



# Development and Validation of the Cardiac Rehabilitation Enrolment Obstacle (CREO) Scale

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## Cardiac Rehabilitation

- The physical, psychological and social benefits of participation in cardiac rehabilitation (CR) following a coronary event have well been established.
- Guidelines recommend that CR should be offered to patients following acute coronary events and coronary revascularization.
- Participation in CR remains low
- Lower participation rates among patients following percutaneous coronary interventions (PCI) compared to those who have had coronary artery bypass grafts (CABG) or myocardial infarction (MI).

## Reasons for non participation

socio demographic  
and clinical factors

lack of referral by  
physician or cardiologist

long waiting lists

language barriers

lack of patient  
motivation

patient work or  
time conflicts

patients beliefs  
about their illness

financial problems  
and reimbursement

distance to the programs  
and transportation

family support

length of the  
programs



## Participation in CR

- Less than a third of the participants adhere to the programs at 6 month follow up
- the application of a validated instrument for identification of CR non-participants following PCI has not been previously used.



## Aim

The aim of this presentation is to present the development and evaluation of a scale to assess obstacles to cardiac rehabilitation enrolment in patients following PCI.



## Development of the CREO Scale

The cardiac rehabilitation enrolment obstacle (CREO) scale and its scoring system were developed in two stages.



Item generation and content validation



Instrument testing: Assessing the reliability and validity of the rating scales



## Item generation and content validation

### Comprehensive literature review

- Medline (1966-2004), CINAHL (1966-2004) and Embase (1980-2004) and the Cochrane Library (Issue 4 2004)
- Nine comprehensive review and numerous publications were identified

### Telephone Interviews with CR program coordinators

- 20 CR program coordinators from across NSW were interviewed
- Themes that emerged included
  - non acceptance of self responsibility for health problems,
  - inadequate knowledge of heart disease and risk factor modification,
  - inability to adopt healthy behaviours,
  - service-related costs, prescriptions- related costs, geographic and travel-related costs,
  - work commitments,
  - cultural issues
  - lack of social support and
  - patients perceptions of health service providers.



Based on the findings 15 multinomial questions requiring estimates were developed.

## Instrument testing

### **Assessing Validity**

- a reference group consisting of experts in cardiac rehabilitation, clinical cardiology, questionnaire development and psychometrics was developed.
- The group provided structured comments relating to face and content validity, comprehensibility and comprehensiveness of the items.
  - a number of the items in the questionnaire were reworded to correct ambiguity.
  - reformatting of the questionnaire
- Reassessment of the refined questionnaire by a panel of CR coordinators



## **Instrument testing**

### **Assessing Comprehensibility**

- Simple unambiguous wording were used.
- The Flesch Reading Ease score and the Flesch-Kincaid Grade Level score was calculated for each component of the questionnaire.
- Flesch scores between 60 and 70, requiring eight to nine years of education was considered appropriate for the questionnaire.
- Five patients who had PCI commented on the questionnaire for its comprehensibility.



## **Instrument testing**

Construct validity was tested with exploratory factor analysis and known group validity and Cronbach alpha values were calculated to determine the internal consistency reliability.



## The Final CREO scale

- 15 items scale
- Responses to each item were based on a five-point Likert scale ranging from “strongly agree (1)” to “strongly disagree (5)”
- Responses to each item on the questionnaire were developed so that a higher item score indicated a more favourable attitude.



## Evaluation of the CREO Scale

### Inclusion Criteria

#### *Patients*

- aged between 18-80 years
- undergone elective, primary or rescue PCI between April 1<sup>st</sup> 2003 and March 31<sup>st</sup> 2004 .
- had a Telephone Interview of Cognitive Status (TICS) score of more than 30
- were able to complete the questionnaire



## **Exclusion Criteria**

### ***Patients with***

- significant co morbidities, such as cerebrovascular accident
- significant neurological deficit
- cognitive impairment (TICS < 30)
- malignant disease undergoing active therapy
- any condition of sufficient severity to impair co-operation in the study e.g. chronic alcoholism
- a length of hospital stay of more than 30 days following the PCI.
- transferred to a nursing home following the procedure
- unable to be contacted (no telephone, incorrect address)



## **Method**

- 1. Ethics approval obtained from Sydney South West Area Health Service and University of Western Sydney**
- 2. Potential participants identified from the cardiology data base**
- 3. Pre-survey screening according to inclusion criteria**
- 4. Participants sent questionnaire for completion**



# Assessment of Cognitive function

## Cognitive status

### The Telephone Interview of Cognitive Status (TICS)

*11-item screening test modelled on the Mini Mental State Examination (MMSE).*

*The maximum score obtainable is 41 points and participants with a score of less than 30 are considered to be cognitively impaired.*



## Demographics of patients

Variable	% or Mean (SD)
Age (years)	63.96 ± (11.47)
Sex (% male)	74.6
Living with partner (%)	69.3
Highest educational achievement (%)	
•Some primary school	3.5
•Completed primary school	8.8
•Some high school	27.2
•Completed high school	30.7
•Post high school education	29.8
Employment status (%)	
•Retired	54.0
•Not in paid employment	7.1
•Blue collar worker*	23.9
•White collar worker**	4.4
•Professional	10.6



## Patients' cardiac risk factors

BMI (kg/m <sup>2</sup> )	29.15 ± (5.76)
Diabetes (%)	24.6
Hypercholesterolaemia (%)	56.1
Hypertension (%)	48.2
Smoker (%)	15.3
History of cardiac disease (%)	63.2
History of cerebrovascular disease (%)	7.0



## Factor analysis of the CREO scale

- Seventy-six participants completed all the 15 items of the CREO scale.
- The potential range of scores of the 15-item CREO scale is 15 to 75.
- The distribution of scores for participants who completed all items on the scale ranged from 19 to 69 with a mean of 42.3 ( $SD = 11.3$ ).
- The internal consistency of the scale and subscales was high
  - Cronbach's alpha coefficients of
    - 0.89 for the total CREO scale,
    - 0.91 for Factor 1: Patient-related obstacles and
    - 0.82 for Factor 2: Health service-related obstacles



## Factor Loadings for Principal Component Analysis with Oblique Rotation

	Factor 1: Patient-related obstacles	Factor 2: Health service-related obstacles
Conflict with work	0.815	0.173
Unsuitable class time	0.785	0.149
Do not have time	0.782	0.053
Do not like group activities	0.743	0.053
Personal thought unnecessary	0.740	0.263
Lack of family support	0.725	0.205
Language difficulties	0.677	0.122
Fear of further pain	0.671	0.208
Too far from home	0.662	0.305
Lack of motivation	0.602	0.114
Not contacted by cardiac rehabilitation staff	0.046	0.815
Not informed about program	0.076	0.763
Lack of support/referral from doctor	0.100	0.748
Long waiting list	0.220	0.738
Doctor said unnecessary	0.237	0.645



## Comparison of cardiac rehabilitation enrolment and CREO scale and subscales

	Enrolees at CR (n=13)		Non-enrolees at CR (n=63)		<i>t</i>	<i>p</i>
	<i>M</i>	( <i>SD</i> )	<i>M</i>	( <i>SD</i> )		
Total 15 items: CREO scale	36.4	(10.4)	43.5	(11.2)	2.12	0.037
Patient-related obstacles	24.5	(9.5)	28.6	(8.6)	1.52	0.133
Health service-related obstacles	11.9	(3.6)	15.0	(4.6)	2.30	0.024



## Conclusions

- The 15-item CREO scale provides a short and reliable method to assist in the rapid identification of patients who would not participate in CR programs and alternate strategies for these patients can be implemented.
- Phase one of the CREO demonstrates reliable psychometric properties and potential application in clinical practice and research.

