Cardiac Rehabilitation Availability and Delivery in Canada:

How does it Compare to other High-Income Countries?

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Brief Summary:
An online survey was administered to cardiac rehabilitation (CR) programs globally, with Canadian responses compared to other high-income countries (HICs). There were 182 Canadian programs, treating 250 guideline-indicated (among other) patients annually, over 40 hours, through 8/10 core components delivered by a multidisciplinary team of 6. However, there is only 1 CR spot for every 5 ischemic heart disease patients (similar to other HICs), and no Northern programs. Volumes, funding, dose, and components varied provincially.

Abstract

Background: Canada has insufficient cardiac rehabilitation (CR) capacity, yet unmet need is unknown. Moreover, Canada has CR guidelines, but whether delivery conforms has not been characterized by province/territory. This study aimed to establish (1) CR volumes, capacity and density, as well as (2) the nature of programs, and (3) compare these by (a) province/territory and (b) to other high-income countries (HICs).

Methods: In this cross-sectional study, an online survey was administered to CR programs globally. National cardiac associations were engaged to facilitate program identification where available, or local champions. Density was computed using Canada's Chronic Disease Surveillance System ischemic heart disease (IHD) incidence estimates. Twenty-eight HICs with CR were selected for comparison (N=619 programs), and multi-level analyses performed.

Results:

CR was available in 10/13 (76.9%) provinces (no programs in Canada's North), with 74 of 182 programs initiating a survey (40.7% response). Program volumes (median=250) were greatest in Ontario, but ultimately there was only 1 CR spot per 4.55 IHD patients nationally (similar in other HICs), and 186,187 more spots are needed annually.

Most programs were funded by government/hospital sources (n=48, 66.7%), but in 23 (31.5%) patients paid some or all of program costs out-of-pocket. Guideline-indicated conditions were accepted in over 90% of programs. Programs had a multidisciplinary team of 6.2±2.1 staff, offering 7.7±1.5/10 core components (varied by province, p=0.001; return-to-work offered less frequently than other HICs; p=0.03), over 42.0±26.0 hours (provincial and other HIC differences, p<.001).

Conclusion: Canadian CR capacity must be augmented, but where available, services are consistent with other HICs.

Introduction

Similar to other high-income countries (HICs), cardiovascular diseases (CVD) are among the leading burdens of disease and disability in Canada[1]. The recent and initial report from the Canadian Chronic Disease Surveillance System demonstrates that Canadians with ischemic heart disease (IHD) have three times greater all-cause mortality than those without[2], and hence secondary prevention is key.

Cardiac rehabilitation (CR) is an established model of care for secondary prevention, which is cost-effective, affordable, and averts costly downstream healthcare utilization[3]. Based on substantive evidence that participation is associated also with 20% reductions in mortality and morbidity[4], clinical practice guidelines for CVD[5–7], revascularization[8,9], and heart failure patients[10], among others, recommend referral to CR. There are internationally-agreed core components (e.g., initial assessment, structured exercise training, and risk factor management, including stress) [11,12] which are delivered by a multi-disciplinary team of healthcare professionals with expertise in all the secondary prevention recommendations[13]. It is recommended programs offer a minimum of 12 sessions, although greater benefits could be achieved with 36[14], and these sessions can be delivered in an unsupervised setting if patients have barriers to participation[15].

In Canada, there are approximately 170 CR programs, with vast provincial/territorial variation, from no programs in the North to 72 programs in Ontario[16]. Except in Ontario[17], little is known about the capacity and density of CR and how it is funded[18], nor about how alternative models are used to reach patients across Canada's geographic expanse[19]. Moreover, despite availability of quality indicators[20], and a national registry through which they can be assessed[21–23], there is little information regarding the nature of services delivered [24], and only 1 study comparing them to other countries[25]. This was a comparison to the Arab world where CR is

grossly under-developed; hence whether CR as delivered in Canada is similar to comparable countries (i.e., same country income classification, similar healthcare systems) is unknown.

Accordingly, the objectives of this investigation were to: (1) characterize the volumes, capacity and density of CR by (a) Canadian province, and (b) nationally in relation to other HICs; (2) characterize the following aspects of CR: (a) who pays for services, (b) type of patients served, (c) number and types of healthcare professionals on the CR team, (d) number of program sessions / dose, (e) core components delivered, and (f) delivery of alternative models, again by Canadian province/territory, and nationally in comparison to other HICs in similar regions of the globe.

Methods

Design & Procedure

This research was quantitative and cross-sectional in design; detailed methods are reported elsewhere[26]. In brief, countries where CR services were available were identified first through previous reviews[27,28]**.** In countries where CR services were not suspected to be available, the internet was searched and major CR and cardiology societies were contacted to identify any programs or verify lack thereof.

For each country identified to offer CR such as Canada, first available CR or cardiac societies leadership were contacted, such as the Canadian Association of Cardiovascular Prevention and Rehabilitation (CACPR). If there was no society available or response, "champions" were identified. Identified leaders were sent an e-mail requesting their collaboration to (a) determine the number of programs in their country, and (b) administer the survey to each program in their country.

The most responsible clinician at each program was emailed with the request to complete

the survey (this was sent by CACPR to their members, as well as by the CR Network of Ontario and of New Brunswick). Informed consent was secured through an online form. The survey was administered through REDCap, with data collection occurring from June 2016 to December 2017. Contacts were sent 2 e-mail reminders, at 2 week intervals. Please note that at the time of data cleaning some inconsistencies were identified, and through investigation with key informants some additional programs were identified and surveyed.

Sample

For the global study, the sample consisted of all CR programs identified in the world that offer services to patients following an acute cardiac event or hospitalization (i.e., Phase II). The inclusion criteria were CR programs that offered: (1) initial assessment, (2) structured exercise, and (3) at least one other strategy to control CV risk factors.

For the purposes of this study, CR programs in Canada were selected, as well as in other HICs in 2 regions namely (a) North America (i.e., United States; note only a random subsample of 250/2632 programs were surveyed in this country), (b) "Europe and Central Asia" (all as per the World Bank income and region classifications)[29] as well as (c) Australia and New Zealand (i.e., regions/countries most comparable to Canada). These comparison countries were selected as they are: (1) in the same country income classification as Canada, and (2) are in the same region as Canada or a region where there are some similar healthcare systems (i.e., the other 5 World Bank regions would not be considered comparable; e.g., Latin America, Africa). There are 43 such countries (see online supplement), of which 31 (72.1%) were determined to have CR[26].

Measures

With regard to the first objective, CR program volume was defined as the median number of patients served by a program annually (program-reported in survey, described below). Provincial and national CR capacity were computed by multiplying the median number of patients a program *could* serve annually (program-reported in survey) among the responding programs in a given province or country respectively, multiplied by the total number of programs in that jurisdiction. For provinces, the total number of programs was determined from a previous review where directories of programs were cross-referenced and tallied[16], and key informants. For other HICs, this was ascertained from literature reviews[26,28] and/or champions. Lastly, to compute density, information on 2012 ischemic heart disease (IHD) incidence was pulled from the Government of Canada's Chronic Disease Surveillance System[30]. The ratio of capacity per annual incident IHD case was computed (i.e., density); this was then ranked from best (i.e., most spots per incident patient) to worst density. Density was computed in other countries using IHD estimates from the Global Burden of Disease study[1,31].

Development of the survey is described in detail elsewhere [25]. In short, items were based on previous national/regional CR programs surveys[24,32,33]. Most items had forced-choice response options, and skip-logic was used to obtain more detail where applicable. The survey is available elsewhere[26].

The following variables were assessed: (i) where the programs are situated (i.e., in an urban centre, academic hospital) as well as proximity to other programs (< or > 20km radius), (ii) who funds the program (i.e., private sources such as healthcare insurance, public sources such as government, or a combination of these sources [i.e., hybrid]), (iii) the type (e.g., myocardial infarction, as well as non-cardiac indications) and number of patients served per session (as well as staff-to-patient ratio), (iv) the number and types of healthcare professionals on

the CR team (part-time staff were counted as 0·5), (v) dose of CR (in hours; i.e., sessions per week x duration in weeks x duration of exercise sessions in minutes); (vi) the type and number of core components delivered (of 10; i.e., initial assessment [including risk factors assessed and type of functional capacity test], risk stratification, supervised exercise, patient education, risk factor management, nutrition counselling, stress management, smoking cessation, prescription of medication, and communication with a primary healthcare provider), and (vii) whether the program offers alternative CR models (i.e., home or community-based programs, or hybrid models where patients transition from supervised to unsupervised settings).

Data analysis

SPSS version 24 was used for analysis[34]. All initiated surveys were included. The number of responses for each question varied due to missing data (e.g., respondent did not answer a question due to lack of willingness or potential inapplicability, use of skip logic); for descriptive analyses, percentages were computed with the denominator being the number of responses for a specific item.

Descriptive statistics were used to characterize volume, capacity, density, as well other closed-ended items in the survey (e.g., funding sources, core components delivered, and healthcare professionals on the CR team). All open-ended responses were coded / categorized. Aspects of CR were then compared by province, and nationally versus other HICs using generalized linear mixed models to take into consideration the hierarchical nature of data (e.g., CR programs nested within provinces) where applicable and there were sufficient data in each province for estimates to be generated. Otherwise Fisher's exact tests or Kruskal-Wallis tests were used.

Results

As shown in Table 1 and Figure 1, CR is available in 10 (76.9%) of Canada's 13 provinces or territories. Data were collected in all 10 (100.0% provincial/territorial response rate; note 2 respondents did not specify their province/territory). Nationally, 74/182 programs responded (40.7% program response rate).

Of the 31 comparable HICs selected that had CR, data were collected in 28 (90.3% country response rate); 619 surveys were completed (mean program response rate=43.1% across these countries; see supplemental table). These countries were: Australia, Austria, Belgium, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, the Netherlands, New Zealand, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, and the United States.

Availability, Volumes, Capacity and Density

The number of programs per province/territory is shown in Table 1. Of responding programs, 57 (78.1%) reported being situated in an urban area, and 6 (8.2%) in a suburban area. Overall, 17 (23.3%) were in a hospital; all of which were academic or tertiary centres. Twenty-two (31.4%) programs reported that there was another CR program within a 20km radius (vs. 275 [48.2%] in other HICs, $p<0.01$). As shown in Table 1, volumes per program were greatest in Ontario (note there was only 1 response in each of Alberta and Manitoba and hence it is not appropriate to over-interpret; significant provincial variation). Program volumes were not significantly different than other HICs ($p=0.44$).

Capacity and density are also shown in Table 1. The greatest CR need is in Ontario and Quebec, and the ranking reveals that the least favourable CR density exists in Quebec as well as Newfoundland and Labrador. When compared to all other countries of the world with CR, Canada's density is 9th best in the world (data shown elsewhere)[35].

Nature of CR Services

Program responders were asked to report who pays for their services, and could check all applicable sources (n=27, 37.0% reported >1 source). Figure 1 displays the most common funders of CR by province/territory. Nationally, 41 (56.2%) reported hospital / clinical centre funding (with significant provincial variation, p=0.02), 32 (43.8%) programs reported government funding, 23 (31.5%) reported the patient pays (and when they do they pay for on average 33.4±35.7% of the program, or $253.10±235.24 Canadian dollars), 6 (8.2%) reported private health insurance and 9 (12.3%) reported other funding sources (these included fund-raising, a University and YMCA; all n=1, 1.4%). In 4 (5.5%) programs, the sole source of funding was the patient. Further information on CR costs in Canada is reported elsewhere[26]. Funding source in Canada was not different than other HICs (p=0.43).

The most common type of patients accepted in CR programs is shown in Table 2. There was no significant provincial variation, and the only significant difference between Canada and other HICs was for stable coronary disease (accepted more often in Canada). Other accepted indications included rhythm devices (n=55, 88.7%), cardiomyopathy (n=55, 88.7%), arrhythmias (n=52, 83.9%), congenital heart disease (n=51, 82.3%), heart transplant (n=51, 82.3%), and mechanical circulatory support devices (n=44, 71.0%). Many programs also accepted patients with non-cardiac indications, namely: high-risk primary prevention (n=43, 69.4%), stroke (n=40, 61.5%), intermittent claudication / peripheral vascular disease (n=36, 55.4%), diabetes (n=34, 52.3%), lung disease (n=22, 33.8%), and cancer (n=14, 21.5%) patients. This did not differ from other HICs (p>.05).

The number and nature of healthcare professionals on CR teams is shown in Table 3; there was significant provincial variation for exercise professionals and a trend for pharmacists

(p=0.05). There were also some significant differences in Canada versus other HICs. Canadian CR programs were more likely to include exercise professionals, but less likely to have physiotherapists than other HICs. They were also less likely to have cardiologists, but more likely to have other types of physicians. Finally, Canadian CR programs were significantly more likely to have dietitians and administrative assistants on their staff than programs in other HICs.

The type of provider with *overall responsibility* for the program was most commonly a cardiologist or physician specialist in internal medicine (both n=15, 22.7%), followed by an exercise physiologist (n=10, 15.2%) and nurse (n=8, 12.1%); 32 (48.5%) were headed by some type of physician. In 34 (53.1%) programs patients had ≥1 individual consultation with a physician, and in 50 (78.1%) programs patients had ≥1 individual consult with a nurse. Cardiopulmonary resuscitation training of staff is reported elsewhere.[26] Nationally, there was a median of 2 staff (interquartile range [IQR]=1-3) present during exercise sessions; this was most commonly a kinesiologist (n=35, 68.6%), followed by an exercise specialist (n=34, 64.2%), nurse (n=31, 59.6%), and physiotherapist (n=25, 52.1%), among others. Programs served a median of 13.0 (IQR=9-20) patients per exercise session. The median number of patients per 1 staff during supervised exercise was 8 (IQR=5-10).

CR program dose was just over 40 hours (Figure 2; more information on CR dose nationally is reported elsewhere[36]). There was significant variation by province/territory (p<0.001), with what looks like higher doses in Saskatchewan and lower doses in New Brunswick. Nationally, programs offered a median of 26 sessions/patient (IQR=24-36; median frequency was 2 sessions per week, and program duration was 12 weeks). Dose was significantly greater in Canada than other HICs.

Programs offered 8 core components on average, but this varied significantly by province, with differences in delivery of return-to-work counselling driving this in particular (Table 4). Programs in Canada offered significantly fewer components than other HICs, in particular counselling for return-to-work.

During the core component of initial assessment, 42 (66.7%) programs had patients undergo an exercise stress test. Risk factors assessed pre-program included blood pressure (n=63, 100.0%), tobacco use (n=62, 100.0%), anthropometrics (n=46, 97.9%), lipid profiles (n=45, 95.7%), physical inactivity (n=60, 95.2%), harmful use of alcohol (n=59, 93.7%), blood glucose (n=44, 93.6%), depression (n= 56, 90.3%), and diet (n=56, 88.9%). More information on the education component is reported elsewhere[37]. Most programs also delivered resistance training (n=61, 96.8%). In 57 (89.1%) programs, patients were re-assessed at program end, and the results were communicated to the patients' primary care physician in 60 (93.8%) programs. Finally, 38 (60.3%) programs had some form of patient contact post-program.

Program equipment available to deliver these components included most commonly resistance training equipment (n=60, 98.4%), an individual assessment/counselling room (n=60, 98.4%), a group education facility (n=59, 96.7%), gym space (n=58, 95.1%), bicycle ergometers (n=56, 91.8%), staff office space (n=55, 91.7%), and treadmills (n=54, 88.5%). In 41 (65.1%) programs, patient records were electronic rather than paper.

Alternative CR model delivery is shown in Figure 3, with 49 (79.0%) programs reporting delivery of any alternative model. There was no provincial variation for the specific settings shown, but differences from other HICs such that in Canada home-based programs were significantly more commonly offered but programs in "other" settings were less commonly offered. Nine (31.0%) programs reported using smartphones, an "app", or text messaging with

patients (i.e., some form of eCR). There was no significant variation by province/territory (p=0.25), but there was significantly lower eCR implementation when compared to other HICs (n=40, 69.0%; p=0.001). Nationally, 21 (32.8%) programs offered alternative forms of exercise (e.g., yoga, tai chi), and 7 (11.0%) programs offered women-only classes (Ontario and British Columbia). More information on alternative model delivery is reported elsewhere[37].

Discussion

For the first time, the unmet need for CR has been established. Approximately 200,000 more spots are needed per year to treat IHD patients alone. Clearly more spots are needed to treat other indicated patients[10] (i.e., there were 92,850 incident cases of heart failure in Canada in 2012-13)[2] and ensure they achieve the mortality and morbidity reductions associated with participation[4]. CR in Quebec is in greatest need of augmentation, with so few spots and such low density that patients have incredibly low access; Ontario and Newfoundland are also particularly deficient. The absolute lack of CR in Canada's north persists[25], and highlights the inequities faced by our Indigenous communities. Despite this, where available, over 2/3rds of programs accepted high-risk primary prevention as well as other atherosclerotic vascular and non-communicable disease patients. Program volumes were surprisingly low, as was use of eCR (although 70% of programs did offer home-based services). All these represent areas that should be targeted to scale-up capacity.

Overall, CR programs were most often funded by hospitals or clinical centres where they were based, which is not surprising given our universal healthcare system, but the significant provincial variation in funding sources was. Moreover, patients were paying out-of-pocket for some or all of the program costs in one-third of programs. This was also shown in our previous survey of Canadian CR programs[25]. Clearly this further limits patient access and participation in

programs. Patients do not pay out-of-pocket in Canada for other cardiac care, hence it is unacceptable they pay for CR.

Guideline-indicated patients are appropriately accepted (including over 90% of programs accepting heart failure patients which is the most recent indication[10]), with these patients participating generally in 26 sessions (2 times/week over 12 weeks; total 40 hours), which is considered a sufficient dose to achieve mortality and morbidity reductions[14]. Most patients received 8 core components (e.g., initial assessment, nutrition counselling, exercise, stress management, risk factor management, patient education), delivered by a multidisciplinary team comprised of 6 members (e.g., nurses, exercise professionals / physiotherapists, dietitians). There is need for more capacity around return-to-work, which could be achieved with inclusion of occupational therapists on a part-time basis. Only 2/3rds of programs had electronic patient records. This likely results in administrative inefficiencies, reduces capacity for program evaluation, and could cause gaps in quality and coordination of care.

Overall, CR delivery was somewhat consistent across the country. There was significant provincial variation with regard to program volumes, the inclusion of exercise professionals on CR teams, components delivered (specifically return-to-work counselling) and dose (as well as funding source as outlined above). This is to a certain extent explicable given healthcare is provincially administered (e.g., funding and volumes), and that there is insufficient evidence to provide guidance to programs in some of these areas (e.g., dose; also programs are advised to have experts in all areas of the core components but specific type is not mandated), but the inconsistency in delivery of return-to-work counselling should be addressed.

When compared to previous studies on CR in Canada, it does appear the number of programs is steady or increasing slightly[16,25], as is the use of alternative delivery models[25]. Moreover, there

does again seem to be very high rates of assessment of harmful use of alcohol by Canadian programs, and potentially somewhat lower use of graded exercise stress tests at program inception than what was reported previously[25]. The median annual program volumes were 300 in the previous survey versus 250 herein, with quite a consistent number of patients served per session at just over 10.

There was consistency in CR delivery with other HICs in terms of volumes and density (although Canadian programs less often had another program in close proximity, which is likely due to the geographic expanse in this country), funding source, and accepted indications (except stable coronary artery disease), but also major differences. Canadian programs had a different mix of healthcare professionals, although the total number was consistent, and given the types of providers it is likely that all core components could be competently delivered in all countries. Canadian programs were somewhat less comprehensive, offering on average one less core component, primarily counselling for return-to-work. However, Canadian programs are of significantly greater dose than other HICs, so the components that are offered would be more fulsome, and it is more likely participants would reap program benefits. Canadian programs are also leading the way in terms of home-based service delivery, but other HICs seem to be offering CR in alternative settings and more often exploiting eCR modalities.

The implications of this work are many. Policy recommendations regarding capacity and funding are forwarded above. Program-level innovations recommended on the basis of this work, again outlined above, include incorporating eCR and return-to-work counselling. In terms of directions for future research, there are several important avenues to be pursued. First, with regard to the former, the degree of reach of eCR to patients in Canada's North warrants further investigation, with regard to both current reality, but also possibility (see work by Lear et al. in

British Columbia[38]). Second, this study considered the crude number of spots needed to treat indicated patients, which fails to take into consideration that some patients are legitimately not appropriate for CR (there are few contraindications to CR participation given that those who cannot ambulate should receive the other core components [although they would likely not receive a full course of CR] and that patients with distance or other such barriers can receive alternative models, however patients with comorbid advanced cancer or dementia, or serious mental illness for example would not be appropriate for CR), and that some appropriate patients elect not to attend out of choice[39]. Research is needed to more specifically characterize the number of CR spots needed taking these factors into consideration.

This study has several limitations. Firstly, response rates to online surveys are notoriously low. The rate was 40% in the current study for Canadian programs and for other HICs, which is fair, but suggests there may be bias. Second, respondents may have been inclined to respond in a socially-desirable manner, such that results were skewed to reflect better provision of CR. However, participants were informed that their responses were confidential. Finally, multiple comparisons were performed, and there were very few respondents in some provinces, and hence caution is necessary when interpreting the findings.

Conclusion

CR has been available in Canada for almost 60 years. There are over 180 programs, each treating on average 250 guideline-indicated but also primary prevention and non-communicable disease patients, over 40 hours, through 8 core components delivered by a multidisciplinary team of 6 staff. Programs were fairly consistent with other HICs, except Canadian programs offer more sessions and home-based services, but they do need to offer return-to-work counselling more often. However, there is only 1 CR spot for every 5 patients in need (similar to other

HICs), with 200,000 more spots needed nationally to meet IHD demand alone. Most programs were funded by government sources, but in 1/3 of programs patients paid some of the cost out-of-pocket, further limiting access. CR capacity must be augmented in Canada's north, Ontario, Quebec as well as Newfoundland and Labrador in particular, potentially through greater exploitation of eCR.

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References

1. Roth GA, Johnson C, Abajobir A, et al. Global, Regional, and National Burden of Cardiovascular Diseases for 10 Causes, 1990 to 2015. *J Am Coll Cardiol*. 2017;70(1):1-25. doi:10.1016/j.jacc.2017.04.052.
2. Public Health Agency of Canada. *Report from the Canadian Chronic Disease Surveillance System: Heart Disease in Canada*.; 2018. https://www.canada.ca/en/public-health/services/publications/diseases-conditions/report-heart-disease-Canada-2018.html.
3. Shields GE, Wells A, Doherty P, Heagerty A, Buck D, Davies LM. Cost-effectiveness of cardiac rehabilitation: a systematic review. *Heart*. 2018;2016(January 2016):heartjnl-2017-312809. doi:10.1136/heartjnl-2017-312809.
4. Anderson L, Oldridge N, Thompson DR, et al. Exercise-Based Cardiac Rehabilitation for Coronary Heart Disease. *J Am Coll Cardiol*. 2016;67(1):1-12. doi:10.1016/j.jacc.2015.10.044.
5. Fihn SD, Gardin JM, Abrams J, et al. 2012 ACCF/AHA Guideline for the diagnosis and management of patients with stable ischemic heart disease: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, and the American College of Ph. *J Am Coll Cardiol*. 2012;60(24):e44-e164. doi:10.1016/j.jacc.2012.07.013.
6. Amsterdam EA, Wenger NK, Brindis RG, et al. 2014 AHA/ACC Guideline for the Management of Patients With Non–ST-Elevation Acute Coronary Syndromes. *J Am Coll Cardiol*. 2014;64(24):e139-e228. doi:10.1016/j.jacc.2014.09.017.
7. O'Gara PT, Kushner FG, Ascheim DD, et al. 2013 ACCF/AHA Guideline for the Management of ST-Elevation Myocardial Infarction. *J Am Coll Cardiol*. 2013;61(4):e78-e140. doi:10.1016/j.jacc.2012.11.019.
8. Hillis LD, Smith PK, Anderson JL, et al. 2011 ACCF/AHA Guideline for Coronary Artery Bypass Graft Surgery. *J Am Coll Cardiol*. 2011;58(24):e123-e210. doi:10.1016/j.jacc.2011.08.009.
9. Levine GN, Bates ER, Blankenship JC, et al. 2011 ACCF/AHA/SCAI Guideline for Percutaneous Coronary Intervention. *J Am Coll Cardiol*. 2011;58(24):e44-e122. doi:10.1016/j.jacc.2011.08.007.
10. Yancy CW, Jessup M, Bozkurt B, et al. 2013 ACCF/AHA Guideline for the Management of Heart Failure. *J Am Coll Cardiol*. 2013;62(16):e147-e239. doi:10.1016/j.jacc.2013.05.019.
11. Grace SL, Turk-Adawi KI, Contractor A, et al. Cardiac Rehabilitation Delivery Model for Low-Resource Settings: An International Council of Cardiovascular Prevention and Rehabilitation Consensus Statement. *Prog Cardiovasc Dis*. 2016;59(3):1-20. doi:http://dx.doi.org/10.1016/j.pcad.2016.08.004.
12. Grace SL, Turk-Adawi KI, Contractor A, et al. Cardiac rehabilitation delivery model for low-resource settings. *Heart*. 2016;102(18):1449-1455. doi:10.1136/heartjnl-2015-309209.
13. Piepoli MF, Corrà U, Adamopoulos S, et al. Secondary prevention in the clinical management of patients with cardiovascular diseases. Core components, standards and outcome measures for referral and delivery. *Eur J Prev Cardiol*. 2014;21(6):664-681. doi:10.1177/2047487312449597.
14. Santiago De Araujo Pio C, Marzolini S, Pakosh M, Grace SL. Effect of Cardiac

Rehabilitation Dose on Mortality and Morbidity: A Systematic Review and Meta-regression Analysis. *Mayo Clin Proc*. 2017;92(11):1644-1659. doi:10.1016/j.mayocp.2017.07.019.
15. Taylor RS, Dalal H, Jolly K, et al. Home-based versus centre-based cardiac rehabilitation. *Cochrane Database Syst Rev*. 2015;(2). http://ovidsp.ovid.com/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=coch&AN=00075320-100000000-05746.
16. Grace SL, Turk-Adawi K, Santiago de Araújo Pio C, Alter DA. Ensuring Cardiac Rehabilitation Access for the Majority of Those in Need: A Call to Action for Canada. *Can J Cardiol*. 2016;32(10). doi:10.1016/j.cjca.2016.07.001.
17. Candido E, Richards JA, Oh P, et al. The relationship between need and capacity for multidisciplinary cardiovascular risk-reduction programs in Ontario. *Can J Cardiol*. 2011;27(2):200-207. doi:10.1016/j.cjca.2011.01.008.
18. Grace SL, Bennett S, Ardern CI, Clark AM. Cardiac rehabilitation series: Canada. *Prog Cardiovasc Dis*. 2014;56(5):530-535. doi:10.1016/j.pcad.2013.09.010.
19. Gillin EK, Salmoni A, Dawson GM, Dawson MJ, Fiaani M. Rural cardiac rehabilitation: a 20-year success story. *Can J Rural Med*. 2016;21(2):39-45. http://www.ncbi.nlm.nih.gov/pubmed/26986683. Accessed June 20, 2018.
20. Grace SL, Poirier P, Norris CM, Oakes GH, Somanader DS, Suskin N. Pan-Canadian development of cardiac rehabilitation and secondary prevention quality indicators. *Can J Cardiol*. 2014;30(8):945-948. doi:10.1016/j.cjca.2014.04.003.
21. Grace SL, Parsons TL, Heise K, Bacon SL. The Canadian Cardiac Rehabilitation Registry: Inaugural Report on the Status of Cardiac Rehabilitation in Canada. *Rehabil Res Pract*. 2015;2015:1-6. doi:10.1155/2015/278979.
22. Moghei M, Oh P, Chessex C, Grace SL. Cardiac rehabilitation quality improvement *J Cardiopulm Rehabil Prev*. (under revision)
23. Grace SL, Parsons TL, Duhamel TA, Somanader D, Suskin N. The Quality of Cardiac Rehabilitation in Canada: A Report of the Canadian Cardiac Rehab Registry. *Can J Cardiol*. 2014;30(11):1452-1455. doi:10.1016/j.cjca.2014.06.016.
24. Polyzotis PA, Tan Y, Prior PL, Oh P, Fair T, Grace SL. Cardiac rehabilitation services in Ontario. *J Cardiovasc Med*. 2012;13(11):727-734. doi:10.2459/JCM.0b013e32835794c1.
25. Turk-Adawi KI, Terzic C, Bjarnason-Wehrens B, Grace SL. Cardiac rehabilitation in Canada and Arab countries: comparing availability and program characteristics. *BMC Health Serv Res*. 2015;15(1):521. doi:10.1186/s12913-015-1183-7.
26. Supervia Pola M, Turk-Adawi K, Lopez Jimenez F, et al. Quality of Cardiac Rehabilitation Around the Globe: Indications Served, Providers Delivering, and Components Offered. *BMJ*:Under Review.
27. Turk-Adawi K, Sarrafzadegan N, Grace SL. Global availability of cardiac rehabilitation. *Nat Rev Cardiol*. 2014;11(10):586-596. doi:10.1038/nrcardio.2014.98.
28. Ragupathi L, Stribling J, Yakunina Y, Fuster V, Mclaughlin MA, Vedanthan R. Availability, Use, and Barriers to Cardiac Rehabilitation in LMIC. *Glob Heart*. 2016;12(4):323-334.
29. World Bank. High income | Data. 2017. https://data.worldbank.org/income-level/high-income. Accessed January 1, 2018.
30. Public Health Infobase. Canadian Chronic Disease Surveillance System (CCDSS), CCDP, PHAC. 2017. https://infobase.phac-aspc.gc.ca/ccdss-scsmc/data-tool/. Accessed January

2, 2018.
31. GBD Compare | IHME Viz Hub. https://vizhub.healthdata.org/gbd-compare/. Accessed June 21, 2018.
32. Bjarnason-Wehrens B, McGee H, Zwisler A-D, et al. Cardiac rehabilitation in Europe: results from the European Cardiac Rehabilitation Inventory Survey. *Eur J Cardiovasc Prev Rehabil*. 2010;17(4):410-418. doi:10.1097/HJR.0b013e328334f42d.
33. Cortes-Bergoderi M, Lopez-Jimenez F, Herdy AH, et al. Availability and characteristics of cardiovascular rehabilitation programs in South America. *J Cardiopulm Rehabil Prev*. 2013;33(1):33-41. doi:10.1097/HCR.0b013e318272153e.
34. IBM Corp. IBM SPSS Software. 2016.
35. Turk-Adawi K et al. Global cardiac rehabilitation availability, volumes, capacity, and density. *under review - Circulation*
36. Santiago de Araujo Pio C, Marzolini S, Pakosh M, Grace SL. Dose of Cardiac Rehabilitation Across the Globe. In: *Toronto General Research Institute Research Day*. Toronto, Canada; 2016.
37. Ghisi, G.L.M., Turk-Adawi, K., Supervia Pola, M., Lopez Jimenez, F., Pesah, E. & Grace SL. Alternative models of cardiac rehabilitation around the globe. *Mayo Clinic Proceedings*. under review.
38. Lear SA, Singer J, Banner-Lukaris D, et al. Randomized trial of a virtual cardiac rehabilitation program delivered at a distance via the Internet. *Circ Cardiovasc Qual Outcomes*. 2014;7(6):952-959. doi:https://dx.doi.org/10.1161/CIRCOUTCOMES.114.001230.
39. Samayoa L, Grace SL, Gravely S, et al. Sex Differences in Cardiac Rehabilitation Enrollment: A Meta-analysis. *Can J Cardiol*. 2014;30(7):793-800. doi:10.1016/j.cjca.2013.11.007.
40. Statistics Canada. Population by year, by province and territory. www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo02a-eng.htm. Published 2017.

Table 1: Cardiac Rehabilitation Availability, Volume, Capacity, Density (including Rank) by Canadian Province/Territory, and other High-Income Countries

	Total Population §	IHD Incidence†	CR Availability (# programs) ‖	# responding (%)	Year of first program	Median annual volume/ program (IQR)	Overall CR Capacity○	Density*	Density Rank	CR Need‡
Alberta	4,286,100	30,603	19	3 (15.8%)	1976	2,000Δ (2000-2000)	47,500	0.64	1	0□
British Columbia	4,817,200	29,770	25	7 (28.0%)	1998	200 (51-450)	10,000	2.98	5	19,770
Manitoba	1,338,100	8,484	7	1 (14.3%)	1979	640 (640-640)	4,760	1.78	2	3,723

New Brunswick	759,700	6,184	11	6 (54.5%)	1984	225 (120-293)	2,827	2.19	4	3,357
Newfoundland & Labrador	528,800	3,041	2	2 (100.0%)	1983	115 (110-115)	230	13.22	9	2,811
Northwest Territories	44,500	299	0	-	-	0	0	-	-	299
Nova Scotia	953,900	6,507	9	1 (11.1%)	2004	140 (140-140)	1,260	5.16	8	5,246
Nunavut	38,000	172	0	-	-	0	0	-	-	172

Ontario	14,194,400	91,696	72	28 (38.9%)	1960	450 (184-2000)	28,800	3.18	6	62,895
Prince Edward Island	152,000	883	2	1 (50.0%)	2017	105 (105-105)	210	4.21	7	673
Quebec	8,394,000	61,612	17	7 (41.2%)	1993	120 (90-300)	2,125	29.0	10	59,486
Saskatchewan	1,163,900	7,915	18	18 (100.0%)	1970	130 (60-285)	4,050	1.95	3	3,865
Yukon	38,500	-	0	-	-	0	0	-	-	-

Canada	36,708,100	249,615	182	74 (40.7%)	1960	250ǀ (115-525)	52,416	4.55††	-	186,187††
Other HICs**	9,860,540	32,901	35	10	1950	255 (143-490)	10,350	4.00	-	22,551

- not applicable
§Source: [40]
†Source: [30]
ǁSource: [23] or key informant (see acknowledgments).
ǒcalculated using median number of patients program could serve per year (from survey) multiplied by the number of programs in the jurisdiction(ǁ). Value represents the number of patients who could receive CR in a year (i.e., CR spots) [16].
*based on ratio of need (i.e., IHD incidence) to supply (i.e., CR capacity). Represents number of CR spots per IHD patient in need. Density ranking where 1 represents the most spots per incident IHD patient, and higher numbers represent the least spots per patient.
ǂnumber of additional spots needed to treat all IHD patients
Δ this should not be over-interpreted given there was 1 response for program volume, and it would be considered an outlier when compared to all other values.
□this should not be over-interpreted given there was 1 response for program capacity, and it would be considered an outlier when compared to all other national values.
ǀ generalized linear mixed models was used to test for significant differences by province: p=0.03
**median across all 28 countries reported. Year first program in any of the 28 countries reported. Density and CR need are reported only for the 28/43 HIC countries in the 2 World Bank regions with CR plus Australia and New Zealand.
††includes IHD patients in Northwest Territories and Nunavut.
Acronyms: CR, cardiac rehabilitation, HIC, high-income country; IHD, ischemic heart disease; IQR, interquartile range.
Abbreviations: pts, patients; prog, program; Yr, year.

Table 2: Most-Commonly Accepted Cardiac Rehabilitation Indications, by Canadian Province/Territory, vs Other High-Income Countries

Jurisdiction n (%)	**Number responding programs**	**Myocardial Infarction**	**Bypass Surgery**	**Valve Procedure**	**Percutaneous Coronary Intervention**	**Heart Failure**	**Chronic Stable CAD‖**
Alberta	3	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)
British Columbia	7	4 (100.0%)	4 (100.0%)	4 (100.0%)	4 (100.0%)	4 (100.0%)	4 (100.0%)
Manitoba	1	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)
New Brunswick	6	6 (100.0%)	6 (100.0%)	6 (100.0%)	6 (100.0%)	5 (83.3%)	6 (100.0%)
Newfoundland & Labrador	2	2 (100.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)
Nova Scotia	1	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)
Ontario	28	25 (100.0%)	25 (100.0%)	25 (100.0%)	25 (100.0%)	24 (96.0%)	23 (92.0%)
Prince Edward Island	1	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)

Quebec	7	6 (100.0%)	6 (100.0%)	6 (100.0%)	6 (100.0%)	6 (100.0%)	5 (83.3%)
Saskatchewan	18	12 (80.0%)	12 (80.0%)	12 (80.0%)	11 (73.3%)	11 (73.3%)	12 (80.0%)
Canada‡	74	59 (95.2%)	59 (95.2%)	59 (95.2%)	58 (93.5%)	56 (90.3%)	56 (90.3%)
Other HICs*	619	456 (97.6%)	446 (95.9%)	427 (91.8%)	448 (96.3%)	412 (88.6%)	343 (73.8%)*

‡there were no significant differences by province.

*Fisher's exact tests was used to test for significant differences between Canada and other HICs: $p<0.01$.

‖CAD=coronary artery disease (i.e., with no recent event or procedure).

Table 3: Healthcare Professionals on the Cardiac Rehabilitation Team, by Canadian Province/Territory vs other High-Income Countries

Province Mean ±SD / n (%)	**Dietitian**	**Nurse or NP**	**Exercise Professional§**	**Admin. Asst.**	**Psych or SW**	**Physiotherapist**	**Pharmacist**	**Cardiologist**	**Other Physicians**	**Total # (/17)**
Alberta	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	8.0±0.0
British Columbia	4 (100.0%)	3 (75.0%)	4 (100.0%)	2 (50.0%)	3 (75.0%)	3 (75.0%)	2 (66.7%)	4 (100.0%)	1 (25.0%)	6.3± 2.1
Manitoba	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	8.0 ± 0.0
New Brunswick	6 (100%)	6 (100.0%)	3 (50.0%)	6 (100.0%)	4 (66.7%)	4 (66.7%)	5 (83.3%)	2 (33.3%)	3 (50.0%)	5.9 ± 1.8
Newfoundland & Labrador	2 (100.0%)	2 (100.0%)	1 (50.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)	0 (0.0%)	0 (0.0%)	2 (100%)	6.0 ± 2.1
Nova Scotia	1 (100.0%)	1 (100.0%)	0 (0.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	6.0 ± 0.0
Ontario	23	21	24	21	21	15	12	15	15	6.8 ± 2.2

	(92.0%)	(84.0%)	(96.0%)	(84.0%)	(84.0%)	(62.5%)	(48.0%)	(62.5%)	(60.0%)	
Prince Edward Island	1 (100.0%)	1 (100.0%)	0 (0.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	0 (0.0%)	0 (0.0%)	1 (100.0%)	5.5 ± 0.0
Quebec	5 (83.3%)	5 (83.3%)	5 (83.3%)	6 (100.0%)	2 (33.3%)	1 (16.7%)	2 (33.3%)	4 (66.7%)	3 (50.0%)	5.5 ± 1.7
Saskatchewan	13 (92.9%)	15 (100.0%)	15 (100.0%)	12 (80.0%)	7 (46.7%)	7 (46.7%)	12 (80.0%)	7 (46.7%)	7 (46.7%)	5.5 ± 2.3
Canada	57 (93.4%)	56 (90.3%)	54 (87.1%)**	53 (85.5%)	42 (67.7%)	36 (59.0%)	34 (55.7%)	34 (55.7%)	33 (53.2%)	6.2 ± 2.1
Other HICs	425 (82.8%)*	486 (94.0%)	267 (52.8%)***	341 (67.7%)**	387 (75.3%)	413 (80.4%)***	219 (43.8%)	370 (72.0%)*	177 (35.8%)**	6.0±2.9

§Includes exercise physiologists, kinesiologists, etc. Was significantly different by province; p<.001. No other differences were found for professionals by province.

ǂDoes not include psychiatrists

*Fisher's exact tests were used to test for significant differences by province (denoted in Canada row) between Canada and other HICs (denoted in other HIC row): *p<0.05, **p<0.01, ***p<0.001.

Acronyms: CR, cardiac rehabilitation; HIC, high-income country; NP, Nurse-Practitioner; SD, standard deviation; SW, social worker.

Abbreviations: Admin Asst, Administrative Assistant; psych, psychologist or psychiatrist.

Table 4: Key Core Components Delivered by Province/Territory, and Nationally as well as in Other High-Income Countries

Province Mean ±SD / n (%)	**n**	**Nutrition Counselling**	**Initial Assmt.**	**Stress Mgmt/ Psych**	**Structured Exercise†**	**Risk Factor Mgmt.**	**Patient Education**	**Counselling for Return to Work**	**Mean Total # Components (/10)§**
Alberta	3	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	0 (0.0%)	9.0±0.0
British Columbia	7	5 (100.0%)	5 (100.0%)	5 (100.0%)	5 (100.0%)	4 (80.0%)	5 (100.0%)	1 (20.0%)	8.4±1.2
Manitoba	1	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	0 (0.0%)	9.0±0.0
New Brunswick	6	6 (100.0%)	6 (100.0%)	6 (100.0%)	5 (83.3%)	6 (100.0%)	6 (100.0%)	1 (16.7%)	8.8±0.6
Newfoundland & Labrador	2	2 (100.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)	2 (100.0%)	0 (0.0%)	9.0±0.0

Nova Scotia	1	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	9.0±0.0
Ontario	28	25 (100.0%)	25 (100.0%)	23 (92.0%)	25 (100.0%)	24 (96.0%)	25 (100.0%)	15 (60.0%)	8.4±1.1
Prince Edward Island	1	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	1 (100.0%)	0 (0.0%)	7.0±0.0
Quebec	7	7 (100%)	7 (100.0%)	7 (100.0%)	7 (100.0%)	7 (100.0%)	6 (85.7%)	5 (83.3%)	7.6±0.9
Saskatchewan	18	15 (100%)	14 (93.3%)	15 (100.0%)	13 (86.7%)	14 (93.3%)	12 (100.0%)	3 (20.0%)	5.7±1.0
Canada	74	64 (100.0%)	63 (98.4%)	62 (96.9%)	61 (95.3%)	61 (95.3%)	60 (98.4%)	26 (41.3%)**	7.7±1.6***
Other HICs	619	501 (95.1%)	521 (98.5%)	509 (96.4%)	510 (96.2%)	505 (95.5%)	502 (97.7%)	367 (70.4%)**	8.4±1.5**

§initial assessment, risk stratification, supervised exercise, patient education, risk factor management, nutrition counselling, stress management, smoking cessation, prescription/titration of medication, and communication with a primary healthcare provider

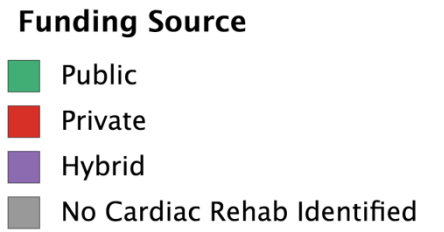
†includes physical activity counselling, exercise prescription and / or exercise training.

*Fisher's exact tests were used to test for significant differences by Canadian provinces (denoted in Canada row) and between Canada and other HICs (denoted in other HICs row): **p<.01; ***p<.001

Acronyms: HIC, high-income country; SD, standard deviation

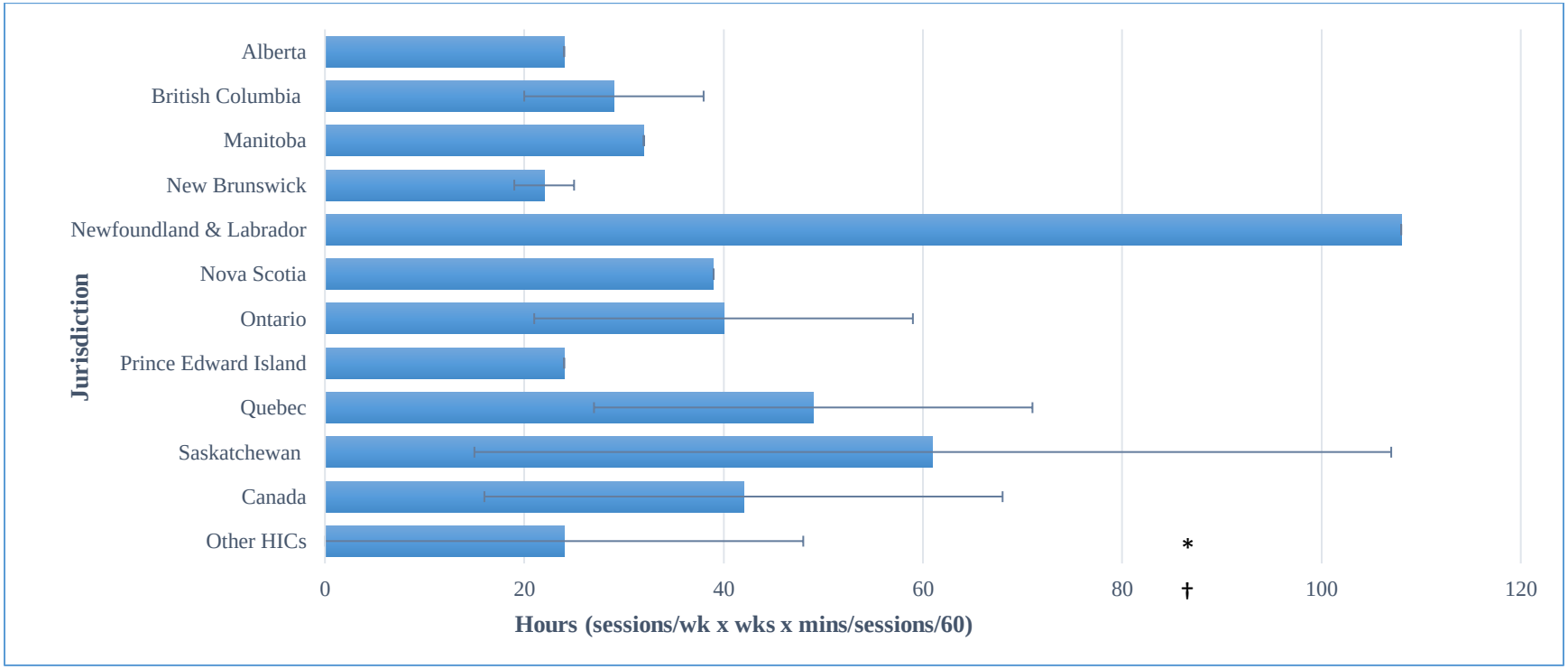
Abbreviations: Assmt, assessment; mgmt, management; psych, psychological counselling.

Figure 1. Most Common Cardiac Rehabilitation Funding Source by Province/Territory



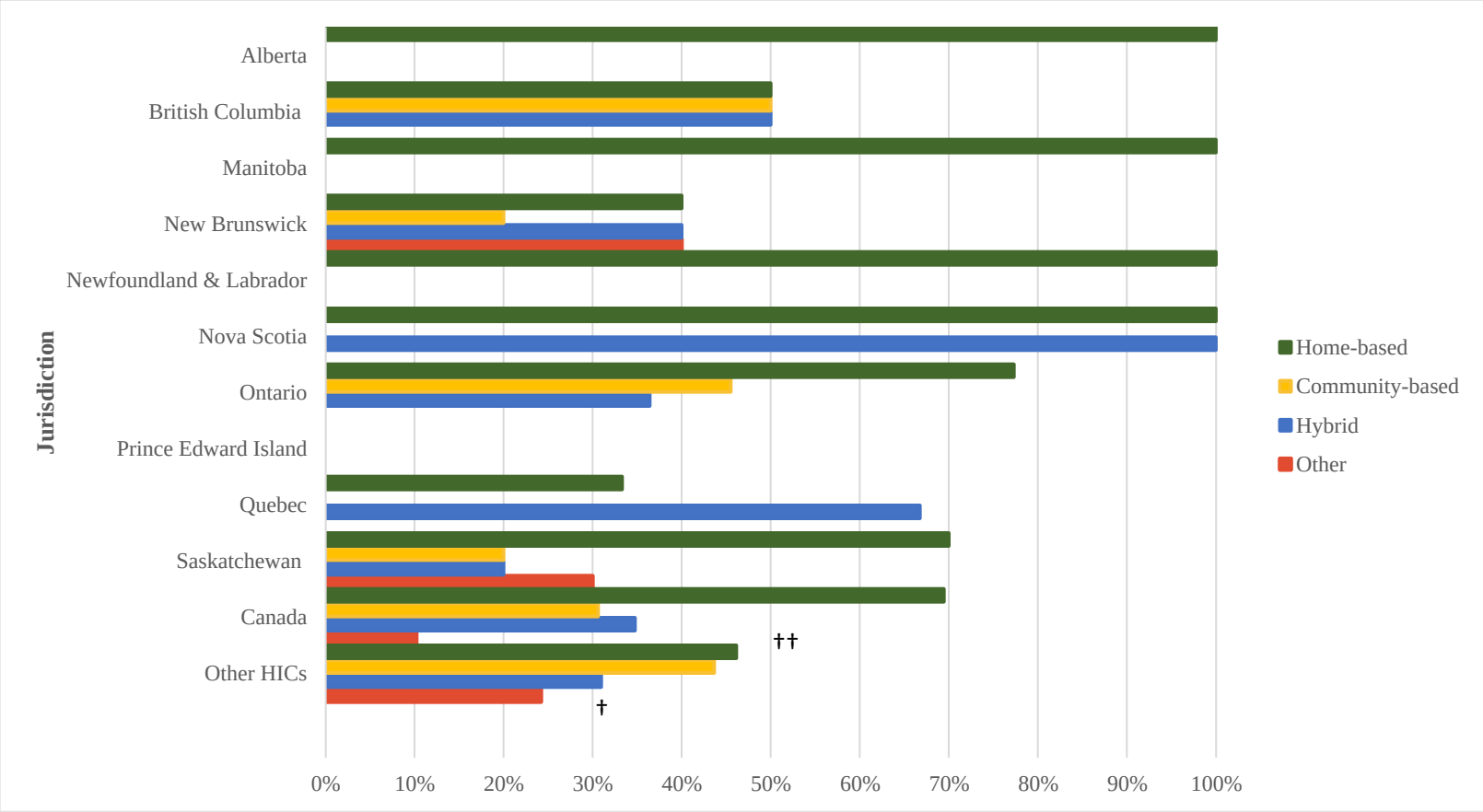
- Patients pay out-of-pocket in some programs

Figure 2. Mean Cardiac Rehabilitation Dose (hours / program), by Canadian Province/Territory vs Other High-Income Countries

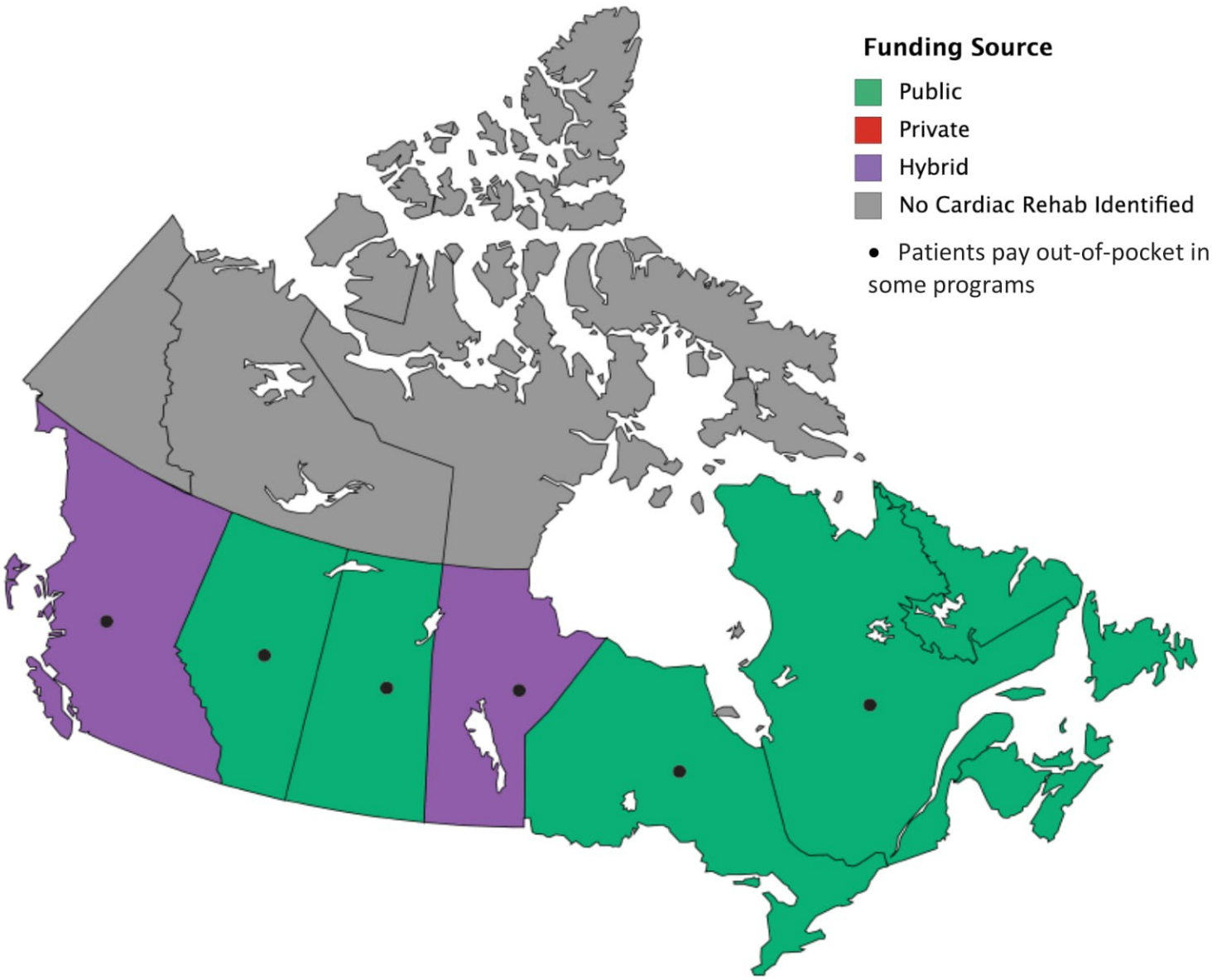


HIC, High-Income Country
Note: no CR is available in the Northwest Territories, Nunavut or Yukon. Only 1 response available for Alberta, Prince Edward Island as well as Newfoundland and Labrador and therefore these should be interpreted with caution.
*$p<0.001$ for provincial variation. Post-hoc tests cannot be performed due to small sample sizes for some provinces.
†Independent samples t-test: $p<0.001$

Figure 3. Percentage of Canadian Programs Delivering Alternative CR Models*, by Province/Territory, vs other High-Income Countries



HIC, High-Income Country.
*respondents selected all that apply.
Note there were no significant differences by province, but there was when compared to other HICs; chi-square †p<0.05, ††p<0.01.


Funding Source
Public
Private
Hybrid
No Cardiac Rehab Identified
• Patients pay out-of-pocket in some programs

Supplemental Table 1. Number of Programs (and Responding Where Available) in High-Income Countries in North America, "Europe and Central Asia" World Bank Regions as well as Australia and New Zealand, N=43

World Bank Region Country	Number of Programs	Number of responses	Response Rate
North America			
Bermuda§	1	1	100.0%
Canada‡			
United States of America	250*	65	26.0%
Europe and Central Asia			
Andorra	0	-	-
Austria†	26	5	19.2%
Belgium	48	9	18.8%
Channel Islands§	0	-	-
Croatia	3	3	100.0%
Cyprus	1	0	0.0%
Czech Republic	15	6	40.0%
Denmark	35	8	22.9%
England‖	266	57	21.4%
Estonia	2	2	100.0%
Faroe Islands§	0	-	-
Finland	25	11	44.0%

France	130	16	12.3%
Germany	120	34	28.3%
Gibraltar§	0	-	-
Greece	4	4	100.0%
Greenland	0	-	-
Hungary	33	20	60.6%
Iceland	4	4	100.0%
Ireland	37	7	18.9%
Isle of Man§	0	-	-
Italy	221	70	31.7%
Latvia	2	1	50.0%
Liechtenstein	0	-	-
Lithuania	25	9	36.0%
Luxembourg	4	0	0.0%
Monaco	0	-	-
Netherlands	90	29	32.2%
Northern Ireland‖	13	10	76.9%
Norway	35	0	0.0%
Poland	56	21	37.5%
Portugal	23	21	91.3%
San Marino§	0	-	-
Scotland†‖	69	24	34.8%
Slovak Republic	7	1	14.3%

Slovenia	2	2	100.0%
Spain	87	47	54.0%
Sweden	69	1	1.4%
Switzerland	51	4	7.8%
Wales‖	17	16	94.1%
Other			
Australia	314	85	27.1%
New Zealand	43	27	62.8%
Total	2127	619	43.1%

- not applicable;
*random sub-sample of 2632 programs.
†sub-sample surveyed only, and therefore response rates actually higher (e.g., for Scotland the lead of each health region was surveyed, and there was a 100% response).
ǂsee text for values. Not included in comparison
§ not included in the comparison group as island not considered comparable to Canada
‖considered as United Kingdom.