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Review Article

Evaluation of Activities of Daily Living Instruments in Cardiac Patients: Narrative Review

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ABSTRACT

Introduction: The evaluation of assessment instruments through activity of daily living (ADL) in heart disease is done for early intervention. The aim of this study is to investigate the proper instrument for assessing ADL in a cardiac patient.

Material and Methods: This study was a narrative review of instruments of screening and assessing ADL in heart disease. A search was conducted using databases including Iran Medex, SID, Mag Iran, Google Scholar, PubMed, ScienceDirect, and Scopus. The instruments were investigated regarding the date of publishing, each activity of ADL, number of items, method of administration/format, parameters used for establishing target intervention outcomes, scoring, time duration of each instrument, and psychometric properties.

Results: From 22 instruments, eight instruments met the criteria and were included. These instruments were all in the form of self-report questionnaire or observation. Among the available instruments, the oldest instrument was invented in 1957 (PULSES Profile) and the most recent one was developed in 2009 [performance measure for ADL (PMADL)-8]. In terms of item, minimum and maximum items for implementation of instrument were listed 8 and 170 for PMADL-8 and Klein-Bell index, respectively. The minimum and maximum administration time duration was 4-6 min (Kansas City Cardiomyopathy Questionnaire) and 60 min (Klein-Bell index).

Conclusion: This study found that some instruments have been used more because of their proficiency subscales in recent years. Furthermore, a comparison of recent and old instruments revealed their evolutionary path. There is a serious lack of proper instrument for ADL evaluation of occupational therapists.

Keywords: Questionnaire; Evaluation; Heart disease; Activity of daily living

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Introduction

Currently, cardiovascular diseases are one of the most common chronic and disabling diseases (1). According to the World Health Organization, 41.3% of total deaths in 2005 in Iran were due to cardiovascular diseases and the rate of this is being forecasted to reach 44.8% by 2020 (2). According to the latest statistics announced by the World Health Organization, 33.7% of mortality is due to cardiovascular diseases in the world and more than 80% of cardiovascular diseases occur in low- and middle-income countries (3). People with heart disease suffer from various complications such as cognitive disorder, for example, executive function, attention, and memory (4), and limitation in physical activity including restrictions in performing activity of daily living (ADL), work, leisure, social isolation sex, roles in family life (5, 6), and also the quality of life of their family (7). Therefore, early evaluation is necessary for proper interventions.

Various ADL instruments/questionnaires are available; each one has advantages and disadvantages. From 1989 (8), there is a limitation of knowledge and

evidence in ADL assessment exclusive for people with cardiac diseases. The aim of this study is to (a) review the assessment/questionnaire of ADL for cardiac patients to find the best assessment for practical and research proceedings and if there isn't an appropriate assessment/questionnaire in this field, an especial test is need to developand (b) investigate the characteristics of each test such as published year, number and kind of ADL (self-care, mobility, etc.,), method of assessment, time duration, parameters used for establishing target intervention outcomes (factors and symptoms that lead to limitations in the performance of activities), and psychometric properties of the instruments.

Materials and methods

Data sources

The following English and Persian electronic databases were searched from 1970 to 2016 for articles on instruments for measuring ADL in cardiac patients: SID, Iran Medex, Mag Iran, Scopus, Google Scholar, PubMed, and ScienceDirect. The following aspects were heart disease assessment, examination, instruments, review, ADL, and function. The reference lists of the identified studies were searched manually to identify any additional relevant studies.

Study design

The following study inclusion criteria were applied: (a) assessment of ADL in cardiac patients, (b) development of a measurement instrument or evaluation of the properties of an instrument, and (c) full-text original articles published in English in a peer-reviewed journal. The exclusion criteria were application of an instrument measuring a general ADL.

Selection of articles: figure 1 presents a flowchart of the study selection process. As shown in figure 1, from 24 available instruments, eight of them were included in this study.

Data extraction

The following data were extracted from the included studies: general characteristics of instruments [assessment title and author(s), year of publication, activities, duration, scoring, parameters (value, independence, safety, difficulty, pain, duration, fatigue, and dyspnea)] and psychometric properties of instruments.

Results

The following eight different types of instruments were identified: (a) Barthel Index (BI), (b) Functional Independent Measurement (FIM), (c) Canadian Occupational Performance Measure (COPM), (d) The Kansas City Cardiomyopathy Questionnaire (KCCQ), (e) Daily Activity Questionnaire in Heart Failure (DAQIHF), (f) Performance Measure for ADL-8 (PMADL-8), (g) Klein-Bell Index, and (h) PULSES Profile.

General characteristics of the instruments and studies

Table 1 presents the characteristics of the eight instruments for measuring ADL in heart disease. In general, among the related instruments to assess the ADL in patients with heart disease, all instruments are in a questionnaire format. Among the evaluation instruments, the oldest instrument is PULSES Profile in 1957 and the newest one is PMADL-8 in 2009. In the study of evaluation instruments in terms of procedure, 2 instruments (25%) in the form of observation reference activities and 6 (75%) in the form of a questionnaire (interview) were recorded.

Quality of the psychometric property results

Table 2 also shows the psychometric properties (validity, reliability) of evaluation instruments.

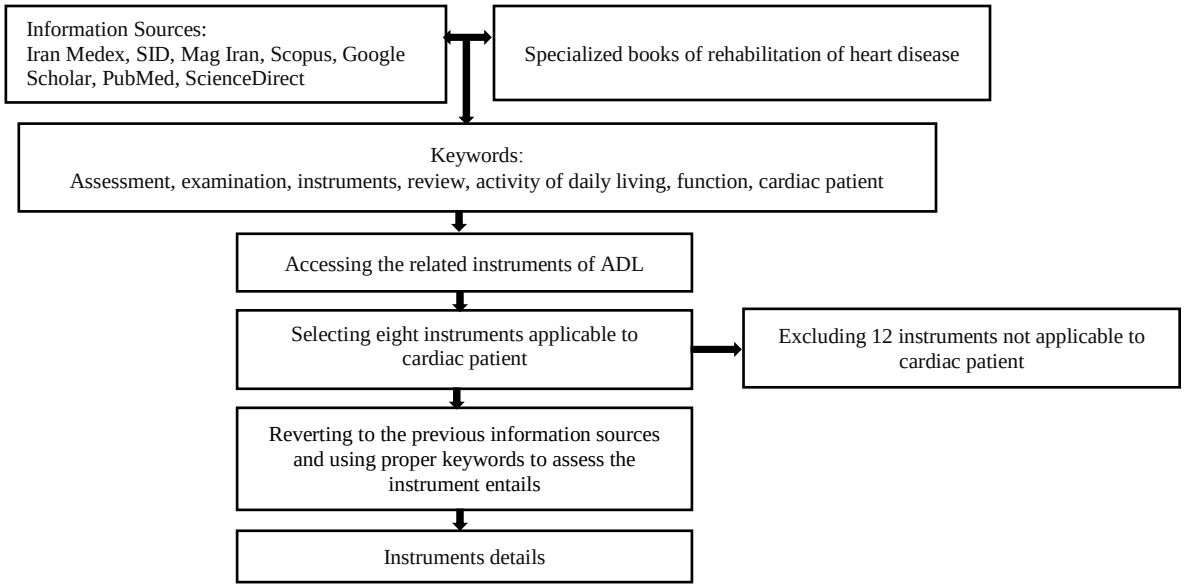

Figure 1. Procedure of collecting information about instruments

Table 1. Results of the questionnaires and the scope and parameters investigated in patients with heart diseases between 1970 and 2016

Row	Assessment title, producer and year of publication	Number of items	Duration (in minutes)	Scoring	Activity	Parameters evaluated
1	Barthel Index, (1979) (10, 17)	10	25	0-100	Bowels, bladder, grooming, toilet use, feeding, transfer, mobility, dressing, stairs, bathing	Dependence/independence
2	Klein-Bell index, Bell and Klein, (1982) (10, 17)	170	60	-*	Dressing, mobility, elimination, bathing and hygiene, eating, and emergency communication	Dependence/independence
3	Functional Independent Measurement, UDSMRR, (1990) (10, 17)	18	45	0-126	Self-care, locomotion, mobility, sphincter control, cognitive emphasis involving communication and social cognition	Dependence/independence
4	Canadian Occupational Performance Measurement, Law, (1994) (10, 17)	5	30-40	0-10	Self-care, productive, and leisure	The importance of implementation, satisfaction with activity
5	The Kansas City Cardiomyopathy Questionnaire, Green, (2000) (13)	23	4-6	0-100	Dressing yourself, showering/bathing, walking 1 block on level ground, doing yard work, housework or carrying groceries, climbing a flight of stairs without stopping, hurrying or jogging	The severity of constraints on activity due to shortness of breath and fatigue and swelling
6	Performance Measure for Activity of Daily Living-8, Shimiza, (2009) (19)	8	-*	8-32	Getting up and off from the floor without instruments, washing your body and hair, going up a flight of stairs without a handrail, vacuuming your room, pulling and closing a heavy sliding door, getting into and out of a car, walking at the same speed with someone of the same age, walking up a slight slope for 10 min	Difficulty of activity
7	Daily activity Questionnaire in Heart Failure, Garet, (2004) (15)	82	15-20	*	Sleep and resting periods, washing, meals, toilet, household and related activities, sports and non-sports leisure time activities, other activities	
8	PULSES Profile, Maccann and Maskowitz, (1957) (10, 17)	6	5-10	24	Physical conditions, the implementation of the (self-care, drinking and eating, wearing clothes, brace and artificial limbs, bathing, caring during defecation), transportation, moving, walking, stairs, mobility with the wheelchair, sensory functions and verbal, excretory functions, psychological state	

*Not available

Table 2. Psychometric characteristics of ADL instruments for cardiac patients

Row	Name of instrument	Validity	Reliability
1	Barthel Index	Convergent = 0.73-0.77 (10, 12, 17)	Test-retest = 0.89 Inter-rater = 0.95
2	Klein-Bell Index	Construct = have** (11, 12)	Test-retest = 0.98 Inter-rater = 0.92
3	Functional Independent Measurement	-*	Test-retest = 0.93 Inter rater = 0.94 (12)
4	Canadian Occupational Performance Measurement	-*	Inter-rater: For performance = 0.63-0.89 For satisfaction: 0.76-0.88 (12)
5	The Kansas City Cardiomyopathy Questionnaire	Construct = 50.9, 60, 83.3 (18)	Test-retest = 0.14
6	Performance Measure for Activity of Daily Living-8	Construct = 68.2 Convergent = 69% (19)	Test-retest = 0.96
7	Daily Activity Questionnaire in Heart Failure	Construct = 88% (15)	Test-retest = 0.82-0.98 Inter-rater = 0.82-0.94
8	PULSES Profile	-*	Test-retest = 0.87 Inter-rater = 0.95 (10, 17)

*Not available, **Number was not reported. ADL: Activity of daily living

Discussion

Evaluation type: for evaluation of ADL, therapist uses several methods for gathering data. Various techniques consist of questioning, interview, and observation. The questioning method has been cheaper and has not needed for expert assessor and the clients in less risk; however, in observation method, it is expensive and depends on comfortable place, special instrument, an expert assessor (9). All instruments, except the Klein-Bell instrument and PULSE profile, were carried out through questionnaires, but Klein-Bell and PULSES Profile instrument were carried out through observation of evaluation activities and scoring (10, 11). In Klein-Bell instrument, after evaluation and scoring each case, the patient's overall score was calculated and graphically presented. A full score means the patient is independent in ADL. These instruments have special and standard methods for evaluation with clear instructions. This instrument has a high sensitivity (11, 12).

Instruments of PMADL-8 and DAQIHF and instruments related to monitor the ADL in cardiac patient are used in these patients and compare the level of performance with maximum oxygen consumption (peak VO_2). PMADL-8 has been implemented in the Japanese population. Based on the difficulty of doing the activity, scoring for each item is from 1 to 4 that low grade on this instrument shows the best performance (5). Kono et al., in the evaluation of physical restraint in patients with heart disease that is related to maximal oxygen consuming, through the provision questionnaire PMADL-8, confirmed that PMADL-8 can be used as a clinical means to manage the chronic disability of people with heart disease (14). DAQIHF are being scored based on the amount of assistance for performing activities and time required to carry out activities during a day or a week. Garet et al. investigated the relation between daily energy expenditure (DEE) with the peak VO_2 by preparing a questionnaire to assess the amount of DEE in patients with heart disease and concluded that daily activity energy expenditure and amount of metabolic are higher than 3 metabolic equivalent (metabolic values for various activities) has a significant relation with peak VO_2 (15).

Number of activities performed in each instrument

For the first step, the assessor must select scale/instrument that includes the activities which are difficult for the patient to perform. In this study, comparing basic ADL and instrumental ADL, the lowest number of activities is related to PMADL-8 (getting up and off from the floor without instruments, washing your body and hair, going up a flight of stairs without a handrail, vacuuming your room, pulling and closing a heavy sliding door, getting into and out of a car, walking at the same speed with someone of the same age, walking up a slight slope for 10 minutes), and the most number of activities is related to Klein-Bell index (dressing, mobility, elimination, bathing and hygiene, eating, and emergency communication) and their subgroups on follow.

Parameters

After determination goals of evaluation choice, indicating the evaluation criteria is that which parameter is considered for each activity? For this goal, the KCCQ and the COPM are appropriate. Over time, the trend toward more specialized instruments is more and KCCQ instrument examined parameters, such as fatigue and shortness of breath.

The time duration for each instrument: Among these questionnaires, the shortest time is 4-6 min for KCCQ and the highest duration is 60 minutes and allocated to Klein-Bell index (12, 16).

Psychometric properties

The less internal sensitivity with Cronbach's $\alpha = 0.61\text{-}0.74$ is related to the PULSE profile and highest sensitivity with Cronbach's $\alpha = 0.95$ is for FIM (10, 12, 17).

Validity

Among the reported number of instruments for validity and reliability, DAQIHF instrument has higher construct validity. It shows that how much correct instrument results in tangential direction (15).

Reliability

The highest number for test-retest reliability is for Klein-Bell and DAQIHF. It means that time has less impact on the result. The highest number for inter-rater reliability is for the instrument PULSE profile and BI; it means that difference between experimenter has less impact on the result (11, 14, 17). BI and Klein-Bell index have a ceiling effect for people with high autonomy; Klein-Bell index has the easy high responsiveness and scoring, implementation and scoring are easy for BI, and its assessment time is very short.

PULSES has high sensitivity to changes and is affordable. FIM is being used for different diagnoses but does not consider the physical performance and environmental factors. COPM is being used in more than 35 countries (10, 12, 17). PMADL-8 and KCCQ and DAQIHF take parameters into consideration more and effectively leading to limitations in carrying out activities in individuals (14, 17, 18). Maybe, the reason for this is explicit impact that the parameters have in cardiac patients (15). In general, the lowest number of citations with six citations for the years 2011-2015 is for the PMADL-8 instrument, and the highest number of citations with 1285 citation from 1995 to 2016 is for the COPM instrument. However, the high number of citations in heart disease from 2016 to 2002 is related to KCCQ with 659 citations, probably because of the specialty questionnaire for people with heart failure who make a high percentage of cardiac patients and the relevance of this questionnaire to the

quality of life that is proper for health policymakers; but also, in terms of ignoring all the parameters involved in the patient, this questionnaire is not appropriate for clinical decision-making point of view.

Conclusion

By examining the related papers, it is identified that some of the instruments due to the technical aspects of evaluation in these patients are more used in recent years and the instruments that are more specialized are in more practical papers and have great research value. Furthermore, comparing between recent years with the past years' instruments, we notice the improvement of quantitative and qualitative path; however, according to the author's opinion, it seems due to lack of questionnaire for the assessment and clinical interventions in occupational therapy, development of a questionnaire that perfectly matches the needs and problems of heart disease that have related parameters to provide the most accurate information about heart disease with minimal cost and time, which is the essential.

Conflict of Interests

Authors have no conflict of interests.

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