Developing equity strategies for genomics-informed nursing: A scoping review

Knowledge Synthesis Grant Final Report

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Executive Summary

Background

Genomics contributes to health and social benefits, however, there is also inequitable access to genetic testing, screening, and treatments. The benefits of integrating genomics into healthcare must be experienced more evenly, which requires concerted action by healthcare providers. Those of lower socioeconomic status, who live in rural settings, or who experience racial discrimination are more likely to experience the disparity gap. Racial and ethnic minorities are underrepresented in genomics research, and there is a reluctance from systematically disadvantaged groups to participate in research due to mistrust stemming from historical harms. To ensure that genomics-informed care contributes to positive health outcomes, it is necessary to understand the root causes and practices that contribute to inequities in genomics healthcare and research. Over 450,000 nurses work in the Canadian healthcare system and can address genomic health disparities from clinical, research, education, policy, and leadership perspectives. To support this work, nurses need a comprehensive understanding of existing genomics-informed strategies to guide workforce development, clinical care, targeted research initiatives, and policy development that promote health equity. Ensuring nurses are prepared to engage in these areas can help address existing disparities and promote safe and equitable genomics-informed care.

Objectives

The objective of this scoping review was to map the available global evidence on strategies nurses can use to facilitate genomics-informed healthcare to address health disparities related to the introduction of genomics. The findings inform the creation of an action and research agenda to address equity issues associated with genomics-informed nursing practices.

Methods

We conducted a scoping review following the JBI methodology. This review followed an a priori protocol. [1] We identified academic and grey literature from several databases and two websites of international genomics nursing organizations. The reference lists of included papers were also searched for further articles. An advisory committee to a CIHR policy catalyst project was consulted to ensure the research questions and project aligned with related initiatives.

Citations were uploaded into Covidence and screened by two or more independent reviewers for assessment against the inclusion criteria. Five reviewers assessed the full-text studies and excluded those not meeting the inclusion criteria. Data were extracted using a tool developed by the reviewers. This was piloted with 10% of the included articles, and any discrepancies were resolved through discussion.

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We summarized the data in a table format using descriptive statistics to illustrate frequency. Conventional content analysis was used to identify equity issues and genomics-informed nursing strategies to address health disparities. We also presented extracted content using a narrative summary.

Results

Inequitable access and outcomes from genomics-informed health services were predominantly experienced by ethnic and racial groups, migrants, older adults, and individuals with lower levels of education, health literacy, socioeconomic status, limited insurance coverage, or who lived in rural and remote areas. We identified two categories of strategies that are relevant to nurses in addressing health disparities in genomics-informed care:

- Strategies to prepare the nursing workforce; and
- Strategies nurses can implement in practice.

We further categorized strategies into five domains of practice:

- Clinical practice
- Education
- Research
- Policy and Advocacy
- Leadership

Most of the strategies focused on preparing the nursing workforce were related to the education domain, while strategies that nurses can implement in practice were predominantly in the clinical practice domain.

Key Messages

- The existing literature provides broad claims and recommendations on strategies and potential outcomes rather than specific directions or evaluation of interventions.
- There is a need for more research evaluating the impact of implementing various strategies on improving health equity and outcomes.
- Most of the literature did not define disparities or inequities or specify root causes. This makes recommendations challenging to follow and strategies hard to replicate. Therefore, scholars need to identify the context within which they use the terms and provide an operational definition so that strategies can be targeted and actionable.
- Further research is needed that reflects equity concerns associated with integrating genomics in the Canadian context and provides guidance for Canadian healthcare practices and policy development.

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Knowledge Synthesis Report

Background

Healthcare professionals striving to integrate genomic medicine and advance people's health and well-being encounter ethical, legal, and social challenges. There is inequitable access to genetic testing and screening such that genomics' health and social benefits are not evenly experienced. [2-10] Lower socioeconomic status, living in rural settings, or experiencing racial discrimination impact health outcomes and widen the disparity gap. [2-10] These disparities exist in high-income countries, though they are more pronounced in low- and middle-income countries where other competing challenges exacerbate inequities. Understanding strategies to support the safe and equitable integration of genomics to address health disparities is critical.

Racial and ethnic minorities are underrepresented in genomics research, [11-13] and there is a reluctance of systematically disadvantaged people to participate in research due to mistrust stemming from historical harms. [14-17] To ensure that genomics-informed care contributes to positive health outcomes, it is necessary to understand the root causes and practices that contribute to inequities in genomics healthcare and research. [16,18] Over 450,000 nurses work in the Canadian healthcare system and can address health disparities arising from integrating genomics in clinical practice, research, education, policy, and leadership. [19] To support this work, nurses need a comprehensive understanding of existing genomics-informed strategies to guide workforce development, clinical care, targeted research initiatives, and policy development that promote health equity. Ensuring nurses are prepared to promote strategies that address equity and structural barriers to health will help reduce existing disparities. [9] An essential first step is determining what nursing strategies currently exist to address health disparities within the genomics context. Nurses can engage in these practices and advocate for initiatives that contribute to the quintuple aim of enhanced patient experience, provider satisfaction, cost-effectiveness, improved population health outcomes, and health equity. [20]

Objectives

The objective of this scoping review was to map the available global evidence on strategies nurses can use to facilitate genomics-informed healthcare to address health disparities. The findings inform the creation of an action and research agenda to address equity issues associated with genomics-informed nursing practices.

The review was guided by the following research question: what is the evidence on how nurses can facilitate genomics-informed healthcare to address health disparities?

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Scoping Review

Inclusion and Exclusion Criteria

Participants

The population, concept, and context (PPC) framework provided a structure for the review question. The population of interest consisted of nurses of all designations, including registered nurses, registered/licensed practical nurses (referred to as enrolled nurses in some jurisdictions), registered psychiatric nurses, and nurse practitioners. Nurses in all domains of practice (clinical practice, education, research, policy, administration) and specialty areas were included. Given that the roles of nurses and midwives are interrelated in some jurisdictions, midwives were included in the criteria, though no included papers mentioned this population.

Concept

The primary concept of interest was strategies that address health disparities. We defined strategies as any methods, processes, interventions, and tools nurses use to manage and mitigate health disparities in providing genomics-informed healthcare. We defined health disparities as the "systematic differences in health status or the distribution of health resources between different population groups, arising from the social conditions in which people are born, grow, live, work and age." [21]

Context

The context for this review included literature from all geographic locations that examined strategies enabling nurses to engage in genomics-informed healthcare to address health disparities.

Types of Sources

Any of the following studies that met the inclusion criteria were retained: experimental, quasi-experimental (randomized control trials, non-randomized control trials, before and after studies, interrupted time-series studies), analytical observational studies (prospective and retrospective cohort studies, case-control studies, analytical cross-sectional studies), descriptive observational studies (case series, case reports, descriptive cross-sectional studies), qualitative studies (phenomenology, grounded theory, ethnography, qualitative description, interpretive description, action research and feminist research), and systematic reviews. Text and opinion papers and grey literature were also included.

Methods

This project's primary knowledge synthesis method was a scoping review following the JBI methodology for scoping reviews and in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for Scoping Reviews (PRISMA-ScR). An advisory committee to a CIHR policy catalyst research project was consulted to ensure the mapping resonated with current thinking and literature. This review followed an a priori protocol. [1]

Search Strategy

Two librarians aided in the search for published and unpublished studies. An initial limited search using MEDLINE (OVID) was conducted to identify articles on the topic and to identify keywords and index terms. On May 25th, 2023, a search was performed using the following databases: MEDLINE (OVID), EMBASE, Cochrane Library, PsychInfo, and CINAHL (see Appendix 1). The date range was 2013-2023, with no language restrictions. Unpublished studies and grey literature were searched for from the websites of two international genomics nursing organizations, the International Society of Nurses in Genetics (ISONG) and the Global Genomics Nursing Alliance (G2NA). The reference lists of included papers were also searched. All articles retrieved were in English except one, which was not included as it could not be translated using AI technology.

Study Selection

Citations were uploaded into Covidence and, following a pilot test of 10% of articles, titles and abstracts were screened by two or more independent reviewers for assessment against the inclusion criteria. Five reviewers assessed the full-text studies and excluded those not meeting the inclusion criteria. Disagreements were addressed by the researchers with JBI methods expertise at each stage using an additional reviewer through a consensus meeting. Citations were uploaded into Mendeley, a reference manager software.

Data Extraction and Analysis

Two independent reviewers extracted data using a tool developed by the reviewers. Data extracted included details about the population (nurses), concept (genomics-informed nursing strategies), context (geographic locations and studies focused on health disparities), study methods and key findings relevant to the review question. Extraction was piloted with 10% of the included articles, and any discrepancies were resolved through discussion. The modification was made to add fields for health disparity, recommendations from articles, and details about patients or populations that nurses engage with as described in the literature.

Data were summarized in a table format using descriptive statistics to illustrate frequency counts. Conventional content analysis was used to identify equity issues and genomics-informed

nursing strategies to address health disparities. A narrative summary of extracted content was also provided, relating the results to the review objective and question.

Results

Study Inclusion

There were 818 records identified from database searches. Duplicates were removed in Covidence, leaving 664 records to screen for relevance using titles and abstracts. Seventy-eight articles were screened in full text against a priori inclusion criteria, resulting in 26 papers being included in the database searches. Other sources, such as websites and citations of included studies, resulted in 5 additional sources meeting the inclusion criteria. See Figure 1 (PRISMA-ScR).

Characteristics of Included Studies

Academic literature included in this review consisted of the following types of papers and studies: discussion papers (n=17, 55%), qualitative studies (n=5, 16%), quantitative studies (n=4, 13%), literature reviews (n=3, 10%), and mixed methods studies (n=2, 6%). Geographically, most papers came from the United States (n=25, 81%), followed by the Netherlands (n=3, 10%), the United Kingdom (n=1, 3%), and Tanzania (n=1, 3%). Nearly half of the included papers were published between 2019 and 2021 [2019 (n=5, 16%), 2020 (n=5, 16%), and 2021(n=5, 16%)], with the remainder published before 2019.

There was significant variation in reporting disparities, population characteristics, diseases, and conditions. For example, patient and community populations were characterized by race/ethnicity, condition, or experience of social determinants of health, and the population of nurses was characterized by race/ethnicity, domain of practice, specialty, or level of training. Nearly half of the papers discussed cancer-related conditions (n=14, 47%) while many did not specify a disease or condition (n=12, 40%). Most papers that mentioned specific nursing populations referred to nurses in clinical practice (n=16, 44%), followed by nurse researchers, academics, or scientists (n=8, 22%). Patient or community populations most frequently discussed included African American patients or communities (n=7, 18%) and racial or ethnic minorities (n=6, 15%).

Inequitable access and outcomes from genomics-informed health services were predominantly experienced by people belonging to ethnic and racial groups (n=14), [7,22-33] migrants (n=3), [34-36] older adults (n=1), [32] and individuals with lower levels of education or health literacy (n=6),[31,44–48] lower socioeconomic status (n=3), [33,37,38] limited insurance coverage (n=2), [22,39] or residents of rural and remote areas (n=2). [38,40] Differences in the quality of care received due to gender perceptions within a community were mentioned in one paper. [41] The inequitable representation and engagement of ethnic and racial minority groups in genomics research were

also discussed (n=4). [7,24,27,42] The root causes were not always clearly delineated, but when they were, they varied at the patient, provider, and system levels. The most common root causes were lack of financial resources, [22,25,31,33,38,43] low health literacy, [24,25,34-36,38,44] lack of knowledge and preparedness among the health workforce, [24,28,30,33,34,39,40,45] underrepresentation of minority groups in genomics research, [7,27,37,46] and medical distrust. [22,24,31,35-37,42,47]

Review Findings

We divided strategies into two categories: 1) those to prepare the nursing workforce and 2) those nurses can implement in practice. These were further divided into domains of practice, including a) clinical practice, b) education, c) research, d) policy and advocacy, and e) leadership. Categorizing these strategies by domains helped identify gaps to develop a research and action agenda.

Strategies to Prepare the Nursing Workforce

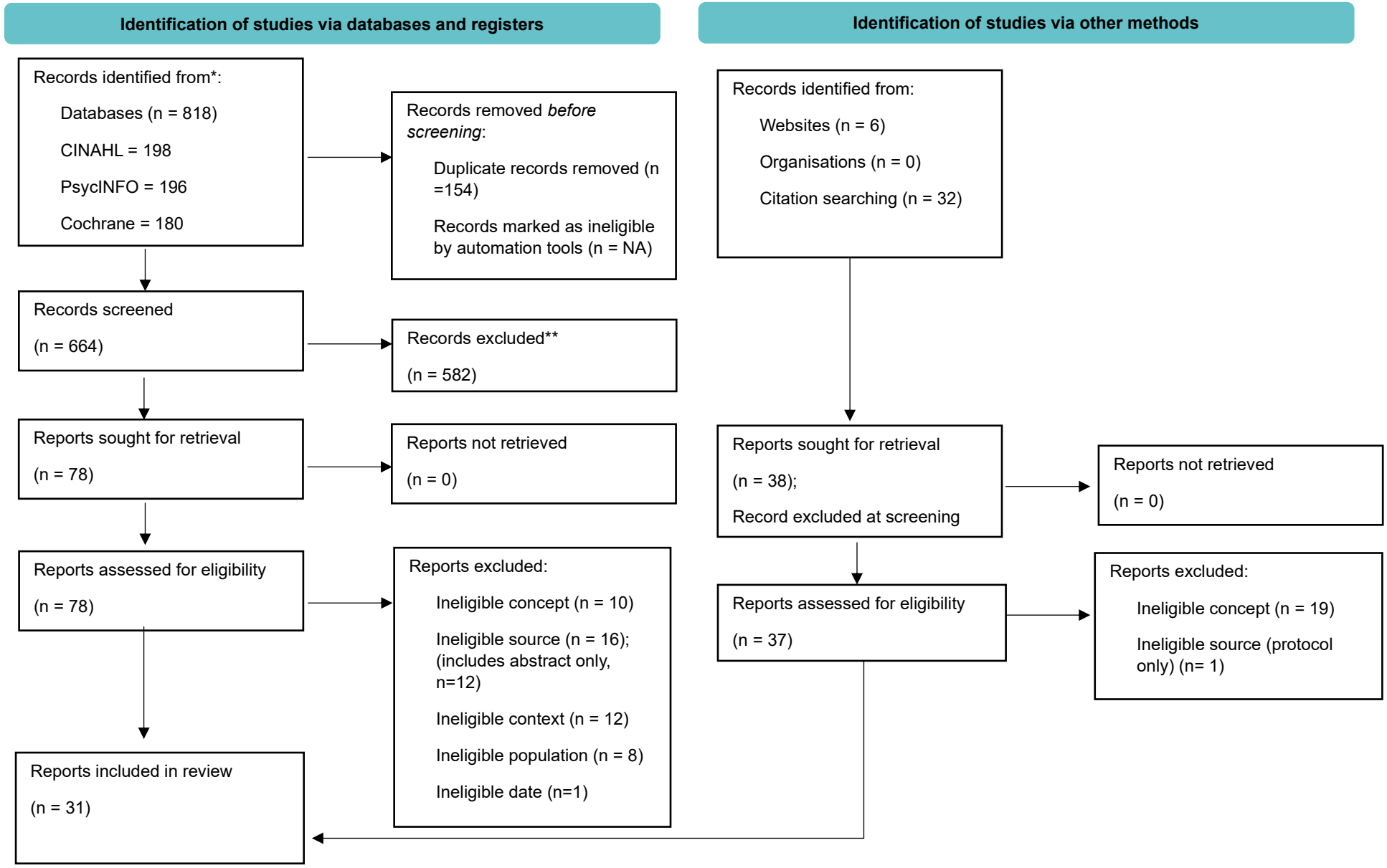
Education.

Most strategies focused on preparing the nursing workforce were related to the education domain. Most pertained to improving education for nurses and other healthcare providers (52%). [22,26-29,32-39,45,46,47,48] Some of the literature advocated for increased accessibility to education and training for nurses to enhance genomic literacy, [22,26,32] culturally safe communication, [31,45,46] and when to refer patients at risk. [28,29] The need for nurses to engage in self-reflection to identify implicit biases, personal attitudes, and beliefs that might impact equitable service delivery was evident in the literature, [26,28] as was the need to provide culturally safe care. [42] Several papers stressed the importance of ethnic diversity in the workplace and addressing the education needs of nurses belonging to racialized groups as strategies to address disparities. [23,27,28,46,48]

Research.

Two papers (6%) discussed the need for increased involvement of nurses and healthcare professionals in genomics research. [38,39] One paper highlighted the gaps in the pharmacogenetics research, [39] while the other noted the need to increase nurses' engagement in research to improve genomics-informed care [38].

Figure 1: Search results and study selection and inclusion process



Policy and Advocacy.

Strategies related to policy were included in three papers (10%). Suggestions included encouraging nurses to advocate on behalf of patients for increased access to genomics health services and ensuring they are up to date on best practices and legislation. [22,28,39]

Leadership.

One paper (3%) advocated harnessing leadership support from professional nursing associations to provide genomics education and services. [42]

Strategies Nurses Can Implement in Practice

Clinical Practice.

Clinical practice was the most notable area identified in the literature (n=20, 65%) where nurses can implement strategies to address health disparities. [7,22,24-26,29-31,33-42,44,49] Recommendations included increasing the level of support to enable nurses to provide enhanced access to genomics services. For example, developing nurses' skills in conducting comprehensive assessments and family histories to identify patients who can benefit from genomics services,[7,30,31] understanding when to refer eligible patients to genetics services, [26] and knowing how to use clinical decision support tools to guide practice. [38] Other articles focused on community engagement, working with community leaders, and conducting outreach visits for at-risk populations to provide education and increase awareness of available genetic testing.[22,23,25,37,42,49]

Strategies for enhancing patient education included using standardized methods of communicating pathology and tumour genetic marker results, [39] providing post-test counselling and education to improve understanding of results, [25] counselling patients about their genetic risk, [29] communicating in ways that are culturally sensitive and gender inclusive, using plain language and interpreters when necessary, [24,29,34-38,41] and developing and evaluating genomics health resources for literacy levels. [38]

Additional strategies for clinical practice related to the innovation and expansion of models of care. Leveraging the use of technology, such as the use of virtual technology, was cited by some articles to increase accessibility. [30] Another suggestion to support enhanced access is capitalizing on the capacity of advanced practice nurses to fill the gaps in the genetics specialist workforce, such as increasing access to genetic counselling through nurse practitioner-led programs, 40 or using patient navigation or telehealth programs to support care coordination. [7,24,31,33,37]

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Research.

The primary focus of several papers (n=13, 42%) addressed research strategies that nurses can take to recruit a greater diversity of participants and enhance the sense of trust and psychological safety for participating in research among people in underrepresented populations. [7,24,27,29,31,33,37-39,43,46,47,48] These include intentional recruitment of diverse participants, [24,29,31,39,46,48] working with community leaders to identify and address concerns about genomics research, [7,27,37,47] and educating participants on the risks and safeguards of the study.[7,47] Nurses are encouraged to engage in research that aims to reduce disparities. [7,29,38]

Policy and Advocacy.

Strategies related to policy and advocacy were discussed in six papers (19%). [24,31,33,37,38,49] One recommended establishing institutional policies to reduce implicit bias. [33] Other strategies included advocating for more equitable access to genomics healthcare services nationally and globally, [24,31,38] addressing ethical and societal issues related to data sharing, [38] an improved understanding of community and service barriers to reducing disparities. [49]

Leadership.

Two papers (6%) discussed strategies leaders could take at an organization and systems level [38,50] which included resource and system improvement aimed at synthesizing genomics information with other healthcare data, [38] engaging nursing leadership to develop information systems to organize, store, and share omics-based data, [38] and including equity and inclusivity in plans for implementing genomics into nursing by drawing on frameworks such as ConNECT, a model for fostering health equity in behavioural sciences [50]

Gaps in the Existing Literature

Most of the scholarship included in this review were discussion papers. These provide broad claims and recommendations rather than specific directions or evaluations of interventions. Only four feasibility studies were located, which was surprising given the frequent calls by nursing leaders to implement evidence-informed strategies to address health equity. [30,34-36] Most literature did not define disparities or inequities or specify root causes. This makes recommendations challenging to follow and strategies hard to replicate. The disparities and inequities in the literature were primarily related to access to genomics services and participation in research among people of specific ethnicity, race, socioeconomic status, migrants, and those with lower literacy levels. Scholars must address the context and factors perpetuating inequities to ensure that their recommended strategies are targeted and actionable. Further research is needed that reflects equity issues associated with integrating

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genomics in the Canadian context and provides guidance for Canadian healthcare practices and policy development.

Conceptualizing the Type of Genomics-informed Strategies

This review has demonstrated that scholars have identified various ways to reduce health disparities when integrating genomics into healthcare, and our mapping of strategies align with the existing literature. Clarke et al. [51] and Schuster et al. [52] categorized interventions to reduce racial and ethnic disparities based on those aimed at the patient, provider, microsystem, organization, community, and policy levels. Utilizing frameworks to conceptualize strategies and interventions in this way, be it by domain, population, or system level (e.g., micro, meso, macro), can help guide researchers about the types of interventions and gaps that exist and the contexts in which they can be implemented.

Implications

Building a Research and Action Agenda for Equitable Genomics-Informed Nursing Care

More research is needed to evaluate the impact of implementing various strategies on improving health outcomes and equity to identify promising practices that can be scaled across health systems. Scholars engaging in disparity research have advocated for studies evaluating evidence-based interventions, suggesting that mere descriptions of disparities are insufficient to improve outcomes. [51,53,54] Nurses also require knowledge about the structural and social determinants of health contributing to disparities to be strong advocates for implementing equitable public policies and healthcare practices. Further, the National Institutes of Nursing Research [NINR] 2022-2026 strategic plan identifies health equity and the social determinants of health as core research lenses. Priority research topics in this agenda included exploring diseases that disproportionately affect specific groups and the impact of race, ethnicity, socioeconomics, and culture on disease occurrence and response to disease treatment. [55] To guide the further development of disciplinary knowledge in the different domains, we identified considerations for practice and education, research, policy, and advocacy.

Practice and Education Considerations

Many of the practice strategies identified in this review focused on enhancing nurses' knowledge, skills, competencies, and self-reflection to address implicit bias. These strategies can improve culturally safe genomics-informed nursing care when conducting comprehensive assessments, recognizing individuals at risk for genetic conditions or diseases, and providing patient education. Equipped with genomic literacy, nurses can confidently answer patient

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questions, assist with health system navigation, and support patients to make informed decisions regarding testing and treatment options. Resources are needed to help nurses provide decision-making support and guidance for communicating genetic risk and test results to families. [56,57] Some research is being done to evaluate these interventions [58-60] and these studies can provide design ideas for further studies that address health disparity. Taking a comprehensive family health history is considered a first-line, cost-effective, and clinically relevant way to assess genetic risk for Mendelian and multi-factorial genetic disorders such as cancer predisposition syndromes [61]. Nurses are skilled in relational practices and can work with high-risk families to communicate test results and disease risks. Nurses can explore the biological, social, and genomic basis of disease and heredity patterns and explore the meaning and significance of treatment decisions with patients and families. [62] Further, nurses must understand how health disparity, equity, and the social determinants of health intersect with genomics. Concrete, evidence-based tools and strategies to help nurses map clinical pathways would accelerate nursing practice and education. Support from leadership to develop and integrate such tools is essential.

It is also essential that genomics interventions for education are pedagogically robust. The Reporting Item Standards for Education and its Evaluation in Genomics (RISE-2 Genomics) is a framework that identifies standards to support the development of evidence-based genomics education by identifying learning outcomes and evaluating interventions to support replicating educational strategies. [63] Using standardized tools can enhance evaluation and communication of how education contributes to changes in nurses' knowledge, attitudes, skills, and competencies related to addressing inequities in genomics-informed care.

Many strategies in our review referred to the need to develop nurses' foundational biomedical knowledge of genomics; however, this alone is insufficient. Educators must ensure content is purposely delivered within an equity and anti-discriminatory lens to avoid widening disparity gaps in genomics care. [64] Moreover, providing accurate information and not overinflating the benefits of genomics are crucial for building patient and community trust in genomics. [52] Setting clear expectations for educational and licensure requirements is a valuable strategy to support the integration of equitable genomics-informed healthcare. [55]

Genomics-informed practices are not neutral; actual harm can arise from an underprepared workforce. [65,66] Education is required for undergraduate and graduate students, and employers must prioritize professional development for practicing nurses to address low levels of genomic literacy and the need for increased confidence using genomic technologies. [61,67-69] A challenge to implementing educational interventions is the need for qualified experts to deliver content.[70,71] This can be addressed by developing evidence-based resources for educators to diffuse genomic knowledge into the nursing workforce.

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Health systems funders (e.g., government), educators, and employers must support nurses taking on innovative roles in genomics care delivery [72] to increase access and expand genomics services. [34,40,73] While some services must be provided collaboratively with specialists such as genetic counsellors, nurses can provide mainstream services. [74] Another vital consideration for diversifying the genomics workforce is ensuring nurses from historically underrepresented communities remain in the workforce. There is an urgent need for more nurse scientists and researchers from ethnic minority backgrounds in the primary investigator role. [3,75] Accordingly, strategies to address structural racism and promote recruitment and retention to the genomics workforce are needed. [3]

Research Considerations

The findings of this review reveal nursing strategies focused on engaging communities to increase awareness of research opportunities, developing culturally appropriate ways to communicate and disseminate results, appropriately applying concepts such as race ancestry, and recognizing the heterogeneity within and across patient populations experiencing diseases. Further, scholars have emphasized that equity considerations must be embedded in research design, implementation, evaluation, and knowledge translation.

Nurses' holistic approach to patient care situates them to lead and contribute to genomics research to address health disparity. [76] Nurses can contribute to dismantling disparities in research by recruiting participants using culturally safe practices. [77] The diversity of participants in genomics research studies and databases is crucial to establishing equity. The underrepresentation of individuals of non-European ancestry has significant implications on the generalizability of research findings, leading to barriers to advancing treatment options and precision healthcare. [2,78-80] For example, in genetic testing for hereditary conditions, variants of uncertain significance (VUS) occur more frequently in Asian patients and those of African ancestry versus patients of European descent. [81] A VUS result is problematic as insufficient data is available to determine clinical significance or to conclude that the variant is (or is not) associated with disease and a VUS does not have corresponding treatments. [82]

This scoping review revealed the need for research exploring competencies and practices nurses can implement to address health equity and disparity with historically marginalized people. Existing studies can advance nursing practice and provide a foundation for future research, such as the study exploring DNA methylation patterns in disease-associated genes in African Americans who experienced racism [76] and studies measuring the impact of nursing interventions on outcomes. [83,84] This review noted innovative service models employing nurses in advanced practice roles using patient navigation or telehealth programs to support care. Feasibility studies are needed to assess the impact of these strategies on health outcomes and the scalability of these models.

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Frameworks exist to support the implementation of research and practice change. A recent framework to promote diversity, inclusion, and equity in research can be used to design studies that enhance the clinical utility of findings. [85] The Consolidated Framework for Implementation Research (CFIR) helps implement and evaluate innovations and shows promise for addressing health disparity. [6] In addition, the ACCESS framework guides nurses in overcoming disparities in genomics healthcare and was developed by an international consortium of nurses in genomics research. [86] ACCESS provides a structure for considering equity and diversity during program development, including advocating for accessible services, effective communication, cascade screening, and ongoing surveillance.

Policy, Advocacy, and Leadership Considerations

While nurses can implement strategies at the individual level, government support is needed to enact systems-level change to provide equitable services to people with the most significant vulnerabilities, such as poverty, disability, disease, or isolation due to lack of transportation or internet. [79] This review revealed broad strategies to advocate for policy, best practices, and legislation. However, there is a need for targeted strategies focused on policy, advocacy, and leadership, locally and nationally, to address health disparities and social injustices.

Health disparities are worsened in areas lacking publicly funded health care, and individuals lacking sufficient insurance coverage continue to experience access issues. [87] Strong advocacy is required to mobilize political investment in genomic technology and the education of healthcare providers so that disease prevention and health promotion are accessible to all. Additionally, the popularity of direct-to-consumer testing and the emphasis on early identification of risk and risk mitigation strategies can shift responsibility to the individual without fully considering the impact of socioenvironmental factors such as the social determinants of health. While direct-to-consumer testing can increase access to care, it is likely only accessible to those who can afford it, and more testing may lead to an increase in requests for unnecessary medical services, reducing the availability of resources for those most in need. [79] Policy recommendations acknowledging genomics' societal and health benefits can guide nurses in developing policies to advance healthcare initiatives addressing health disparities. [88]

Policy infrastructure is needed to support nurses' contributions to genomics-informed research, practice, education, and leadership. This policy infrastructure is required in Canada to help nurses gain traction for strategic genomics initiatives and to collaborate in other national efforts.[89] Developing scope of practice documents, standards of practice, education frameworks, and position statements will help clarify nurses' unique role in providing genomics-informed care. Policy and professional practice guidance should direct specific attention to the responsibilities of addressing health disparities. Further, policy infrastructure offers meaningful direction for health service organizations to identify models and approaches to care that

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address equity concerns when implementing genomics into healthcare. These considerations can be used as the basis for a research and action agenda to expand upon evidence-informed strategies that nurses can advocate for, implement, and promote to provide equitable, genomics-informed healthcare.

International nursing organizations such as G2NA have developed tools to accelerate the integration of genomics that acknowledge the importance of centring approaches on equity. For example, Tonkin et al. developed a roadmap to guide the acceleration of genomics in nursing to support the common goal of genomics: improving healthcare for all. [90] The roadmap is guided by the Consolidated Framework for Implementation Research (CFIR), [108] and encourages nurses to consider how implementation plans address equity and inclusivity. The roadmap draws on the ConNECT framework, a model for fostering health equity in behavioural sciences. [91] Further, the Assessment of Strategic Integration of Genomics Across Nursing (ASIGN) Maturity Matrix tool (developed by the G2NA and designed to be used with the G2NA Roadmap) outlines several critical success factors mapped against enablers and outcome indicators. [72] One key outcome indicator is that genomic tests and services are equally accessible. These tools guide nurses in integrating genomics into practice, research, and education. They are examples of the work resulting from leaders and advocates championing the advancement of genomics practices in healthcare.

Conclusion

This scoping review has outlined several strategies to prepare the nursing workforce to enhance genomic literacy and strategies that nurses can implement in all domains of practice. The nursing workforce can be developed to address health disparities by developing education to promote genomic literacy and self-reflection amongst nurses to address bias, racism, and cultural safety. Increasing nurses' genomic literacy and understanding of health disparities can support them in engaging in clinical practices that prioritize patient values related to genetic testing, collect family health histories to identify risk, and enhance community engagement and participation in research. Nurses in policy and administration can advocate for increasing diversity in the workforce. Further, nurses in research can ensure studies are designed to recruit diverse participants and reflect culturally safe practices while generating knowledge with and for historically underrepresented communities.

Equipping nurses with genomic literacy rooted in an equity lens will enable them to apply their unique disciplinary perspective and fully participate in health system transformation, interprofessional practice, care coordination, and developing and implementing care pathways that address health disparities. Advancing strategies will require multi-sectoral and interprofessional collaboration and leadership. While the existing evidence provides a

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foundation for nurses to begin to take action on this work, more interventional research is needed to identify best practices and evaluate the impact of implementing strategies on improving health equity and outcomes. Addressing this gap can legitimize claims that nurses are well-positioned to promote equity in providing genomics-informed care. In addition, research is needed that reflects equity concerns associated with integrating genomics in the Canadian context and provides guidance for Canadian healthcare practices and policy development.

Knowledge Mobilization Activities

The work of this scoping review has informed the CIHR catalyst grant-funded study *Designing Engagement Strategies for Genomics-Informed Oncology Nursing: A Comparative Prospective Cross-Jurisdictional Policy Analysis [DESIGN: Policy].* The manuscript for phase one of the DESIGN: Policy study is under review.

Dordunoo D, Limoges J, Chiu P, Puddester R, Carlsson L, & Pike A. Genomics-informed nursing strategies and health equity: A scoping review protocol. *PLoS One.* 2023;18(12):e0295914. https://doi.org/10.1371/journal.pone.0295914

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Appendix 1: Search Strategy

MEDLINE (OVID)

Search conducted 25 May 2023

#	Query	Records Retrieved
1	nurs*.tw,kf.	530,217
2	("genomics informed health care" or "genomics informed healthcare" or "genomics informed" or genomic* or genetic* or hereditary or "family history" or "family health" or "precision health" or "precision medicine" or "cascade screening" or "cascade testing").tw,kf.	1,613,278
3	(genetic* adj5 (test* or screen* or service*)).tw,kf.	72,688
4	(equalit* or disparit* or inequalit* or equit* or inequit*).tw,kf.	196,210
5	((Health or healthcare or "health care") adj5 (disparit* or inequit* or equalit* or status or equit* or inequalit*)).tw,kf.	155,710
6	Nurse's Role/ or exp Nurses/	131,940
7	Genomics/ or Genetic Testing/	107,609
8	Healthcare Disparities/ or Health Status Disparities/ or Health Equity/	41,202
9	1 or 6	577,938
10	2 or 3 or 7	1,638,692
11	4 or 5 or 8	297,101
12	9 and 10 and 11	199
13	limit 12 to yr="2013 -Current"	123

CINAHL (EBSCO)

Search conducted 25 May 2023

#	Query	Limiters/Expanders	Last Run Via	Results
S13	S9 AND S10 AND S11	Limiters - Published Date: 20130101- Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	198
S12	S9 AND S10 AND S11	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search	351

			Database - CINAHL Complete	
S11	S4 OR S5 OR S8	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	198,202
S10	S2 OR S3 OR S7	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	241,207
S9	S1 OR S6	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,004,728
S8	(MH "Healthcare Disparities") OR (MH "Health Status Disparities+")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	27,256
S7	(MH "Genomics") OR (MH "Genetic Screening+")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research	25,319

			Databases Search Screen - Advanced Search Database - CINAHL Complete	
S6	(MH "Nurses+") OR (MH "Nursing Role")	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	271,314
S5	(Health or healthcare or "health care") N5 (disparit* or inequit* or equalit* or status or equit* or inequalit*)	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	150,020
S4	equalit* or disparit* or inequalit* or equit* or inequit*	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	104,182
S3	genetic* N5 (test* or screen* or service*)	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database -	24,718

			CINAHL Complete	
S2	"genomics informed health care" or "genomics informed healthcare" or "genomics informed" or genomic* or genetic* or hereditary or "family history" or "family health" or "precision health" or "precision medicine" or "cascade screening" or "cascade testing"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	241,207
S1	nurs*	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,004,140

APA PsychInfo (EBSCO)

Search conducted 25 May 2023

#	Query	Limiters/Expanders	Last Run Via	Results
S13	S9 AND S10 AND S11	Limiters - Published Date: 20130101- Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	196
S12	S9 AND S10 AND S11	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	376

S11	S4 OR S5 OR S8	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	161,906
S10	S2 OR S3 OR S7	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	208,098
S9	S1 OR S6	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	201,399
S8	DE "Health Disparities"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	10,972
S7	DE "Genomics"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	1,633

S6	DE "Nurses"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	33,774
S5	(Health or healthcare or "health care") N5 (disparit* or inequit* or equalit* or status or equit* or inequalit*)	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	81,114
S4	equalit* or disparit* or inequalit* or equit* or inequit*	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	116,068
S3	genetic* N5 (test* or screen* or service*)	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	14,592
S2	"genomics informed health care" or "genomics informed healthcare" or "genomics informed" or genomic* or genetic* or hereditary or "family history" or "family health" or "precision health" or "precision medicine" or "cascade screening" or "cascade testing"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	208,098

S1	nurs*	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	201,399

Cochrane Library

Search conducted 25 May 2023

#	Query	Results
1	nurs*.tw,kf.	54,877
2	("genomics informed health care" or "genomics informed healthcare" or "genomics informed" or genomic* or genetic* or hereditary or "family history" or "family health" or "precision health" or "precision medicine" or "cascade screening" or "cascade testing").tw,kf.	31,620
3	(genetic* adj5 (test* or screen* or service*)).tw,kf.	2,693
4	(equalit* or disparit* or inequalit* or equit* or inequit*).tw,kf.	8,506
5	((Health or healthcare or "health care") adj5 (disparit* or inequit* or equalit* or status or equit* or inequalit*)).tw,kf.	17,593
6	2 or 3	31,620
7	4 or 5	23,325
8	1 and 6 and 7	180

EMBASE

Search conducted 25 May 2023

No.	Query	Results
#1	nurs*:ti,ab,kw	637197
#2	'genomics informed health care':ti,ab,kw OR 'genomics informed healthcare':ti,ab,kw OR 'genomics informed':ti,ab,kw OR genomics:ti,ab,kw OR genetics:ti,ab,kw OR hereditary:ti,ab,kw OR 'family history':ti,ab,kw OR 'precision health':ti,ab,kw OR 'precision medicine':ti,ab,kw OR 'cascade screening':ti,ab,kw OR 'cascade testing':ti,ab,kw	539689
#3	(genetic* NEAR/5 (test* OR screen* OR service*)):ti,ab,kw	112258
#4	equalit*:ti,ab,kw OR disparit*:ti,ab,kw OR inequalit*:ti,ab,kw OR equit*:ti,ab,kw OR inequit*:ti,ab,kw	243148
#5	((health OR healthcare OR 'health care') NEAR/5 (disparit* OR inequit* OR equalit* OR status OR equit* OR inequit*)):ti,ab,kw	180866
#6	'nurse'/exp	216882

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#7	'genomics'/exp OR 'genetic screening'/de	251892
#8	'health care disparity'/de OR 'health disparity'/de OR 'health equity'/de	59975
#9	#1 OR #6	688560
#10	#2 OR #3 OR #7	751578
#11	#4 OR #5 OR #8	375798
#12	#9 AND #10 AND #11	168
#13	#9 AND #10 AND #11 AND [2013-2023]/py	121

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