Systematizing Inpatient Referral to Cardiac Rehabilitation 2010

CANADIAN ASSOCIATION OF CARDIAC REHABILITATION AND CANADIAN CARDIOVASCULAR SOCIETY JOINT POSITION PAPER

Sherry L. Grace, PhD (Chair); Caroline Chessex, MD, FRCPC (Co-Chair); Heather Arthur, PhD; Sammy Chan, MD; Cleo Cyr, RN, BN, MHS; William Dafoe, MD; Martin Juneau, MD; Paul Oh, MD; Neville Suskin, MBChB

Despite recommendations in clinical practice guidelines, evidence suggests cardiac rehabilitation (CR) referral and use following indicated cardiac events is low. Referral strategies such as systematic referral have been advocated to improve CR use. The objective of this policy position is to synthesize evidence and make recommendations on strategies to increase patient enrollment in CR. A systematic review of 6 databases from inception to January 2009 was conducted. Only primary, published, English-language studies were included. A meta-analysis was undertaken to synthesize the enrollment rates by referral strategy. In all, 14 studies met inclusion criteria. Referral strategies were categorized as *systematic* on the basis of use of systematic discharge order sets, as *liaison* on the basis of discussions with allied health care providers, or as *other* on the basis of patient letters. Overall, there were 7 positive studies, 5 without comparison groups, and 2 studies that reported null findings. The combined effect sizes of the meta-analysis were as follows: 73% (95% CI, 39%-92%) for the patient letters ("other"), 66% (95% CI, 54%-77%) for the combined systematic and liaison strategy, 45% (95% CI, 33%-57%) for the systematic strategy alone, and 44% (95% CI, 35%-53%) for the liaison strategy alone. In conclusion, the results suggest that innovative referral strategies increase CR use. Although patient letters look promising, evidence for this strategy is sparse and inconsistent at present. Therefore we suggest that inpatient units adopt systematic referral strategies, including a discussion at the bedside, for eligible patient groups in order to increase CR enrollment and participation. This approach should be considered best practice for further investigation.

K E Y W O R D S

Author Affiliations: York University, Toronto, Ontario, Canada (Dr Grace); University Health Network, Toronto, Ontario, Canada (Drs Grace and Chessex); University of Toronto, Toronto, Ontario, Canada (Drs Chessex and Oh); McMaster University and Hamilton Health Sciences, Hamilton, Ontario, Canada (Dr Arthur); Providence Health and St. Paul's Hospital, Vancouver, British Columbia, Canada (Dr Chan); New Brunswick Heart Centre, Saint John, New Brunswick, Canada (Ms Cyr); Alberta Health Services and University of Alberta, Edmonton, Alberta, Canada (Dr Dafoe); Institut de Cardiologie de Montreal, Montreal, Québec, Canada (Dr Juneau); Toronto Rehabilitation Institute, Toronto, Ontario, Canada (Dr Oh); London Health Sciences Centre and University of Western Ontario, London, Ontario, Canada (Mr Suskin).

Correspondence: Sherry L. Grace, PhD, Kinesiology and Health Science, York University, Bethune 368, 4700 Keele St, Toronto, ON M3J 1P3, Canada (sgrace@yorku.ca).

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The Canadian Heart Health Strategy and Action Plan released in February 2009, the result of national stakeholder consultation and extensive research and policy consideration, describes a continuum of comprehensive care for cardiovascular disease patients in Canada.[1] Cardiac rehabilitation (CR) is identified as a core component of such care, serving as a critical vehicle for the implementation of cardiovascular disease (CVD) prevention strategies and the reduction of CVD risk.[2] CR is a comprehensive, outpatient, chronic-disease management program designed to enhance and maintain cardiovascular health through the delivery of individualized, but integrated, interprofessional care. CR programs ensure appropriate medical assessment, structured programs of exercise training, patient and family education, and the delivery of comprehensive CVD risk factor management strategies.[2]

Peer-reviewed scientific evidence, including randomized controlled trials (RCTs), rigourous systematic reviews, and meta-analyses, have consistently established that the delivery of CR, after initial treatment of a cardiac condition, further reduces mortality by approximately 25%.[2,3] The magnitude of the benefit achieved by participation in a CR program is comparable to that of other standard cardiac therapies, including treatment with statins[4] and aspirin[5] and percutaneous coronary interventions.[6,7] Through the metabolic and physiological effects of exercise, promotion of medication adherence, smoking cessation, and improved nutrition and mental health, CR provides a comprehensive means of addressing a pathologic atherosclerotic milieu that cannot be modified by surgical or percutaneous intervention alone.[8-11] CR is a highly cost-effective outpatient approach that ensures an ongoing return on investments in inpatient care, culminating in reduced rates of rehospitalization, morbidity, and mortality,[12-14] with a cost-to-utility ratio of USD$9200 per quality-adjusted life-year gained during the year after CR.[15] Participation in CR also facilitates ongoing communication among caregivers regarding patient medication compliance and effectiveness, adoption of physical activity and other protective behaviours, continuity of care, and the development of patient self-management strategies.[16]

Reflecting the substantial evidence of the benefits of such programs, many national clinical practice guidelines (eg, American, Canadian, Australian) promote referral of eligible cardiac patients to CR.[2,17,18] Sadly, overall, only approximately 30% of eligible cardiac inpatients enroll in CR programs.[18-20] The overall rate of CR use in the United States has been estimated to be 18.7%.[21] In Canada, data from 2001 demonstrated a 22% use of CR in Ontario;[22] a more recent comprehensive provincial survey showed 34% of high-risk secondary prevention patients (ie, postacute coronary syndrome, coronary artery bypass graft surgery, percutaneous coronary interventions, valve surgery, or heart failure) participating in a CR program.[20] In New Brunswick, 18.6% of eligible patients participated in CR in 2008.[23] In the United Kingdom, 28.6% of eligible patients were enrolled in CR in 2004, despite a national target of 85% enrollment in such programs.[24] The reasons for the underutilization of CR programs, despite their demonstrated effectiveness, are multifactorial. They include health system-, provider-, program-, and patient-level factors. Nonetheless, it is striking that when patients are asked why they do not attend such programs, the most frequent reason cited is lack of CR referral.[25,26]

A referral is defined as an official communication between the health care provider, the CR program, and the patient that recommends timely assessment and participation in an outpatient program. This referral includes the provision of all necessary information to the patient that will promote enrollment in CR.[27] It also entails communication between the health care provider or health care system and the CR program, and this communication must include the patient referral information. To ensure care coordination, this communication should include the primary health care provider. A hospital discharge summary may be formatted to contain the necessary patient information to communicate to the appropriate CR program (patient cardiovascular history, tests, and treatments, for instance). All communication must maintain appropriate confidentiality as outlined by the 2004 Personal Health Information Protection Act.[28]

Consistent with current national CR guidelines, the performance measure of inpatient CR referral is determined by dividing the number of patients with a qualifying event referred to CR (the numerator), by the number of patients with a qualifying event minus the number of patients with a qualifying event but who meet CR referral exclusion criteria (the denominator). CR referral exclusion criteria are both patient related (eg, discharge to long-term care) and medical related (eg, severe dementia).[2]

Patients are generally referred to CR from the physician office, inpatient units, and outpatient clinics.[22] It has been established that time from hospitalization to access CR services is significantly shorter when referral is initiated from the inpatient unit;[29] such an approach ensures consistent and universal identification of eligible patients. Accordingly, this policy position addresses strategies to optimize the referral of inpatients to CR.

OBJECTIVES AND METHODS

The objective of this policy position is to synthesize evidence and make recommendations on strategies to increase patient enrollment in CR. Comprehensive literature searches of Scopus, MEDLINE, CINAHL, PsycINFO, PubMed, and the Cochrane Library databases were conducted to identify eligible peer-reviewed articles. The search strategy for each database consisted of 4 themes: (1) CVDs, (2) rehabilitation, (3) referral, and (4) enrollment. Articles were included in the review if they met the following criteria: (1) They reported a primary or secondary observational study (cross-sectional or cohort) or an interventional study (randomized or nonrandomized) that evaluated the impact of a referral strategy on CR enrollment, (2) participants were cardiac patients eligible for CR, (3) the article or abstract was published in a peer-reviewed journal, and (4) they were published in English. Papers were excluded if CR enrollment rates were not reported and the authors could not be contacted with a request to provide the data. Original articles of relevant abstracts were obtained. Using a standardized form, 2 reviewers independently assessed the papers for inclusion. Discrepancies were resolved by discussion and consensus with the first author.

This strategy resulted in the inclusion of 1 article[30] in addition to those identified in 3 previously published reviews.[31-33] Overall, 14 articles were evaluated according to the grading of recommendations assessment, development, and evaluation system.[34] The articles were assessed for quality, and a table summarizing findings was generated and sorted by referral strategy. A meta-analysis was undertaken using Comprehensive Meta-Analysis software V2[35] to synthesize the enrollment rates by referral strategy. This process culminated in determination of overall quality of evidence and strength of recommendation. The Secondary Panel reviewed the resulting document, it was posted publicly for input, and finally it was submitted to the Canadian Cardiovascular Society Guidelines Committee, the Canadian Association of Cardiac Rehabilitation Board of Directors, and the Canadian Cardiovascular Society Council for approval.

CR Referral Strategies

"Usual" referral practice is dependent on a physician's initiating a referral discussion, then securing, completing, signing, and transmitting an institution-specific CR referral form.[27] Referral strategies have emerged to improve the flow of eligible cardiac inpatients to CR and are advocated in American College of Cardiology and American Heart Association Guidelines that state that clinicians "should consider instituting processes that encourage referral of appropriate patients to CR.… In addition, it is important that referring health care practitioners and CR teams communicate in ways that promote patient participation."[36(p.e100)] Appropriate cardiac patients are defined as those who have experienced an acute coronary syndrome, chronic stable angina or heart failure, percutaneous coronary interventions, coronary artery bypass graft surgery, cardiac valve surgery, or cardiac transplantation.[2] Other cardiac patients can be considered on an individual basis. For example, there are patients with adult congenital heart disease and arrhythmias that have benefited from CR.

These systematic strategies can be defined as "the implementation of standing referral orders to CR based on eligible diagnoses supported by clinician guidelines."[37] In the literature, these *systematic* strategies are implemented manually through the use of discharge order sets or electronic medical records. Such approaches have the benefit of ensuring nearly universal referral of patients and are particularly appropriate for direct referral to within-institution CR programs.

Other referral strategies[38] include "liaison" strategies, in which a health care provider or peer mentor speaks to the patient at the bedside about CR and facilitates referral while permitting discussion of the nature and merits of such programs and potential barriers to participation. Other strategies identified in the literature review have included the dissemination of patient education materials or motivational letters, both designed to augment CR use.

Effect of Referral Strategies on CR Enrollment

An individual referred to CR must attend an intake session and then participate in the program. As reported in the studies we reviewed, the enrollment rates according to the various referral strategies were as follows: usual referral ranged from 6% to 32%, systematic referral ranged from 19% to 54%, liaison ranged from 35% to 56%, a combination of these methods resulted in 53% to 78%, and finally systematic or liaison strategies, combined with a patient CR letter intervention (ie, "other"), resulted in 58% to 86% enrollment.

The Forrest plot displaying the rate of enrollment by referral strategy following quantitative synthesis is shown in Figure 1. In descending order, the estimates were 73% (95% CI, 39%-92%) for the patient letters (ie, "other" strategies), 66% (95% CI, 54%-77%) for the combined systematic and liaison strategy, 45% (95% CI, 33%-57%) for the systematic strategy alone, and 44% (95% CI, 35%-53%) for the liaison strategy alone.

Therefore, we suggest that in order to ensure CR enrollment, participation, and the benefits that follow, all cardiac inpatient units in Canada adopt and implement systematic referral strategies, including a patient

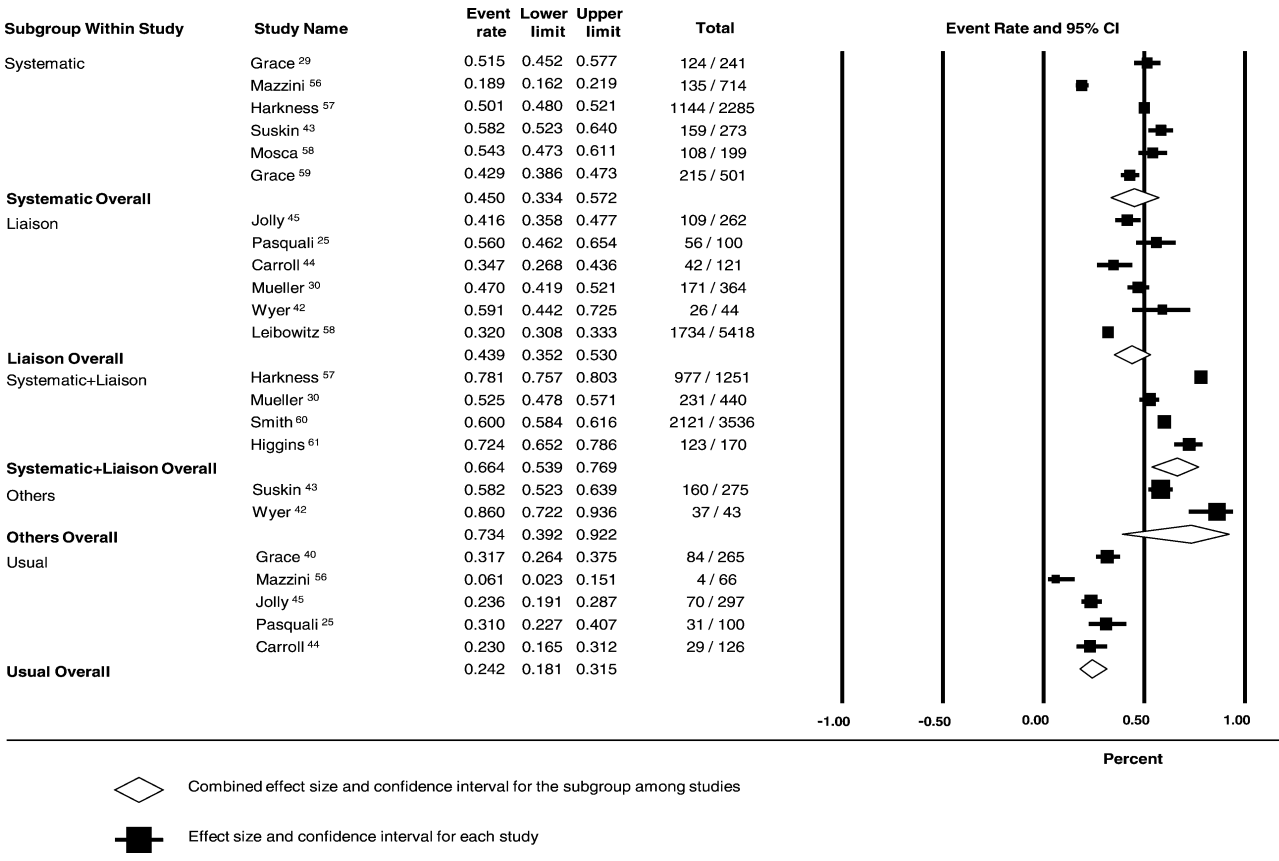

Figure 1. Forrest plot of the effect of referral strategy on CR enrollment. Extent of Heterogeneity: Systematic: Q = 225.32, df = 5, $P < .0001$; $I^2 = 97.78$; Liaison: Q = 74.45, df = 5, $P < .0001$; $I^2 = 93.28$. Systematic + liaison: Q = 157.22, df = 3, $P < .0001$, $I^2 = 98.10$; Other: Q = 10.63, df = 1, $P < .001$, $I^2 = 90.59$. Usual: Q = 17.91, df = 4, $P < .001$, $I^2 = 77.66$.

discussion at the bedside (Systematic + Liaison), for patient groups known to benefit from CR (see recommendations 1 and 2, Table 1). This combined approach has been deemed most effective because it leads to near universal patient referral while engaging the patient in the chronic disease care continuum. The evidence for the patient letters is sparse and inconsistent at present, although this line of research is promising and an RCT is currently under way[39] (see recommendation 3, Table 1). The strength of these recommendations was rated as *strong*, given the net benefits demonstrated and the translation of evidence into practice.

Table 1 • CACR-CCS Recommendations on Systematized Cardiac Rehabilitation Referral Strategies

	Evidence Quality	Strength
1. We suggest that to increase referral, systematic referral strategies (Systematic) be implemented in comprehensive discharge order sets for inpatients with cardiac conditions indicated for CR.	Low	Strong
2. We suggest that to optimize CR enrollment, the systematic inpatient referral strategies should be augmented by patient discussion at the bedside (Systematic + Liaison).	Low	Strong
3. We suggest that to optimize CR enrollment, the systematic inpatient referral strategies should be augmented by a motivational letter (Other).	Low	Strong
4. We suggest that AHA Get With the Guidelines, as Canadianized through University of Ottawa Heart Institute's Guidelines Applied to Practice tool for Acute Coronary Syndrome, be applied for all cardiac inpatients (Systematic + Liaison).	Low	Strong
5. We suggest a national review of the state of CR need, financial support, and supply be undertaken.	Very low	Conditional

Abbreviations: AHA, American Heart Association; CACR, Canadian Association of Cardiac Rehabilitation; CCS, Canadian Cardiovascular Society; CR, cardiac rehabilitation.

These recommendations are supported by the results of the Cardiac Rehabilitation Care Continuity Through Automatic Referral Evaluation study,[40] which demonstrated through a multisite, controlled observational design that enrollment rates can reach their highest level, over 70%, after systematic referral in combination with a liaison strategy. This combination of the systematic and liaison strategies resulted in 8 times greater CR referral when compared with standard approaches, after adjusting for hospital site of recruitment.[41] Booking the CR intake appointment prior to inpatient discharge and early delivery of outpatient CR were also shown to result in significantly greater CR enrollment. (S. L. Grace et al, unpublished data, 2010). The latter strategies warrant further study.

Methodological Limitations and Gaps

While the overall findings are fairly consistent and direct and resulted in net benefits, the overall quality of evidence is low because of study design and heterogeneity. Only 4 of the 14 studies were RCTs: 2 that tested the effects of patient letters after liaison[42] and systematic referral,[43] and 2 that involved a nurse-patient liaison discussion.[44,45] There are no RCTs testing effects of systematic referral vs usual referral on CR utilization.

Enrollment rates ranged fairly broadly within referral strategies. This broad range of rates could be due to differences in patient sociodemographic or clinical characteristics, CR program characteristics and capacity, differences in how individual inpatient units operationalize the referral strategies, or other unmeasured variability. For example, the effect of a standard discharge order and the effect of an electronic order for systematic CR referral have not been compared, nor has the effect of liaison referral at the bedside by a physician, nurse, or allied health professional and by a peer. These areas represent priorities for future research.

Other future research needed includes the potential of systematic referral strategies in reducing inequities in CR access. Finally, a full economic evaluation of the costs and consequences of CR, including systematic inpatient referral strategies, is needed.

Improving Referral to CR

The National Service Framework for Coronary Heart Disease, released in the United Kingdom in 2000, set a target, although unrealized,[24] of 85% for CR referral.[46] The present Writing Panel supports this target, but from a clinical perspective, it is more important to establish a target for CR enrollment; the latter is a more important determinant of patient morbidity and mortality. Based on the evidence,[31] we recommend an initial goal of 70% enrollment of eligible cardiac inpatients in CR. This target is attainable through best practice in CR referral and takes into consideration that some patients may not choose to enroll despite referral.

We must take immediate action to address the low rate of CR use in Canada, using referral strategies that have been demonstrated effective in increasing patient enrollment. Several tools are available to support change in CR referral practice and to promote patient enrollment. In Ontario, the Cardiac Care Network has adopted the University of Ottawa Heart Institute ACS Guidelines Applied to Practice tool, which incorporates CR referral[47] (see recommendation 4, Table 1). This tool is based on the American Heart Association's Get With the Guidelines tool,[48] which has been shown through large multi-institution studies to significantly increase CR referral rates.[49] More broadly, the American Association of Cardiopulmonary Rehabilitation and Prevention has published CR referral performance measures that are applicable to all eligible patient groups[27] and that include a referral order set, an overview of the referral process, and a suggested script for description of CR.

Implementation of these best practice referral strategies can be measured comparatively through the Performance Measures published in the Canadian Association of Cardiac Rehabilitation's third edition of the *Canadian Guidelines for Cardiac Rehabilitation and Cardiovascular Disease Prevention*.[2] The recently established Canadian Cardiac Rehabilitation Registry[50] will provide the platform to track and compare the effectiveness of quality improvement changes toward meeting the 70% enrollment target. Figure 2 presents a flow diagram of implementation of CR referral strategies. Proven techniques to promote change in health care practice include initiating rapid, frequent, and small Plan-Do-Study-Act cycles; monitoring and measuring; sharing daily small tests of change in staff huddles; developing a policy that designates who is responsible for each step in the referral process and when it should occur; providing staff and resident education on the importance of CR referral through "just in time" inservice meetings; and engaging professional practice and quality councils within institutions. These efforts should be undertaken within a context of buy-in and clear mandates by senior management, with support of physician champions.

Policy Implications

The broad implementation of the best practice CR referral strategies herein could result in significant public health benefit. An increase in CR enrollment from approximately 30% to 70% suggests that 40% more eligible cardiac patients could realize the benefit of a 25% reduction in mortality.[3,51] Such an increase in participation can be anticipated to produce a significant

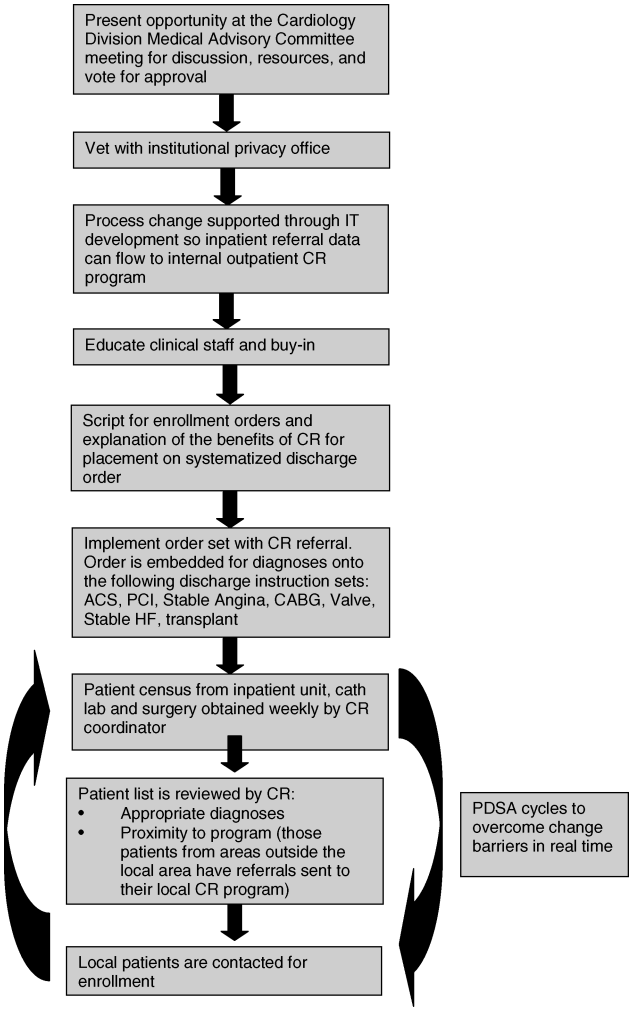

Figure 2. Development process for systematizing inpatient cardiac rehabilitation referrals. ACS, acute coronary syndrome; CABGS, coronary artery bypass graft surgery; CR, cardiac rehabilitation; HF, heart failure; IT, information technology; PCI, percutaneous coronary intervention; PDSA, Plan-Do-Study-Act.

reduction in costs as one consequence, among others, of reduced rates of rehospitalization.[13,52]

However, there are several implications of implementing systematic and liaison referral strategies to increase patient flow into CR programs. There is a need for CR programs to be available to which patients can be referred. Existing CR programs will need to consider how they will manage increased numbers of referrals. Sadly, CR service funding and availability are highly variable by province and by region within provinces, despite the public health system in place in Canada. We advocate a national review of the availability of CR programs and their funding by a joint Canadian Association of Cardiac Rehabilitation–Canadian Cardiovascular Society committee in order to spur the support of accessible CR in all regions of every Canadian province (see recommendation 5, Table 1). With regard to the latter, CR programs may have neither sufficient staff to handle such increases in patient referrals and volumes, nor funding. Therefore, funding increases for additional staff and for larger and more facilities may be indicated. Other strategies to address possible CR program capacity constraints are shown in Figure 3.

- Advocacy to advance funding
- Tailoring length of programs to patient risk and need
- Referral to home or community-based CR, where risk stratification supports such allocation
- Collaborating with other programs to redirect referrals to sites closer to patient home
- Rolling out systematic referrals for one eligible patient diagnosis at a time
- Determination of the best candidates for different types of programs
- Exploring innovative program delivery models (ie, telemedicine)
- Exploring safe, community-based models that leverage community resources and optimize the expertise of CR professionals

Figure 3. Strategies to address increased cardiac rehabilitation (CR) demand when implementing systematic and liaison referral.

A final consideration is cost of referral. Although implementing a systematic referral strategy may have significant start-up costs and require time commitment, particularly in the case of electronic discharge orders, the cost to maintain such a system would not be onerous. However, the cost to enable liaison referral through the payment of salary for a health professional would be greater. Many institutions use this model in practice, and thus it may ultimately be widely adoptable, through incorporation into the nurse-educator workload, for example. The use of a patient education pamphlet, which shows promise, may be a low-cost manner to achieve the bedside liaison aspect of CR referral. The cost-effectiveness of these referral strategies should be studied; however, it is the policy herein that the net health benefits of these referral strategies are likely worth the costs.[12,53,54]

CONCLUSIONS

Despite the proven benefits of CR,[3] only an average of 34% of eligible patients are referred,[55] and 20% ultimately enroll.[21] This trend runs counter to evidence-based clinical practice guidelines, which recommend CR as the standard of care in the management of CVD.[27] Based on the evidence synthesized through the development of this policy position, we strongly suggest that to increase CR enrollment, a combination of systematic and liaison referral strategies be implemented for all inpatient units serving patient groups that have been shown to benefit from CR. Indeed, CR enrollment rates above 70% can be reached. Implementing these referral strategies on a broader scale could translate into significant public health

benefits. Here is an opportunity for policy makers and providers to build capacity for chronic disease management across Canada.

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Disclaimer

This statement was developed following a thorough consideration of medical literature and the best available evidence and clinical experience. It represents the consensus of a Canadian panel comprised of multidisciplinary experts on this topic with a mandate to formulate disease-specific recommendations. These recommendations are aimed to provide a reasonable and practical approach to care for specialists and allied health professionals obliged with the duty of bestowing optimal care to patients and families, and can be subject to change as scientific knowledge and technology advance and as practice patterns evolve. The statement is not intended to be a substitute for physicians using their individual judgment in managing clinical care in consultation with the patient, with appropriate regard to all the individual circumstances of the patient, diagnostic and treatment options available, and available resources. Adherence to these recommendations will not necessarily produce successful outcomes in every case.

References

1. Arthur HM, Suskin N, Bayley M, et al. The Canadian Heart Health Strategy and Action Plan: cardiac rehabilitation as an exemplar of chronic disease management. *Can J Cardiol.* 2010;26:37-41.
2. Stone JA, Arthur HM, Suskin N, eds. *Canadian Guidelines for Cardiac Rehabilitation and Cardiovascular Disease Prevention: Translating Knowledge Into Action*. 3rd ed. Winnipeg, MB: Canadian Association of Cardiac Rehabilitation, 2009. Available at: http://www.cacr.ca/resources/guidelines.cfm. Accessed January 20, 2011.
3. Taylor RS, Brown A, Ebrahim S, et al. Exercise-based rehabilitation for patients with coronary heart disease: systematic review and meta-analysis of randomized controlled trials. *Am J Med*. 2004;116:682-692.
4. LaRosa JC, He J, Vupputuri S. Effect of statins on risk of coronary disease: a meta-analysis of randomized controlled trials. *JAMA*. 1999;282:2340-46.
5. Antithrombotic Trialists' Collaboration. Collaborative meta-analysis of randomised trials of antiplatelet therapy for prevention of death, myocardial infarction, and stroke in high risk patients. *BMJ*. 2002;324:71-86.
6. Boden WE, O'Rourke RA, Teo KK, et al. Optimal medical therapy with or without PCI for stable coronary disease. *N Engl J Med*. 2007;356:1503-1516.
7. Hambrecht R, Walther C, Mobius-Winkler S, et al. Percutaneous coronary angioplasty compared with exercise training in patients with stable coronary artery disease: a randomized trial. *Circulation*. 2004;109:1371-1378.
8. Wenger NK. Current status of cardiac rehabilitation. *J Am Coll Cardiol*. 2008;51:1619-1631.
9. Chow CK, Jolly S, Rao-Melacini P, Fox KA, Anand SS, Yusuf S. Association of diet, exercise, and smoking modification with risk of early cardiovascular events after acute coronary syndromes. *Circulation*. 2010;121:750-758.
10. Clark AM, Hartling L, Vandermeer B, McAlister FA. Meta-analysis: secondary prevention programs for patients with coronary artery disease. *Ann Intern Med*. 2005;143:659-672.
11. Kotseva K, Wood D, De Backer G, De Bacquer D, Pyorala K, Keil U. Cardiovascular prevention guidelines in daily practice: a comparison of EUROASPIRE I, II, and III surveys in eight European countries. *Lancet*. 2009;373:929.
12. Oldridge N, Furlong W, Feeny D, et al. Economic evaluation of cardiac rehabilitation soon after acute myocardial infarction. *Am J Cardiol*. 1993;72:154-161.
13. Theriault L, Stonebridge C, Browarski S. *The Canadian Heart Health Strategy: Risk Factors and Future Cost Implications. Conference Board of Canada*. Ottawa, ON; 2010. Available at: http://www.conferenceboard.ca/documents.aspx?did=3447. Accessed December 14, 2010.
14. Papadakis S, Oldridge NB, Coyle D, et al. Economic evaluation of cardiac rehabilitation: a systematic review. *Eur J Cardiovasc Prev Rehabil*. 2005;12:513-520.
15. Brown A, Taylor R, Noorani H, Stone J, Skidmore B. *Exercise-Based Cardiac Rehabilitation Programs for Coronary Artery Disease: A Systematic Clinical and Economic Review*. (Technology Report no. 34.) Ottawa: Canadian Coordinating Office for Health Technology Assessment, 2003.
16. Riley DL, Stewart DE, Grace SL. Continuity of cardiac care: cardiac rehabilitation participation and other correlates. *Int J Cardiol*. 2007;119:326-333.
17. Arnold JMO, Liu P, Demers C, et al. Canadian Cardiovascular Society consensus conference recommendations on heart failure diagnosis and management. *Can J Cardiol*. 2006:22:2006;23-45.
18. Dafoe W, Arthur H, Stokes H, Morrin L, Beaton L; for the Canadian Cardiovascular Society Access to Care Working Group on Cardiac Rehabilitation. Universal access:but when? treating the right patient at the right time: access to cardiac rehabilitation. *Can J Cardiol*. 2006;22:905-911.
19. Witt BJ, Jacobsen SJ, Weston SA, et al. Cardiac rehabilitation after myocardial infarction in the community. *J Am Coll Cardiol*. 2004;44:988-996.
20. 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. In press.
21. Suaya JA, Shepard DS, Normand SL, Ades PA, Prottas J, Stason WB. Use of cardiac rehabilitation by medicare beneficiaries after myocardial infarction or coronary bypass surgery. *Circulation*. 2007;116:1653-1662.
22. Swabey T, Suskin N, Arthur HM, Ross J. The Ontario cardiac rehabilitation pilot project. *Can J Cardiol*. 2004;20:957-961.
23. Cardiac Rehab New Brunswick. *Annual Report to the NB Cardiac Services Advisory Committee*. Saint John: NB Heart Centre, 2008.

24. Bethell HJ, Evans JA, Turner SC, Lewin RJ. The rise and fall of cardiac rehabilitation in the United Kingdom since 1998. *J Public Health (Oxf).* 2007;29:57-61.
25. Pasquali SK, Alexander KP, Lytle BL, Coombs LP, Peterson ED. Testing an intervention to increase cardiac rehabilitation enrollment after coronary artery bypass grafting. *Am J Cardiol.* 2001;88:1415-1416, A6.
26. Grace SL, Abbey SE, Shnek ZM, Irvine J, Franche RL, Stewart DE. Cardiac rehabilitation II: referral and participation. *Gen Hosp Psychiatry.* 2002;24:127-134.
27. Thomas RJ, King M, Lui K, et al. AACVPR/ACC/AHA 2007 performance measures on cardiac rehabilitation for referral to and delivery of cardiac rehabilitation/secondary prevention services. *J Am Coll Cardiol.* 2007;50:1400-1433.
28. Personal Health Information Protection Act. Available at: http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_04p03_e.htm. Accessed November 2010.
29. Grace SL, Scholey P, Suskin N, et al. A prospective comparison of cardiac rehabilitation enrollment following automatic vs usual referral. *J Rehabil Med.* 2007;39:239-245.
30. Mueller E, Savage PD, Schneider DJ, Howland LL, Ades PA. Effect of a computerized referral at hospital discharge on cardiac rehabilitation participation rates. *J Cardiopulm Rehabil Prev.* 2009;29:365-369.
31. Gravely-Witte S, Leung YW, Nariani R, et al. Effects of cardiac rehabilitation referral strategies on referral and enrollment rates. *Nat Rev Cardiol.* 2010;7:87-96.
32. Arthur HM. Enhancing secondary prevention of cardiovascular disease through increased referral to cardiac rehabilitation. *J Clinical Outcomes Management.* 2006;13:572-577.
33. Beswick AD, Rees K, West RR, et al. Improving uptake and adherence in cardiac rehabilitation: literature review. *J Adv Nurs.* 2005;49:538-555.
34. Guyatt GH, Oxman AD, Vist GE, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ.* 2008;336:924-926.
35. Biostat Inc. *Comprehensive meta-analysis.* Available from: http://www.meta-analysis.com/pages/why_do.html. Accessed November 2010.
36. Anderson JL, Adams CD, Antman EM, et al. ACC/AHA 2007 guidelines for the management of patients with unstable angina/non-ST-elevation myocardial infarction: a report of the American College of Cardiology/American Heart Association task force on practice guidelines (writing committee to revise the 2002 guidelines for the management of patients with unstable angina/non-ST-elevation myocardial infarction) developed in collaboration with the American College of Emergency Physicians, the Society for Cardiovascular Angiography and Interventions, and the Society of Thoracic Surgeons endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation and the Society for Academic Emergency Medicine. *J Am Coll Cardiol.* 2007;50:e1-e157.
37. Fischer JP. Automatic referral to cardiac rehabilitation. *J Cardiovasc Nurs.* 23:2008;474-479.
38. Grace SL, Krepostman S, Abramson B, et al. *Referral to and discharge from cardiac rehabilitation: key informant views on continuity of care.* Paper presented at: University Health Network Annual Research Day. November 2003; Toronto, ON.
39. Mosleh SM, Kiger A, Campbell N. Improving uptake of cardiac rehabilitation: using theoretical modeling to design an intervention. *Eur J Cardiovasc Nurs.* 2009;8:161-168.
40. Grace SL, Tam C, Leung Y, et al. Potential of innovative cardiac rehabilitation techniques to increase utilization rates: preliminary results of the CRCARE study. *Can J Cardiol.* 2008;24:195E.
41. Grace SL, Russell KL, Reid RD, et al. Effect of cardiac rehabilitation referral strategies on utilization rates: a prospective, controlled study. *Arch Int Med.* 2011. In press.
42. Wyer SJ, Earll L, Joseph S, Harrison J, Giles M, Johnston M. Increasing attendance at a cardiac rehabilitation programme: an intervention study using the theory of planned behaviour. *Coronary Health Care/* 2001;5:154-159.
43. Suskin N, Irvine J, Arnold JMO, et al. Improving cardiac rehabilitation (CR) participation in women and men, the CR participation study. *J Cardiopulm Rehabil Prev.* 2007; 27:342.
44. Carroll DL, Rankin SH, Cooper BA. The effects of a collaborative peer advisor/advanced practice nurse intervention: cardiac rehabilitation participation and rehospitalization in older adults after a cardiac event. *J Cardiovasc Nurs.* 2007;22:313-19.
45. Jolly K, Bradley F, Sharp S, et al. Randomised controlled trial of follow up care in general practice of patients with myocardial infarction and angina: final results of the Southampton heart integrated care project (SHIP). *BMJ.* 1999;318:706-711.
46. National Health Service. *Chapter 7: cardiac rehabilitation: coronary heart disease: national service framework for coronary heart disease: modern standards and service models.* Available at: http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/en/documents/digitalasset/dh_4057524.pdf. Accessed November 2010.
47. Champlain Cardiovascular Disease Prevention Network. *Get With the Guidelines Initiative: acute coronary syndrome guidelines applied to practice toolkit.* Available at: http://www.ccpnetwork.ca/GWG/en_toolkit.php. Accessed November 2010.
48. American Heart Association. *Get With the Guidelines.* Available at: http://www.heart.org/HEARTORG/HealthcareProfessional/GetWithTheGuidelinesHFStroke/Focus-on-Quality-Home-Page_UCM_306348_SubHomePage.jsp. Accessed November 2010.
49. LaBresh KA, Fonarow GC, Smith SC Jr, et al. Improved treatment of hospitalized coronary artery disease patients with the Get With the Guidelines program. *Crit Pathw Cardiol.* 2007; 6:98-105.
50. Canadian Cardiac Rehabilitation Registry. Available at: http://www.cacr.ca/resources/registry.cfm. Accessed November 2010.
51. Taylor RS, Unal B, Critchley JA, Capewell S. Mortality reductions in patients receiving exercise-based cardiac rehabilitation: how much can be attributed to cardiovascular risk factor improvements? *Eur J Cardiovasc Prev Rehabil.* 2006;13:369-374.
52. Cardiac Care Network. *The Ontario Cardiac Rehabilitation Pilot Project: report and recommendations.* Toronto, ON: Cardiac Care Network; 2002. Available from: http://www.ccn.on.ca/pdfs/Rehab-Pilot-Project-Sep2002.pdf. Accessed November 2010.
53. Papadakis S, Reid RD, Coyle D, Beaton L, Angus D, Oldridge N. Cost-effectiveness of cardiac rehabilitation program delivery models in patients at varying cardiac risk, reason for referral, and sex. *Eur J Cardiovasc Prev Rehabil.* 2008;15:347-353.
54. Lowensteyn I, Coupal L, Zowall H, Grover SA. The cost-effectiveness of exercise training for the primary and secondary prevention of cardiovascular disease. *J Cardiopulm Rehabil.* 2000; 20:147-155.
55. Cortes O, Arthur HM. Determinants of referral to cardiac rehabilitation programs in patients with coronary artery disease: a systematic review. *Am Heart J.* 2006;151:249-256.