Resuscitation 93 (2015) 63–68

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical Paper

Cognitive problems in patients in a cardiac rehabilitation program after an out-of-hospital cardiac arrest☆

L.W. Boyce-van der Wal[a,*], W.G. Volker[a], T.P.M. Vliet Vlieland[a,b], D.M.J. van den Heuvel[a,c], H.J. van Exel[a,d], P.H. Goossens[a,b]

[a] Rijnlands Rehabilitation Centre, Leiden, The Netherlands
[b] Department of Orthopaedics, Rehabilitation and Physical Therapy, Leiden University Medical Center, The Netherlands
[c] Division Health, Medical and Neuropsychology, Faculty of Social and Behavioural Science, Leiden University, The Netherlands
[d] Department of Cardiology, Leiden University Medical Center, The Netherlands

ARTICLE INFO

Article history:
Received 26 November 2014
Received in revised form 29 April 2015
Accepted 26 May 2015

Keywords:
Out-of-hospital cardiac arrest
Cognitive disorders
Rehabilitation
Cognitive screening

ABSTRACT

Objective: Estimate prevalence of cognitive problems due to hypoxic brain injury in out-of-hospital cardiac arrest (OHCA) survivors referred for cardiac rehabilitation and association with quality of life as well as autonomy and participation.
Design: Prospective cohort study.
Method/design: Consecutive OHCA patients. The Mini-Mental State Examination (MMSE), Cognitive Failures Questionnaire (CFQ) and Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE) were administered 4 weeks after the OHCA. Cognitive problems were defined if MMSE <28, CFQ >32 or IQCODE >3.6. The Impact on Participation and Autonomy Questionnaire (IPAQ) (participation/autonomy), the SF-36 Health Survey (SF-36) (quality of life) and the Hospital Anxiety Depression Scale (HADS) (anxiety/depression) were administered. Correlations between cognitive problems and participation/autonomy and quality of life were calculated.
Results: 63 of 77 patients were male (82%), median age 59 years (range 15–84). MMSE median 29 (interquartile range 28–30), CFQ mean 20.9 (SD 9.4) and IQCODE mean 3.1 (SD 0.2). Eighteen patients (23%) scored positive for cognitive problems. Significant correlations were found between MMSE and IPAQ: autonomy inside ($r = -0.38$), family role ($r = -0.26$), autonomy outside ($r = -0.32$), social relations ($r = -0.38$) and social functioning ($r = 0.32$). MMSE was related to SF-36: social functioning ($r = 0.32$). The CFQ was related to IPAQ: autonomy outdoors ($r = 0.29$) and SF-36: bodily pain ($r = -0.37$), vitality ($r = -0.25$), mental health ($r = -0.35$) and role emotional ($r = -0.40$). The IQCODE was related to IPAQ: autonomy indoors ($r = 0.26$) and to SF-36: vitality ($r = -0.33$) and social functioning ($r = -0.41$).
Conclusion: Twenty-three percent of the patients referred for cardiac rehabilitation showed cognitive problems. Associations were found between cognitive problems and several aspects of participation/autonomy and perceived quality of life.

1. Introduction

In Europe, out-of-hospital cardiac arrest (OHCA) has an incidence of 86.4 per 100,000 inhabitants with a survival rate of 9% until hospital discharge.[1] In the Netherlands, survival is ranging from 16 to 22% for OHCA with a cardiac cause to 43% of emergency department attended OHCA.[2,3,4]

OHCA survival can be complicated by hypoxic brain injury with subsequent cognitive impairments. A systematic review in 2009 by Moulaert et al. on cognitive impairments in survivors after OHCA retrieved 28 studies. The authors of this review concluded, based upon three large, methodologically sound, prospective studies, that cognitive problems occurred in 42% to 50% of the ventricular fibrillation OHCA survivors.[5] Cognition was measured with a broad range of extensive neuropsychological tests. Memory, attention and executive functions were most affected.

Cognitive problems can be distinguished between cognitive impairments measured with objective cognitive tests and

☆ A Spanish translated version of the abstract of this article appears as Appendix in the final online version at http://dx.doi.org/10.1016/j.resuscitation.2015.05.029.

* Corresponding author at: Rijnlands Rehabilitation Centre, PO Box 176, 2300 AD Leiden, The Netherlands.
E-mail address: lww@rrc.nl (L.W. Boyce-van der Wal).

http://dx.doi.org/10.1016/j.resuscitation.2015.05.029
0300-9572/

cognitive complaints assessed with subjective questionnaires. These objective and subjective cognitive problems cause a negative effect on participation/autonomy and quality of life.[6,7] A study by Stub et al. in 2011 of patients with OHCA of suspected cardiac cause in Australia showed that of the 31% of survivors 4% was referred to a nursing home, 18% went to a rehabilitation centre and 76% went directly home.[8] Based on the 42–50% of cognitive problems found in literature a substantial amount of patients have to cope with cognitive problems at home. According to Dutch guidelines all survivors who return home are qualified for cardiac rehabilitation.[9] Currently in cardiac rehabilitation, no attention is paid to potential (mild) cognitive problems. This is a problem, since (mild) cognitive problems can have a high impact on a person's participation/autonomy and quality of life.[10] Besides for patients with brain injury treatment (cognitive rehabilitation) is proven effective.[11]

To screen for cognitive problems, the Cerebral Performance Category could be used.[12] Unfortunately, this test is not sensitive in detecting mild cognitive problems.[13] Extensive neuropsychological testing can trace mild cognitive problems, but take approximately 3 h and thus not suitable as screening.[14–16]

As screening, the widely used and validated Mini-Mental State Examination (MMSE) is often used as gold standard to detect cognitive impairment.[17] Unfortunately the MMSE is not standardised for patients after OHCA and one can question its sensitivity. In heart failure patients the MMSE showed a sensitivity/specificity of 0.70/0.66.[18,19] It seems necessary to complement the MMSE to increase the sensitiveness. In order to list cognitive complaints, a self-perceived neuropsychological functioning questionnaire was added, the Cognitive Failures Questionnaire (CFQ).[20] Considering that some patients have an impaired awareness of illness the validated Informant Questionnaire on Cognitive Decline of the Elderly (IQCODE), was used in which partners were asked to compare the patients cognition before and after the OHCA.[21]

With the results of three tests, the cognitive impairment (MMSE) and cognitive complaints (CFQ and IQCODE), patients were advised to follow a cardiac rehabilitation program or a cardiac rehabilitation supplemented with cognitive rehabilitation. All patients who showed a deviant score on one or more parts of the screening were advised to have an intake for cognitive rehabilitation. This study describes cognitive problems in patients referred for cardiac rehabilitation after OHCA using three concise tests. In addition, the association between the presence of cognitive problems and quality of life and autonomy and participation was studied.

2. Methods

2.1. Study design

This study had a prospective design. Data gathered for the present study were routinely recorded in clinical care, the Medical Ethical Review Board of the Leiden University Medical Center, Leiden, The Netherlands judged this study to be outside the remit of the Dutch Medical Research Involving Human Beings Act and provided a certificate of no objection.

2.2. Patients and setting

All consecutive OHCA survivors referred for cardiac rehabilitation to the Rijnlands Rehabilitation Centre in Leiden the Netherlands were eligible for this study. Based on an estimated inclusion rate of 3 patients per month and an arbitrary wish to include 75 patients, we decided to follow all patients between 1 February 2011 and 1 February 2013. The period was extended with 3 months to reach 75 patients. OHCA patients are referred to cardiac rehabilitation by their cardiologist and admitted within 2 weeks after discharge from the hospital. Institutionalised patients were excluded from this research.

Socio-demographic characteristics and data on the cardiac arrest were retrieved from the medical record of the rehabilitation centre.

Questionnaires on cognitive functioning, quality of life and participation/autonomy were administered to the patients and their partners within 4 weeks after the cardiac arrest by a specialised nurse at the beginning of the cardiac rehabilitation.

2.3. Assessments

Patient and OHCA characteristics included gender, date of cardiac arrest, age at time of cardiac arrest and recorded cause of cardiac arrest: myocardial infarction, cardiac arrhythmia, cardiac myopathy, myocarditis and other (i.e. heart failure, electrocution, drowning). Eligible patients were seen by specialised nurses, who helped filling in questionnaires if needed. The whole assessment for patients took approximately 55 min; for partners 10–15 min.

2.4. Cognitive functioning

Cognition was evaluated using the MMSE, CFQ and IQCODE.

The MMSE is an 11-item cognitive scale ranging from 0 to 30 points and takes 10 min to conduct. The test assesses multiple domains of cognitive functioning. A cut-off score of <28 was used to determine cognitive impairments.

The CFQ is a 25-item questionnaire for self-perceived cognitive functioning and takes 10 min to complete. The CFQ provides ratings of the perception on the frequency of various cognitive slips in daily life. Items are related to memory and attention. Ponds added four questions to identify an increase of possible cognitive mistakes and how these mistakes are troublesome, aggravating or worrying someone.[22] The scale ranges from 0 to 100 and a higher score indicates worse cognitive functioning. To assess problems in self-perceived cognitive functioning we used a score of >32 as cut-off.

The partner was asked to complete the Dutch version of the short IQCODE. This version consists of 16 items, aiming at cognitive functions like everyday memory and instrumental activities of daily living and takes 10–15 min to administer.[23] The questionnaire compares the present functioning with some point in the past (situation prior to the cardiac arrest). The questionnaire has been validated for the Dutch population.[24,25] There are five response alternatives from 1, much better to 5, much worse. Higher scores indicate a greater decline: we used the cut-off point of >3.6.[26] Cognitive problems were defined as MMSE <28, CFQ >32 or IQCODE >3.6.

To get a first impression on the relevance of the cognitive tests used, relations to participation/autonomy and perceived quality of life in daily living were studied, using the Impact on Participation and Autonomy Questionnaire (IPAQ) and the Short Form-36 Health Survey (SF-36).[27,28,29] Since depression and anxiety are confounders for cognitive complaints and quality of life, the self-report screening Hospital Anxiety Depression Scale (HADS) was obtained.[30]

2.5. Participation and autonomy

To assess social participation and autonomy, the Dutch 'Impact on Participation and Autonomy Questionnaire' (IPAQ) was used. The IPAQ focuses on autonomy and participation of people with chronic conditions. It is developed to assess disease severity, needs and outcome. Per subcategory scores range from 0 to 4. A score of 0 is normal and higher scores indicate greater hindrance in participation and autonomy or an increased problem experience. The IPAQ takes approximately 20 min to administer.