

Original Article

# Women-Focused Cardiac Rehabilitation Delivery Around the World and Program Enablers to Support Broader Implementation

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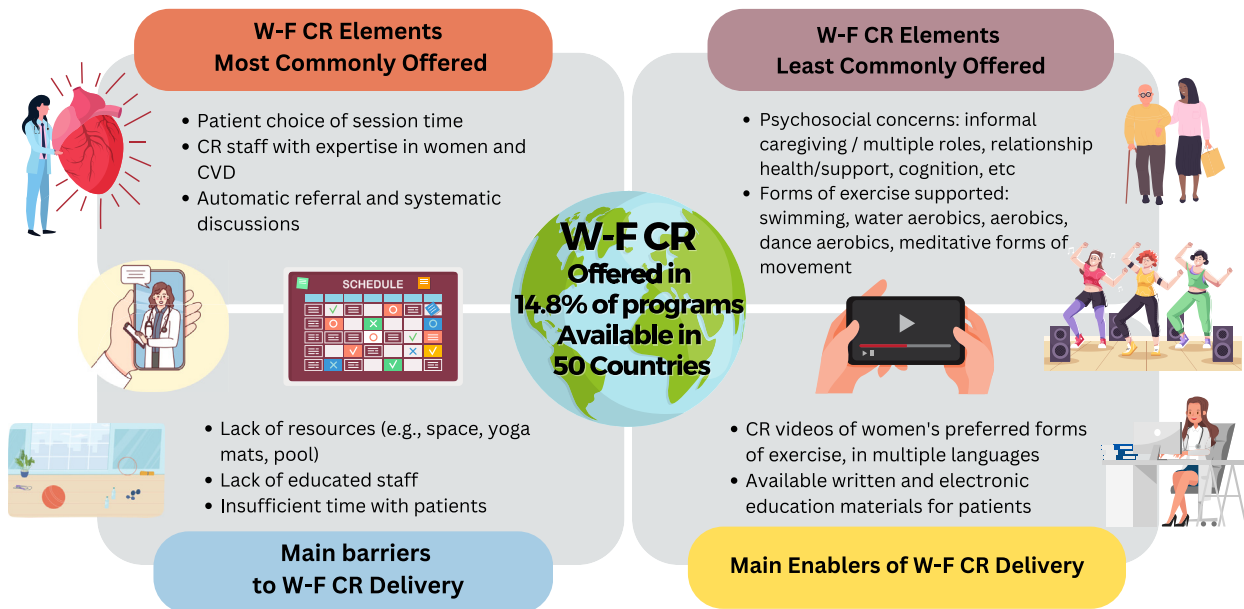
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CR, cardiac rehabilitation; CVD, cardiovascular disease; W-F, women-focused.

**ABSTRACT**

**Background:** Women are less likely than men to use cardiac rehabilitation (CR); thus, women-focused (W-F) CR was developed. Implementation of W-F CR globally was investigated, as well as barriers and enablers to its delivery.

**Methods:** In this cross-sectional study, a survey was administered to CR programs via Research Electronic Data Capture (REDCap) from May to July, 2023. Potential respondents were identified via the International Council of Cardiovascular Prevention and Rehabilitation's network.

**Results:** A total of 223 responses were received from 52 of 111 countries (46.8% country response rate) in the world that have any CR, across all 6 World Health Organization regions. Thirty-three programs (14.8%) from 30 countries reported offering any W-F programming. Programs commonly did offer elements preferred by women and recommended, namely, the following: patient choice of session time ( $n = 151$ ; 70.6%); invitations for informal care providers and/or partners to attend sessions ( $n = 121$ ; 57.1%); CR staff that have expertise in women and heart diseases ( $n = 112$ ; 53.3%); separate changerooms for women ( $n = 38$ ; 52.8%); and discussion of CR referral with patients ( $n = 112$ ; 52.1%). Main barriers to delivery of W-F exercise were physical resources ( $n = 33$ ; 14.8%), space ( $n = 30$ ; 13.5%), and staff time ( $n = 26$ ; 11.7%) and expertise ( $n = 33$ ; 10.3%). Main barriers to delivery of W-F education were human resources ( $n = 114$ ; 51.1%), educational resources ( $n = 26$ ; 11.7%), and expertise in the content ( $n = 74$ ; 33.2%). Enablers of W-F education delivery were availability of materials, in multiple modalities, as well as educated staff and financial resources.

**Conclusions:** Despite the benefits, W-F CR is not commonly offered globally. Considering the barriers and enablers identified, the International Council of Cardiovascular Prevention and Rehabilitation is developing resources to expand delivery.

**Lay Summary**

*Women are less likely than men to participate in cardiac rehabilitation (CR), but women-focused (W-F) CR could improve participation. An online survey about W-F CR, as well as factors that assist or hinder the delivery of this program, was completed by 223 CR programs in 52 countries. Results showed that only 14.8% of the programs that completed the survey offered W-F CR. Space, equipment, trained staff, and educational materials are needed to expand delivery, worldwide.*

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See page 434 for disclosure information.

**RÉSUMÉ**

**Contexte :** Les femmes étant moins susceptibles que les hommes d'avoir recours à la réadaptation cardiaque (RC), il convient d'élaborer des programmes de RC qui sont mieux adaptés à leurs besoins. Le recours à de tels programmes dans le monde a fait l'objet d'une étude, laquelle portait également sur les obstacles à leur prestation et les facteurs qui les favorisent.

**Méthodologie :** Dans cette étude transversale, un sondage a été mené auprès de programmes de RC via la REDCap (*Research Electronic Data Capture*) de mai à juillet 2023. Les participants potentiels au sondage ont été sélectionnés par le réseau de l'International Council of Cardiovascular Prevention and Rehabilitation.

**Résultats :** Au total, 223 réponses ont été reçues de 52 pays sur 111 qui ont un programme de RC (taux de réponse des pays de 46,8 %), dans les 6 régions de l'Organisation mondiale de la Santé. Selon les résultats, trente-trois programmes (14,8 %) de 30 pays offrent des services axés sur les femmes. Les programmes offraient habituellement des éléments privilégiés par les femmes et recommandaient notamment des séances au moment choisi par les patientes ( $n = 151$ ; 70,6 %); la possibilité de se faire accompagner par un aidant naturel et/ou un(e) partenaire ( $n = 121$ ; 57,1 %); du personnel de RC possédant une expertise auprès des femmes et en matière de maladies cardiaques ( $n = 112$ ; 53,3 %); des vestiaires réservés aux femmes ( $n = 38$ ; 52,8 %); et une discussion avec les patientes sur leur orientation vers des spécialistes en RC ( $n = 112$ ; 52,1 %). Les principaux obstacles à la prestation de services pour les femmes étaient les ressources physiques ( $n = 33$ ; 14,8 %), l'espace ( $n = 30$ ; 13,5 %) ainsi que la disponibilité du personnel ( $n = 26$ ; 11,7 %) et son expertise ( $n = 33$ ; 10,3 %). Les principaux obstacles à l'éducation destinée aux femmes étaient les ressources humaines ( $n = 114$ ; 51,1 %), les ressources éducatives ( $n = 26$ ; 11,7 %) et l'expertise liée au contenu ( $n = 74$ ; 33,2 %). Les facteurs qui favorisent l'éducation destinée aux femmes étaient la disponibilité du matériel, sous plusieurs formes, de même que le personnel formé et les ressources financières.

**Conclusions :** En dépit des bienfaits, la RC axée sur les femmes n'est pas couramment offerte dans le monde. En tenant compte des obstacles et des facteurs favorisant la prestation des services cités, l'International Council of Cardiovascular Prevention and Rehabilitation s'affaire à concevoir des ressources pour élargir la portée des programmes destinés aux femmes.

Cardiovascular disease (CVD) prevalence in women is high globally,<sup>1</sup> which leads to a great burden of disability, and CVD is their leading cause of death.<sup>2</sup> Cardiovascular rehabilitation (CR) is an outpatient model of secondary preventive care proven to mitigate this burden.<sup>3</sup> In CR, core components that are internationally agreed on, such as atherosclerotic disease risk factor management, structured exercise, patient education, and counselling,<sup>4</sup> are delivered by a multidisciplinary team over on average of 24 sessions.<sup>5</sup> CR participation results in 20% reductions in mortality and morbidity,<sup>6</sup> as well as improvements in quality of life<sup>7</sup>; the benefits of CR are known to extend to women as well.<sup>8</sup>

Nevertheless, significantly fewer women than men access CR,<sup>9</sup> and those that do are less likely to complete the program.<sup>10</sup> CR barriers are multifactorial, and they have been characterized recently in women globally.<sup>11</sup> These barriers include lack of awareness of CR, cost, distance, transportation, family responsibilities and other time conflicts, as well as

finding exercise tiring or painful.<sup>11,12</sup> One of the key strategies identified to overcome women's barriers is to offer women-focused (W-F) CR,<sup>13</sup> namely (i) sessions with > 50% women participants (eg, women-only); and/or (ii) components tailored to meet women's needs or preferences (eg, comprehensive psychosocial programming, women-specific education content, and/or preferred forms of exercise); (iii) in the modality of their choice (eg, unsupervised).<sup>14</sup> According to the International Council of Cardiovascular Prevention and Rehabilitation (ICCP; [globalcardiacrehab.com](http://globalcardiacrehab.com))'s Global Audit of CR (2016/2017),<sup>15</sup> women-only CR classes are offered in an estimated 41 of the 111 of 203 countries (37.0%) globally that have any CR; 32.1% of programs in those countries offered women-only CR, or 686 of the almost 6000 programs worldwide. Generally, only larger academic programs in the West and those in the Eastern Mediterranean offered women-only CR. No details on W-F CR elements were investigated through the survey.<sup>16</sup>

ICCP recently developed the first Clinical Practice Guidelines on W-F CR, forwarding 15 recommendations related to the referral, setting, and delivery of W-F CR, including that education comprise topics specific to women.<sup>17</sup> Whether and how CR programs globally tailor any aspects of delivery for women participants in line with these recommendations are unknown. Therefore, the objectives of this study were to investigate the following factors: (i) the level of implementation of W-F CR by programs around the globe; (ii) barriers to delivery of W-F CR; and (iii) what CR programs would want and need to apply the recommendations, particularly with regard to patient education and counselling.

## Methods

### Design and procedure

This study was cross-sectional in design. The study was undertaken by the ICCPR and approved by York University's Office of Research Ethics (e2023-165; Toronto, Canada). Respondents consented to participate online, and responses were confidential.

An invitation to complete the survey was sent to all ICCPR member associations (43, and 17 key leaders in countries with no CR-related associations) and was shared via ICCPR's mailing list (ie, e-mails of 2000 people who work in CR around the globe) and social media channels (approximately 3000 followers across Twitter, Instagram, LinkedIn, and Facebook). The survey also was advertised at some national CR conferences that were held during the period of recruitment.

Data were collected from May to July 2023 via an online survey administered through the **Research Electronic Data Capture (REDCap)** platform hosted at York University (Toronto, Canada).<sup>18</sup> The survey was available in English only, but respondents were instructed to use Web browser-embedded translation software if English was not their first language.

### Participants

The sample comprised phase II outpatient secondary prevention programs that offer at minimum the following elements: (i) initial assessment; (ii) structured exercise (supervised

or unsupervised); and (iii) at least one other core CR component to address cardiovascular risk factors. The CR program manager was requested to complete the survey if possible.

Countries were categorized by World Health Organization (WHO) region.<sup>19</sup> To understand the representativeness of the sample, responses were compared to results from ICCPR's Global Audit of CR programs,<sup>20</sup> including the availability of W-F programs.<sup>16</sup>

### Measures

A 25-item questionnaire was developed by the investigators to examine the objectives of this study (**Supplemental Appendix S1**). The questionnaire comprised 3 sections: (i) CR program characteristics; (ii) delivery of W-F CR, including barriers; and (iii) delivery of patient education, including enablers for W-F education. The items had forced-choice (some were "select all that apply") and open-ended response options, and skip-logic (ie, a feature that changes what questions respondents need to answer next based on their responses) was used to get more detail when applicable. The survey was piloted with a few centres from Canada and Brazil, and minor changes were then made to the survey.

### Data analysis

Data were exported to SPSS, version 28 (IBM, Armonk, NY), with which all analyses were performed. All initiated surveys that had at least one response were included. The number of responses for each question varied due to missing data (eg, respondent did not answer a question due to inapplicability, skip-logic, or other reasons); for descriptive analyses, percentages were computed using the number of valid responses for the specific item as the denominator. Descriptive statistics (eg, frequency with percentage) were applied for all closed-ended items in the survey. All open-ended responses were coded.<sup>21</sup>

## Results

### Global response and overall characteristics

Overall, 223 surveys that were at least partially completed were received; country was identified in 212 (95.1%). As shown in **Table 1**, responses were received from at least 52 (46.8%) of the approximately 111 countries in the world with CR, covering all 6 WHO regions.

**Figure 1** presents a map illustrating countries where survey responses were received, in relation to those that have any women-only CR in available programs. Responses were received from programs in 25 of the 41 countries (61.0%) identified to have any women-only CR in ICCPR's Global Audit.<sup>16</sup> Overall, 163 respondents (73.1%) identified as female.

Programs reported having the capacity to serve a median of 250 (quartile [Q]25-75 = 100-500) patients per year, with an estimated median percentage of 30.0% of program participants identifying as women (Q25-75 = 21.5-40.0).

### W-F CR delivery

**Table 2** displays modes of CR delivery offered, including remote and asynchronous modalities that are often preferred

**Table 1. Cardiac rehabilitation (CR)–related characteristics of countries with survey respondents and response rate, N = 52**

WHO region Country	Number of CR programs*	CR density*,†	Number of women-only CR programs‡	Number of survey responses (response rate, %)
<b>African</b>				
Kenya	3	368	0	1 (33.3%)
Cameroon	0	25,761	0	2 (NA)
<b>Americas</b>				
Argentina	23	3	0	1 (0.1)
Barbados	1	13	0	1 (100.0)
Brazil	75	98	2	17 (23.0)
Canada	170	2	7	29 (17.1)
Chile	10	23	1	1 (10.0)
Colombia	50	4	3	13 (26.0)
Costa Rica	6	12	0	3 (50.0)
Cuba	8	35	0	1 (12.5)
Curacao	2	NA	0	1 (50.0)
Guatemala	2	114	0	1 (50.0)
Honduras	2	274	0	1 (50.0)
Mexico	24	27	0	3 (12.5)
Panama	1	63	0	1 (100/0)
Paraguay	3	25	1	2 (66.7)
Peru	10	20	0	1 (10.0)
United States of America	2685§	3	4	9 (0.3)
Venezuela	9	31	0	1 (11.1)
<b>Eastern Mediterranean</b>				
Iran	34	15	34	2 (6.0)
Pakistan	4	104	1	4 (100.0)
Saudi Arabia	1	335	1	1 (100.0)
<b>European</b>				
Belgium	48	5	0	1 (2.1)
Croatia	3	9	0	1 (33.3)
Czech Republic	15	22	1	1 (7.0)
Denmark	35	3	0	1 (2.9)
France	130	4	1	3 (2.3)
Georgia	17	2	1	1 (9.0)
Germany	120	4	5	1 (0.8)
Greece	4	153	3	1 (25.0)
Hungary	33	4	2	2 (6.1)
Ireland	37	1	0	4 (11.0)
Italy	221	5	12	5 (2.3)
Moldova	1	53	0	1 (100.0)
Poland	56	11	1	1 (1.8)
Serbia	2	13	1	1 (50.0)
Spain	87	17	3	17 (19.5)
United Kingdom			3	
England	266	2	—	15 (5.6)
Northern Ireland	13	3	—	1 (7.7)
Scotland	69	1	—	2 (2.9)
Wales	17	2	—	4 (23.5)
<b>South-East Asian</b>				
India	23	360	2	9 (39.1)
Indonesia	13	51	1	3 (23.1)
<b>Western Pacific</b>				
Australia	314	1	1	28 (9.0)
Japan	325	5	0	1 (0.3)
Malaysia	6	58	1	1 (16.7)
Mongolia	1	21	0	1 (100.0)
New Zealand	43	2	2	2 (4.7)
Philippines	10	39	0	4 (40.0)
Singapore	7	5	0	2 (29.0)
South Korea	17	22	0	1 (5.9)
<b>Total</b>	-	-	-	<b>212  </b>

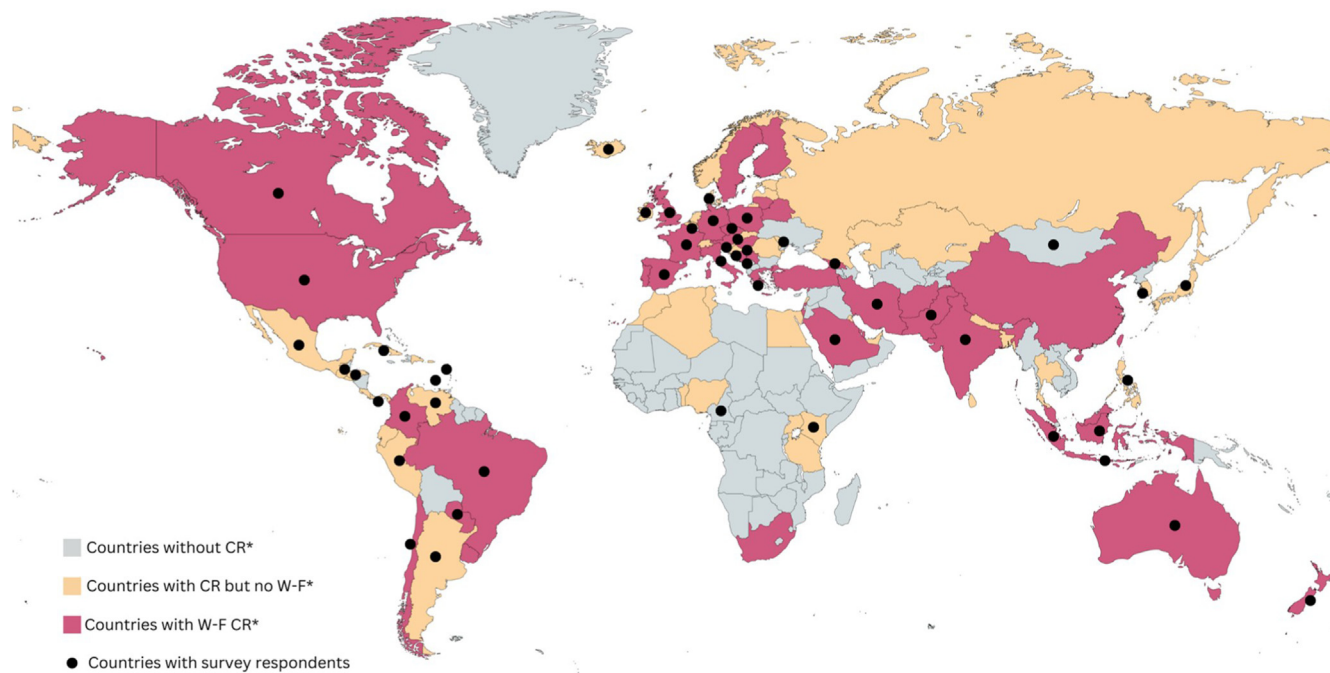
ICCPR, International Council of Cardiovascular Prevention and Rehabilitation; NA, not available; WHO, World Health Organization.

\* Based on ICCPR Global Audit.<sup>18</sup>

† One spot per number of incident ischemic heart patients shown per year. 21 (9.4%) respondents did not state their country.

‡ Based on ICCPR Global Audit.<sup>15</sup>

§ Received updated information regarding number of programs in country since ICCPR Global Audit.



**Figure 1.** Map of countries with programs that participated in the study, by availability of cardiac rehabilitation (CR) and women-focused (W-F) CR. \*Based on the International Council of Cardiovascular Prevention and Rehabilitation’s (ICCPR) Global Audit.<sup>20</sup>

by women as a means to overcome their time-related, as well as distance-related and transportation-related, barriers. Programs were most commonly delivered in-person in a group format, or via phone calls. Programs in the African and Eastern Mediterranean regions less commonly delivered virtual and group sessions. Asynchronous delivery was uncommon.

Overall, 33 programs (14.8%) from 30 countries (5 of 6 WHO regions) reported offering any W-F programming (ie, women-specific education, preferred exercise modalities, peer support groups for women and/or with women-only sessions).<sup>14</sup> Countries newly identified as offering some form of W-F CR programming through this survey were as follows: Argentina, Guatemala, Honduras, Mexico, Mongolia, Panama, Republic of Moldova, Singapore, and Venezuela. Overall then, Europe and the Americas offer W-F CR more commonly than do other regions (Fig. 1).

The proportions of programs offering the guideline-recommended elements of W-F CR<sup>17</sup> are shown in Table 3. Most programs did have at least one staff member who identified as a woman, with half having someone on staff with expertise regarding women and CVD. Almost three-quarters of programs offered patient choice of session timing. Just over half of the programs reported that someone discussed CR referral with patients either in person or on the phone (and just less than half had automatic CR referral), invited informal caregivers or partners to sessions, and had separate changerooms for women. About one-third of programs considered women’s context and other gender-related matters in the initial assessment, and the same proportion addressed the main psychosocial concerns relevant to women with CVD. Few offered women’s preferred forms of exercise, with the exception of South-East Asia offering more yoga, and the same

region as well as the Eastern Mediterranean and the Americas offering walking on a track or outside vs on a treadmill.

When asked about what they would need to change in their program to better address the needs and preferences of patients who identify as women, program respondents reported the following factors: space and/or location (n = 49); extra staff (n = 44); more comprehensive components for women (ie, psychosocial, nutrition; n = 32); facilities and equipment (n = 31); time for extra classes (n = 18); available W-F content to deliver (n = 14); more government funding and/or subsidy so women can afford the program (n = 13); staff training (n = 12); more referral of women (n = 12); women’s place in society and/or their multiple roles (n = 9); and ability to offer women’s preferred exercise modes (eg, yoga; n = 9), among others.

### Characteristics of patient education and W-F tailoring

Programs reported delivering a median of 7 patient education sessions per patient in a complete program (Q25-75 = 3-12), with an average duration of 38.3 ± 21.3 minutes per session (range: 2-100 minutes per session; longest duration in European [mean = 43.5 ± 20.7 minutes], Western Pacific [mean = 42.4 ± 22.0 minutes] and American [mean = 35.9 ± 21.7 minutes] WHO regions). Exercise professionals (eg, physiotherapists, exercise specialists, and kinesiologists) were delivering most of the education (n = 170; 76.2%), followed by nurses (n = 139; 62.3%), dietitians (n = 135; 60.5%), and doctors (n = 102; 45.7%).

Table 2 presents details about the mode of delivery of patient education, overall and by WHO region. Patient education was mostly delivered in coed in-person group sessions, followed by informal and formal 1-1 discussions with patients.



**Table 2. Models of cardiac rehabilitation (CR) delivery, as well as modes of content and patient education delivery, overall and by World Health Organization (WHO) region (N = 223)**

Model or mode	WHO region						
	Overall (N = 223)	African (n = 3)	Americas (n = 86)	Eastern Mediterranean (n = 7)	European (n = 64)	South-East Asian (n = 12)	Western Pacific (n = 40)
<b>Models of CR delivery</b>							
In-person	185 (83.0)	2 (66.7)	74 (86.0)	6 (85.7)	48 (75.0)	11 (91.7)	37 (92.5)
Virtual (eg, via phone or computer)	102 (45.7)	0 (0.0)	36 (41.9)	1 (14.3)	28 (43.8)	7 (58.3)	27 (67.5)
Group	163 (73.1)	1 (33.3)	61 (70.9)	2 (28.6)	52 (81.3)	8 (66.7)	32 (80.0)
Individual	124 (55.6)	1 (33.3)	48 (55.8)	6 (85.7)	30 (46.9)	11 (91.7)	24 (60.0)
Asynchronous	23 (10.3)	0 (0.0)	15 (17.4)	0 (0.0)	4 (6.3)	2 (16.7)	1 (2.5)
Other	8 (3.6)	0 (0.0)	3 (3.5)	0 (0.0)	5 (7.8)	0 (0.0)	0 (0.0)
<b>Forms of communication and/or content delivery modes</b>							
In-person / onsite visit	197 (88.3)	3 (100.0)	75 (87.2)	6 (85.7)	54 (84.4)	11 (91.7)	39 (97.5)
Phone call (landline or mobile)	165 (74.0)	3 (100.0)	62 (72.1)	5 (71.4)	46 (71.9)	7 (58.3)	34 (85.0)
E-mail	103 (46.2)	0 (0.0)	41 (47.7)	2 (28.6)	31 (48.4)	5 (41.7)	23 (57.5)
Internet Web page (s) with text	101 (45.3)	1 (33.3)	40 (46.5)	3 (42.9)	28 (43.8)	6 (50.0)	21 (52.5)
Internet Web page (s) with embedded video	76 (34.1)	1 (33.3)	29 (33.7)	1 (14.3)	23 (35.9)	5 (41.7)	15 (37.5)
Text messages (eg, WhatsApp)	76 (34.1)	2 (66.7)	30 (34.9)	3 (42.9)	18 (28.1)	5 (41.7)	12 (30.0)
Webcam video session 1-1	57 (25.6)	0 (0.0)	25 (29.1)	1 (14.3)	8 (12.5)	7 (58.3)	14 (35.0)
Webcam—group synchronous / live	52 (23.3)	0 (0.0)	22 (25.6)	1 (14.3)	11 (17.2)	5 (41.7)	11 (27.5)
Smartphone app	41 (18.4)	0 (0.0)	14 (16.3)	2 (28.6)	11 (17.2)	5 (41.7)	9 (22.5)
Podcasts	9 (4.0)	0 (0.0)	3 (3.5)	1 (14.3)	6 (9.4)	3 (25.0)	0 (0.0)
Other	10 (4.5)	0 (0.0)	4 (4.7)	1 (14.3)	4 (6.3)	1 (8.3)	0 (0.0)
<b>Mode of delivery of patient education</b>							
Group sessions (coed) in-person	155 (69.5)	2 (66.7)	59 (68.6)	3 (42.9)	42 (65.6)	9 (75.0)	30 (75.0)
Informal 1-1 discussions with patients (eg, while they are exercising)	150 (67.3)	1 (33.3)	62 (72.1)	3 (42.9)	39 (60.9)	10 (83.3)	28 (70.0)
1-1 sessions in-person	145 (65.0)	3 (100.0)	53 (61.6)	5 (71.4)	38 (59.4)	9 (75.0)	30 (75.0)
Online educational resources for patients to view/download for asynchronous review (eg, videos, podcasts, written materials); e-mailing or mailing educational resources	108 (48.4)	2 (66.7)	41 (47.7)	3 (42.9)	32 (50.0)	6 (50.0)	22 (55.0)
Phone-based sessions (individual or group coed)	75 (33.6)	1 (33.3)	27 (31.4)	2 (28.6)	18 (28.1)	5 (41.7)	19 (47.5)
Virtual real-time/live sessions (group coed)	54 (24.2)	2 (66.7)	26 (30.2)	2 (28.6)	7 (10.9)	4 (33.3)	12 (30.0)
Virtual real-time/live interactive session (1-1)	47 (21.1)	0 (0.0)	21 (24.4)	3 (42.9)	7 (10.9)	4 (33.3)	11 (27.5)
Women-only group—in-person	25 (11.2)	0 (0.0)	11 (12.8)	2 (28.6)	6 (9.4)	2 (16.7)	1 (2.5)
Women-only group—online or on the phone	11 (4.9)	0 (0.0)	6 (7.0)	1 (14.3)	1 (1.6)	1 (8.3)	1 (2.5)
We do not offer formal education	16 (7.2)	1 (33.3)	8 (9.3)	0 (0.0)	2 (3.1)	1 (8.3)	3 (7.5)

Values are frequency (percentage) of valid responses shown, where respondents could check all that apply. Coed indicates inclusion of both men and women.

Approximately half of programs did have online educational resources for asynchronous review, and this finding was quite consistent across all global regions. Women-only group education was delivered in person by approximately 10% of programs, and online by 5%.

The education content covered most commonly was exercise (ie, safety, prescription, monitoring, benefits), CVD risk factors (eg, hypertension, dyslipidemia, diabetes, tobacco use), and heart-healthy diet. Of the educational topics delivered, cardiac signs and symptoms and/or emergencies (n = 14; 6.3%), cardiovascular risk factors (n = 12; 5.4%) and psychosocial health (n = 11; 4.9%) were reported to be those most commonly tailored to women; topics least commonly tailored to women were cardiac medications (n = 3; 1.3%) and heart interventions (n = 4; 1.2%).

Figure 2 illustrates the delivery of information related to women and secondary prevention of CVD by programs. The

topics covered most commonly were nutrition and body image in women, myocardial infarction as well as ischemia with nonobstructive coronary arteries (MINOCA/INOCA), and heart failure with preserved ejection fraction in women. The topics programs were most interested in covering were menopause/hormonal therapy, unique considerations for exercise in women, comorbidities more common in women, CVD tests and treatments in women, CVD risk factors that are unique or more hazardous in women, and more in-depth psychosocial topics; no other topics were suggested. The topics that were most often considered to be unimportant and/or infeasible to cover were CVD in transgender and/or nonbinary individuals.

### Barriers to W-F CR delivery

Table 4 presents barriers to delivery of the W-F CR components, overall and by WHO region, of exercise and

**Table 3. Women-focused cardiac rehabilitation (CR) delivery,\* overall and by WHO region**

CR delivery	Overall (N = 223)	WHO region					
		African (n = 3)	Americas (n = 86)	Eastern Mediterranean (n = 7)	European (n = 64)	South-East Asia (n = 12)	Western Pacific (n = 40)
<b>Automatic CR referral</b>	95 (44.6)	0 (0.0)	38 (45.2)	5 (83.3)	23 (39.0)	7 (63.6)	19 (48.7)
<b>Discuss CR referral with patients</b>							
Yes, inform and discuss barriers in person or on the phone	112 (52.1)	1 (33.3)	40 (47.6)	4 (66.7)	33 (55.0)	8 (66.7)	23 (59.0)
Yes, inform only (can include written materials)	31 (14.4)	0 (0.0)	13 (15.5)	0 (0.0)	10 (16.7)	2 (16.7)	5 (12.8)
No, this doesn't happen systematically and/or only for some patients	71 (33.0)	2 (66.7)	30 (35.7)	2 (33.3)	17 (28.3)	2 (16.7)	11 (28.2)
<b>Any staff who identify as female on team</b>	189 (87.5)	2 (66.7)	73 (86.9)	5 (83.3)	52 (85.2)	10 (83.3)	38 (97.4)
<b>Any CR staff with expertise in women and CVDs</b>	112 (53.3)	2 (66.7)	46 (55.4)	2 (40.0)	31 (53.4)	8 (66.7)	17 (43.6)
<b>Separate changeroom for women</b>	38 (52.8)	0 (0.0)	14 (46.7)	2 (50.0)	13 (65.0)	2 (33.3)	4 (57.1)
<b>Patient choice of program model (eg, virtual, asynchronous)</b>	88 (39.6)	0 (0.0)	31 (36.0)	1 (14.3)	22 (34.9)	7 (58.3)	25 (62.5)
<b>Patient choice of session time</b>	151 (70.6)	3 (100.0)	66 (78.6)	6 (100.0)	34 (57.6)	12 (100.0)	25 (64.1)
<b>Informal care providers and/or partners invited to sessions</b>							
Yes	121 (57.1)	0 (0.0)	50 (60.2)	3 (50.0)	28 (48.3)	7 (58.3)	26 (66.7)
Only for coed or 1-1 sessions	25 (11.8)	2 (66.7)	6 (7.2)	1 (16.7)	9 (15.5)	2 (16.7)	5 (12.8)
<b>Women's context, clinical history, comorbidities considered at initial assessment</b>							
Yes	47 (21.1)	0 (0.0)	19 (22.1)	1 (14.3)	15 (23.4)	4 (33.3)	4 (10.0)
Partially	26 (11.7)	0 (0.0)	12 (14.0)	3 (42.9)	5 (7.8)	2 (16.7)	3 (7.5)
<b>Women-only program offerings</b>							
Some "only-women" sessions	25 (11.2)	0 (0.0)	10 (11.6)	2 (28.6)	9 (14.1)	1 (8.3)	2 (5.0)
Some "mostly-women" sessions	9 (4.0)	0 (0.0)	2 (2.3)	0 (0.0)	5 (7.8)	0 (0.0)	2 (5.0)
Only- or mostly-women program	6 (2.7)	0 (0.0)	4 (4.7)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
<b>Forms of exercise supported (onsite or virtual)</b>							
Walking or jogging on indoor or outdoor track	47 (21.1)	0 (0.0)	20 (23.3)	2 (28.6)	10 (15.6)	5 (41.7)	5 (12.5)
Meditative forms of movement (eg, yoga)	21 (9.4)	0 (0.0)	9 (10.5)	0 (0.0)	5 (7.8)	4 (33.3)	1 (2.5)
Aerobics or dance aerobics (eg, Zumba)	14 (6.3)	0 (0.0)	6 (7.0)	0 (0.0)	5 (7.8)	1 (8.3)	2 (5.0)
Swimming, water aerobics	5 (2.2)	0 (0.0)	0 (0.0)	0 (0.0)	2 (3.1)	0 (0.0)	3 (7.5)
Support preferred forms of exercise in community if cannot within program	27 (12.1)	0 (0.0)	14 (16.3)	1 (14.3)	6 (9.4)	1 (8.3)	3 (7.5)
Treadmill or cycle ergometer only <sup>†</sup>	69 (30.9)	0 (0.0)	29 (33.7)	4 (57.1)	19 (29.7)	6 (50.0)	7 (17.5)
<b>Psychosocial concerns addressed in program</b>							
Stress	67 (30.0)	0 (0.0)	28 (32.6)	4 (57.1)	18 (28.1)	5 (41.7)	7 (17.5)
Depression	66 (29.6)	0 (0.0)	28 (32.6)	4 (57.1)	18 (28.1)	5 (41.7)	6 (15.0)
Anxiety	64 (28.7)	0 (0.0)	26 (30.2)	4 (57.1)	18 (28.1)	5 (41.7)	6 (15.0)
Sleep quality	56 (25.1)	0 (0.0)	24 (27.9)	3 (42.9)	15 (23.4)	4 (33.3)	5 (12.5)
Social support/ peer support	51 (22.9)	0 (0.0)	23 (26.7)	3 (42.9)	13 (20.3)	4 (33.3)	6 (15.0)
Cognitive issues	34 (15.2)	0 (0.0)	12 (14.0)	1 (14.3)	10 (15.6)	4 (33.3)	6 (15.0)
Sexual well-being	33 (14.8)	0 (0.0)	14 (16.3)	2 (28.6)	10 (15.6)	2 (16.7)	1 (2.5)
Intimate relationship health	32 (14.3)	0 (0.0)	13 (15.1)	2 (28.6)	10 (15.6)	2 (16.7)	4 (10.0)
Informal caregiving provision	23 (10.3)	0 (0.0)	11 (12.8)	1 (14.3)	6 (9.4)	2 (16.7)	2 (5.0)

Values are frequency (valid percentage) affirmative responses.

CVD, cardiovascular disease; WHO, World Health Organization.

\*Based on recommendations in women-focused CR guidelines.<sup>16</sup>

†Not women-focused.

education. The main barriers faced in delivering women's preferred forms of exercise were lack of physical resources (eg, yoga mats and pool), space, and staff time and expertise to deliver these forms of exercise. Except for lack of staff time, these issues were more prevalent in the Eastern Mediterranean.

In regard to delivering women-tailored patient education (Table 4), many more programs reported barriers than they did for exercise modalities. The main barriers programs faced were insufficient staff and/or human resources (over half of respondents), lack of women-tailored educational resources, lack of expertise in the content areas, and insufficient time

with patients. These issues were particularly problematic in some regions, such as Africa, and were often problematic in the Western Pacific and Eastern Mediterranean. The other barrier raised by several programs was not having enough women in the program to justify separate education.

### Program supports or enablers to deliver W-F CR

The majority of respondents (n = 141; 63.2%) reported that if recorded videos targeted to women and supporting them in engaging in their preferred forms of exercise (eg,

prerecorded cardio dance classes at basic and moderate levels) were made available in the language most commonly spoken by their participants, their program would offer them to women participants. Those that reported they would not use such videos explained that the reasons were concerns over the safety of unsupervised exercise, limited time to add one more resource into their programming, and cost to program and/or whether the care would be covered.

If programs had the resources, respondents perceived that the mode to deliver W-F education that would be most feasible for programs and most well-received by patients are as follows: written materials patients could print or download from the Web ( $n = 139$ ; 62.3%); brief recorded videos ( $n = 137$ ; 61.4%); lecture slides with discussion points ( $n = 130$ ; 53.8%); peer group discussions without CR staff online and/or in person ( $n = 81$ ; 36.3%); podcasts ( $n = 56$ ; 25.1%); and asynchronous resources only ( $n = 24$ ; 10.8%). These preferences were consistent across all WHO regions.

Finally, to implement W-F education (open-ended item), programs perceived that they would need the following components, among others: evidence-based materials ( $n = 39$ ); availability of materials in multiple modes ( $n = 23$ ); funding ( $n = 16$ ); staff time ( $n = 15$ ); staff education ( $n = 13$ ); materials in patient's preferred language ( $n = 11$ ); availability of materials appropriate for lay audience ( $n = 8$ ); and technology support for women and/or the program ( $n = 6$ ).

## Discussion

Despite their high CVD burden and great need for secondary prevention, women are underrepresented in CR. W-F CR is tailored to meet women's needs, and it has been established to result in improved outcomes, such as quality of life, as compared to traditional CR with men and women.<sup>13</sup> Through this study, for the first time, CR programs globally were surveyed regarding the implementation of W-F programming, with responses received from almost half of the countries in the world with CR, across all 6 WHO regions. Only 14% of respondent programs reported offering any W-F programming, namely, including some women-only sessions or tailored education, exercise, or psychosocial counselling; given that program staff who were interested in W-F CR were more likely to participate in this study, this finding suggests that W-F programming is scantily available. Considering the countries newly identified as offering W-F CR, through this study, along with the results of ICCPR's Global Audit,<sup>16</sup> the estimated number of countries that deliver any W-F CR worldwide is 50 of the 111 countries with CR (45%; 55% of all). Programs in these countries can serve as models to expand W-F offerings to other programs, leveraging the enablers identified through this study, but also with consideration of the barriers.

Encouraging findings, however, are that program respondents did report offering many guideline-recommended W-F elements<sup>17</sup>—most commonly giving patients a choice of session timing—with about half reporting providing automatic CR referral and informing women of CR to overcome gender biases, having CR staff with expertise in women and CVD, having a separate changeroom for women, and including informal caregivers and/or partners in sessions. Most programs did have women on staff, which is likely due

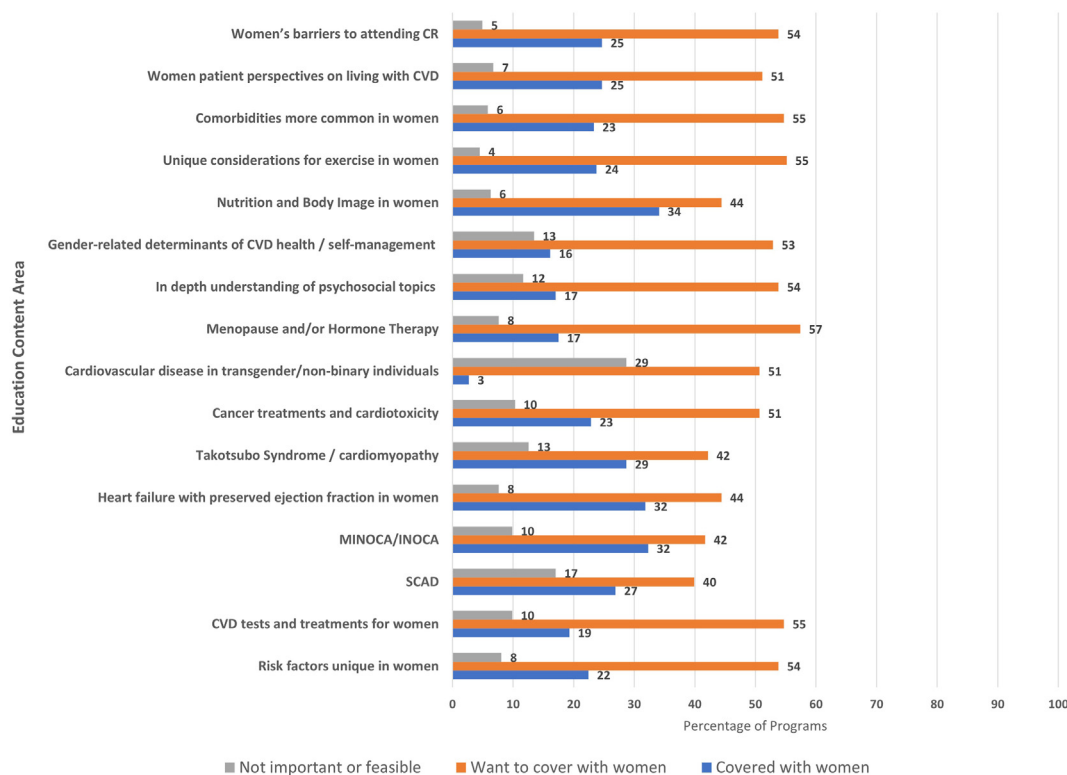
to the fact that more women than men work in the caring professions.<sup>22</sup> In only approximately one-third of programs were patients given a choice of program model, or were women's context and full history considered in their initial assessment. Most programs were unable to offer forms of exercise preferred by women, such as swimming or water aerobics, aerobics or dance aerobics, and meditative forms of movement. Women-only sessions for any CR component were rare. The amount of counselling regarding psychosocial issues of concern to women was low, particularly relating to the challenges of informal caregiving provision and/or women's multiple roles (which can conflict with self-management needs), relationship well-being and supports, and cognitive issues known to be particularly relevant for women.<sup>23</sup> Considerable variation was found in delivery of W-F CR elements across the 6 WHO regions, however, with some areas providing more delivery.

Foremost, results of this study underscore the need to get more women into CR<sup>9</sup>; respondents reiterated that they have few women in their programs and thus, they have not tailored their programs to women. The finding that about half of programs reported providing automatic referral and systematic discussions with patients about such referral is encouraging, as this factor will be the most impactful, followed by tailoring programs so that women are supported through to completion.<sup>24</sup> Moreover, informing women of W-F programming, where available, at the bedside may further entice them to join.<sup>25</sup>

The modality of aerobic exercise can affect women's enjoyment and hence adherence.<sup>26</sup> Therefore, providing their preferred types of exercise, such as yoga and dance,<sup>27</sup> is important, although additional research is needed to confirm the effects of these exercise types on cardiovascular health.<sup>28,29</sup> The level of delivery of women's preferred forms of exercise was low, but programs did not highly endorse barriers to such delivery. Although more research in this area clearly is needed, the main challenges programs reported were lack of physical resources (eg, yoga mats, pool), lack of space, and lack of staff time and expertise to deliver these forms of exercise. Musculoskeletal issues disproportionately affect women, and staff should be aware of this when discussing modality and developing exercise prescriptions.<sup>30</sup> Women also should be given flexibility to schedule exercise sessions in their preferred mode, owing to their multiple-role obligations.

With regard to education, the low number of education sessions, at 7 per program, does not leave much time for needed W-F content. Globally, although wide variation exists, programs offer a median of 24 supervised and 6 home-based sessions, including only 5 hours of patient education.<sup>31</sup> Given the number of minutes per education session reported herein, this finding is consistent with results from ICCPR's Global audit of CR. As engaging women to come back for more sessions is a challenge, given all their legitimate barriers,<sup>11</sup> a few approaches may help. First, assessing the amount and accuracy of women's existing knowledge regarding secondary prevention of CVD,<sup>32</sup> as well as their information needs and preferences,<sup>33</sup> can inform prioritization of education content, and clarify what content could be skipped. ICCPR offers such an assessment online for patients, in multiple languages (<https://globalcardiacrehab.com/Patients-INCR>). Moreover, asynchronous, virtual content





**Figure 2.** Education content areas delivered by programs and importance for tailoring to women; N = 223. CR, cardiac rehabilitation; CVD, cardiovascular disease; INOCA, ischemia with no obstructed coronary arteries; MINOCA, myocardial infarction with nonobstructive coronary arteries; SCAD, spontaneous coronary artery dissection.

should be offered for women who have the needed literacy skills and technology access, to reduce use of their CR time and staff time.

Respondent programs reported considerable barriers to delivery of W-F education, with the main ones being insufficient staff and/or human resources, lack of women-tailored educational resources, and lack of expertise in the content areas. The availability of virtual education can overcome barriers related to not only the lack of resources, but also lack of staff resources and expertise. Health e-University's Cardiac College offers comprehensive, evidence-based virtual CR patient education open access in 8 languages for programs to use.<sup>34</sup> Results from this study are now being used to co-design W-F education materials, with women to be added to the platform, and available open access at no cost (Cardiac College for Women). Enablers of delivery for programs are being considered and satisfied where possible (eg, multiple modalities, multiple languages, lay language). Content on almost all topics shown in Figure 2 will be available, considering demand reported. Lecture slides to support CR programs to deliver W-F education sessions also have been developed and currently are undergoing evaluation.

This study has limitations, so results should be interpreted with caution. The overall response rate was low, so the representativeness of the results cannot be established without further research. The program response rate was lower than 10% in the American, European, and Western Pacific regions, so generalizability to those regions in particular is more questionable. Relatedly, cell sizes by region

were very low in many cases, and thus, they should not be overinterpreted. Similarly, due to this issue, regional differences could not be tested inferentially, and hence, they are descriptive only. Selection bias also is likely at play, with mainly programs that are interested in W-F CR delivery participating in the survey.

With regard to measurement limitations, low levels of provision of W-F psychosocial counselling, among other W-F CR elements, such as comprehensive initial assessment and choice of program model, were reported, but barriers and enablers were underexplored. Future research in this area is needed. Moreover, as the survey was investigator-generated, the reliability and validity of items are unknown. However, the survey was pilot-tested in English and non-English programs. Errors in translation software programs could occur, which may have led to discrepancies in survey responses among those whose first language was not English. Finally, socially desirable responding may have been at play, given the self-report nature of the survey and the fact that responses were not verifiable; when considered in conjunction with potential selection bias and the fact that the original ICCPR Global Audit also comprises some estimates, estimates of W-F CR delivery reported herein may be higher than is accurate.

### Conclusion

W-F CR is scantily offered worldwide, despite need. Space, physical resources, trained staff, and educational materials are

**Table 4. Barriers to delivering women-focused cardiac rehabilitation (exercise and education), overall and by World Health Organization (WHO) region**

Barriers	Overall (N = 223)	WHO region					
		African (n = 3)	Americas (n = 86)	Eastern Mediterranean (n = 7)	European (n = 64)	South-East Asian (n = 12)	Western Pacific (n = 40)
<b>Barriers to delivering women's preferred forms of exercise</b>							
Lack of physical resources (eg, yoga mats, pool)	33 (14.8)	0 (0.0)	13 (15.1)	3 (42.9)	8 (12.5)	3 (25.0)	2 (5.0)
Lack of needed space	30 (13.5)	0 (0.0)	11 (12.8)	3 (42.9)	8 (12.5)	2 (16.7)	3 (7.5)
Lack of staff time	26 (11.7)	0 (0.0)	15 (17.4)	1 (14.3)	6 (9.4)	0 (0.0)	3 (7.5)
Lack of staff expertise	23 (10.3)	0 (0.0)	13 (15.1)	2 (28.6)	3 (4.7)	0 (0.0)	3 (7.5)
Concerns about ability to monitor exercise intensity	21 (9.4)	0 (0.0)	8 (9.3)	1 (14.3)	5 (7.8)	2 (16.7)	2 (5.0)
Concerns about ability to progress exercise prescription	19 (8.5)	0 (0.0)	7 (8.1)	1 (14.3)	6 (9.4)	1 (8.3)	1 (2.5)
Lack of program staff willingness or capacity to engage in program quality improvement	16 (7.2)	0 (0.0)	6 (7.0)	0 (0.0)	3 (4.7)	1 (8.3)	2 (5.0)
Concerns about patient safety	13 (5.8)	0 (0.0)	5 (5.8)	2 (28.6)	2 (3.1)	1 (8.3)	2 (5.0)
<b>Barriers to delivering women-focused patient education</b>							
Insufficient staff and/or human resources	114 (51.1)	3 (100.0)	45 (52.3)	0 (0.0)	35 (54.7)	2 (16.7)	23 (57.5)
Lack of women-tailored educational resources to provide patients (ie, no written materials, slides, or videos to support staff in providing this to women)	107 (48.0)	3 (100.0)	46 (53.5)	3 (42.9)	24 (37.5)	4 (33.3)	24 (60.0)
Lack of expertise in the content area (s)	74 (33.2)	2 (66.7)	27 (31.4)	4 (57.1)	23 (35.9)	1 (8.3)	12 (30.0)
Insufficient time with patients—they do not come back for many sessions	71 (31.8)	2 (66.7)	29 (33.7)	4 (57.1)	19 (29.7)	3 (25.0)	11 (27.5)
Our program does not prioritize this	58 (26.0)	2 (66.7)	27 (31.4)	0 (0.0)	15 (23.4)	1 (8.3)	10 (25.0)
Lack of space at our centre	51 (22.9)	0 (0.0)	22 (25.6)	3 (42.9)	13 (20.3)	0 (0.0)	9 (22.5)
It is too much content to cover for patients and/or is overwhelming	49 (22.0)	3 (100.0)	23 (26.7)	1 (14.3)	12 (18.8)	0 (0.0)	12 (30.0)
Women have more barriers to education*	44 (19.7)	1 (33.3)	12 (14.0)	3 (42.9)	8 (12.5)	4 (33.3)	12 (30.0)

Values are n (%).

\* Examples: low health literacy, language barriers, need to be accompanied by a family member, no electronic device or Internet access to connect to education materials online.

needed to expand delivery and program comprehensiveness. Results from this survey will be used to support implementation of the W-F CR guideline recommendations, such as increasing exercise modality options and psychosocial counselling, and development of W-F educational resources. An informational page on W-F CR for providers has been added to ICCPR's Web site (<https://globalcardiacrehab.com/Women-Focused-CR-CPG>), and a module was added to ICCPR's Provider Certification<sup>35</sup> to educate staff and support broader implementation.

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### Ethics Statement

The study was undertaken by the International Council of Cardiovascular Prevention and Rehabilitation (ICCPR) and approved by York University's Office of Research Ethics (e2023-165; Toronto, Canada).

### Patient Consent

The authors confirm that a patient consent form (s) has been obtained for this article.

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### Disclosures

The authors have no conflicts of interest to disclose.

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### Supplementary Material

To access the supplementary material accompanying this article, visit *CJC Open* at <https://www.cjcopen.ca/> and at <https://doi.org/10.1016/j.cjco.2023.10.008>.