

Attendance at outpatient cardiac rehabilitation: is it enhanced by specialist nurse referral?

AUTHORS

Natalie A. Johnson

BEd, GradDipHlthSocSci, PhD
Lecturer, School of Medicine and Public Health,
University of Newcastle, Callaghan, New South Wales,
Australia.
Natalie.Johnson@newcastle.edu.au

Kerry J. Inder

BN, GradDipClinEpi, PhD
Lecturer, School of Medicine and Public Health,
University of Newcastle, Callaghan, New South Wales,
Australia.
Kerry.Inder@newcastle.edu.au

Amanda L. Nagle

BSc(Hons), PhD
Heartmoves Program Manager, NSW Division Heart
Foundation, Kotara, New South Wales, Australia.

John H. Wiggers

BA(Hons), PhD
Director, Population Health, Hunter New England
Health. Associate Professor, School of Medicine and
Public Health, University of Newcastle. Wallsend, New
South Wales, Australia.

Acknowledgements

Natalie Johnson's contribution to this project was supported by a NHMRC Public Health Postdoctoral Fellowship (Regkey 964208) between 1998 and 2001 and by a University of Newcastle Equity Research Fellowship in 2008. The authors wish to acknowledge the significant contribution of the late Mrs Janet Fisher to data collection and management and thank the Hunter New England Heart and Stroke Health Outcomes Council for permission to use the data.

KEY WORDS

coronary disease, rehabilitation, outpatients, nurses

ABSTRACT

Objective

Strength of physician recommendation is the principal predictor of outpatient cardiac rehabilitation (CR) participation. Since nurses spend more time with inpatients than physicians, recommendations by nurses may be significant. This study sought to determine which health care provider recommendations were independently associated with CR attendance.

Design and setting

Secondary analysis of cross-sectional survey data provided by patients discharged between March 1998 and February 1999 with coronary heart disease from public hospitals in the Hunter region of New South Wales.

Subjects

Surveys seeking information about advice to attend CR and CR attendance were mailed to 1933 patients aged 20 to 84 years, discharged with a principal diagnosis of acute myocardial infarction, unstable angina pectoris, congestive heart failure, and ischaemic heart disease including those undergoing coronary artery bypass graft surgery and percutaneous coronary intervention. Multiple logistic regression was used to determine which health care provider recommendations were associated with CR attendance.

Main outcome measures

Self-report of one or more health care provider recommendations to attend CR and self-reported attendance.

Results

Among the 404 patients advised to attend CR (70% male, 53% ≥ 65 years), 66% (266/404) attended at least one session. The odds of attendance were significantly higher among patients referred to CR by a CR nurse after adjustment for strength of physician recommendation and other potential confounding variables (odds ratio 3.40, 95% confidence interval 1.74-6.64).

Conclusions

Since recommendations by CR nurses increased the odds of CR attendance, CR nurse recommendations should be included in strategies designed to increase CR utilisation.

INTRODUCTION

Coronary heart disease (CHD) is a major cause of death and disability in Australia (AIHW 2009). Guidelines for the management of acute coronary syndromes recommend that cardiac rehabilitation (CR), a multidisciplinary intervention designed to promote recovery after a coronary event and prevent recurrence, be available and routinely offered to all patients (Aroney et al 2006). Despite this, fewer than half of eligible patients attend outpatient CR (Suaya et al 2007; Scott et al 2003; Bunker et al 1999). This may be due to non-referral of eligible patients or non-attendance after referral (Bunker and Goble 2003). Automatic referral, which is recommended in Australian best practice guidelines for CR (Goble and Worcester 1999), addresses the problem of a lack of initial referrals but does not address the problem of non attendance after referral.

Comprehensive reviews of the factors associated with CR attendance conclude that strength of physician recommendation is the principal predictor of participation (Jackson et al 2005; Cooper et al 2002; Daly et al 2002). Ades et al (1992) found that 1.8% of patients attended CR when they perceived the physician recommendation to be weak compared with 66% when they perceived a strong physician recommendation. Shanks et al (2007) also found strength of physician recommendation to be the strongest predictor of CR attendance but suggested that recommendations from nurses may also be significant because nurses spend more time with inpatients than physicians.

Advice to attend CR for clinically stable patients is commonly provided by CR nurses in the Hunter region (area around Newcastle in New South Wales, Australia), which is consistent with national best practice recommendations (Goble and Worcester 1999). Since medical referral is not always required, the purpose of this secondary analysis of data from the Hunter Outpatient Cardiac Care study (Johnson et al 2004) was to determine which health care provider recommendations were associated with CR attendance after adjustment for potential confounding variables. The association between

various health care provider recommendations and patient attendance has not, to the authors' knowledge, been explored elsewhere.

METHOD

At the time of this study, the tertiary referral hospital for cardiology in the Hunter region employed 2.5 full-time equivalent CR nurses who were responsible for identifying inpatients suitable to attend outpatient CR in addition to supervising the outpatient services. Thus, patients admitted with an acute myocardial infarction (AMI) or for coronary revascularisation with an uncomplicated clinical course were referred routinely to outpatient CR by CR nurses without a medical referral. Other patients were referred to attend CR by cardiologists on a case by case basis. While other hospitals in the region employed CR nurses to supervise outpatient CR, these staff had limited time to identify and invite eligible inpatients. Subsequently, referrals were predominantly made by medical staff, allied health staff, and ward nurses at these sites. Waiting time between referral and CR attendance varies according to demand and is estimated to be approximately one month.

Sample and procedure

The primary aim of the Hunter Outpatient Cardiac Care study was to determine CR referral, attendance and completion rates in the Hunter region. Surveys seeking information about advice to attend CR and CR attendance were mailed to 1,933 patients aged 20 to 84 years discharged from public hospitals in the Hunter region between 1 March 1998 and 28 February 1999 with a principal diagnosis of AMI, unstable angina pectoris (UAP), congestive heart failure (CHF), and ischaemic heart disease (IHD). Patients undergoing coronary artery bypass graft surgery (CABGS) and percutaneous coronary intervention (PCI) were also included. As described elsewhere, a greater proportion of the respondents (1,202/1,933) were male, lived in the urban health sector, had been treated by a specialist or undergone a procedure in a hospital that offers CR while a smaller proportion had been discharged with the diagnosis of CHF (Johnson et al 2004). Information provided by respondents who did not report being advised to

attend CR or reported being advised to attend after further treatment or surgery was excluded from this secondary analysis of the data.

Persons eligible for the study were identified by staff of the Heart and Stroke Register and sent a participant information sheet and questionnaire, including a reply paid envelope, after hospital discharge. Reminders were sent according to the usual register protocol (a reminder letter after two weeks, a letter and second copy of the questionnaire after eight weeks and a final reminder letter ten weeks after initial mailing). Approval for the study was obtained from The University of Newcastle and Hunter Area Health Service Ethics Committees.

Study subjects were asked: 'Did any of the following people advise you to attend an Outpatient Cardiac Rehabilitation Program?' (a yes or no response was required for each): a general practitioner, a cardiologist (cardiac specialist), a cardiac surgeon, a cardiac rehabilitation nurse, a ward nurse, a physiotherapist, a social worker, a lay support person (eg Open Heart Association, Heart Support Australia), family or friends, or other patients. CR attendance was assessed by the question: 'After your discharge from hospital, did you attend any sessions of a hospital-based Outpatient Cardiac Rehabilitation Programme?' (response options were 'yes' and 'no').

The potential confounding variable of age was classified as 20 to 64 years and 65 to 84 years because age younger than 65 years has been shown to be associated with referral to CR in the region (Johnson et al 2004). The other potential confounding variables considered were gender, marital status (married or defacto relationship/other), education level (primary or some high school education/completed high school or above), employment status (employed/not employed), health sector of residence (semi-rural or rural/urban), self-reported health (poor or fair/good-to-excellent), number of self-reported cardiac risk factors (0/1/2/≥3), discharge diagnosis (AMI/UAP/CHF/IHD), revascularisation (not revascularised/CABGS/PCI), length of stay (<7days /≥7days), previously admitted to hospital 'for heart trouble' (yes/no),

previous CR participation (yes/no), and strength of physician recommendation (did not mention CR or suggested patient might like to attend/advised or strongly advised CR).

Statistical Analyses

The data were analysed using Intercooled Stata 10.0 (Stata Corporation, College Station, TX). Differences between CR attendees and non-attendees were analysed using χ^2 tests. Multiple logistic regression was used to determine which health care provider recommendations were associated with attendance at CR after adjustment for potential confounding variables. All variables with a *P* value less than 0.25 in the χ^2 analyses were entered into the logistic model simultaneously and retained. The strength of associations was quantified by estimated odds ratios and 95% confidence intervals.

FINDINGS

Among respondents to the Hunter Outpatient Cardiac Care study (1,202/1,933), 493 reported being advised to attend CR. Of these, 89 had been advised to attend after further treatment and were excluded from this analysis. Of the remaining 404 study subjects, the majority were male (70%), 65 to 84 years of age (53%) and lived in the urban (Greater Newcastle) health sector (66%). Thirty-five percent had been admitted with an AMI and most had not been revascularised (64%).

Table 1: Source of recommendations to attend cardiac rehabilitation (n = 379*)

Source of recommendation	Advised CR n (%)	Attended CR n (%)	χ^2 ; df=1; P-value
GP	60 (16)	43 (72)	0.9; 0.36
Cardiologist	133 (35)	104 (78)	12.6; <0.0001
Cardiac surgeon	44 (12)	33 (75)	1.6; 0.20
CR nurse	215 (57)	163 (76)	19.4; <0.0001
Ward nurse	72 (19)	40 (56)	4.8; 0.03
Physiotherapist	111 (29)	69 (62)	1.3; 0.25
Social worker	44 (12)	24 (55)	3.2; 0.07
Lay support person	62 (16)	39 (63)	0.4; 0.51
Family or friend(s)	44 (12)	34 (77)	2.6; 0.11
Other patients	19 (5.0)	14 (74)	0.5; 0.50

Note: CR: cardiac rehabilitation; GP: General practitioner. *Missing data (n=25)

Table 2: Association between various health care provider recommendations to attend cardiac rehabilitation and patient attendance (n = 313*)

Variable	n (% who attended CR)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age group, y			
20-64	189 (70)	1	1
65-84	211 (64)	0.80 (0.49, 1.29)	0.89 (0.47, 1.70)
Gender			
Male	218 (71)	1	1
Female	95 (64)	0.71 (0.43, 1.19)	0.74 (0.36, 1.51)
Education			
Primary or some high school education	143 (64)	1	1
Completed high school or above	170 (74)	1.54 (0.95, 2.50)	1.13 (0.58, 2.18)
Health sector of residence			
Semi-rural or rural	104 (55) 209 (77)	1	1
Urban		2.69 (1.63, 4.45) [†]	3.06 (1.55, 6.06) [†]
Self-reported health			
Fair or poor	104 (60)	1	1
Good-to-excellent	209 (74)	1.94 (1.18, 3.20) [†]	2.32 (1.13, 4.79) [*]
Discharge diagnosis			
AMI	117 (79)	1	1
UAP	88 (72)	0.68 (0.36, 1.30)	0.60 (0.24, 1.52)
CHF	36 (69)	0.62 (0.27, 1.42)	2.04 (0.62, 6.73)
IHD	72 (52)	0.29 (0.15, 0.54) [†]	0.18 (0.06, 0.56) [†]
Revascularisation			
No	202 (70)	1	1
CABGS	73 (62)	0.68 (0.39, 1.19)	2.32 (0.72, 7.47)
PCI	38 (79)	1.58 (0.69, 3.66)	2.96 (0.95, 9.19)
Length of stay			
< 7 days	151 (74)	1	1
≥ 7 days	162 (65)	0.68 (0.42, 1.11)	0.35 (0.16, 0.79) [*]
Admitted previously "for heart trouble"			
No	175 (75)	1	1
Yes	138 (62)	0.56 (0.34, 0.90) [*]	0.74 (0.37, 1.50)
Strength of physician recommendation			
Didn't mention CR or suggested patient might like to attend	140 (47)	1	1
Advised or strongly advised CR	173 (87)	7.70(4.41,13.43) [†]	13.55(6.24,29.44) [†]
Cardiologist recommendation			
No	196 (63)	1	1
Yes	117 (80)	2.43 (1.41, 4.16) [†]	0.83 (0.39, 1.81)
Cardiac surgeon recommendation			
No	278 (69)	1	1
Yes	26 (74)	1.32 (0.59, 2.93)	0.57 (0.19, 1.72)
CR nurse recommendation			
No	132 (58)	1	1
Yes	181 (78)	2.60 (1.59, 4.25) [†]	3.40 (1.74, 6.64) [†]
Ward nurse recommendation			
No	132 (58)	1	1
Yes	181 (78)	0.70 (0.39, 1.25)	0.99 (0.43, 2.27)
Social worker recommendation			
No	278 (71)	1	1
Yes	35 (60)	0.63 (0.30, 1.29)	0.66 (0.24, 1.83)
Family/friend recommendation			
No	274 (68)	1	1
Yes	39 (82)	2.20 (0.93, 5.18)	2.67 (0.85, 8.40)

Note: CR: cardiac rehabilitation; OR: odds ratio; 95% CI: 95% confidence interval; AMI: acute myocardial infarction; UAP: unstable angina pectoris; CHF: congestive heart failure; IHD: ischemic heart disease; CABGS: coronary artery bypass graft; PCI: percutaneous coronary intervention. *Missing data excluded, data complete in 313 responders. * P<0.05 † P<0.01 ‡ P<0.001.

A variety of people had recommended CR. The median number of recommendations was two (25th percentile=1, 75th percentile=3). Among patients advised to attend CR by a CR nurse (57%) or a cardiologist (35%), 76% and 78% attended, respectively (table 1).

Sixty-six percent (266/404) of the study subjects reported attending CR, 33% (134/404) did not report attending CR, and 1% (4/404) did not answer this question. A recommendation from a cardiologist, cardiac surgeon, CR nurse, ward nurse, social worker, and by family and friends all had a *P*value less than 0.25 in the χ^2 analyses and were included in the logistic regression analysis. All the potential confounding variables, except number of self-reported cardiac risk factors, marital status, and previous attendance at CR, had a *P*value less than 0.25 and were also included in the logistic regression analysis. Employment status was not included because of missing data (11%). Strength of physician recommendation was retained despite a large amount of missing data (13%), because of its association with CR attendance in the literature.

Table 2 presents the results of the logistic regression analyses. Univariate logistic regression results are provided to enable comparison of the adjusted and unadjusted odds ratios. Of the patients with complete data, 69% (217/313) had attended and 31% (96/313) had not. The factors significantly associated, statistically, with CR attendance were residing in the urban health sector, having good-to-excellent self-reported health, not having a principal discharge diagnosis of IHD, having a length of stay of less than seven days, being advised or strongly advised to attend CR by a physician and advice from a CR nurse to attend CR. The Hosmer-Lemeshow goodness-of-fit test indicated that the model fitted the data well ($\chi^2 = 8.61$, *df*=8, *P*=0.38). Overall, 77% of the cases were correctly classified.

DISCUSSION

Strength of physician recommendation was associated with CR attendance, which is consistent

with previous research (Grace et al 2008; Shanks et al 2007; Jackson et al 2005; Cooper et al 2002; Daly et al 2002; Ades et al 1992). A recommendation from a CR nurse was associated with attendance after adjustment for strength of physician recommendation and other potential confounding variables. This finding has not previously been demonstrated. Recommendations from other health care providers were not statistically significantly associated with attendance nor were recommendations from lay support, family and friends, or other patients. These findings are consistent with Australian best practice guidelines which recommend that cardiologists and cardiac surgeons refer patients to programs and encourage them to attend and suggest that CR co-ordinators encourage patients to attend (Goble and Worcester 1999). This study showed that recommendations by CR nurses increased the odds of CR attendance. Therefore, CR nurse recommendations should be included in strategies designed to increase CR utilisation.

Self-reported health was also associated, independently, with attendance. The odds of CR attendance were significantly lower among patients who perceived their health to be fair or poor compared with those who perceived their health to be good, very good or excellent. This supports the view expressed by Jackson et al (2005) that referring professionals should inform patients that severity of disease, co-morbidity, depression and low exercise capacity are not obstacles to CR participation. A discharge diagnosis of IHD and a length of stay of seven days or more were associated with non attendance. Although it is plausible that these findings are due to severity of disease, which the authors could not assess, these are not necessarily obstacles to CR participation as noted above.

The odds of attending CR were lower among patients who lived outside the urban (Greater Newcastle) health sector. This is consistent with the findings of a recent Australian study that showed patients were less likely to attend CR as travel time increased (Higgins et al 2008). Since some of the hospitals

outside the urban health sector provide CR, and the provision of additional services is unlikely, this highlights the importance of research testing the efficacy of alternative models of CR in the Australian setting (Redfern et al 2008; Vale et al 2003).

This study has several limitations. First, only 62% of eligible patients completed the survey in the primary study. If respondents were more health oriented, then this study will overestimate the proportion of patients who attend CR after referral. However, since the aim of the study was to determine which health care provider recommendations were associated with CR attendance, the response rate is not a threat to the internal validity of the study. Second, disease severity could not be assessed. While the appropriateness of non-attendance at CR could not be established, all of the study subjects included in this analysis had been advised to attend CR. Third, the direction of significant associations could not be ascertained. Therefore, results could be interpreted to suggest that patients who attend CR are more likely to recall CR nurse advice to attend CR or that patients who receive CR nurse advice to attend CR are more likely to attend. Fourth, the reasons why CR nurse recommendations might enhance CR attendance were not identified. Further research is required to determine whether it is a consequence of the relationship CR nurses establish with inpatients, a consequence of the enthusiasm CR nurses exhibit when describing and recommending CR, or a consequence of the CR nurses' knowledge of CR services and useful contacts within the region or a combination of the above. This knowledge may clarify why recommendations from other health professionals, lay support, family and friends were not associated with attendance. The strengths of the study include the ability to separate non attendance from non referral and the use of multivariable statistical methodology.

National data regarding current referral practices throughout Australia is needed. However, this study conducted in the Hunter region has demonstrated that CR nurses and other health professionals, in addition to medical practitioners, regularly refer

patients with heart disease to CR. While there are anecdotal reports to suggest that not all medical practitioners welcome the involvement of CR nurses in the referral process, further research is required to confirm or refute this.

CONCLUSION

To the authors' knowledge, this is the first study to examine the role of health care provider recommendations to attend CR on attendance. Only a CR nurse recommendation was associated with attendance after adjustment for strength of physician recommendation and other potential confounders. These data provide evidence that CR nurse recommendations should be included in strategies designed to increase patient participation in CR.

REFERENCES

- Ades, P.A., Waldman, M.L., McCann, W. and Weaver, S.O. 1992. Predictors of cardiac rehabilitation participation in older coronary patients. *Archives of Internal Medicine*, 152(5):1033-1035.
- Aroney, C.N., Aylward, P., Kelly, A., Chew, D.P.B., Clune, E., on behalf of the Acute Coronary Syndrome Guidelines Working Group. 2006. Guidelines for the management of acute coronary syndromes 2006. *Medical Journal of Australia*, 184(8 Suppl): S1-S32. Available from: http://www.mja.com.au/public/issues/184_08_170406/suppl_170406_fm.html (accessed May 2010).
- Australian Institute of Health and Welfare (AIHW). 2009. *Impact of falling cardiovascular disease death rates: deaths delayed and years of life extended*. Australian Institute of Health and Welfare: Canberra, Australia. Available from: <http://www.aihw.gov.au/publications/index.cfm/title/10688> (accessed May 2010).
- Bunker, S.J. and Goble, A.J. 2003. Cardiac rehabilitation: under referral and underutilisation [Editorial]. *Medical Journal of Australia*, 179(7):332-333.
- Bunker, S., McBurney, H., Cox, H., and Jelinek, M. 1999. Identifying participation rates at outpatient cardiac rehabilitation programs in Victoria, Australia. *Journal of Cardiopulmonary Rehabilitation*, 19(6):334-38.
- Cooper, A.F., Jackson, G., Weinman, J. and Horne, R. 2002. Factors associated with cardiac rehabilitation attendance: a systematic review of the literature. *Clinical Rehabilitation*, 16(5):541-552.
- Daly, J., Sindone, A.P., Thompson, D.R., Hancock, K., Chang, E. and Davidson, P. 2002. Barriers to participation in and adherence to cardiac rehabilitation programs: a critical literature review. *Progress in Cardiovascular Nursing*, 17(1):8-17.
- Goble, A.J. and Worcester, M.U.C. 1999. *Best practice guidelines for cardiac rehabilitation and secondary prevention*. Melbourne: Heart Research Centre, on behalf of the Department of Human Services Victoria. Available from: <http://www.health.vic.gov.au/nhpa/downloads/bestpracticecardiacrehab.pdf> (accessed May 2010).

- Grace, S.L., Gravely-Witte, S., Brual, J., Monette, G., Suskin, N., Higginson, L., Alter, D.A. and Stewart, D.E. 2008. Contribution of patient and physician factors to cardiac rehabilitation enrolment: a prospective multilevel study. *European Journal of Cardiovascular Prevention and Rehabilitation*, 15(5):548-556.
- Higgins, R.O., Murphy, B.M., Goble, A.J., LeGrande, M.R., Elliott, P.C. and Worcester, M.U.C. 2008. Cardiac rehabilitation program attendance after coronary artery bypass surgery: overcoming the barriers. *Medical Journal of Australia*, 188(12):712-714.
- Jackson, L., Leclerc, J., Erskine, Y. and Linden, W. 2005. Getting the most out of cardiac rehabilitation: a review of referral and adherence predictors. *Heart*, 91(1):10-14.
- Johnson, N., Fisher J, Nagle A, Inder K, Wiggers J. 2004. Factors associated with referral to outpatient cardiac rehabilitation services. *Journal of Cardiopulmonary Rehabilitation*, 24(3):165-170.
- Redfern, J., Briffa, T., Ellis, E. and Freedman, S.B. 2008. Patient-centred modular secondary prevention following acute coronary syndrome: a randomized controlled trial. *Journal of Cardiopulmonary Rehabilitation and Prevention*, 28(2):107-115.
- Scott, I.A., Lindsay, K.A., Harden, H.E. 2003. Utilisation of outpatient cardiac rehabilitation in Queensland. *Medical Journal of Australia*, 179(7):341-5.
- Shanks, L.C., Moore, S.M. and Zeller, R.A. 2007. Predictors of cardiac rehabilitation initiation. *Rehabilitation Nursing*, 32(4):152-7.
- Suaya, J.A., Shepard, D.S., Normand, S.T., Ades, P.A., Prottas, J., Stason, W.B. 2007. Use of cardiac rehabilitation by Medicare beneficiaries after myocardial infarction or coronary bypass surgery. *Circulation*, 116(15):1653-62.
- Vale, M.J., Jelinek, M.V., Best JD, Dart, A.M., Grigg, L.E., Hare, D.L., Ho, B.P., Newman, R.W. and McNeil, J.J., for the COACH Study Group. 2003. Coaching patients on achieving cardiovascular health (COACH). *Archives of Internal Medicine*, 163(22):2775-2783.