10 articles (Adams et al., 2021; Aldred et al., 2025; Baid et al., 2022; Clark, 2025; Clark & Sonsiadek, 2023; DeAndrade et al., 2024; Doig et al., 2022; Maxwell et al., 2022; Reid et al., 2022; Ross et al., 2025).

Cultural Safety and Humility

Indigenous Peoples receive culturally safe care when they are involved in decision-making, are listened to and heard, and when there is mutual respect and their physical, mental, emotional, spiritual, and cultural needs are met (BCCNM, 2022b). With the acknowledgement that racism exists within the health care system, research is being done to try to understand the health experiences of Indigenous Peoples. Aldred et al. (2025) recently examined the experiences of rurally living Indigenous British Columbians who accessed health care. The study resulted in multiple themes, including that racism was occurring in multiple forms in health care; racism had multiple negative impacts on health care; there was a disconnect between how the providers and Indigenous community members perceived their health care experience (Aldred et al., 2025). Of significant note, many rural Indigenous communities identified a lack of culturally safe care. Understanding the British Columbia landscape is invaluable, given that the authors reside in this area. Research from other communities deepens the perspective, making it relevant for areas outside British Columbia.

The literature further reinforces that the needs and experiences identified among rural Indigenous communities in British Columbia are echoed in Indigenous communities in rural and remote settings beyond the province to other countries. Maxwell et al. (2022) explored the experiences of motherhood among Ketoowah women in the United States and the role of historical trauma. The women with historical trauma in this study expressed fragmented trust with care providers; the historical trauma, paired with perception of judgment by non-Indigenous providers for mothering within their culture, consequently left many women reluctant to share their experiences. The impact of historical trauma was felt by participants to impact care access while also worsening post-partum depression symptoms. A systematic review by Clark and Sonsiadek (2023) exploring the neurobiology of trauma and the implications of trauma-informed approaches in medical imaging validated the findings from Maxwell et al.'s (2022) study. Following experiences of intergenerational trauma or personal experiences of trauma, individuals become hypersensitive to stimuli with signs and symptoms resembling the trauma experience (Clark & Sonsiadek, 2023). While Clark and Sonsiadek (2022) position this literature within formal diagnostic sonography contexts, it validates not only Maxwell et al.'s (2022) findings but also the importance of a culturally safe, trauma-informed approach to POCUS and, in general approaches to care.

While not a POCUS-related study, a study by Adams et al. (2021) sought to understand the perceptions and experiences of Indigenous People living in remote northern Canadian areas

regarding access to formal ultrasound. This study demonstrated challenges commonly seen in rural populations, such as geographic isolation from ultrasound facilities, competing social and economic responsibilities (home and work responsibilities) and the importance of having imaging options closer to their home community (Adams et al., 2021). An interesting perspective shared within this study was the guilt felt by a participant using Indigenous-specific travel funds to access sonography, declining use of funding to access care, despite it being their treaty right. While ultrasonography was largely viewed positively as supporting health and wellness, indicating that it is not necessarily culturally unsafe in its implementation, there are underpinnings of a colonial system and stereotyping that may be embedded in broader health system processes, which should also be considered when examining culturally safe approaches to care.

A recent study by Clark (2025) offers an alternative perspective on the implementation of culturally safe approaches to sonographic examinations. The concern for rising sexual assault allegations against sonographers in the United States prompted Clark (2025) to examine the legal implications associated with sonographers' preferences for the use of a chaperone during examinations. The survey responses (n=193) were compared with the literature on patient and provider preferences, demonstrating that 74.2% of respondents felt that chaperones were needed for the sonography profession, with the literature showing patient preference for chaperones depending on the patient's age, gender, religion, and culture (Clark, 2025). While the focus of this paper is on the implementation of culturally safe, trauma-informed approaches to care for Indigenous patients, there may also be benefit from the POCUS user perspective.

Trauma-Informed Care

Research on trauma-informed ultrasound is limited. Of the articles included in the final review, none were specific to POCUS or trauma-informed approaches to implementation. There was one systematic review that specifically examined TIC and medical imaging, such as ultrasound, with applicability to POCUS practices (Clark & Sonsiadek, 2023). Of significance, the authors note that various forms of medical care can retraumatize patients, including diagnostic imaging such as ultrasound (Clark & Sonsiadek, 2023), underscoring the importance of creating a therapeutic environment and enacting relational practice. Multiple possible triggers were identified from medical imaging, including being touched, dark lighting, if the provider enters the room without knocking, ultrasound gel, and removal of clothing (Clark & Sonsiadek, 2023). To further contextualize this, specifically regarding the implementation of POCUS, a TIC approach is imperative given the sensitive nature of many of the scans. For example, lung POCUS requires patients to expose their chest so that both the anterior and posterior thoracic areas can be scanned, in both the supine and sitting positions, with the probe applied directly to the skin (Baid et al., 2022). Alternatively, probe application in obstetrics is performed either transabdominally or transvaginally, depending on the reason for examination (Doig et al., 2022). Given that a provider may not be aware of a person's trauma history, care must be used with patients to avoid triggering or retraumatizing both Indigenous and non-Indigenous patients during such sensitive POCUS scans.

While not specific to rural areas or POCUS, a study by DeAndrade et al. (2024) examined the gap in TIC training for obstetric and gynecology residents in the US and Canada. This study found that many residency programs incorporate some formal TIC training; however, only 1 in 5 programs offers recurring educational opportunities due to a lack of time and space within existing curricula. An interesting finding not uncommon to many urban sites was that 64.6% of acute sexual assault cases transferred care to sexual assault nurses for further evaluation. Within rural areas, often sexual assault nurse examiner programs are not available for case referral, and if available, they often require patients to travel distances to be able to access these services. Furthermore, if cases involve strangulation, access to CT Angiogram imaging is often not available locally. A recent case study in Australia reviews the use of state-of-the-art POCUS images not only to identify life-threatening injuries but also as a new modality that may supplement medic-legal examinations, particularly in rural areas (Foster-Greenwood, 2024). The review of these studies further underscores the importance of not only TIC approaches in general, but also TIC approaches to POCUS implementation.

A study by Ross et al. (2025) assessed provider training and confidence in applying trauma-informed approaches to care. Despite roughly 88% of participants receiving variable levels of TIC training, roughly 73% of participants reported low confidence in applying trauma-informed approaches in practice. Provider-level barriers to TIC application included the need for more robust training and strategies in the application and management of disclosed trauma histories (Ross et al., 2025). A very important system-level barrier identified was the lack of time during appointments to address TIC principles, gaps in specific TIC training areas, and the absence of adaptable policies and procedures to implement identified TIC approaches. Similar findings were echoed by Reid et al. (2022), who found that one-time generic TIC training was less effective than system-level, context-relevant approaches to TIC training and implementation. Knowledge from these articles can be translated and used to inform all providers, including NPs, about TIC with POCUS use. Reid et al. (2022) and Ross et al.'s (2022) studies emphasize the need not only to examine provider-level TIC approaches but also broader system-level context approaches to incorporation.

Nurse Practitioners as Allies

No specific studies were found examining allyship and NPs; however, findings on allyship were drawn from two articles (Hoppmann et al., 2022; Suyemoto et al., 2021). Before examining the articles on allyship, it is important to provide relevant background and contextual information to understand their relevance and to demonstrate how nurses and NPs are well-positioned to support Indigenous People through allyship.

Truth and Reconciliation within Canada

The Truth and Reconciliation Commission (TRC) of Canada was led by Chief Justice Murray Sinclair who established a space for individuals impacted by the Indian Residential School system to share their stories (Government of Canada, 2024b). In 2015, the TRC released a report

with 94 calls to action, recommendations for all levels of government, institutions, and the public, as a guide towards reconciliation (Government of British Columbia, 2015). All 94 calls to action are equally important when considering the broad systemic effects of colonization; however, the calls to action most notable for the purposes of this paper relate to Health (Calls to Action 18-24; Government of Canada 2024b). Together, these calls to action call upon the health care system, its providers, and the medical and nursing educational institutions to create a more equitable, culturally safe and trauma-informed system that addresses historical colonial root determinants and the lasting colonial manifestations of racism and discrimination contributing to Indigenous health disparities. The root of colonization from an educational context was the residential school system that forced Indigenous children to attend so that educators could take the ‘Indian out of the child’ - a form of cultural genocide. Justice Murray Sinclair asserted that “education got us into this mess, and education will get us out” (Sinclair & Sinclair, 2024). Led by this sentiment, it is befitting to explore the role of education, NP training, and allyship to ensure culturally safe practice.

Nurse Practitioners in Canada

Nurse Practitioners are trained to provide holistic, culturally safe TIC. As an example, BC trained NPs complete one master’s level course in Indigenous Health Leadership (Thompson Rivers University, n.d.) and often have culturally safe trauma-informed course content. Once graduated, NP practice is guided by Standards of Practice, including the Indigenous Cultural Safety, Cultural Humility, and Anti-Racism standard (BCCNM, 2022a), with access to ongoing required and supplementary educational opportunities to maintain culturally safe competencies. Indigenous allyship is particularly relevant to NPs practicing in rural and remote communities where there is a large demographic of Indigenous peoples. It requires ongoing personal growth, self-reflection and education (McGuire-Adams, 2021; Mullen, 2022; Suyemoto et al., 2021). Engaging in opportunities to learn about Indigenous history and culture and critical self-reflection to better understand one’s own thoughts, actions, and behaviors towards Indigenous People. These activities are foundational to the provision of culturally safe TIC and the development of meaningful reciprocal relationships built on trust (McGuire-Adams, 2021; Montreal Urban Aboriginal Community Strategy Network, n.d.; Suyemoto et al., 2021).

The awareness of NP education and standards of practice in this paper highlights the importance of recommendations for POCUS education. Hoppmann et al. (2022) presented International Conference Consensus recommendations for establishing ultrasound curricula. While these recommendations are not specific to POCUS and were focused on curricula within undergraduate medical education, their recommendations highlight that these curricular recommendations can support non-physician education (Domain 1.4); can enhance assessment and clinical reasoning (Domain 2.5 & 2.6) and demonstrate ultrasound competencies into entrustable professional activities for patient care (Domain 3.6; Hoppman et al., 2022). As allies with a strong background in culturally safe TIC, NPs are well-positioned to advocate for the inclusion of

culturally safe, trauma-informed approaches to POCUS implementation in rural and Indigenous communities.

Point of Care Ultrasound

This thematic analysis explores POCUS, drawing on findings from 11 studies (Aldred et al., 2025; Adams et al., 2021; Baid et al., 2022; Bidner et al., 2023; Bidner et al., 2022; Clark & Sonsiadek, 2023; Doig et al., 2022; Morton et al., 2024; Osborn et al., 2022; Recker et al., 2022; Shaddock & Smith, 2022).

Facilitators

In rural and remote communities, where other forms of diagnostics are limited, POCUS has been shown to be a low-cost, portable tool that improves clinical reasoning and diagnostic accuracy (Baid et al., 2022; Morton et al., 2024; Shaddock & Smith, 2022) with earlier detection of medical conditions and improved overall health outcomes (Adams et al; 2021; Baid et al., 2022; Shaddock & Smith, 2022). In addition to accessibility, increased diagnostic accuracy, and improved outcomes, studies have found increased patient attendance, patient satisfaction with care, improved perception of patient-provider rapport, and increased patient attendance with POCUS use (Bidner et al., 2023; Morton et al., 2024). Adams et al. (2021) further highlighted that patients perceived earlier detection, reduced fear and anxiety associated with awaiting diagnostic results and eased social and economic constraints associated with travel to areas with formal sonography. Overall, POCUS is perceived to improve health equity for those living in rural communities.

Barriers

Although POCUS is beneficial, its implementation does not come without obstacles. It has been well established throughout this paper that many rural and Indigenous communities located rurally are impacted by geographical, social, economic, and systemic barriers to accessing formal sonography (Adams et al., 2021; Bidner et al., 2023, Doig et al, 2022; Morton et al., 2024). Bidner et al. (2023) found that 59% (n=114) of providers had limited training/skills in POCUS use, and 47% cited the inaccessibility of training opportunities as a main reason for not incorporating POCUS into their practice. These findings are consistent with those of Morton et al. (2024), in which rural providers (n=227; 214 general practitioners, and 13 specialists) use POCUS: roughly 74% endorsed receiving some training, roughly 61% had no formal certification, and roughly 26% had received no training. The inaccessibility of both onsite and distance training opportunities (Bidner et al., 2023; Morton et al., 2024) and the lack of time and funding support for training (Doig et al., 2022; Morton et al., 2024) were identified as significant barriers to POCUS use. Findings from Doig et al. (2022) and Morton et al. (2024) also highlighted health system challenges, such as additional time needed for scanning during appointments and lack of employer support, impacting the feasibility of POCUS use in practice.

As mentioned, there is variability in the type of POCUS education and the extent of training received by POCUS users. Bidner et al. (2022) conducted a systematic review of POCUS

education and found that, in general, POCUS education was very physician-centric, lacked formal pedagogy, varied in its approach and curricular content, and lacked evidence on the impact of education on POCUS competence. The lack of accessible training and the variance in training programs and delivery may contribute to many studies indicating the need for continuing access to real-time and telehealth POCUS skills and image interpretation support (Recker et al., 2022; Morton et al., 2024), as well as memberships for online support and continuing education and community of practice opportunities (Doig et al., 2022). Despite its barriers, POCUS use has been shown to improve access to healthcare in rural communities.

Cultural Safety and Trauma-Informed Care

In review of the barriers for POCUS use in rural areas, including the lack of consistent education founded on pedagogy for students and practicing health care providers, it is not surprising that principles of cultural safety and trauma-informed approaches to POCUS use have not been embedded into POCUS education. This paper has established the need for culturally safe TIC approaches to health care delivery previously noted as an urgent area by researchers (Aldred et al., 2025; Osborn et al., 2022), with the implementation of POCUS included. The systematic review by Clark and Sonsiadek (2023) highlights the need for culturally safe approaches to formal sonography by sonographers, which can easily be extrapolated to POCUS use. Their review listed a minimum of 29 potential triggers specific to formal ultrasound; Twenty of those triggers represent potential triggers for re-traumatization during a POCUS examination, which highlights the very real potential for harm in someone who might already be sensitive to stimuli due to past historical or personal traumas. Examples include being touched during landmarking, having your private areas of the body exposed, dark lighting, the provider's demeanor, the provider's positioning relative to the patient during the examination, lying still for extended periods, and not fully understanding examination expectations, to name a few (Clark & Sonsiadek, 2023). The importance of including culturally safe and trauma-informed approaches to POCUS use is imperative to ensuring safe, quality care to rural and Indigenous patients.

Recommendations

The purpose of this scoping review was to explore how trauma-informed care is being integrated into POCUS care delivery by NPs in rural and Indigenous communities in British Columbia. No literature specifically addressed the identified review question, however, results from the thematic analysis were extrapolated to provide recommendations that align with Nurse Practitioner Entry to Practice Competency Domains (BCCNM, 2024) within the context of culturally safe, trauma-informed POCUS care within rural areas and Indigenous communities.

Table 4
Competency Domains and Recommendations by Role

Competency Domains	Recommendations
Clinician	<p>Considerations to support integration of culturally safe, trauma-informed strategies for POCUS use:</p> <ul style="list-style-type: none"> ● Environmental considerations (ensure proper lighting; Clark & Sonsiadek, 2023). Informed consent (verbalized details of exam clearly, ongoing informed consent, agree on nonverbal behavior that indicates distress if indicated; Clark & Sonsiadek, 2023). ● Offer choice in exam approaches where possible (offer mirror to see procedures that are out of patients view; Clark & Sonsiadek, 2023); (inclusion of chaperone during sensitive examination if patient prefers; Clark, 2025); (include partners in examinations if patient prefers; Adams et al., 2021). ● Take the time to build therapeutic rapport and trust (Avoid impersonal communication styles; Aldred et al., 2025; Bidner et al., 2023; Reid et al., 2023). ● Develop relationships (Be open, be inclusive and collaborative, develop reciprocal connections with others that situate health care as a two-way, non-authoritarian partnership, ensure patients feel cared for, not just that they have received care; Aldred et al., 2025); (acknowledge power dynamics, create non-judgmental environment; Adams et al., 2021), ● Mobilize the 5s Framework for actionable reconciliatory practices for health care providers: Respect, Relevant, Reciprocal, Responsibility, Relationship; Aldred et al., 2025); (Guiding pillars of TIC: safety, trustworthiness or transparency, peer support, collaboration, empowerment, responsiveness and cultural considerations; Clark & Sonsiadek, 2023). ● Educate Self (educate self about Indigenous history and calls to action pertinent to your areas; Aldred et al., 2025). ● Resources (be aware of local resources available; Ross et al., 2025).
Leader	<p>Engagement and collaboration with rural communities and Indigenous partners on:</p> <ul style="list-style-type: none"> ● Culturally safe health initiatives (Adams et al., 2021; Maxwell et al., 2022). ● Rural primary health care TIC implementation strategy (Reid et al., 2023). ● Recognition and understanding factors impeding care access, building on multidisciplinary and collaborative approaches, facilitating strength-based and outcome-focused approaches to develop sustainability in rural contexts (Reid et al., 2023). ● Cultural safety and trauma-informed training relevant to local community (Reid et al., 2023). <p>Policy Development</p> <ul style="list-style-type: none"> ● Chaperone policy development and implementation (Clark, 2025). ● Cultural safety and TIC policy development and implementation (Ross, 2025). <p>Resource Allocation and Advocacy</p> <ul style="list-style-type: none"> ● Enhanced engagement for funding support for POCUS education, equipment, and supportive technology and expert resource support (Bidner et al., 2023; Doig et al., 2022; Morton et al., 2024; Osborn et al., 2022).
Educator	<p>Develop standardized POCUS education and supportive mechanisms</p> <ul style="list-style-type: none"> ● Promote POCUS courses development and accreditation pathways (Bidner et al., 2023); curricular standardization with competency domains (Hoppmann et al., 2022; Morton et al., 2024)

Competency Domains	Recommendations
	<ul style="list-style-type: none"> ● POCUS training integration into medical curricula (Bidner et al., 2023; Matschl et al., 2024); on-the job training (Bidner et al., 2023) ● Integration of POCUS into midwifery curriculum ● Policy development to enhance POCUS integration into curricula (Groos et al., 2024); Policy development on training and use in practice (Morton et al., 2024) ● Development of regulatory mechanisms for education including teaching costs, setting guidelines and examination funding (Groos et al., 2024) <p>Develop ongoing multimodal continuing education options</p> <ul style="list-style-type: none"> ● Continuing educational opportunities (Clark & Sonsiadek, 2023; Morton et al., 2024) ● Enhance TIC education opportunities (DeAndrade et al., 2025) ● Enhance US/TIC mentorship opportunities (Clark & Sonsiadek, 2023) ● Blended learning methods with modular structure (Groos et al., 2024)
Scholar	<p>Further research needed to assess new technologies in improving POCUS accessibility and utility in rural and Indigenous communities</p> <ul style="list-style-type: none"> ● Patient Perspective of POCUS to inform culturally safe approaches to care and curricula (Bidner et al., 2022) ● Telehealth and Tele-Ultrasound System Integration for POCUS support (Bidner et al., 2022; Doig et al., 2022; Recker et al., 2022) ● Telerobotic Ultrasound (Adams et al., 2021) ● AI in POCUS use (Recker et al., 2022) ● POCUS user knowledge and implementation of culturally safe and TIC practices into use ● Robust clinical studies to demonstrate the efficacy of training models, and the clinical impact of trainee operating PoCUS on quality of care (Bidner et al., 2022) ● Economic analysis investigating the cost-effectiveness of PoCUS training and implementation to justify and inform future programs (Bidner et al., 2022)

Limitations

There were several limitations to this literature review. First, only English only, full text articles within the last five years were reviewed. Secondly, the keywords (Point of care ultrasound or POCUS or Ultrasound) and (Nurse Practitioner or Advanced Practitioner or APN or NP) and (Indigenous or Native or Aboriginal or Indians or First Nations) and (Rural) and (Trauma-Informed Care or Trauma-Informed Approach) restricted the articles selected in the initial search. Finally, a quality review of articles was not done.

Conclusions

This scoping review was guided by the research question: How is trauma-informed care being integrated into POCUS care delivery by NPs in rural and Indigenous communities in British Columbia? Given that NP-led POCUS delivery in the Canadian context is an emerging practice, there was limited research to inform this question. However, through the review of articles from other countries with similar health care delivery systems, intersections of seminal knowledge were identified. These intersections highlight realities influencing both POCUS care provision (training, service supports) and the experiences at points of care by Indigenous individuals and communities

living in rural and remote settings Within this context, NPs play a critical role at the bedside, not only as clinical decision-makers but also as advocates for trauma-informed, culturally safe, and equitable care. The legacy of Indigenous peoples' historical and contemporary health care experiences has contributed to a persistent and disproportionate burden of illness resulting in the overrepresentation of Indigenous peoples with poor health outcomes and health disparities.

Health care of Indigenous Peoples is complex. The lasting effects of colonialism have led to traumas and systemic oppression within the health care system. Those living in rural and remote communities are further impacted by social determinants of health including limited access to health care services including diagnostic services such as ultrasound. As an ally, NPs provide care in a culturally safe way, fighting oppression. POCUS is a beneficial tool used by NPs in rural and remote communities to reduce barriers to accessing health services.

A culturally safe, trauma-informed approach should be used with all patients; however, many NPs lack the training or do not feel confident in the training that they have. Trauma-informed care has not been integrated into POCUS education or guidelines. It is recommended that funding increases support NP POCUS certification in rural communities; all NPs complete mandatory TIC and cultural safety training, and TIC training is implemented into POCUS curriculum. Additionally, there is room for further POCUS research development. Through allyship, NPs can provide culturally safe, TIC to rural communities.

Conflict of Interest

The authors declared no conflict of interest, financial or otherwise.

Acknowledgements

None declared

Funding

None declared.

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