Title Page

Healthcare Providers' Awareness of the Information Needs of their Cardiac Rehabilitation Patients throughout the Program Continuum

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Abstract

Objectives: to: (1) describe cardiac rehabilitation (CR) participant information needs, (2) investigate whether CR providers are cognizant of patient's information needs and preferred delivery formats, and (3) whether patient information needs change over the course of CR.

Methods: In this cross-sectional study, 306 CR patients and 28 CR providers completed a survey. The survey consisted of the Information Needs in CR (INCR) questionnaire, and items about preferred education delivery formats.

Results: Low-income CR participants had significantly greater information needs than high-income participants. CR providers were cognizant of patient information needs, except patients did desire more information on diagnosis and treatment than providers perceived (p<.01). Books, lectures and discussion were identified as the preferred delivery formats by both patients and providers. There were some significant differences in patient information needs over the course of the program, particularly in relation to concerns and risk factors.

Conclusion: CR patients desire information in many areas, particularly regarding emergency/safety and diagnosis/treatment. CR providers were highly cognizant of patient information needs; however, these do change over time.

Practice Implications: These findings could inform evaluation and improvement of CR education programming, to ensure programs are meeting patient information needs across all stages of recovery.

Keywords: Coronary Artery Disease; Rehabilitation; Needs Assessment; Patient Education as Topic; Questionnaires; Health Personnel.

1. Introduction

Cardiovascular diseases (CVDs) are the leading cause of mortality worldwide [1], and are a significant contributor to morbidity and health-related costs [2]. Patient participation in cardiac rehabilitation (CR), a comprehensive outpatient risk reduction program, mitigates this burden [3-5]. Given the complexity of CVD management, including physical activity, nutrition, medication adherence and smoking cessation, education is necessary to support patients in achieving risk reduction and ultimately secondary prevention [6-9]. Indeed, a core component of CR programs is patient education [10,11].

Patient education has been formally defined as “the process by which health professionals and others impart information to patients that will alter their health behaviors or improve their health status” [12; page 788]. As a facilitator of behavior change, patient education therefore plays a key role in the management of CVD [9]. The effectiveness of patient education has been demonstrated, such that patient CVD knowledge has been shown to strongly influence their symptom recognition [13,14], advocacy for physician screening [15], attitudes toward their disease [16], to promote their motivation for self-care and ultimate behavior change [16,17], improve health-related quality of life, and decrease costs through reductions in downstream healthcare utilization [9]. Conversely, inadequate patient understanding of their disease may cause unwarranted emotional distress, inappropriate coping behavior, non-compliance with medical advice [18,19], and unnecessary disease progression [13,20].

To deliver effective patient education, educators need to address patients’ information needs. The information needs of cardiac patients immediately following revascularization [21-23], acute coronary syndrome [24,25], myocardial infarction (MI) [26-31], and heart failure [32,33], have been previously described, and include knowing how to manage signs and symptoms, knowing how to modify or change risk factors, and knowing the names, dosages and side-effects of medications. However, the information needs of CR participants have only recently been described [34]. This is a major gap, considering many CR participants understand or recall little of what happened in hospital (due to anxiety and sedation for example), they would have received information primarily related to acute recovery from their therapies [6-9, 35], and that information needs change across the continuum of care [36].

To be effective, patient education should be comprehensive, planned, supportive and, in particular, patient-centered [9,12,37,38]. Unfortunately, much previous literature on cardiac and non-cardiac patient education has demonstrated that healthcare providers' are often unaware or inaccurately-perceive patients' educational needs [26,27,39-41]. Clearly, this can result in less engaged and informed patients, and thus potentially negatively impact their health outcomes. Accordingly, understanding what patients identify as information needs and concerns, especially early in CR, can ensure that education provided is relevant to the learner [42]. Thus, the objectives of this study were to: (1) describe CR patient information needs and their relation to patient sociodemographic and clinical characteristics, (2) investigate whether CR providers are cognizant of patient's information needs and preferred delivery formats, and (3) investigate whether patient information needs change over the course of CR.

2. Methods

The framework for this study was based on Knowles's assumptions regarding the nature of the adult learning process [43]. Specifically, it was assumed that adults are able to identify their own learning needs, and that they are motivated to learn when they see the content as relevant.

2.1 Design and Procedure

This was a cross-sectional study. Ethics approval was obtained from the local review board, and written consent to participate was provided by all respondents. Data was collected between January and August, 2012.

CR patients were approached by a research team member at the beginning of their group classes to participate in the study. They were provided the option to complete the survey while in the CR center, or to take it home to complete, and bring it back at their next visit. The survey included sociodemographic items, the Information Needs in CR (INCR) instrument [34], and items assessing patient preferences for educational delivery formats. Clinical data were extracted from their medical charts. CR providers were asked to complete an adapted version of the same survey.

2.2 Participants

This study included CR patients and healthcare providers recruited from a large academic CR centre in Toronto, Canada. The CR program is 6-months in duration. Upon starting CR, each patient undergoes a comprehensive assessment, they are provided a CR book, and are provided pamphlets as applicable to their needs. Participants then come to the center for weekly exercise classes, in addition to their home exercise. In conjunction with these weekly visits, an interdisciplinary team provides approximately 15 hours of patient education including information on exercise safety, nutrition, risk management, medications, stress management, and lifestyle management. This is delivered in large and small group lectures.

A convenience sample of 500 CR patients was approached to participate in this study. Patients from all CR classes were approached to solicit responses across all months of the program. The exclusion criteria for patients were: age less than 18 years, lack of English language proficiency, and any visual, cognitive or psychiatric condition that would preclude the participant from completing the survey. All 59 healthcare providers from the CR centre were emailed the survey to complete, namely nurses, registered dietitians, exercise physiologists, kinesiologists, physicians, physiotherapists, social workers, and psychologists. Administrative and exercise testing staff were excluded from participation.

2.3 Measures

Patients' clinical characteristics were obtained from the medical chart, and included cardiac history, comorbidities, risk factors and months in CR. Patients and CR providers' sociodemographic characteristics were also assessed: age, sex, educational level and family income for patients; and age, sex and years working in CR for providers.

The INCR assessed CR patients' information needs in 10 areas: the heart (physiology, symptoms, and surgical treatments), nutrition, exercise/physical activity, medication, work/vocational/social, stress/psychological factors, general/social concerns, emergency/safety, diagnosis and treatment, and risk factors. Participants were asked to rate the importance of each of the 55 information items in increasing their knowledge about CVD. Items were rated on a 5-point Likert-type scale, that ranged from 1 = *really not important* to 5 = *very important*, and accordingly higher scores indicated greater information needs. The INCR has been psychometrically-validated in the CR setting, and demonstrated good reliability and validity [34].

The INCR was adapted to be administered to CR providers, through minor revision to the instructions. Providers were asked to rate the importance of each item to their patients on the same 5-point scale.

Next, patients were asked to report their preferences for educational delivery formats, checking their preferences from a list of options. There was also space to report "other" preferred formats, in open-ended fashion. CR providers were similarly asked to denote their perceptions of their patients preferred delivery formats. Finally, providers were also asked to describe the most common questions asked by patients, to describe perceived education gaps in the program, in open-ended fashion.

2.4 Statistical Analyses

SPSS Version 20 was used (IBM Inc 2011, NY). Descriptive statistics were used to describe sociodemographic and clinical characteristics of patients and CR providers. To test the first objective, INCR scores were explored. Pearson’s correlation, t-tests and ANOVAs (as applicable) were computed to test for significant differences INCR scores based on patient and provider characteristics.

To test the second objective, a descriptive examination of mean total information needs scores and mean item scores by sample (patients vs. CR providers) was performed. To test for differences between samples, non-parametric tests (Mann-Whitney U) were applied, due to difference in size between samples. A similar approach was also undertaken for preferred delivery formats.

Open-ended questions (preferences for educational delivery formats, the most common questions patients asked, and gaps in CR education curriculum) were coded [44] and described by sample. Responses from all open-ended questions were analyzed as follows [45]: (1) first the quality of the data was considered; (2) next the analysis was focused by topic; (3) information was then categorized, such that themes or patterns were identified and organized into coherent categories; (4) patterns and connections within and between categories were identified; and finally, (5) these were interpreted. Two authors (GLMG and HS) independently reviewed the data and met to compare results. Any discrepancies in meaning were resolved by a third author (PO).

Finally, to test the third objective, patients were categorized based on their month in the program, as beginning (1-2 months), middle (3-4 months) and end (5 or more). INCR subscale scores were compared across each time point using ANOVA.

3. Results

3.1 Respondent Characteristics

With regard to patients, 306 (response rate = 61.2%) returned and fully completed the INCR tool. On average, patients had been in the program just over 4 of the 6 months. Table 1 displays their sociodemographic and clinical characteristics, and how these characteristics were related to their information needs. As shown, patients with lower income had significantly higher information needs than those with higher income. There was no significant relationship between information needs and any other characteristic.

With regard to CR providers, 28 (response rate = 47.5%) completed the survey. CR providers were on average 43.64±13.56 years of age, and were primarily female (n=23, 82.1%). With regard to tenure, 19 (68%) providers reported working in CR for more than 6 years, 7 (25%) between 1 and 5 years, and 2 (7%) less than 1 year. There was no significant relationship between total INCR scores and sex (p=0.30), age (p=0.25), or years working in CR (p=0.30).

3.2 Information Needs

The INCR performed reliably in both samples, with Cronbach’s alpha for the patients’ and CR providers’ respondents being 0.98 and 0.89, respectively. Cronbach’s alpha for the subscales ranged from .83 to .93 for the patients’ version, and from .75 to .91 for the CR providers’ version.

The mean total INCR for both samples was 4.38±0.44. Table 2 displays the mean total, subscale and item needs scores for patients and CR providers. Both patients and CR providers rated all items as “important” to learn (i.e., all item means above 3.0). The items where the mean score was below 4 would generally not be applicable to all participants (i.e., diabetes, smoking, return to work, driving); an observation which is supported by the generally higher standard deviations for these items.

As shown in Table 2, CR providers rated the total information needs of patients significantly greater than patients overall. Similarly, for 30 of 55 items and for 5 of 10 subscales, CR providers rated the information needs significantly higher than patients did. The were only 2 items where patients scored the information importance as significantly higher than providers rated them, specifically with respect to diagnosis and treatment. The greatest disparities in mean item score between patients and providers were for again for specific items which may not pertain to all patients such as smoking (0.86 – 1.47) and diabetes (0.71-0.96).

CR providers were asked to report the topics that they perceived patients have more difficulty learning. Using content analysis, responses were grouped into 9 categories: goal-setting and self-care (identified by 12 providers; 43%), exercise (n=7; 25%), nutrition (n=6; 21%), the heart (physiology, symptoms, surgical treatments; n=5; 18%), medication (n=5; 18%), stress/psychological factors (n=3; 11%), risk factors (n=3; 11%), work/vocational/social (n=1; 4%), and diagnosis and tests (n=1; 4%).

Finally, based on their experiences with patients and their perceived information needs, providers were asked to identify gaps in the education curriculum. They noted gaps in information related to the heart (i.e., physiology, symptoms, surgical treatments), exercise, medication, sexual activity, stress/psychological factors, sleep problems, different forms of physical activity (e.g. tai chi, relaxation techniques), and risk factors. In addition, providers identified “other” topics, including fall prevention, problem solving, and self-management.

3.3 Education Delivery Formats and Gaps

Table 3 displays the preferences for education delivery formats by patients and CR provider’s perceptions of patients’ preferences. Lecture, book and discussion with healthcare providers were identified as the preferred formats by patients, and were also correctly perceived by CR providers as patients’ preference. As with the information needs, providers endorsed each delivery format more strongly than patients did. But contrarily, providers significantly under-estimated patient preference for education delivered by their physician. However, this was among the least preferred format. Finally, in the open-ended responses, 10 (3.3%) patients reported the inclusion of family or spouse during education delivery as important.

3.4 Information Needs over the Course of CR

Table 4 displays patient’s information needs by area and by time in CR. Specifically, at the beginning of the program, patients were most interested in learning about medications and emergency/safety. Mid-program their greatest information needs related to diagnosis and treatment, as well as nutrition. At the end of the program, participants reported their greatest information needs related to emergency/safety, diagnosis/treatment and the heart. There was a significant difference in information needs by time in program in the following areas: general/social concerns (greatest mid-program), emergency/safety (greatest beginning of program), and risk factors (greatest mid-program).

CR providers were asked to describe the most common questions patients asked them, when during the program, and where (location inside the CR center) these were generally asked. Content analysis revealed these questions corresponded to 9 of the 10 areas of the INCR, plus questions related to the CR program itself. Questions related to the heart (physiology, symptoms, and surgical treatments), work, vocational and social aspects of CR, and general and social concerns were commonly asked in the beginning of the program, and usually on a one-on-one basis. Questions related to exercise and physical activities were also usually asked in the beginning of the program, in several places such as: in the exercise testing lab, on the exercise track, during lectures, and one-on-one, among others. Furthermore, in the beginning of the program overall questions about CR were mostly asked, in several locations inside the CR center.

Questions related to nutrition were asked in the beginning and middle of the program, mostly during educational lectures or one-on-one. Questions about risk factors were most-commonly asked in the middle of the program, in several places such as: the exercise testing lab, on the exercise track, during lectures, and one-on-one, among others. Question regarding medication were asked throughout the program and usually during lectures or during a one-on-one consultation. Questions regarding diagnosis and tests were also asked throughout the program, usually in the exercise testing laboratory, on the exercise track and during one-on-one consultations. Although identified by CR providers, questions about stress and psychological factors were not perceived to be common, and were usually asked to allied health professionals and peers.

4. Discussion and Conclusion

4.1 Discussion

Both patients and CR providers generally reported all 55 informational items as “important” to learn, suggesting that CR, which affords repeated contacts over time between patients and providers, must play an important role in ensuring all patients’ information needs are met. The greatest information needs identified by patients were related to medication, emergency/safety, and diagnosis and treatment, and were perceived as stress/psychological factors, emergency/safety, and risk factors by CR providers. CR providers were quite aware of patient's information needs, except in regard to diagnosis and treatment. Finally, most additional questions CR providers reported they received by patients are included in the INCR tool, supporting its validity and comprehensiveness.

Overall, patient's desired information in areas that are vital to patient survival and ongoing control of symptoms, and CR providers were quite aware of these information needs. In this study, there was agreement between patients and CR providers that emergency/safety was one of the highest information needs, which has also been observed in previous studies [24,34,35,39]. Most of the previous studies that compared patients and CR providers views of information needs, found that providers considered medication information as a greater need than patients [34,35,39]; however, this study did not corroborate this, which may reflect an increasing awareness and interest of patients in their pharmacological treatment. Moreover, in contrast to other studies [24,34,35,39], patients identified 'risk factors' as one of their lowest information needs. This may suggest that patients come to CR with knowledge of risk factors, stemming from inpatient education. CR educators perhaps should ascertain the degree of patient understanding in this area, and potentially have patients who are knowledgeable in this regard convey risk factor information to their peers, such that educators can correct or expand on any deficiencies verbalized. Finally, providers should focus on educating patients of lower income, as they identified significantly greater educational needs than their high income counterparts [46].

Overall, CR providers rated the total information needs of patients significantly greater than did patients overall. A potential explanation could be that providers have fulsome education regarding treatment and secondary prevention of CVD, and therefore have a more complete sense of what patients need to know. Second, providers would not be aware of what information patients have already received at other stages of the continuum of care. Finally, patients were asked to rate their own information needs, whereas providers were rating the needs in relation to patients in general. Thus, caution is warranted in over-interpretation of the total difference in information needs between patients and providers.

In regards to delivery formats, lectures, books and discussions with healthcare providers were identified as the preferred formats by patients, and were also correctly perceived by CR providers as patients' preference. These desired formats are congruent with what is offered in the CR program evaluated. Surprisingly, patients did not desire to learn through electronic media resources such as the internet, and e-learning. Despite patients' preferences for non-electronic resources, the effectiveness of this type of technology in patient education has been described in the literature [47]. Moreover, there are some randomized controlled trials of web-based CR currently underway [48]. It will be important to test the user-friendliness of the education modules, and the impact on patient knowledge, and subsequently behavior. Indeed, the current research was intended to inform the development of online education videos, to enable a broader reach to cardiac patients, and "on-demand" access right when patients want particular information. Clearly, further consideration and assessment will be needed prior to video development, to ensure the education content is learner-centered.

This study presents findings of a needs assessment tool in which patients were involved in the development (a stated gap in a systematic review [42]). Moreover, this is the only study to have examined information needs in CR, and to have initially considered the role of time-in-program on information needs. There were significant differences in information needs by time related to general/social concerns, emergency/safety, and risk factors. Specifically, patients were significantly most interested in learning about emergency/safety at the beginning of the program, and about general/social concerns and risk factors mid-program. These findings could inform efforts to “time it right” in CR education delivery. Replication is warranted to test the robustness of these differences over the course of CR, and how clinically meaningful they are.

Needs Assessment is considered an ongoing process of gathering data to determine what information needs exist so that education can be developed to help the institution to accomplish its patients goals. In this context, personal aspects, background, beliefs, previous knowledge influence results. Thus, individual and group learning needs are different. The approach used by this study is the group learning needs, which produce an average picture that fails to address important needs and interests of individual members of the group—so a balance is required. Individual learning needs assessment is best used in the context of learning that occurs on an individual basis— which is not the case for most of the CR Programs, where the education is delivered in group settings. Furthermore, CR providers rated the total needs of patients significantly greater than patients, which may be related to the fact that perhaps the providers were also considering the needs of those who did not volunteer for this study.

Caution is warranted when interpreting results. First, the generalizability of these finding to other CR populations is somewhat limited, considering recruitment stemmed from a single centre. Replication is warranted. Second, this was a convenience sample, and as such may be biased. For instance, the sample could have been composed of patients with higher information needs than the average CR participant. Third, the response rate for both samples (patients and providers) was lower than 75%, which can also introduce bias. Fourth, participants were provided the option to complete the survey on site at the CR program or to take them home to complete. It is unknown whether the environment where participants completed surveys off-site may have biased their reporting. Finally, the design was cross-sectional and therefore causal conclusions cannot be drawn. In particular, a longitudinal study of change in patients' information needs through the course of CR is warranted, to ascertain whether the differences in information needs identified herein are robust.

Broader considerations should also be noted. Overall, both patients and providers considered all 55 items are relatively important to learn. First, this could explain why there was a semblance of concordance between patient and provider perceptions of patient information needs. Second, there may be a bias in responding to the scale, as all items were developed based on what patients ought to know and also patients provided input in the scale development process.

4.3 Conclusion

CR patients desire information in many areas, but in particular they desire information regarding emergency / safety and diagnosis / treatment. CR providers were highly cognizant of patient information needs. Patients preferred information to be delivered via lectures, books or discussions with CR providers. This is concordant with healthcare provider perceptions, and with CR delivery in most instances. This is the first study to our knowledge to have documented differences in patient information needs over the course of CR programs.

4.2 Practice Implications

The identification of needs using an instrument like the INCR could serve as a mechanism for understanding patient information gaps. Moreover, CR staff could use the INCR to assess the comprehensiveness of their education programming, and to consider whether the main focus of their programming relates to the key information needs of patients at different stages of the program. Programs should also consider whether the delivery format of their education program is concordant with patient preferences.

References

[1] WHO. Cardiovascular disease fact sheet n 317, September 2011. Available at: <http://www.who.int/mediacentre/factsheets/fs317/en/index.html>

[2] Cardiac Care Network. The Ontario cardiac rehabilitation pilot project: Report and recommendations. 2002.

[3] Clark AM, Hartling L, Vandermeer B and McAlister FA. Meta-analysis: Secondary prevention programs for patients with coronary artery disease. Ann Intern Med 2005; 143: 659–72.

[4] Heran BS, Chen JM, Ebrahim S, Moxham T, Oldridge N, Rees K, et al. Exercise-based cardiac rehabilitation for coronary artery disease. Cochrane Database Syst Rev 2011; (7): CD001800.

[5] Lawler PR, Filion KB, Eisenberg M J. Efficacy of exercise-based cardiac rehabilitation post-myocardial infarction: A systematic review and meta-analysis of randomized controlled trials. Am Heart J 2011; 167:571-84.

[6] Kayaniyil S, Winstanley J, Parsons C, Brister S, Oh P, Stewart DG, et al. Degree and correlates of cardiac knowledge and awareness among cardiac impatiens. Patient Educ Counsel 2009; 75: 99-107.

[7] Alm-Roijer C, Fridlund B, Stagmo M, Erhardt L. Knowing your risk factors for coronary heart disease improves adherence to advice on lifestyle changes and medication. J Cardiovasc Nurs 2006; 21: E24-31.

[8] Boyde M, Turner C, Thompson DR, Stewart S. Educational interventions for patients with heart failure: a systematic review of randomized controlled trials. J Cardiovasc Nurs 2011; 26: E27-35.

[9] Brown JP, Clark AM, Dalal H, Weich K, Taylor RS. Patient education in the management of coronary heart disease. Cochrane Database Syst Rev 2011; (12):CD008895.

[10] 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.

[11] British Association for Cardiovascular Prevention and Rehabilitation (BACPR). The BACPR standards and core components for cardiovascular disease prevention and rehabilitation. 2nd edition. Available at: www.bacpr.com/resources/15E_BACPR_Standards_FINAL.pdf

[12] Koongstvedt P. The managed health care handbook. Gaithersburg: Aspen Publishers; 2001.

[13] Zalesskaya JV, Noruzbaeva AM, Lunegova OS, Mirrakhimov EM. Evaluation of the economic efficiency of educational programs for patients with coronary heart disease and dyslipidemia. CVD Prev Control 2005;1:297-304.

[14] DeVon HA, Rankin SH, Paul SM, Ochs AL. The Know & Go! Program improves knowledge for patients with coronary heart disease in pilot testing. Heart Lung 2010;39:S23-33.

[15] Bolman C, Brug J, Bar F, Martinali J, Borne B. Long-term efficacy of a checklist to improve patient education in cardiology.Patient Educ Counsel 2005;56:240-8.

[16] Bellman C, Hambraeus K, Lindback J, Lindahl B. Achievement of secondary prevention goals after myocardial infarction: A comparison between participants and nonparticipants in a routine patient education program in Sweden. J Cardiovasc Nurs 2009;24:362-8.

[17] Dickson VA, Tkas N, Riegel B. Social cognitive influences on self-care decision making in persons with heart failure. Am Heart J 2008;154:424-31.

[18] Monane M, Bonn R, Gurwitz J, Glynn R, Avorn J. Noncompliance with congestive heart failure therapy in the elderly. Arch Intern Med 1994;154:433-7.

[19] Blyth F, Lazarus R, Ross D, Price M, Cheuk G, Leeder S. Burden and outcomes of hospitalization for congestive heart failure. Med J Australia 1997;157:99-104.

[20] Sui X, Gheorghiade M, Zannad F, Young JB, Ahmed A. A propensity-matched study of the association of education and outcomes in chronic heart failure. Int J Cardiol 2008;129:93-9.

[21] Astin F, Closs SJ, McLenachan J, Hunter S, Priestley C. The information needs of patients treated with primary angioplasty for heart attack: an exploratory study. Patient Educ Couns 2008;73:325-32.

[22] Brezynskie H, Pendon E, Lindsay P, Adam M. Identification of the perceived learning needs of balloon angioplasty patients. Can J Cardiovasc Nurs 1998; 9: 8-14.

[23] Goodman H. Patients' perceptions of their education needs in the first six weeks following discharge after cardiac surgery. J Adv Nurs 1997;25:1241-51.

[24] Czar ML, Engler MM. Perceived learning needs of patients with coronary artery disease using a questionnaire assessment tool. Heart Lung 1997;26:109-17.

[25] Nakano A, Mainz J, Lomborg K. Patient perception and assessment of admission to acute cardiac care unit. Eur J Cardiovasc Nurs 2008;7:10-5.

[26] Casey E, O'Connel JK, Price JH. Perceptions of educational needs for patients after myocardial infarction. Patient Educ Couns 1984;6:77-82.

[27] Moynihan M. Assessing the educational needs of post-myocardial infarction patients. Nurs Clin North Am 1984;19: 441-7.

[28] Ashton KC. Perceived learning needs of men and women after myocardial infarction. J Cardiovasc Nursing 1997;12:93-100.

[29] Timmins F, Kaliszer M. Information needs of myocardial infarction patients. Eur J Cardiovasc Nurs 2003;2:57-65.

[30] Decker C, Garavalia L, Chen C, Buchanan DM, Nugent K, Shipman A, Spertus JA. Acute myocardial infarction patient's information needs over the course of treatment and recovery. J Cardiovasc Nurs 2007;22:459-65.

[31] Smith J, Liles C. Information needs before hospital discharge of myocardial infarction patients: a comparative, descriptive study. J Clin Nurs 2007;6:662-71.

[32] Wehby D, Brenner PS. Perceived learning needs of patients with heart failure. Heart Lung 1999;28:31-40.

[33] Lile JB, Buhmann J, Roders S. Development of a learning needs assessment tool for patients with congestive heart failure. Home Health Care Manage Prac 1999;11:11-25.

[34] Ghisi G, Grace SL, Thomas S, Evans MF, Oh P. Development and psychometric validation of a scale to assess information needs in cardiac rehabilitation: The INCR Tool. Patient Educ Couns 2013;91:337-43.

[35] de Melo Ghisi GL, Oh P, Thomas S, Benetti M. Development and validation of an English version of the Coronary Artery Disease Education Questionnaire (CADE-Q). Eur J Prev Cardiol 2013;20:291-300.

[36] Cameron JI, Gignac MA. "Timing It Right": a conceptual framework for addressing the support needs of family caregivers to stroke survivors from the hospital to the home. Patient Educ Couns 2008;70:305-14.

[37] Furze G, Roebuck A, Bull P, Lewin RJP, Thompson DR. A comparison of illness beliefs of patients with angina and their peers: a questionnaire study. *BMC Cardiovasc Disord* 2002;2:1-5.

[38] Su WM, Herron B, Osisek PJ. Using a competency-based approach to patient education: Achieving congruence among learning, teaching and evaluation. Nurs Clin North Am 2001;46:291-8.

[39] Gerard PS, Peterson LM. Learning needs of cardiac patients. Cardiovascular Nursing 1984;20:7-11.

[40] Karlik BA, Yarcheski A. Learning needs of cardiac patients: A partial replication study. Heart & Lung 1987;16:544-51.

[41] Hagenhoff BD, Feutz C, Conn VS, Sagehom KK, Moranville-Hunziker M. Patient education needs as reported by congestive heart failure patients and their nurses. J Adv Nurs 1994;19:685-90.

[42] Scott JT, Thompson DR. Assessing the information needs of post-myocardial infarction patients: a systematic review. Patient Education and Counseling 2003 Jun;50(2):167-77.

[43] Knowles M. The adult learner: A neglected species. Houston: Gulf Publishing Co, 1973.

[44] Silverman D. Doing Qualitative Research - A Practical Handbook. London: Sage Publications Ltd, 2000.

[45] Pope C, Ziebland S, Mays N. Qualitative Research in Health Care. 2nd ed. London: BMJ, 1999.

[46] Kaplan GA, Keil JE. Socioeconomic factors and cardiovascular disease: a review of the literature. *Circulation 1993;*88:1973–98.

[47] Kuhn EA, Sears SF, Conti JB. Internet-based behavioral change and psychosocial care for patients with cardiovascular disease: a review of cardiac disease-specific applications. Heart Lung 2006;35:374-82.

[48] Simon Fraser University; Heart and Stroke Foundation of Canada. Trial of a cardiac rehabilitation program delivered remotely through the internet (vCRP). In: ClinicalTrials.gov [Internet]. Bethesda (MD): National Library of Medicine (US). 2000 – [cited 2013 Aug 16]. Available from:

http://clinicaltrials.gov/ct2/show/NCT00683813?term=cardiac+rehabilitation&rank=31 NLM

Identifier: NCT00683813

Tables

Table 1 – Sociodemographic and Clinical Characteristics of Patient Respondents (N=306), and Mean and Standard Deviation of Total Information Needs Scores by these Characteristics.

Characteristic	**Mean±SD / n (%)**	**Information Needs (Mean±SD)**	**test statistic***
Sociodemographic[†]			
Age, years (mean±SD)	66.33±11.11	-	0.02
Less than or equal to 65 years old	139 (45.4%)	4.22±0.54	0.09
Older than 65 years old	165 (54.6%)	4.12±0.53	
Sex, n (%)			1.06
Female	85 (27.8%)	4.22±0.54	
Male	219 (72.2%)	4.15±0.53	
Highest Educational Level, n (%)			1.49
Elementary School	4 (1.3%)	4.18±0.75	
High School	70 (22.9%)	4.05±0.54	
College	71 (23.2%)	4.22±0.46	
University	86 (28.1%)	4.15±0.58	
Graduate School	67 (21.9%)	4.26±0.52	
Did not answer	8 (2.6%)	-	
Annual Family Income in CAD, n (%)			2.62§
Under $10,000	5 (1.6%)	4.68±0.30	
$10,000 - $50,000	77 (25.2%)	4.15±0.58	
$50,001 - $100,000	108 (35.3%)	4.17±0.49	
$100,001 - $150,000	55 (18.0%)	4.02±0.50	
Above $150,000	29 (9.5%)	4.05±0.59	
Did not answer	32 (10.5%)	-	
Clinical,[‡]n (% yes)			
Hypertension	104 (34.0%)	4.19±0.54	0.26
Dyslipidemia	59 (19.3%)	4.22±0.54	0.98
Smoking History	55 (18.0%)	4.25±0.55	1.30
Diabetes Type I	4 (1.3%)	4.64±0.16	1.55
Diabetes Type II	48 (15.7%)	4.27±0.52	1.46
Previous MI	79 (25.8%)	4.29±0.50	1.46
Prior CABG	94 (30.7%)	4.04±0.58	1.48
Prior PCI	125 (40.8%)	4.24±0.51	1.59
Heart Failure	11 (3.6%)	4.25±0.65	0.14
Peripheral Vascular Disease	14 (4.6%)	4.27±0.73	0.78

Chronic Obstructive Pulmonary Disease	5 (1.6%)	4.36±0.50	0.81

CABG indicates coronary bypass artery graft surgery, CAD Canadian dollars, CR cardiac rehabilitation, MI myocardial infarction, PCI percutaneous coronary intervention, SD standard deviation.

*F test, t-test or Pearson’s correlation, as appropriate.

Significant differences between samples: §p<.05

†self-reported

‡extracted from medical chart

Note. INCR scores range from 1-5, with greater scores denoting greater information needs.

Table 2 – Mean and Standard Deviation of Total Information Needs by Sample, and Mean Differences.

		Patients (n=306; 91.6%)	**CR Providers (n=28; 8.4%)**	**Difference (CR providers needs – patients needs)**
Subscale	**Item**	**Mean±SD**	**Mean±SD**	
The Heart (physiology, symptoms, surgical treatments)	1. How does a healthy heart work?	4.41±0.79	4.43±0.72	0.02
	2. What is “coronary artery disease”?	4.46±0.79	4.79±0.57	0.33*
	3. What is angina?	4.46±0.78	4.79±0.42	0.33*
	4. What happens when someone has a heart attack?	4.55±0.77	4.64±0.62	0.09
	5. What is “bypass surgery”?	4.16±0.85	4.39±0.74	0.23
	6. What is an angioplasty	4.28±0.85	4.46±0.69	0.18
	Total Mean	**4.39±0.65**	**4.58±0.50**	**0.19‡**
Nutrition	7. What foods should I eat for a healthy heart?	4.49±0.80	4.68±0.48	0.19
	8. How can I choose healthy foods at the grocery store?	4.32±0.87	4.54±0.58	0.22
	9. How can I choose healthy foods when dining out?	4.16±0.85	4.50±0.51	0.34*
	10. How do I read food labels?	4.32±0.78	4.64±0.56	0.32*
	Total Mean	**4.32±0.68**	**4.59±0.50**	**0.27**
Exercise/ Physical Activity	11. How will exercise help my heart condition?	4.62±0.67	4.93±0.26	0.31*
	12. What are the components of a safe exercise program?	4.54±0.69	4.86±0.36	0.32*
	13. What is cardiovascular or aerobic exercise?	4.35±0.72	4.43±0.84	0.08
	14. What can I do to improve or maintain flexibility?	4.22±0.81	3.96±0.79	-0.26
	15. How should I exercise in hot or cold weather?	4.20±0.85	4.61±0.57	0.41*
	16. If I have diabetes, how do I prevent low blood sugar with exercise?	3.83±1.13	4.79±0.42	0.96‡
	17. How do I take care for my feet when in an exercise program?	3.85±0.97	4.56±0.51	0.44‡
	18. What is resistance training (i.e. exercise for strengthening muscles)?	4.12±0.93	4.56±0.51	0.44*
	19. What types of exercise equipment are available? (where?)	3.82±0.94	3.96±0.74	0.14
	20. How can I exercise at home safely?	4.11±0.88	4.61±0.57	0.5‡
	21. When should I stop physical exercise?	4.27±0.91	4.64±0.56	0.37*
	22. Is sexual activity safe for me?	3.72±1.15	4.46±0.58	0.74‡
	Total Mean	**4.09±0.59**	**4.51±0.41**	**0.42‡**
Medication	23. What medications do I need to help my heart?	4.41±0.93	4.75±0.52	0.34
	24. How do I take my medication in the right way?	4.41±0.84	4.67±0.56	0.26
	25. What side effects are possible with my medication?	4.35±0.87	4.39±0.63	0.04
	26. Do the medications I am taking interfere with each other?	4.41±0.87	4.39±0.69	-0.02
	27. Are there foods I should avoid while taking these medications?	4.44±0.81	4.50±0.69	0.06
	28. What are the effects of complementary and alternative medications?	4.24±0.89	4.25±0.80	0.01
	Total Mean	**4.37±0.69**	**4.51±0.55**	**0.14**
Work/Vocational/ Social	29. When can I return to work and my old activities?	3.89±1.01	4.64±0.49	0.75‡
	30. Can I go back to my same job?	3.65±1.18	4.39±0.74	0.74†
	31. When can I start driving again?	3.91±1.17	4.36±0.87	0.45

	Total Mean	**3.65±1.10**	**4.46±0.63**	**0.81‡**
Stress/Psychological Factors	32. What feelings are common after a heart attack?	4.24±0.95	4.68±0.48	0.44*
	33. How does stress affect my heart?	4.50±0.76	4.75±0.44	0.25
	34. How can I cope with stress?	4.41±0.80	4.75±0.44	0.34*
	35. What can I do to reduce stress in my life?	4.39±0.86	4.79±0.42	0.40*
	36. Do sleep problems affect my heart?	4.20±0.91	4.75±0.44	0.55†
	Total Mean	**4.31±0.72**	**4.74±0.36**	**0.43**
General/Social Concerns	37. What services, support organizations and groups are available?	4.04±0.92	4.54±0.58	0.50†
	38. What support services are available to my family?	3.87±1.06	4.50±0.58	0.63†
	Total Mean	**3.92±0.99**	**4.52±0.54**	**0.60‡**
Emergency/Safety	39. How do I recognize angina symptoms?	4.57±0.75	4.93±0.26	0.36*
	40. What should I do if I feel angina or chest pain?	4.59±0.80	4.89±0.32	0.30*
	41. When should I call the doctor?	4.58±0.76	4.86±0.36	0.28
	42. When should I call 911 or go to emergency room?	4.63±0.80	4.79±0.42	0.16
	Total Mean	**4.58±0.70**	**4.87±0.26**	**0.29**
Diagnosis and treatment	43. What are the tests used to diagnose my heart condition?	4.36±0.84	4.21±0.79	-0.15
	44. What treatments are available for my condition?	4.48±0.80	4.44±0.75	-0.04
	Total Mean	**4.42±0.74**	**4.25±0.88**	**-0.17†**
Risk Factors	45. What are the risk factors for heart disease?	4.47±0.84	4.89±0.32	0.42*
	46. What are the risk factors that I cannot control?	4.26±0.88	4.46±0.64	0.20
	47. What are the risk factors I can control?	4.64±0.63	4.82±0.39	0.18
	48. What can I do to bring my risk factors under control?	4.64±0.70	4.86±0.36	0.22
	49. How does cholesterol affect my heart?	4.40±0.90	4.75±0.44	0.35*
	50. How does diabetes affect my heart?	3.97±1.12	4.79±0.42	0.82‡
	51. How does physical inactivity affect my heart?	4.41±0.83	4.86±0.36	0.45†
	52. How does smoking affect my heart?	3.46±1.46	4.93±0.27	1.47‡
	53. What are the benefits of quitting smoking?	3.41±1.53	4.68±0.55	1.27‡
	54. What supports are available to help me quit smoking?	3.17±1.45	4.54±0.58	1.37‡
	55. How does alcohol affect my heart?	3.68±1.26	4.50±0.64	0.82†
	Total Mean	**3.93±0.79**	**4.73±0.38**	**0.80†**
Total		**4.17±0.53**	**4.59±0.34**	**0.42‡**

SD indicates standard deviation.

Significant differences between samples: *p<.05; †p<.01; ‡p<.001.

Table 3 – Preferences for Educational Delivery Formats by Sample.

Format	**Patients (N=306)**	**CR Providers (N=28)**	**p**
Lectures	211 (69.0%)	25 (89.3%)	0.04
Book	206 (67.3%)	27 (96.4%)	0.004
Discussions with CR providers	198 (64.7%)	26 (92.9%)	0.004
Internet	162 (52.9%)	24 (85.7%)	0.001
Movies/videos	90 (29.4%)	11 (39.3%)	0.322
E-learning	71 (23.2%)	18 (64.3%)	<.001
Audio	64 (20.9%)	10 (35.7%)	0.08
Peer	8 (2.6%)	6 (21.4%)	0.09
Physician only	13 (4.3%)	3 (1.0%)	0.04

Table 4 – Mean and Standard Deviation of Patient Information Needs by Subscale and Time in CR Program, N=306

Area of Information Need	**Beginning Months 1 and 2 (n=86; 28.1%)**	**Middle Months 3 and 4 (n=93; 30.4%)**	**End More than 5 Months (n=96; 26.8%)**	**F**
The heart	4.29±0.80	4.41±0.50	4.36±0.63	0.81
Nutrition	4.26±0.61	4.43±0.65	4.22±0.78	2.34
Exercise/Physical activity	3.98±0.65	4.12±0.60	4.10±0.52	1.59
Medication	4.47±0.58	4.36±0.75	4.30±0.75	1.26
Work/Vocational/Social	3.60±1.14	3.67±1.13	3.67±0.94	1.51
Stress/Psychological factors	4.22±0.70	4.38±0.71	4.35±0.72	1.19
General/social concerns	3.57±1.20	4.11±0.81	3.94±0.93	6.96***†‡
Emergency/safety	4.40±0.88	4.26±0.65	4.22±0.53	3.61*†
Diagnosis and treatment	4.32±0.69	4.53±0.75	4.38±0.80	1.92
Risk factors	3.81±0.83	4.08±0.82	3.86±0.74	2.90**†

SD indicates standard deviation.
Significant differences by time: *p<.05; **p<.01; ***p<.001.
† Significant differences between Beginning and Middle
‡ Significant differences between Beginning and End