

Cardiac rehabilitation for heart failure: Do older people want to attend and are they referred?

Article (Accepted Version)

Buttery, A K, Carr-White, G, Martin, F C, Glaser, K and Lowton, K (2014) Cardiac rehabilitation for heart failure: Do older people want to attend and are they referred? *European Geriatric Medicine*, 5 (4). pp. 246-251. ISSN 1878-7649

This version is available from Sussex Research Online: <http://sro.sussex.ac.uk/id/eprint/54058/>

This document is made available in accordance with publisher policies and may differ from the published version or from the version of record. If you wish to cite this item you are advised to consult the publisher's version. Please see the URL above for details on accessing the published version.

Copyright and reuse:

Sussex Research Online is a digital repository of the research output of the University.

Copyright and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable, the material made available in SRO has been checked for eligibility before being made available.

Copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

Cardiac rehabilitation for heart failure: Do older people want to attend and are they referred?

Amanda K Buttery^{1,2,3} Gerald Carr-White² Finbarr C Martin^{2,3} Karen Glaser³ Karen Lowton³

¹National Institute for Health Research (NIHR) Biomedical Research Centre, Guy's and St Thomas' NHS Foundation Trust and King's College London, UK

²Guy's and St Thomas' NHS Foundation Trust, UK

³King's College London, Institute of Gerontology, UK

Corresponding Author: Amanda K Buttery, King's College London, Institute of Gerontology, 4th Floor King's Building, Strand, London WC2R 2LS, UK. Email: amanda.buttery@kclalumni.net

Disclosure of interest: The authors declare that they have no conflicts of interest concerning this article.

Acknowledgement: We acknowledge the patients for participating in this study and the expert review panel for their assistance with developing the interview schedule. We are grateful to heart failure nurse specialists: Fiona Hodson, Annie O'Donaghue, Ana Felton and Caroline Reid for their assistance with patient recruitment and the Continuing Care Cardiac Team for assistance in data collection. The authors acknowledge assistance with protocol development from Professor Michael Marber, King's College London. The research was funded by the National Institute for Health Research (NIHR) Biomedical Research Centre based at Guy's and St Thomas' NHS Foundation Trust and King's College London. The views expressed are those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health.

Ethical statement: All patients gave written informed consent. Ethical approval for the study was granted through the National Health Service (NHS) National Research Ethics Service in the UK (Reference Number: 09/H0802/16).

Abstract

Purpose: Uptake of cardiac rehabilitation services by older people is suboptimal. Offering suitable services may increase participation. This study investigated older heart failure patients' preferences between hospital, community and home-based service models and sociodemographic and clinical factors associated with these preferences. Rates of referral were examined.

Methods: Cross-sectional survey of patients aged 65 years and older consecutively admitted to elderly care, cardiology and general medicine wards in a large UK hospital with confirmed heart failure between March–December 2009. A 57-item interview schedule incorporating open and closed questions and standard measures was developed enabling both quantitative and qualitative analysis. Associations between patients' preferences and characteristics including disease severity (New York Heart Association [NYHA] classification) and comorbidity (Charlson comorbidity score) were analysed using Chi-squared tests and one-way ANOVA.

Results: One hundred and six interviews were completed (mean age 77.8 ± 7.3 , 62% male, 47% lived alone). Most patients had moderate–severe heart failure (55% NYHA class III; 34% class II) and comorbidities (mean Charlson score 3.3 ± 1.7). Most opted for cardiac rehabilitation (72%), preferring hospital to community classes. Those preferring hospital programmes were younger (mean 5.1 years, 95% CI -10.1 to -0.1 , $P = 0.043$) than those preferring not to participate. Neither disease severity nor comorbidity was associated with preferences. Only 21% were referred to any cardiac rehabilitation service.

Conclusion: Most of these older heart failure patients wanted to attend cardiac rehabilitation, but few were referred. Age was related to preferring certain cardiac rehabilitation service models but not to an overall preference to attend. Referral processes need urgent improvement and offering choice of service models may increase participation.

Keywords: Heart failure; Cardiac rehabilitation; Exercise; Elderly; Patient preferences

1. Introduction

Older people participate less frequently in cardiac rehabilitation than younger cardiac patients [1], [2], [3] and [4]. Exercise training improves quality of life and reduces hospital readmission for those with heart failure [5] and international guidelines recommend cardiac rehabilitation for patients with heart failure [6]. In the UK, participation in cardiac rehabilitation for heart failure is low compared to other cardiac conditions such as myocardial infarction (MI) and following coronary artery bypass grafting (CABG) [7]. Furthermore, national access to cardiac rehabilitation is restricted with only 57% of cardiac rehabilitation services accepting patients with heart failure [8]. In addition to services not accepting patients, possible explanations for these lower rates of participation include limited service models suitable for these patient's needs and preferences, limited referral by healthcare professionals and reluctance by these patients to attend cardiac rehabilitation.

In the UK, referral and invitation for suitable patients with cardiac conditions to cardiac rehabilitation services most frequently occurs when patients are admitted to hospital [9]. For example, patients admitted following a MI or a scheduled admission for cardiac surgery may be invited to attend cardiac rehabilitation programmes which are predominantly delivered on an outpatient basis following hospital discharge [10]. Usually these are hospital or community group-based programmes lasting approximately 6–12 weeks provided by a multidisciplinary team incorporating exercise, education, secondary prevention advice and risk factor management [10]. Home-based services are available in some locations and include domiciliary visits by health professionals and telephone contact [10].

With heart failure prevalence increasing [11], knowledge of older people's preferences about cardiac rehabilitation service models is essential for health service planning and will enable the most suitable and appealing services to be offered and thus may improve participation. Our objectives were to investigate among older (≥ 65 years) heart failure inpatients:

- Preferences for a variety of cardiac rehabilitation service models;
- Associations of these preferences with demographic or clinical characteristics;
- Recorded rates of service referrals.

2. Methods

2.1. Study sample

We conducted a cross-sectional survey using face-to-face bedside interviews with a sample of consecutively admitted inpatients in a large London teaching hospital from 26th March–17th

December 2009. Patients under the care of the heart failure specialist team were identified as potential participants via an electronic admissions register. Those aged 65 years and over, with a confirmed diagnosis of heart failure using established diagnostic criteria [12], were recruited from elderly care, cardiology and general medicine wards. Patients included had no cognitive impairment (Abbreviated Mental Test Score [AMTS] [13] $\geq 7/10$), were reported as medically stable by their hospital physician, were able to walk prior to hospital admission, had a hospital discharge date to return to their usual residence and gave informed consent. Exclusion criteria related to their suitability for participation in cardiac rehabilitation (inability to stand without assistance or not suitable for exercise) and their ability to participate in the study protocol (severe visual impairment or inability to communicate sufficiently for interview). Eligible patients were recruited and interviewed towards the end of their hospital stay by a researcher not involved in their care. Ethical approval for the study was granted through the National Health Service (NHS) National Research Ethics Service in the UK (reference number: 09/H0802/16).

2.2. The survey instrument

A 57-item interview schedule was developed for this study drawing on previous survey instruments that utilised focus groups and in-depth interviews to establish appropriate questions on exercise for older people [14], [15] and [16]. Both open and closed questions and responses from a Likert-type scale were incorporated to enable quantitative and qualitative analyses. Valid and reliable health instruments for certain health domains were also included and are discussed below.

An expert panel consisting of 10 people (including geriatricians, cardiologists, cardiac rehabilitation and heart failure nurses, allied health professionals and a previous cardiac rehabilitation patient) participated in developing the instrument. Pilot testing ($n = 5$ patients) helped refine the interview schedule and established face validity and duration of administration (20–30 minutes).

Key factors associated with cardiac rehabilitation participation were incorporated. These included:

- Demographic characteristics including age, gender and living arrangements;
- Disease severity, measured by New York Heart Association (NYHA) classification [17];
- Comorbidity, measured by the Charlson Comorbidity Index [18];
- Self-efficacy, which describes the confidence an individual has in performing a specific behaviour, measured by the Exercise Regularly Scale, part of the Chronic Disease Self-Efficacy Scale [19];
- Previous experience of cardiac rehabilitation, including having been given advice to attend.

To determine functional status at the time of interview the Barthel Index [20] was included. The Hospital Anxiety and Depression Scale (HADS) [21], a screening tool to detect clinically significant anxiety and depression in a general medicine setting was incorporated. Objective measures included grip strength, a valid indicator of physical frailty [22], measured using a Jamar® isometric hand-held dynamometer employing a standard protocol [23]. Body mass index (BMI) was calculated using the participant's most recent weight in kg recorded on a daily hospital weight chart. Half-arm span was measured in the sitting position using a standard protocol to calculate height [24].

The interview schedule included items about patients' preferences towards attending cardiac rehabilitation. Patients were presented with a list of cardiac rehabilitation service models and asked to indicate their preference from five options:

- To attend classes at a local hospital;
- Classes at a local community centre;
- A home programme;
- Not to participate;
- Any "other" type of programme.

Patients were asked to describe the reasons for their choice and given the opportunity to suggest alternative cardiac rehabilitation service models.

To examine the extent to which patients' preferences related to their actual follow-up arrangements, information about their referral to their local cardiac rehabilitation service (within 2 weeks of hospital discharge) and other outpatient clinics was systematically collected from hospital records (including written and electronic patient and service database sources).

2.3. Statistical and qualitative data analyses

Descriptive statistics were used to describe patients' preferences. Associations between patients' preferences and categorical data including gender, living arrangements (living alone versus not living alone), NYHA classification, and past experience of cardiac rehabilitation were analysed using Chi-squared tests. Associations of patients' preferences with measurements with continuous distributions (including age, Charlson Comorbidity Index score and the Exercise Regularly Scale) were investigated using one-way ANOVA. A post-hoc Bonferroni Multiple Comparisons Test was used to investigate significant differences between groups. In a post-hoc analysis related to previous attendance in

cardiac rehabilitation categories were collapsed to: those preferring to attend, including preferences for hospital, community and home programmes; those preferring not to participate, including the “other” category.

For all analyses, a P value of ≤ 0.05 was considered significant. Analyses were performed using SPSS version 17.0. Qualitative responses to open questions were analysed using content analysis [25].

3. Results

Of 186 heart failure patients identified, 120 patients met the study criteria and 106 were recruited and completed interviews (see Fig. 1). Participants were recruited from cardiology (68%, 72/106), elderly care (21%, 22/106) and general medicine (11%, 12/106) wards. Median hospital stay was 15 days (IQR 9, 20). Patient characteristics are summarised in Table 1.

INSERT FIGURE 1 AND TABLE 1 AROUND HERE

Nearly three quarters of patients (72%, 76/106) reported that they would prefer to participate in cardiac rehabilitation. Of these, most preferred group classes (40%, 42/106), located at a local hospital (25%, 26/106) rather than at a local community centre (15%, 16/106). About a third (30%, 32/106) preferred a home programme. Just two participants suggested ‘other’ cardiac rehabilitation service models; a local walking group and an individualised walking and/or breathing exercise programme.

3.1. Patient characteristics and relationships with preferences

Table 2 presents preferences according to patients’ age. There was a significant variation by age ($F = 3.243$, $df = 3$, $P = 0.025$). Those preferring to attend a hospital class were a mean 5.11 years younger (95% CI -10.12 to -0.10 , $P = 0.043$) than those preferring not to participate in cardiac rehabilitation. No significant associations were found between preference of service model and gender ($\chi^2 = 1.338$, $P = 0.720$), living alone ($\chi^2 = 3.383$, $P = 0.336$), severity of heart failure (NYHA classification I and II, $n = 40$ versus III and IV, $n = 66$; $\chi^2 = 1.287$, $P = 0.732$) or comorbidity (Charlson Comorbidity Index score, $F = 1.174$, $df = 3$, $P = 0.324$). Patients preferring not to participate in any service model had a lower mean self-efficacy score (indicating lower self-efficacy) than any of the other preference groups, but this was not statistically significant ($F = 1.792$, $df = 3$, $P = 0.153$).

INSERT TABLE 2 AROUND HERE

Around a third of patients (31%, 33/106) reported being previously advised to take part in cardiac rehabilitation, with a subset reporting that they participated (64%, 21/33). Most (58%, 19/33) reported receiving this advice following CABG or MI. Only five patients (15%, 5/33) reported previous referral due to heart failure. No significant associations were found between previous attendance ($\chi^2 = 0.506$, $P = 0.477$) or previous advice to attend ($\chi^2 = 0.225$, $P = 0.635$) and patients' current preferences.

3.2. Qualitative analyses for open-ended questions

Group classes were preferred by patients due to perceived social benefits and improved motivation from exercising with others. Some (10/26) patients preferring hospital classes considered hospital-based health professionals more knowledgeable and qualified than staff members in other locations. Patients emphasised that superior hospital facilities and equipment, such as defibrillators, and the availability of health professionals provided them with greater confidence to participate in this location. Alternatively, other patients (9/16) preferring a local community centre reported practical reasons for their choice, such as proximity of location and ease of access, including transport and parking. Requesting transport from family members and carers was considered burdensome by these older people.

Most (19/32) participants preferring home-based cardiac rehabilitation described health and functional limitations, such as difficulties in going outdoors, climbing stairs, preparing to leave the house causing fatigue and transport difficulties as reasons for preferring this option. Alongside a dislike of groups, perceived difficulties in participating in groups due to limitations with vision, hearing and continence were described. Seven participants perceived a more personalised service from a home service, believing individual encouragement and rehabilitation would be better tailored to their specific needs.

Patients preferring not to participate mainly considered that they exercised and walked enough, were satisfied with their current activity levels, or considered their knowledge about their condition to be sufficient. Some ($n = 4$) reported a dislike of groups and some ($n = 4$) expressed a lack of confidence in their ability to participate, feeling "too old", or it was "too late" for them to engage in cardiac rehabilitation because of their health limitations.

3.3. Rates of service and cardiac rehabilitation referral

Data on referral were available for 103 discharged patients (3 patients died in hospital). Nearly all (93%, 96/103) had evidence of follow-up with a heart failure specialist service. Only a fifth (21%, 22/103) had documented referral to their local cardiac rehabilitation service, 20 patients from cardiology wards and two from general medicine wards. No patients from elderly care wards had evidence of referral.

4. Discussion

In this study, nearly three quarters of these older inpatients preferred to attend cardiac rehabilitation. However, only a fifth of this sample had evidence of being referred to their local cardiac rehabilitation service on hospital discharge highlighting a large discrepancy between those wanting and obtaining a referral to attend. Previous studies have reported even lower rates of referral for heart failure patients in England, Wales and Northern Ireland; finding less than 1% of 9387 patients sampled had documented referral to cardiac rehabilitation at hospital discharge [26]. The provision of a specialist heart failure service and a multidisciplinary cardiac rehabilitation service providing all service models included in the study may explain the referral rate we reported. However, even in the study hospital where a comprehensive heart failure cardiac rehabilitation service was available, large gaps in referral were found. Therefore, healthcare service-related factors are limiting participation of heart failure patients in cardiac rehabilitation. These findings support recent calls for increased coordination between geriatricians and cardiologists to improve care for heart failure patients [27]. Establishing robust and systematic pathways of referral and enrolment to improve access for older people with heart failure to cardiac rehabilitation and exercise training is required.

Another key finding in this sample of older people was the significant association between age and patients' preferences for cardiac rehabilitation service models. Those preferring hospital-based classes were younger than those preferring not to participate. However, on pooling all those willing to participate, regardless of preferred service model, age was no longer a significant factor. These findings are largely consistent with previous reported associations between older age and non-participation in cardiac rehabilitation in patients with MI and CABG [1], [2] and [3] that have often been limited to group-based outpatient cardiac rehabilitation service models and younger cohorts. However, our findings highlight that subtle age-related preferences are likely to relate to certain service models rather than an overall wish to not participate.

We found no significant associations in our quantitative analyses between disease severity, comorbidity, gender and living arrangements with preferences. However, qualitative findings

indicated that patients weight their health problems differently and functional limitations may underpin choices for services models. Patients' responses to participation and non-participation were often focused on the exercise component of programmes, consistent with other studies [28]. Among those willing to attend, group hospital-based options were most frequently preferred; supporting previous findings of positive associations of exercising in a safe environment with supervision with future participation in cardiac rehabilitation [28]. Perceptions of satisfaction with current activity levels of those preferring not to participate has also been described by community-dwelling older people as a reason for not wishing to increase physical activity levels [14]. However, older people may overestimate their levels of physical activity [29] and may underestimate the levels of exercise required to gain health benefits, and mistakenly believe that their habitual levels are adequate [16]. Such patients may require assessment of current activity levels and information about the benefits of exercise at invitation to cardiac rehabilitation. Furthermore, being overweight and obese and having high levels of anxiety were common in this sample, emphasising clinical need for secondary prevention in this high-risk group. Evidence-based techniques to encourage participation, such as bedside liaison [30] and addressing barriers to participation [1], for example regarding access and transport, are necessary for these older people who raise concerns about these issues.

To our knowledge this study is the first to investigate preferences for cardiac rehabilitation service models and participation among older inpatients with heart failure. Interviews were conducted at a time during the process of recovery in hospital that mimic the timing of invitation to cardiac rehabilitation in the UK for other patient groups, such as after MI and CABG. Although our interview schedule had face validity, other forms of validity and reliability have not been established and therefore results should be interpreted with caution. Over a quarter of patients answered frankly that they would not want to participate in cardiac rehabilitation if they were advised to by a doctor or other health professional, but this potentially underestimates the true figure as socially desirable responses frequently play a role in studies about exercise participation [29]. The limited sample size of this study and patients' mixed preferences for service models meant that responses in some categories were relatively few and it is possible that Type II errors occurred when exploring associations of these preferences.

This was a single centre study in a large acute teaching hospital in the UK. Study participants were of similar age and had similar hospital lengths of stay as reported in the 2012 national heart failure audit, which records data from an almost complete national sample of patients in England and Wales admitted to hospital with heart failure [31]. Further studies in different types of hospitals and locations

where older people are invited to participate in cardiac rehabilitation would provide additional insights into their preferences for cardiac service models and participation.

5. Conclusion

Most of these older people with heart failure wished to participate in cardiac rehabilitation. However, relatively few were referred. Although there were some age-related differences, it was not a reliable predictor of preferences. Since neither comorbidity nor disease severity influenced preferences, the design of all cardiac rehabilitation service models needs to be accessible for a wide variety of patients. Offering choice may increase uptake and adherence. Access to cardiac rehabilitation and exercise may be further improved by addressing health service-related factors and establishing systematic referral and invitation processes for older inpatients with heart failure across all hospital locations.

References

1. L. Jackson, J. Leclerc, Y. Erskine, W. Linden. Getting the most out of cardiac rehabilitation: a review of referral and adherence predictors. *Heart*, 91 (2005), pp. 10–14
2. T.M. Brown, A.F. Hernandez, V. Bittner, C.P. Cannon, G. Ellrodt, L. Liang, et al. Predictors of cardiac rehabilitation referral in coronary artery disease patients: findings from the American Heart Association's Get With The Guidelines Program. *J Am Coll Cardiol*, 54 (2009), pp. 515–521
3. S.L.P. Grace, S.B. Shanmugasagaram, S.M. Gravely-Witte, J.M. Brual, N.M. Suskin, D.E.M.D. Stewart Barriers to cardiac rehabilitation: does age make a difference? *J Cardiopulm Rehabil Prev*, 29 (2009), pp. 183–187
4. J.J. Perrenoud Cardiac rehabilitation. *Eur Geriatr Med*, 2 (2011), pp. 296–298
5. E.J. Davies, T. Moxham, K. Rees, S. Singh, A.J. Coats, S. Ebrahim, et al. Exercise based rehabilitation for heart failure. *Cochrane Database of Syst Rev* (2010)
6. J.J.V. McMurray, S. Adamopoulos, S.D. Anker, A. Auricchio, M. Böhm, K. Dickstein, et al. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012: the Task Force for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012 of the European Society of Cardiology. Developed in collaboration with the Heart Failure Association (HFA) of the ESC. *Eur Heart J*, 33 (2012), pp. 1787–1847
7. British Heart Foundation. The national audit of cardiac rehabilitation annual statistical report. (2013) <http://www.cardiacrehabilitation.org.uk/nacr/>
8. A.K. Buttery, G. Carr-White, F.C. Martin, K. Glaser, K. Lowton. Limited availability of cardiac rehabilitation for heart failure patients in the United Kingdom: findings from a national survey. *Eur J Prev Cardiol* (2013) <http://dx.doi.org/10.1177/2047487313482286> [Advanced online publication March 19]
9. C. Proudfoot, M. Thow, D. Rafferty. A UK survey of phase 1 cardiac rehabilitation for patients with acute coronary syndrome. *Physiotherapy*, 93 (2007), pp. 183–188
10. H. Bethell, R. Lewin, H. Dalal. Cardiac rehabilitation in the United Kingdom. *Heart*, 95 (2009), pp. 271–275
11. T.E. Owan, D.O. Hodge, R.M. Herges, S.J. Jacobsen, V.L. Roger, M.M. Redfield. Trends in prevalence and outcome of heart failure with preserved ejection fraction. *N Engl J Med*, 355 (2006), pp. 251–259
12. K. Dickstein, A. Cohen-Solal, G. Filippatos, J.J.V. McMurray, P. Ponikowski, P.A. Poole-Wilson, et al. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2008:

The task force for the diagnosis and treatment of acute and chronic heart failure 2008 of the European Society of Cardiology. Developed in collaboration with the Heart Failure Association of the ESC (HFA) and endorsed by the European Society of Intensive Care Medicine (ESICM). *Eur Heart J*, 29 (2008), pp. 2388–2442

13. H.M. Hodkinson. Evaluation of a mental test score for assessment of mental impairment in the elderly. *Age Ageing*, 1 (1972), pp. 233–238
14. I.K. Crombie, L. Irvine, B. Williams, A.R. McGinnis, P.W. Slane, E.M. Alder, et al. Why older people do not participate in leisure time physical activity: a survey of activity levels, beliefs and deterrents. *Age Ageing*, 33 (2004), pp. 287–292
15. M.L. Booth, N. Owen, A. Bauman, O. Clavisi, E. Leslie. Social-cognitive and perceived environment influences associated with physical activity in older Australians. *Prev Med*, 31 (2000), pp. 15–22
16. A.K. BATTERY, F.C. Martin. Knowledge, attitudes and intentions about participation in physical activity of older post-acute hospital inpatients. *Physiotherapy*, 95 (2009), pp. 192–198
17. The Criteria Committee of the New York Heart Association. Nomenclature and criteria for diagnosis of diseases of the heart and great vessels. Little, Brown & Co., Boston (1994)
18. M.E. Charlson, P. Pompei, K.L. Ales, C.R. MacKenzie. A new method of classifying prognostic comorbidity in longitudinal studies: Development and validation. *J Chron Dis*, 40 (1987), pp. 373–383
19. K. Lorig, A. Stewart, P. Ritter, V. González, D. Laurent, J. Lynch. Outcome measures for health education and other health care interventions. Sage Publications, Thousand Oaks CA (1996) [24–25, 41–45]
20. F. Mahoney, D. Barthel. Functional evaluation: the Barthel Index. *Md State Med J*, 14 (1965), pp. 56–61
21. A. Zigmond, R. Snaith. The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand*, 67 (1983), pp. 361–370
22. H. Syddall, C. Cooper, F. Martin, R. Briggs, A.A. Sayer. Is grip strength a useful single marker of frailty? *Age Ageing*, 32 (2003), pp. 650–656
23. V. Mathiowetz, K. Weber, G. Volland, N. Kashman. Reliability and validity of hand grip strength evaluations. *J Hand Surg Am*, 9 (1984), pp. 222–226
24. T. Kwok, M.N. Whitelaw. The use of armspan in nutritional assessment of the elderly. *J Am Geriatr Soc*, 39 (1991), pp. 492–496
25. C. Frankfort-Nachmias, D. Nachmias. Research methods in the social sciences (6th ed.) Worth Publishers, New York (2000)

26. E.D. Nicol, B. Fittall, M. Roughton, J.G.F. Cleland, H. Dargie, M.R. Cowie. NHS heart failure survey: a survey of acute heart failure admissions in England, Wales and Northern Ireland. *Heart*, 94 (2008), pp. 172–177
27. J. Baxter, T. McDonagh. Can geriatricians improve inpatient heart failure care? Time for a heart to heart. *Age Ageing*, 41 (2012), pp. 140–141
28. A.F. Cooper, J. Weinman, M. Hankins, G. Jackson, R. Horne. Assessing patients' beliefs about cardiac rehabilitation as a basis for predicting attendance after acute myocardial infarction. *Heart*, 93 (2007), pp. 53–58
29. J. Sims, K. Hill, S. Davidson, J. Gunn, N. Huang. A snapshot of the prevalence of physical activity amongst older, community dwelling people in Victoria, Australia: patterns across the “young-old” and “old-old”. *BMC Geriatr*, 7 (2007), p. 4
30. G.J. Balady, P.A. Ades, V.A. Bittner, B.A. Franklin, N.F. Gordon, R.J. Thomas, et al. Referral, enrollment, and delivery of Cardiac Rehabilitation/Secondary Prevention Programs at clinical centers and beyond: a presidential advisory from the American Heart Association. *Circulation*, 124 (2011), pp. 2951–2960
31. National Institute for Cardiovascular Outcomes Research (NICOR). National heart failure audit: March 2011 to March 2012. (2012) www.ucl.ac.uk/nicor/audits/heartfailure/additionalfiles

Figure 1: Patient screening and recruitment.

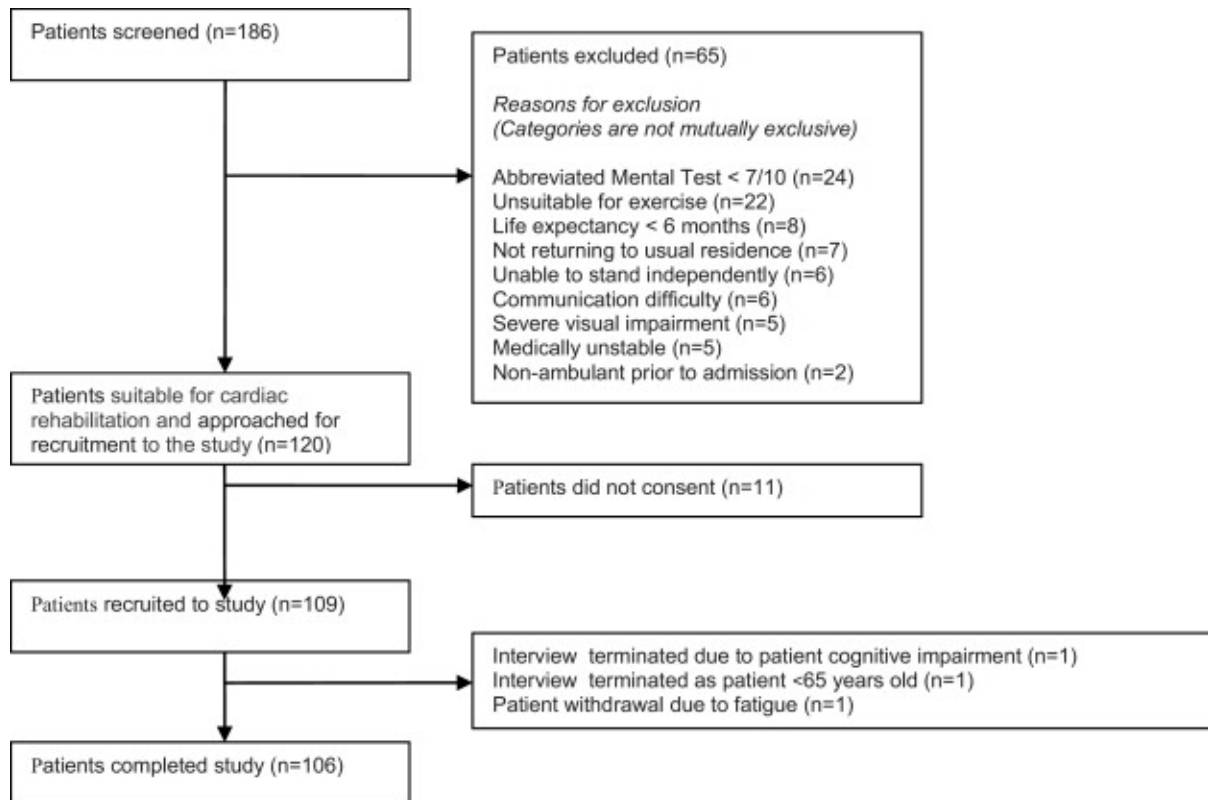


Table 1. Demographic and clinical characteristics.

Characteristic (n = 106 unless stated)	n	%
Mean age (yrs) (SD)	77.8 (7.3)	
Gender (male %)	66 male: 40 female	62
Lives alone	50	47
Mean age (yrs) left school (SD) (n = 102)	14.9 (1.6)	
New York Heart Association (NYHA) classification		
NYHA I	4	4
NYHA II	36	34
NYHA III	58	55
NYHA IV	8	8
New diagnosis of heart failure at hospital admission	11	10
B-type Natriuretic Peptide (BNP) blood test performed whilst inpatient	17	16
Echocardiograph results available (within 3 months of interview date)	87	82
Left Ventricular Ejection Fraction < 45% on echocardiograph	60	57
Mitral regurgitation (moderate or severe)	52	49
Tricuspid regurgitation (moderate or severe)	38	36
Gait aid used	61	58
Mean Barthel score (20 point) (SD)	17.6 (2.3)	
Mean Charlson Comorbidity Index (SD)	3.3 (1.7)	
Coronary heart disease/ischaemic heart disease	67	63

Previous myocardial infarction	46	43
Hypertension	62	58
Diabetes mellitus	39	37
Chronic obstructive pulmonary disease	34	32
Valvular heart disease	60	57
Pacemaker	18	17
Implantable cardioverter defibrillator	19	18
Fall in past 6 months	41	39
Mean body mass index (BMI) kg/m ² (SD) (n = 102)	27.9 (7.1)	
BMI < 18.5 (Underweight)	3	3
BMI 18.5–24.9 (Ideal weight)	34	33
BMI 25–29.9 (Overweight)	32	31
BMI 30–39.9 (Obese)	27	26
BMI > 40 (very obese)	6	6
Mean grip strength in kg (SD)		
Women	16.5 (6.3)	
Men	25.3 (9.5)	
Hospital Anxiety and Depression Scale (n = 105)		
Anxiety Subscale (mild, moderate or severe anxiety)	49	51
Depression Subscale (mild, moderate or severe depression)	34	36
Median prescribed medications at hospital discharge (n = 103) (IQR)	11 (9.14)	

Table 2. Comparisons of patients' preference for cardiac rehabilitation service models by mean age.

Patients' preferences	n = 106	Mean age	SD	95% Confidence interval	Minimum age	Maximum age
Attend hospital class	26	74.58 ^a	6.96	71.76 to 77.39	65	96
Attend community class	16	76.44	8.33	72.00 to 80.88	66	90
Home-based rehabilitation	32	79.28	7.29	76.65 to 81.90	65	92
Not participate and "other"	32	79.69 ^a	6.1	77.47 to 81.90	68	93

^a Significant difference between these groups.