
**CANADIAN ASSOCIATION OF CARDIAC REHABILITATION (CACR) –
CANADIAN CARDIOVASCULAR SOCIETY POSITION STATEMENT (CCS)**

**Systematizing Inpatient Referral to Cardiac Rehabilitation: A joint policy position of
the Canadian Association of Cardiac Rehabilitation and
Canadian Cardiovascular Society**

Endorsed by the Cardiac Care Network of Ontario

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Sherry L. Grace, PhD (chair) & Caroline Chessex, MD, FRCPC (co-Chair)

Primary Panel Writing Group: Heather Arthur, Sammy Chan, Cleo Cyr, William Dafoe,
Martin Juneau, Paul Oh, Neville Suskin.

Secondary Panel Writing Group: Paul Poirier, Rob Stevenson, Jim Stone.

Introduction

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 Canada¹. 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 risk². 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 strategies².

Peer-reviewed scientific evidence, including randomized controlled trials (RCTs), rigorous systematic reviews and meta-analyses have consistently established that the delivery of CR, following 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 statins⁴ and aspirin⁵, and percutaneous coronary interventions (PCI)^{6,7}. Through the metabolic and physiological effects of exercise, promotion of medication adherence, smoking cessation, improved nutrition and mental health, CR provides a comprehensive means of addressing a pathological atherosclerotic milieu which cannot be modified by surgical or percutaneous intervention alone⁸⁻¹¹. CR is a highly cost-effective outpatient approach which ensures an ongoing return on investments in inpatient care, culminating in reduced rates of re-hospitalization, morbidity and mortality¹²⁻¹⁴; with a cost-utility ratio of \$9,200/quality-adjusted life-year gained during the year after CR¹⁵. Participation in CR also facilitates: ongoing

communication among caregivers providing important feedback regarding patient medication compliance with, and response to, prescribed medication; adoption of physical activity and other protective behaviours; and promotes continuity of care and the development of patient self-management strategies¹⁶.

Reflecting the substantial evidence of the benefits of such programs, many national clinical practice guidelines (e.g., American, Canadian, Australian) promote referral of eligible cardiac patients to CR^{2, 17, 18}. Sadly, overall only approximately 30% of eligible cardiac in-patients enrol in CR programs¹⁸⁻²⁰. The overall rate of CR use in the United States was established to be 18.7%²¹. In Canada, data from 2001 demonstrated a 22% use of CR in Ontario²²; a more recent comprehensive provincial survey showed 34% of high-risk secondary prevention patients (i.e, post-acute coronary syndrome, coronary artery bypass surgery (CABGS), PCI, valve surgery or heart failure) participating in a CR program²⁰. In New Brunswick, 18.6% of eligible patients participated in CR in 2008²³. In the United Kingdom 28.6% of eligible patients were enrolled in CR use in 2004, despite a national target of 85% enrollment in such programs²⁴. The reasons for the under-utilization of CR programs, despite their demonstrated effectiveness are multi-factorial. 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 amongst the healthcare provider, CR program and the patient that recommends assessment and participation in an early post-cardiac outpatient program. This includes the provision of all necessary information to the patient that will promote enrollment in CR²⁷. This also entails communication between the healthcare provider or healthcare system and the CR program, which includes the patient's referral information. This communication should include the primary healthcare provider to ensure care

coordination. A hospital discharge summary may potentially be formatted to contain the necessary patient information to communicate to the appropriate CR program (the patient's cardiovascular history, tests, and treatments, for instance). All communication must maintain appropriate confidentiality as outlined by the 2004 Personal Health Information Protection Act (PHIPA).

Consistent with current national CR guidelines, the performance measure of in-patient 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 that meet CR referral exclusion criteria (the denominator). CR referral exclusion criteria are both patient-related (e.g., discharge to long-term care) and medical-related (e.g., severe dementia)².

Patients are generally referred to CR from physician's offices, inpatient units, and outpatient clinics²². It has been established that time from hospitalization to access CR services is significantly shorter where referral is initiated from the inpatient unit²⁸; 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) Cardiovascular Diseases, (2) Rehabilitation, (3) Referral, and (4) Enrollment. Articles were included in the review if the following criteria were met: (i) 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; (ii) participants were cardiac patients eligible for CR; (iii) paper or abstract published in a peer-reviewed journal; and (iv) published in English. Papers were excluded if CR enrollment rates were not reported, and the authors could not be contacted to provide the data. Original articles of relevant abstracts were obtained. Two reviewers independently assessed the papers for inclusion using a standardized form. Discrepancies were resolved by discussion and consensus with the first author.

This strategy resulted in the inclusion of 1 additional article³² than those identified in 3 previously-published reviews²⁹⁻³¹. Overall, 14 articles were evaluated according to the GRADE system³³. The articles were assessed for quality, and a summary of findings table was generated and sorted by referral strategy. A meta-analysis was

undertaken using Comprehensive Meta-Analysis software V2³⁴ 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 CCS Guidelines Committee, CACR Board of Directors, and CCS Council for approval.

CR Referral Strategies

“Usual” referral practice is dependent upon a physician initiating a referral discussion, then securing, completing, signing and transmitting an institution-specific CR referral form²⁷. Referral strategies have emerged to improve the flow of eligible cardiac inpatients to CR, and are advocated in American College of Cardiology / American Heart Association Guidelines which state that clinicians “should consider instituting processes that encourage referral of appropriate patients to CR... In addition, it is important that referring healthcare practitioners and CR teams communicate in ways that promote patient participation” (p. e100)³⁵. Appropriate cardiac patients are defined as those who have experienced an acute coronary syndrome, chronic stable angina or heart failure, PCI, CABGS, cardiac valve surgery, or cardiac transplantation². 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”³⁶. In the literature, these “systematic” strategies are implemented manually using discharge order sets or electronic medical records. Such approaches have the benefit of ensuring near-universal referral of patients and are particularly appropriate for direct referral to within-institution CR programs.

Other referral strategies³⁷ include “liaison” strategies, in which a healthcare 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 utilization.

Effect of Referral Strategies on CR Enrollment

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

The Forrest plot displaying the rate of enrollment by referral strategies following quantitative synthesis is shown in Figure 1. In descending order, the estimates were 73% (95% CI 39-92%) for the patient letters (i.e., “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. The evidence for the patient letters is sparse and inconsistent at present, although this line of research is promising and a randomized controlled trial is currently underway³⁸.

Therefore we suggest that all cardiac inpatient units in Canada adopt and implement systematic referral strategies, including a patient discussion at the bedside, (Systematic + Liaison) for patient groups known to benefit from CR in order to ensure CR enrollment, participation and the benefits that follow. 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. A summary of positions is shown in Table 1. The position strength was rated as “strong” given the net benefits demonstrated and translation of evidence into practice.

These recommendations are supported by the results of the Cardiac Rehabilitation care Continuity through Automatic Referral Evaluation (CRCARE) study³⁹, which demonstrated through a multi-site, controlled observational design that enrollment rates can reach their highest level, over 70%, following systematic referral in combination with a liaison strategy. This combination of the systematic and liaison strategy resulted in 8 times greater CR referral when compared to standard approaches, after adjusting for hospital site of recruitment⁴⁰. Booking the CR intake appointment prior to inpatient discharge and early delivery of outpatient CR were also shown to result in significantly greater CR enrollment⁴¹. The latter strategies warrant further study.

Methodological Limitations and Gaps

While overall the findings were fairly consistent, direct, and resulted in net benefits, the overall quality of evidence is low due to study design and heterogeneity. Only four of the 14 studies were RCTs: two that tested the effects of patient letters after liaison⁴², and systematic referral⁴³, and two that involved a nurse-patient liaison discussion^{44, 45}. There are no RCTs testing effects of systematic referral versus usual referral on CR utilization.

There was a fairly broad range of enrollment rates within referral strategies. This could be due to differences in patient socio-demographic 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 versus electronic order for “systematic” CR referral has not been compared, nor has the effect of “liaison” referral at the bedside by a

physician, nurse, allied health professional versus peer been compared. 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

Although unrealized²⁴, in 2000 the National Service Framework for Coronary Heart Disease was released in the United Kingdom, which set a target of CR referral⁴⁶. This first and only published target was 85%. The Writing Panel supports this target, but from a clinical perspective however, 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 evidence²⁹, we recommend as an initial goal 70% enrollment of indicated eligible cardiac inpatients in CR. This target is demonstrated to be 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 utilization in Canada, using referral strategies which 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’s ACS Guidelines Applied to Practice (GAP) tool which incorporates CR referral (http://www.ccpnetwork.ca/GWG/en_toolkit.php). This tool is based on the American Heart Association’s “Get with the Guidelines” tool (<http://www.americanheart.org/presenter.jhtml?identifier=1165>), which has been shown through large multi-institution studies to significantly increase CR referral rates over time⁴⁷. More broadly, the American Association of Cardiopulmonary Rehabilitation and Prevention has published CR referral performance measures applicable to all eligible patient groups²⁷, which 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 3rd Edition of the Canadian Guidelines for Cardiac Rehabilitation and Cardiovascular Disease Prevention². The recently-established Canadian Cardiac Rehab Registry (<http://www.cacr.ca/resources/registry.cfm>) 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 to facilitate implementation of CR referral strategies. Proven techniques to promote change in healthcare practice

include: initiation of rapid, frequent and small Plan-Do-Study-Act (PDSA) 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” in-service 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, and 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, 48}. Such an increase in participation can be anticipated to produce a significant reduction in costs as a consequence, among others, of reduced rates of re-hospitalization^{13, 49}.

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 is 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 CACR-CCS committee in order to spur the support of accessible CR in all regions of every Canadian province.

With regard to the latter, CR programs may not have sufficient staff to handle such increases in patient referrals and volumes, nor the funding. Therefore, funding increases for additional staff, and larger and more facilities, may be indicated. Other strategies to address possible CR program capacity constraints are shown in Figure 3.

A final consideration is cost to refer. While implementing a systematic referral strategy may have significant start-up costs and 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 position herein that the net health

benefits of these referral strategies are likely worth the costs^{12, 50, 51}.

Conclusions

Despite the proven benefits of CR³, only an average of 34% of eligible patients are referred⁵², and 20% ultimately enroll²¹. This runs counter to evidence-based clinical practice guidelines which recommend CR as the standard of care in the management of CVD²⁷. 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. If these referral strategies could be implemented on a broader scale, this could potentially translate into significant public health benefits. Here is an opportunity for policy-makers and providers to build capacity for chronic disease management across Canada.

Conflicts of Interest:

The panelists had completed editorial independence in the development and writing of the present manuscript on a pro bono basis.

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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 edition). Winnipeg, MB: Canadian Association of Cardiac Rehabilitation; 2009. Available from: <http://www.cacr.ca/resources/guidelines.cfm>.
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;282:2340-2346.
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 countries. *Lancet.* 2009;373:929. 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. Heart and Stroke Foundation; 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. Ottawa: Canadian Coordinating Office for Health Technology Assessment. 2003. Technology Report no. 34.
16. Riley DL, Stewart DE, Grace SL. Continuity of cardiac care: Cardiac rehabilitation participation and other correlates. *Int J Cardiol.* 2007; 119(3):326-333.
17. Arnold JMO, Liu P, Demers C, Dorian P, Giannetti N, Haddad H, et al. Canadian cardiovascular society consensus conference recommendations on heart failure 2006: Diagnosis and management. *Can J Cardiol.* 2006;22:23-45.
18. Dafoe W, Arthur H, Stokes H, Morrin L, Beaton L, 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, Suskin N, Arthur HM, Alter DA. Needs-based regional planning of secondary cardiac prevention services in Ontario. *Can J Cardiol.* 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. 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.
 29. 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.
 30. Arthur, H.M. (2006). Enhancing secondary prevention of cardiovascular disease through increased referral to cardiac rehabilitation. *Journal of Clinical Outcomes Management, 13*:572-577.
 31. Beswick AD, Rees K, West RR, et al. Improving uptake and adherence in cardiac rehabilitation: Literature review. *J Adv Nurs.* 2005;49:538-555.
 32. 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.
 33. 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.
 34. Biostat Inc. Comprehensive meta-analysis. New Jersey, USA:2006;2. Available from: http://www.meta-analysis.com/pages/why_do.html. Accessed 2009.
 35. 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.
 36. Fischer JP. Automatic referral to cardiac rehabilitation. *J Cardiovasc Nurs.* 2008;23:474-479.
 37. Grace SL, Krepostman S, Abramson B, et al. Referral to and discharge from cardiac rehabilitation: Key informant views on continuity of care. Presented at the University Health Network Annual Research Day. Toronto, ON:2003.
 38. Mosleh SM, Kiger A, Campbell N. Improving uptake of cardiac rehabilitation: Using theoretical modelling to design an intervention. *Eur J Cardiovasc Nurs.* 2009;8:161-168.
 39. Grace SL, Tam C, Leung Y, Oh O, Reid R, Fair T, Anand S, Rush J, Williamson K, Gupta M, Braga M, Petro J, Brister S, & Stewart DE. Potential of innovative cardiac rehabilitation techniques to increase utilization rates: Preliminary results of the CRCARE study. *Can J Cardiol.* October 2008;24:195E.
 40. Grace SL, Russell KL, Reid RD, et al. Effect of cardiac rehabilitation referral strategies on utilization rates: A prospective, controlled study. *Arch Int Med.* In Press.
 41. Grace SL, Russell KL, Reid RD, et al. Effectiveness of inpatient and outpatient strategies in increasing referral and utilization of cardiac rehabilitation: A prospective, multi-site study. *CMAJ.* Under Review.
 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, Turner R, Zandri J, Prior P, Unsworth K. Improving cardiac rehabilitation (CR) participation in women and men, the CR participation study. *JCRP.* Quebec: Canadian Association of Cardiac Rehabilitation Annual Meeting and Symposium; 2007;27(5):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;22:313-319. 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.
 45. Department of Health. Cardiac rehabilitation. In: Coronary heart disease: national service framework for coronary heart disease - modern

standards and service models, chapter 7, product number 16611. Available at: http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4057524.pdf. Accessed 12/22, 2009.

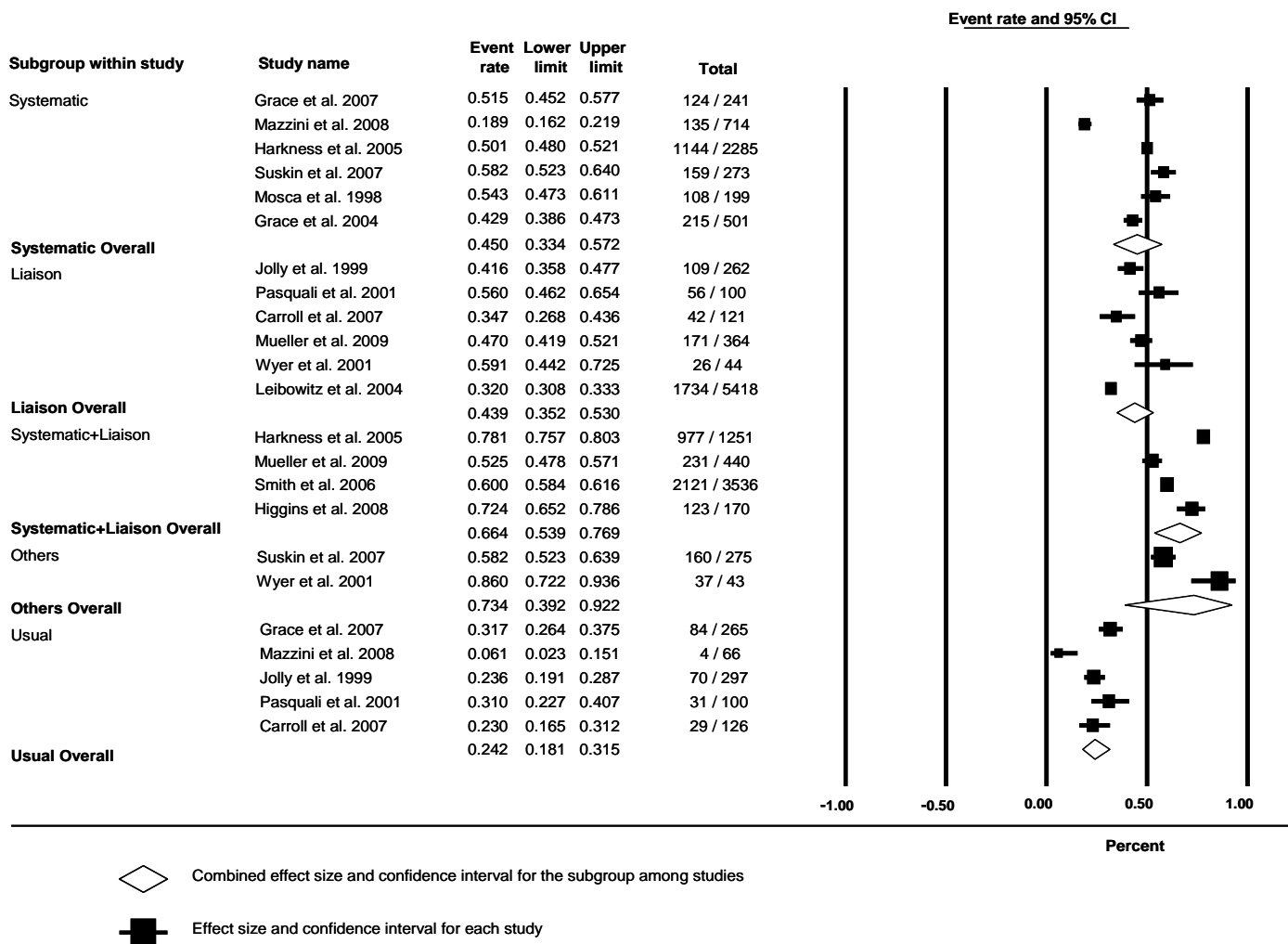
46. LaBresh KA, Fonarow GC, Smith SC, Jr, et al. Improved treatment of hospitalized coronary artery disease patients with the get with the guidelines program. *Crit Pathw Cardiol.* 2007;6:98-105.
47. Taylor RS, Unal B, Critchley JA, Capewell S. Mortality reductions in patients receiving exercise-based cardiac rehabilitation: How much can be attributed to cardiovascular risk factor improvements? *Eur J Cardiovasc Prev Rehabil.* 2006;13:369-374.
48. 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>.
49. 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.
50. 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.
51. 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.
52. The Canadian Heart Health Strategy and Action Plan. The Canadian Heart Health Strategy and Action Plan: Building a Heart Healthy Canada. Ottawa: Submitted to the Minister of Health; 2009.

Table 1. CACR-CCS POSITIONS ON SYSTEMATIZED CARDIAC REHABILITATION REFERRAL STRATEGIES

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

AHA=American Heart Association; CR=cardiac rehabilitation

Figure 1. Forrest plot of the effect of referral strategy on CR enrollment



Heterogeneity:

Systematic: $Q=225.32$, $df=5$, $p<0.0001$; $I^2=97.78$

Liaison: $Q=74.45$, $df=5$, $p<0.0001$; $I^2=93.28$

Systematic + Liaison: $Q=157.22$, $df=3$, $p<0.0001$; $I^2=98.10$

Other: $Q=10.63$, $df=1$, $p<0.001$; $I^2=90.59$

Usual: $Q=17.91$, $df=4$, $p<0.001$; $I^2=77.66$

Figure 2. Development Process for Systematizing Inpatient Cardiac Rehabilitation Referrals

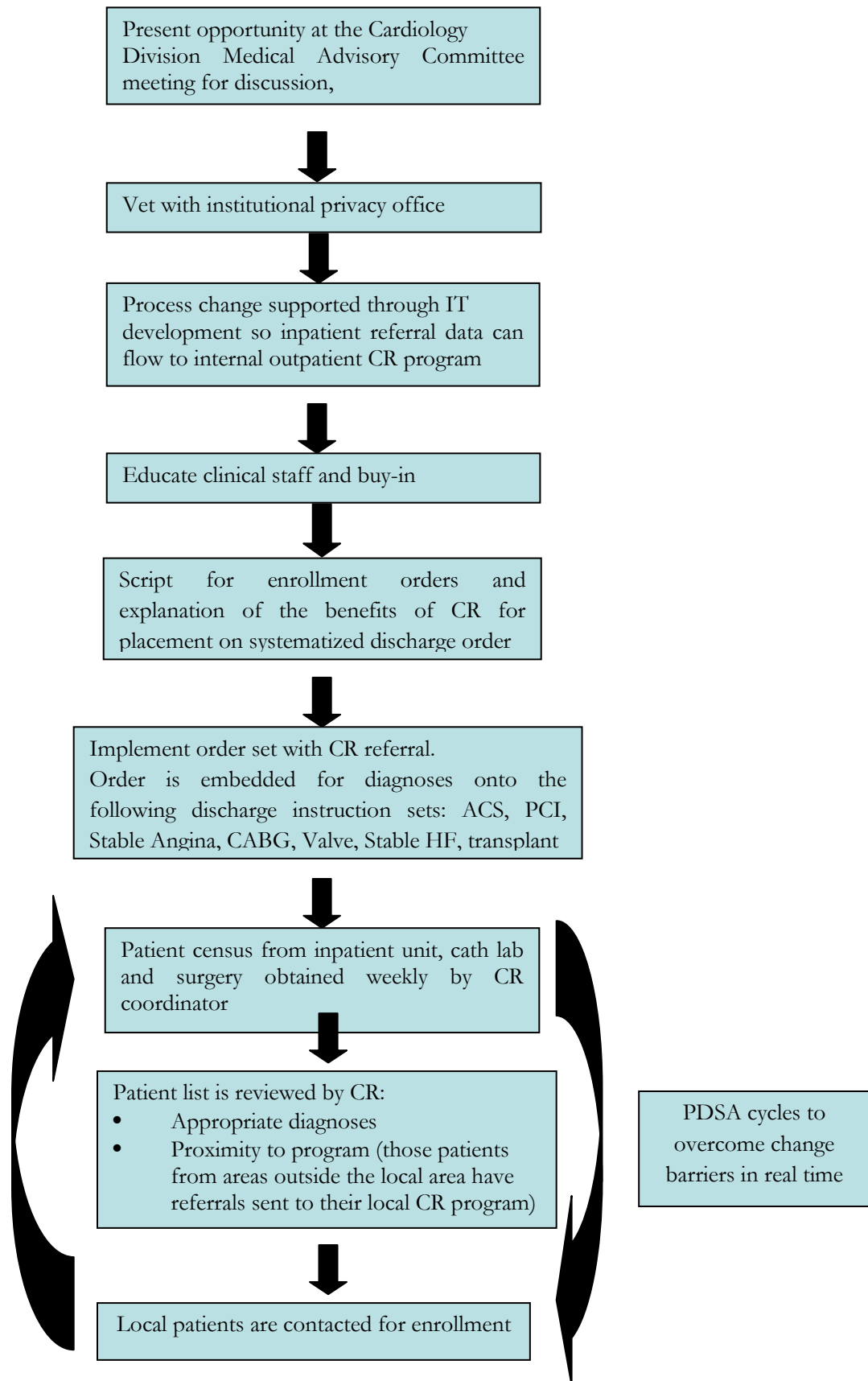


Figure 3. Strategies to Address Increased CR Demand When Implementing Systematic & Liaison Referral

- 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 re-direct referrals to sites closer to patients' homes
- 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 (i.e., telemedicine)
- Exploring safe, community-based models that leverage community resources and optimize the expertise of CR professionals