



Review

Integration of Women's Cardiovascular Health Content Into Healthcare Provider Education: Results of a Rapid Review and National Survey

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ABSTRACT

Despite its importance, formal education in healthcare training programs on sex- and gender-specific cardiovascular disease (CVD) risk factors, symptoms, treatment, and outcomes is lacking. We completed rapid reviews of the academic and grey literature to describe the current state of women-specific CVD education in medical, nursing, and other healthcare education programs. Second, we analyzed results from a Canada-wide survey of healthcare professional education programs to identify gaps in curricula related to sex- and gender-specific training in CVD. Our academic review yielded only 15 peer-reviewed publications, and our online search only 20 healthcare education programs, that note that they specifically address women, or sex and

RÉSUMÉ

Malgré la prévalence des maladies cardiovasculaires (CV), les programmes d'enseignement en santé accordent peu d'attention aux facteurs de risque, aux symptômes, aux traitements et aux issues selon le sexe ou le genre. Premièrement, nous avons fait une revue rapide de la littérature universitaire et la littérature grise pour faire état de la formation sur les maladies CV spécifiques aux femmes dans les programmes d'enseignement en médecine, en soins infirmiers et autres domaines de la santé. Deuxièmement, nous avons analysé les résultats d'une enquête menée à l'échelle du Canada sur des programmes de formation professionnelle pour cerner les lacunes dans les programmes au chapitre de la formation sur les maladies CV en

Lay Summary

Differences are present in the symptoms, diagnosis, and development of heart disease between women and men. How many healthcare education programs address these differences is unclear. A survey of Canadian programs found that, although > 50% did teach about the differences in heart disease between women and men, the content varied. Healthcare professionals should receive uniform education on how heart disease differs between women

and men, followed by advanced topics, using practical training and lifelong learning.

Cardiovascular disease (CVD) remains a leading cause of death and disability in Canada and worldwide. Sex- and gender-related factors lead to differences in CVD presentations, diagnoses, treatments, and outcomes.¹ Despite the considerable advancements that have been made in cardiovascular care, research, and technology, women face unique challenges in receiving timely and appropriate treatment. The underrepresentation of female patients in CVD trials has led to a lack of sex-specific recommendations in clinical guidelines, thereby contributing to the misinterpretation of women's CVD symptoms, inadequate and delayed diagnoses, suboptimal management of women,² and poorer outcomes, compared to those of their male counterparts.³ Also contributing to this context is a concerning lack of awareness and

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gender, and CVD in their curricula. Across both searches, the majority of training and education programs were from the USA, varied greatly in length, delivery mode, and content covered, and lacked consistency in evaluation. Of surveys sent to 213 Canadian universities and other entry-to-practice programs, 80 complete responses (37.6%) were received. A total of 47 respondents (59%) reported that their programs included women-specific CVD content. Among those programs without content specific to CVD in women, 69.0% stated that its inclusion would add “quite a bit” or “a great deal” of value to the program. This study highlights the emerging focus on and substantial gaps in women-specific CVD training and education across healthcare education programs. All medical, nursing, and healthcare training programs are implored to incorporate sex- and gender-based CVD content into their regular curricula as part of a consolidated effort to minimize gaps in cardiovascular care.

knowledge of women’s cardiovascular health and risk factors, particularly among healthcare professionals.³⁻⁵

Despite the importance of gender-related factors as determinants of overall health, an alarming absence of sex- and gender-related content in medical education persists. *Sex-specific* content (ie, knowledge related to biological aspects of being female, eg, anatomic differences in coronary arteries, the role of estrogen in CVD, pregnancy-related risks, and menopause)⁶ and *gender-related* content (ie, knowledge of gender identity, roles, relations, and institutionalization),⁷ and the intersection of sex and gender influences with CVD risks, symptoms, diagnoses, management, and outcomes, are not routinely included in medical school curricula; thus, rarely are they translated into clinical practice.⁸ A 2017 cross-sectional survey of 504 randomly selected Canadian physicians (60% primary care, 20% cardiology, 20% obstetrics and gynecology) revealed that many physicians lacked adequate knowledge of CVD prevalence, identification, risk assessment, and management in women.⁴ To address this critical issue, an urgent need exists for a comprehensive and targeted approach to incorporating concepts of sex and gender and their relation to cardiovascular health into physician, nursing, and other healthcare provider education. Such training has immense potential to reduce misdiagnoses, improve outcomes, and reduce mortality among women impacted by CVD.

The objectives of this article are as follows: (i) to review the literature and outline the current state of women’s heart health education in healthcare professional educational programs; (ii) to summarize the results of a survey of Canadian healthcare professional educational programs regarding content addressing women’s CVD; and (iii) to propose evidence-based strategies for integrating sex- and gender-specific cardiovascular

fonction du sexe et du genre. Notre analyse de la littérature universitaire a permis de relever seulement 15 publications révisées par des pairs à ce sujet, et notre recherche en ligne a mis au jour seulement 20 programmes d’enseignement qui comportent un volet portant spécifiquement sur les femmes, ou bien le sexe et le genre, et les maladies CV. Ces deux enquêtes ont révélé que la majorité des programmes de formation et d’enseignement étaient aux États-Unis et qu’ils présentaient une grande diversité sur le plan de la durée, du mode d’enseignement et du contenu abordé. De plus, les méthodes d’évaluation n’étaient pas uniformes. Parmi les sondages envoyés à 213 universités et programmes d’admission à la pratique au Canada, 80 réponses complètes (37,6 %) ont été reçues. Quarante-sept des établissements qui ont répondu (59 %) ont signalé que leurs programmes comprenaient du contenu portant sur les maladies CV spécifiques aux femmes. Parmi les établissements dont les programmes ne comportaient aucun contenu spécifique aux femmes, 69,0 % ont indiqué qu’une telle inclusion ajouterait « beaucoup » ou « énormément » de valeur au programme. Cette étude met en lumière l’attention nouvelle accordée à la formation et à l’enseignement sur les maladies CV spécifiques aux femmes ainsi que les lacunes substantielles observées à cet égard dans les programmes d’enseignement en santé. Les programmes de formation en médecine, en soins infirmiers et en santé sont vivement invités à intégrer du contenu spécifique au sexe et au genre pour ce qui est des maladies CV dans un effort concerté visant à réduire les lacunes dans les soins cardiovasculaires.

health content into the core curriculum of healthcare professional training programs.

Methodology

Rapid review of peer-reviewed literature

A comprehensive rapid review of the academic literature was completed. Several databases (MEDLINE [Ovid], Embase [Ovid], Cumulative Index to Nursing and Allied Health Literature [CINAHL; EbscoHost], and Web of Science Core Collection) were searched for the period from their inception until June 20, 2023, by the librarian specialist, E.S., using search terms that focused on the following 3 major concepts: cardiovascular and heart health; women, sex, and gender; and curriculum, school, and training. See [Supplemental Table S1](#) for full search details. Search results were exported to Covidence (Melbourne, Australia), and duplicate results were eliminated. Title and abstract screening and, subsequently, full-text review were carried out by at least 2 independent reviewers (K.M., M.M., A. Pike, N.A.) using the inclusion and exclusion criteria displayed in [Table 1](#). Any conflicts were resolved by a third independent reviewer. Relevant data were extracted from each included full-text article by one reviewer and were independently verified by a different reviewer (N.A., M.H.M., A. Pike, K.M., C.O.).

Grey literature search

An extensive “grey literature” search was also conducted to identify non-peer-reviewed women’s cardiovascular health educational and curricular materials using Google (www.google.com) in “Incognito” or “private browsing” mode, with

Table 1. Inclusion and exclusion criteria for peer-reviewed and grey literature reviews

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> Sex- and gender-specific or women's specific CVD education/curricula Any postsecondary health professional program (eg, medicine, nursing) OR postgraduate training (eg, residency, specialized training) English-language 	<ul style="list-style-type: none"> Primary, middle, or secondary school education General women's health and/or non-CVD-related curricula Non-women or sex and/or gender-focused curricula Editorial or opinion pieces Non-English-language

CVD, cardiovascular disease.

5 separate search queries created by coauthor E.S. (see Supplemental Table S2). The first 100 search results for each of the 5 queries (for a total of n = 500) were screened by one of the coauthors (N.A., C.O., K.T.) using the .com Google search engine, the .ca domain for Canadian Web sites, and the .edu domain for American university Web sites. No equivalent university search filters are available for other countries. Sites were screened using the inclusion and exclusion criteria in Table 1. Relevant data were extracted, and any discrepancies were resolved by consensus with a third reviewer (N.A., K.M.).

Survey of Canadian healthcare professional education programs

To identify gaps in curricular content related to women's CVD, the Training and Education Working Group of the

Canadian Women's Heart Health Alliance (CWHHA) recently (2022) developed and disseminated, via e-mail, a survey (see Supplemental Appendix S1) to individuals at 213 Canadian universities and other entry-to-practice health discipline programs. E-mails were sent to 716 program administrative accounts, deans, professors, and other individuals identified as leading or overseeing program curricula at one of the 213 programs. The list of contacts for each program was generated by CWHHA members and from program Web sites. The invitation asked the recipient to either complete the survey or "please forward the survey to the person responsible for curriculum content and who can best comment on this topic." Survey items addressed the presence or lack of women's CVD content, the perceived value of such content, and perceived barriers and facilitators to program implementation. The project was submitted to the Ottawa Health Science Network Research Ethics Board and was approved as a Quality Improvement initiative (Project QI-104).

Results

Rapid review of peer-reviewed literature

Our academic literature search yielded 1075 citations; using the process above resulted in 15 papers being included in our final review (see Supplemental Fig. S1, Preferred Reporting Items for Systematic Reviews and Meta-Analyses [PRISMA] diagram). The majority (n = 12) were from the

Table 2. Characteristics of women's heart health educational programs found in the peer-reviewed literature review

Program or initiative characteristic (n = 15)	n (%) or description
Publication years	1995–2022
Country of origin	
USA	12 (80)
Canada	1 (7)
United Kingdom	1 (7)
Netherlands	1 (7)
Target audience*	
IM/cardiology/EM residents, nursing specialties	5 (33)
OB/GYN	4 (27)
Family practice residents and/or faculty	2 (13)
Undergraduate medical and/or nursing school	3 (20)
All health professionals	2 (13)
Not stated	1 (7)
Delivery modes	Grand rounds and/or lectures Online modules Seminars and/or labs Journal clubs Office meetings Conferences
CVD content included	Comprehensive CVD content (women-focused ACS, HF, pregnancy & heart disease, congenital heart disease, cardiac rehabilitation) Coronary disease, chest pain HTN in pregnancy (OB/GYN) Dyslipidemia
Formal evaluation reported	11 (73)
Outcomes (n = 11)	
Pretest and posttest knowledge scores (n = 8)	Improved, overall
Satisfaction with the program (n = 2)	Overall increased confidence in clinical assessment skills; moderate to high satisfaction with program
Pretest and posttest knowledge + satisfaction (n = 1)	As above

Values are n (%), unless otherwise indicated.

ACS, acute coronary syndrome; CVD, cardiovascular disease; EM, emergency medicine; HF, heart failure; HTN, hypertension; IM, internal medicine; OB/GYN, obstetrics & gynecology.

* Exceeds 100% because one program targeted both cardiology and OB/GYN fellows.

USA, and a wide variety of programs were described. [Table 2](#) summarizes the characteristics of the included programs identified in the peer-reviewed literature. Target audiences were most often internal medicine, cardiology, or obstetrics and gynecology medical residents or staff, and nurses; family practice and undergraduate learners were also represented. The programs ranged in duration from single, 1-hour lectures, to a 2-week rotation, to 30 or more hours over 2 to 3 years. Modes of delivery also varied widely, including online self-directed modules,⁹ lectures, seminars and labs, and other modes. Eight of the programs were devoted to women's health issues in general,¹⁰⁻¹⁷ but they included some content focusing on women and CVD in particular. The topics were most often described as "CVD in women," although 2 specifically covered chest pain,^{13,15} and others specifically covered coronary disease,^{15,16} and hypertension, dyslipidemia, and CVD and pregnancy.¹⁵ Under half (47%) of the reported programs focused on CVD specifically, ranging from a comprehensive curriculum that includes risk assessment, acute coronary syndrome, chest pain, myocardial infarction with nonobstructive coronary arteries, stress-induced cardiomyopathy, spontaneous coronary artery dissection, heart failure, hypertensive disorders of pregnancy and gestational diabetes, and cardiac rehabilitation,⁹ to more specific foci on heart failure,¹⁸ hypertension,¹⁹ pregnancy and heart disease,^{20,21} and heart disease prevention.^{20,21}

Of the 15 papers, 11 provided evaluation data. Two provided participant satisfaction data only,^{12,22} whereas the remaining 9 provided pretest and posttest data. In general, participants were satisfied with the programs, and in some cases, they indicated increased confidence in their clinical skills related to women's CVD. Among the programs that underwent a formal evaluation of knowledge changes, the posttest scores were almost uniformly improved over pretest scores, although one evaluation indicated minimal improvement in knowledge of and rates of recommending statin therapy for women with CVD.²¹

In summary, reports of programs addressing CVD in women are limited in number, and formal evaluations are rare. The reported initiatives represent a wide variety of delivery modes and content. Overall, a need remains for rigorously evaluated curricula and programs in women's cardiovascular health.

Grey literature search

Using the 5 queries to search the general Google search engine, without or with the .ca or .edu domain restrictions, 500 search results were screened. Ultimately, 60 results were screened in-depth with the general Google search, 20 results were screened with the *.ca domain restriction for Canadian Web sites, and 20 results were screened with the *.edu domain restriction for American university Web sites. Some of these results may have been duplicates that were retrieved in multiple searches.

The "grey literature" search identified 20 results that met inclusion criteria ([Table 1](#)) in the following categories: women's cardiovascular health curriculum (overall, n = 6; university-based, n = 5; nursing, n = 4); professional development gender-specific cardiovascular health (n = 2); sex-specific heart health e-learning (n = 2); and women's heart

health training modules (n = 3). [Table 3](#) summarizes the programs that were included from the grey literature search. The curricula targeted multiple health disciplines, including multidisciplinary physicians (family medicine, internal medicine, intensivists, and surgeons), researchers (physician, biomedical, natural and social science), nurses and nurse practitioners, and medical trainees (including cardiology fellows). Two of the included programs also were featured in our academic search. The majority of these educational programs were delivered in the USA (n = 15), followed by Canada (n = 5), Australia (n = 1) and the United Kingdom (n = 1). The Australian and United Kingdom programs are delivered via the Australian government and the National Health Service (NHS), respectively. By contrast, the North American programs are delivered by individual medical institutions and universities, some of which have dedicated clinical and research fellowship training and practice programs focused on women's cardiovascular health. Of the 20 educational programs, 15 (75%) provide some type of accreditation for participation, with continuing education credits given for medical and nursing disciplines.

Survey of Canadian healthcare professional education programs

Surveys were sent to program leads at 213 Canadian universities and other entry-to-practice health discipline programs, and complete responses were received from 80 programs (37.6%). The proportion of responses by province is displayed in [Figure 1](#). The distribution of responses was similar to the population breakdown in Canada, with slight overrepresentation from British Columbia (7% over), slight underrepresentation from Ontario (8% under) and Quebec (8% under), and no responses from the territories.²³ [Table 4](#) displays the number of survey invitations sent and the response rates, by discipline. Overall, 47 respondents (58.7%) indicated that their program had content addressing CVD in women, although this varied widely among the surveyed disciplines ([Fig. 2](#)). Among programs that did include women's CVD content, the topics most often included were chest pain (60%), risk assessment (52%), acute coronary syndrome (47%), cardiac rehabilitation (46%), and gestational diabetes and/or hypertensive disorders of pregnancy (46%), as displayed in [Figure 3](#). Included topics, by the top-4 responding disciplines, are shown in [Supplemental Figure S2](#). Among those who did not include such content in their programs, 63% stated that doing so would add "quite a bit" or "a great deal" of value. The most commonly stated barrier to introducing this content was the lack of curricular time (42%), although 24% indicated that they did not foresee any barriers. All reported barriers are displayed in [Supplemental Figure S3](#).

Discussion

We have presented the results of a rapid review of the peer-reviewed academic literature, a structured search of the grey literature, and a survey of Canadian universities and other entry-to-practice health discipline programs to estimate the extent to which sex, gender, and women's cardiovascular health content is being taught within healthcare professional programs. Our search found only 15 peer-reviewed

Table 3. Summary of programs delivering women's heart health curricula included in grey literature search

	Name of program	Target audience	Country	Institution, Organization, or Association	Evaluation of sex- and/or gender-specific components
1	Women & Girls with Rheumatic Heart Disease eLearning	Clinicians	Australia	Australian Government Department of Health & Aged Care	Yes CME points
2	Women's Cardiovascular Health Curriculum (MUCHACHA)	Cardiology fellows in training	USA	University of Pennsylvania Cardiovascular Fellowship program	Yes
3	Barbra Streisand Women's Heart Disease & Health Center Fellowship teaching service	Fellows	USA	Cedars-Sinai	Yes
4	The Women's Research and Training Program	Physician-scientists	USA	The Women's Research and Training Program at the Texas Heart Institute Center for Women's Heart & Vascular Health	No
5	Postdoctoral Fellowship Training Program in Women's Cardiovascular Health	Qualified investigators with a background in biomedical, natural, or social sciences	USA	UCSD DFM Women's Cardiovascular Health Research Center	Yes
6	Healing Women's Hearts: An Integrative Approach Training Course	Women's health wellness professionals	USA	The Integrative Women's Health Institute	Yes Credits
7	Unravelling the Secrets of Women's Cardiovascular Health	Family medicine and general internal medicine physicians	USA	Medical College of Wisconsin	Yes Credits
8	OWIMS Professional Development Course: "Ms. Diagnosed"	Healthcare professionals	USA	Warren Alpert Medical School of Brown University	Yes Credits
9	Women's Health Symposium 2023	Healthcare providers— physicians, nurses, medical students, specialists, and those interested in enhancing their understanding of women's health and sex and gender differences	USA	University of Colorado's Ludeman Family Center for Women's Health Research School of Medicine	Yes CME points
10	Canadian Women's Heart Health Education Course	Those interested in learning more about women's CVD health and faculty	Canada	University of Ottawa Heart Institute	Yes CME points
11	University of Calgary Women's Health Seminar Series	Women's health researchers	Canada	University of Calgary	No
12	Healing Women's Hearts: An Integrative Approach Training Course	Women's health and wellness professionals	USA	Integrative Women's Health Institute	Yes CME credit and certificate
13	Women's Cardiovascular Health	Trainees, fellows, cardiologists	USA	CardioNerds	No
14	Women and Coronary Heart Disease	Nurses in family practice or medical and/or surgical areas, especially critical care or cardiac units	USA	NetCE	Yes
15	The Women's Research and Training Program	Physician-scientists	USA	The Women's Research and Training Program at the Texas Heart Institute Center for Women's Heart & Vascular Health	No
16	Women & Girls with Rheumatic Heart Disease eLearning	Clinicians	Australia	Australian Government Department of Health & Aged Care	Yes CME credit
17	Nursing Education Day Explores Women's Cardiac Health	Nurses in the Heart Centre at St. Paul's Hospital	Canada	University of British Columbia	
18	Women and Cardiovascular Disease, 4th Edition— N32879	Nurses	USA	Elite Learning	Yes Exam and option of certificate
19	Cardiac Nursing Continuing Education	Nurses and nurse practitioners	USA	The Preventive Cardiovascular Nurses Association	Yes CME point, Certificate
20	CMHC's Foundations of Cardiometabolic Health Certificate Course	Practicing clinicians, students, and patients interested in cardiorenal and metabolic health	USA	Cardiometabolic Health Congress	Yes Certificate

CME, continuing medical education; CMHC, Cardiometabolic Health Congress; CVD, cardiovascular disease; DFM, Department of Family Medicine; MUCHACHA, woMen's Cardiovascular Health; OWIMS, Offices of Women In Medicine and Science; UCSD, University of California San Diego.

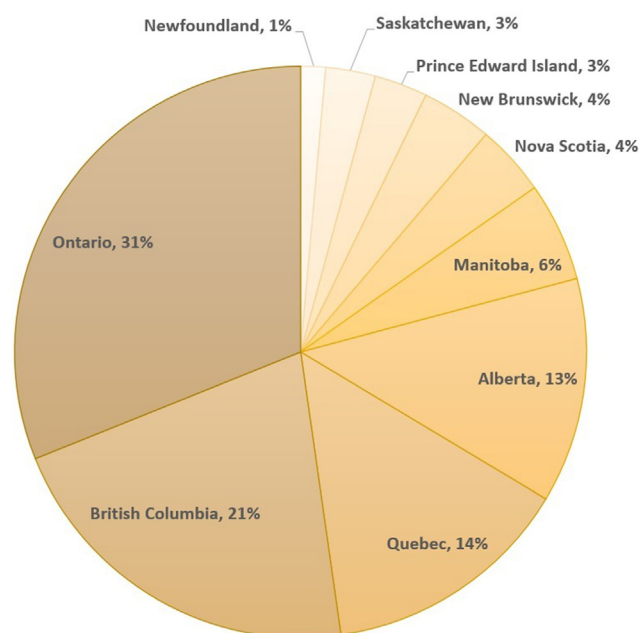


Figure 1. Survey respondents by province (%).

publications of educational programs that specifically address CVD in women. Our systematic online search of the grey literature identified fewer than 24 healthcare education programs that have women's cardiovascular health noted in their curricula. The majority were accredited programs and were being delivered in the USA or Canada. Over 40% of healthcare programs that responded to our survey did not include women-specific cardiovascular health content in their curricula; of those that did, chest pain and risk assessment were the most commonly included topics.

Our study findings are consistent with previous assessments of sex and gender content in general medical school curricula. A study of undergraduate medical school curricula identified that, despite a growing evidence base, the content taught was not sufficient for medical students to truly understand the relationships between sex and gender and their influence on health outcomes.²⁴ In a 2011 survey of over 40 medical schools in Canada and the USA, the majority of schools (70%) did not formally include sex- or gender-specific content in their curriculum.⁸ A more recent (2021) analysis of

course content of 16 Canadian medical schools found that women's health content was scarce.²⁵ In our survey, a main barrier noted to including sex- and gender-related content in healthcare curricula was a lack of time.

Multiple calls to action aimed at improving health equity for women have been published, recommending the inclusion of sex-specific content in clinical education and an emphasis on sex-specific or sex-predominate cardiovascular risk factors.^{2,26-28} Although knowledge deficits remain with respect to the diagnosis and treatment of women's CVD, this study identified that some emerging educational programs do aim to mitigate these gaps across many healthcare disciplines. In addition to medical programs, nursing and other allied health programs are beginning to incorporate content focused on women's heart health topics. Our review found evidence of women's CVD-related content being integrated into clinical and research fellowship programs, which will likely play a key role in raising awareness, facilitating advocacy, and helping reduce the knowledge gap around women's CV health.^{22,23}

Identification of the characteristics of successful programs is crucial to effectively incorporate women's heart health content into healthcare education. Initiatives that have been shown to increase knowledge, confidence, and competency among healthcare professionals in managing women's heart health should be considered for broader adoption. However, successful changes to curricula should be based on pedagogical theories and strategies. Development of the Canadian Women's Heart Health Education Course, for instance, was guided by a 6-step approach to curriculum development for medical education.²⁶ The process starts with dissecting the existing curriculum and continues to include built-in evaluation and accreditation systems that ensure continuous learning and implementation. Engagement of students in the earliest stages of curriculum development will improve the chances of successful implementation.²⁷

Academic institutions must assign internal leaders to work with curriculum experts, student champions, and patient partners to create strategic plans for curriculum development. These strategies may include developing dedicated modules or courses on women's heart health, incorporating case studies and real-life scenarios featuring women with CVD, and implementing simulation-based training to improve practical skills. Additionally, encouraging research on sex and gender differences in CVD can further contribute to evidence-based practice. Collaboration among educators, professional

Table 4. Total number of programs in Canada, survey invitations sent, and responses received, by discipline

Discipline	Accredited schools/programs in Canada, n	Schools/programs survey was sent to, n	Responses received, n (%)
Kinesiology	49	49	18 (37)
Nursing (undergraduate)	48	48	17 (35)
Paramedic	59	59	15 (25)
Medicine (undergraduate)	17	17	10 (59)
Physical and occupational therapy	14	13	6 (46)
Midwifery	6	6	6 (100)
Respiratory therapy	17	17	4 (24)
Physician assistant	4	4	4 (100)
TOTAL	214	213	80 (38)

Valid contact information was missing for one physical and occupational therapy program.

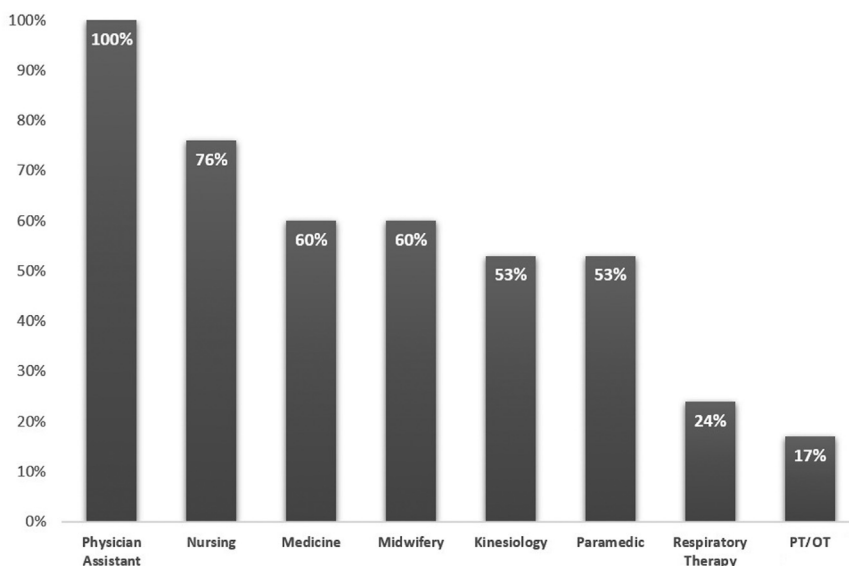


Figure 2. Proportion (%) of programs that include women's cardiovascular disease content, by discipline. PT/OT, physical therapy and occupational therapy.

organizations, policymakers, and healthcare professionals is essential to drive the necessary changes in healthcare professional education.⁸

Figure 4 summarizes recommendations for the integration of sex- and gender-specific cardiovascular health content within the education of healthcare providers. Incorporating women's heart health content is essential in training programs not only in cardiology, but also across all health professions, such as primary care, nursing, obstetrics and gynecology, internal medicine, and their subspecialties. For example, nurses are often the first point of contact for patients; thus, equipping them with the necessary education to identify and address women's needs will improve the disparity in women's heart health care. This approach would also promote interprofessional collaboration, as all specialties care for women at risk for CVD. Not only must the content gaps in initial education be

closed, but also, such measures must extend to postgraduate training. Integrating criteria related to women's cardiovascular health into clinical licensing examinations, opportunities for rotations and/or simulation training in women's CVD programs for residents and fellows, and interactive, multi-exposure, outcome-focused continuing education opportunities for practicing clinicians are important strategies for increasing knowledge and changing clinical practice.²⁸⁻³¹ Designing sex-specific content in CVD is only the first step. We also must implement evidence-based strategies for continuous evaluation and improvement. Measuring the effectiveness of integrated women's heart health education through feedback, knowledge, skill and attitude assessments, and patient outcomes is essential. Quality-improvement methods following the implementation of these interventions could guide further refinements in the programs.

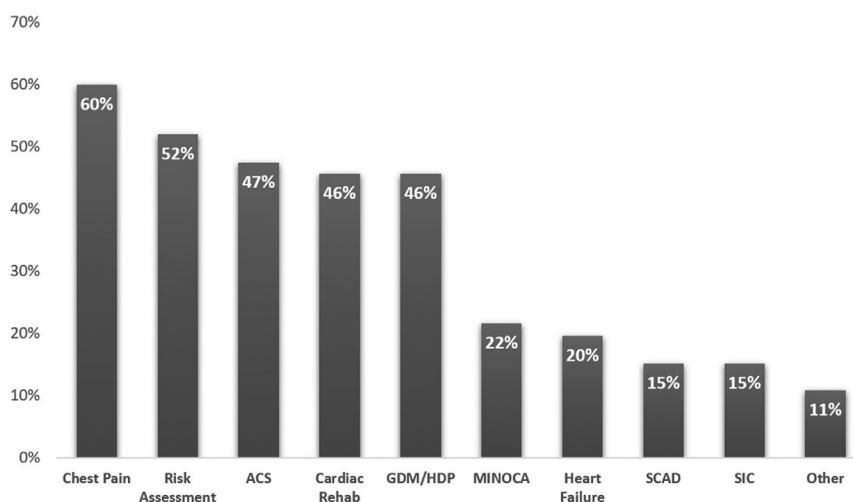


Figure 3. Women's cardiovascular disease topics included, all disciplines (% of respondents). ACS, acute coronary syndrome; GDM/HDP, gestational diabetes mellitus and/or hypertensive disorders of pregnancy; HF, heart failure; MINOCA, myocardial infarction with nonobstructive coronary arteries; Rehab, rehabilitation; SCAD, spontaneous coronary artery dissection; SIC, stress-induced cardiomyopathy.

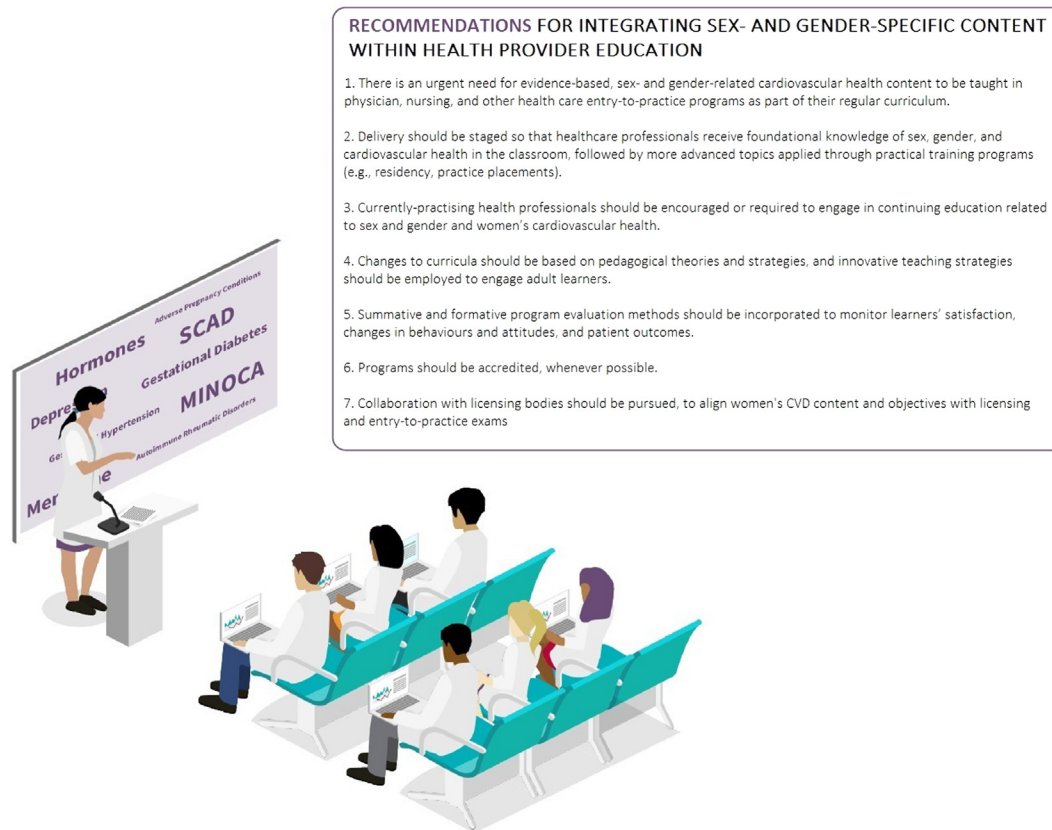


Figure 4. Recommendations for healthcare provider professional education. CVD, cardiovascular disease.

Work underway

The CWHHA has been working to raise awareness of women's CVD among healthcare professionals in a number of ways. This effort includes the CWHHA e-Course and Toolkit, which comprises 9 e-health modules (CWHHA.ca) targeting trainees in cardiology, general internal medicine, and emergency medicine. These free, accredited modules are available in both English and French. At the time of this publication, nearly 700 learners have completed the modules since their launch in the fall of 2020.

The CWHHA's "Atlas" is a collection of 9 chapters published in the *Canadian Journal of Cardiology Open*, accompanied by detailed infographics, that report on the current state of CVD in women. The aim of the CWHHA Atlas is to help clinicians and trainees recognize the unique aspects of women's heart health care and provide policymakers with the information they need to ensure equitable care for women with CVD.

Finally, the CWHHA is currently conducting a 3-year pilot project that will develop and implement a formal women's heart health curriculum for adult cardiology residency training programs in Canada.

Limitations and recommendations for further research

Although our review and survey results identified key gaps in curricula and programs that extend to clinical practice, our study has a number of limitations. Although the aim of our reviews was to identify educational programs targeted to healthcare professionals within postsecondary institutions, our search strategy

could have missed some relevant items. The grey literature search strategy may have been skewed toward identifying North American educational initiatives, by restricting it to the .ca and .edu domains, which primarily identify Canadian and American Web sites. Another possibility is that some programs that teach sex- and gender-related cardiovascular content have not published this content or explicitly listed it on their program Web sites or course documents; thus, they may have been missed. Nonetheless, at least for North America, we feel that a comprehensive search was carried out. Future work should determine whether other domains exist that are specific to educational programs in other countries. The survey of health professional programs was meant to provide an environmental scan of the state of women's CVD content within existing Canadian educational curricula. However, our findings must be interpreted with caution, as the response rate from several disciplines was relatively low. An additional possibility is that those programs that deliver content on CVD in women were more likely to respond to the survey, which would lead to an overestimation of this measure, thus further emphasizing the gap in health professionals' education in this regard. Future work is needed to expand this examination to the global landscape.

Conclusion

This review highlights the significant gap in health providers' education regarding women's heart health. Educating healthcare professionals at all levels is vital to reducing misdiagnoses and improving women's CVD outcomes. By using

evidence-based strategies and targeted interventions, medical, nursing, and allied health professional schools can integrate women's cardiovascular health into their curricula. This approach will equip healthcare professionals with the necessary knowledge, skills, and awareness to provide optimal care for women living with or at risk of developing CVD. Collaborative efforts among the healthcare professional communities, policymakers, and educators are crucial to making these changes a reality and shaping an improved Future for Women's Heart Health.

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Ethics Statement

The project was submitted to the Ottawa Health Science Network Research Ethics Board and was approved as a quality improvement initiative (Project QI-104).

Patient Consent

The authors confirm that patient consent is not applicable to this article. This is a rapid review, and no patient data are included.

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The authors have no conflicts of interest to disclose.

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Supplementary Material

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