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Developing Indicators of Service Quality Provided for Cardiovascular Patients Hospitalized in Cardiac Care Unit

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ABSTRACT

Introduction: Cardiovascular diseases are among the most prevalent chronic diseases leading to high degrees of mortality and morbidity worldwide and in Iran. The aim of the current study was to determine and develop appropriate indicators for evaluating provided service quality for cardiovascular patients admitted to Cardiac Care Units (CCU) in Iran. **Methods**: In order to determine the indicators for evaluating provided service quality, a four-stage process including reviewing systematic review articles in premier bibliographic databases, interview, performing two rounds of Delphi technique, and holding experts panel by attendance of experts in different fields was adopted. Finally, after recognizing relevant indicators in resources, these indicators were finalized during various stages using ideas of 27 experts in different fields. **Results**: Among 2800 found articles in the text reviewing phase, 21 articles, which had completely mentioned relevant indicators, were studied and 48 related indicators were extracted. After two interviews with a cardiologist and an epidemiologist, 32 items of the indicators were omitted and replaced by 27 indicators coping with the conditions of Iranian hospitals. Finally, 43 indicators were added into the Delphi phase and after 2 rounds of Delphi with 18 specialists, 7 cases were excluded due to their low scores of applicability. In the experts' panel stage, 6 items were also omitted and 10 new indicators were developed to replace them. Eventually, 40 indicators were finalized. **Conclusion**: In this study, some proper indicators for evaluating provided service quality for CCU admissions in Iran were determined**.** Considering the informative richness of these indicators, they can be used by managers, policy makers, health service providers, and also insurance agencies in order to improve the quality of services, decisions, and policies.

Introduction

Cardiovascular diseases (CVD) are of the most common leading causes of morbidity and mortality all over the world and are considered as one of the serious life threatening diseases. Prevalence of this disease is increasing and it is predicted to turn into the first cause of death by 2020.[1-4] It is estimated that each year 57,218 deaths are attributable to heart failure in the US and 16 million people are affected by Coronary artery diseases (CAD); while the economical burden of this disease was estimated about $156 billion in 2008.[5] In Iran, cardiovascular diseases are the most common causes of death and have tremendous physical, psychological and financial effects on the patients and society. According to the report of Ministry Of Health and Medical Education (MOHME) in 2003, 369 people died of cardiovascular diseases in Iran every day.[5] Although delivery of health care and outcomes for patients living with cardiac disease have improved, this disease continues to be a major medical and social problem all over the world.[5] Also there is a large gap between ideal care and actual care provided in hospitals around the world.[6] To identify and bridge the gap between routine and evidence-based care, we are required to measure quality of care performance and feedback of results.[7] For achieving this

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goal, many health care systems around the world are using "indicators" for measuring the quality of health care.[8,9] There are many definitions for indicator in literature; Joint Commission Accreditation on Health care Organizations (JCAHO) defined indicators as "A valid and reliable quantitative process or outcome measure related to one or more dimensions of performance such as effectiveness and appropriateness and a statistical value that provides an indication of the condition or direction over time of an organization performance of specified outcome.[2] Quality of care can be defined as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge" .[3] In many of the countries numerous studies have been conducted to design and implement indicators in their health care systems.[10-13] In Iranian health care system, in spite of the previous studies carried out on selecting and developing indicators of clinical effectiveness, risk management, and patient safety provided many indicators[14-16], there are limited indicators to measure quality of care, specific in intensive care such as cardiac care while previous studies indicate that current standards used in the assessment of hospitals are not efficient.[17] The aim of this study was to select more relevant quality indicators from published resources and to adapt or develop quality indicators for measuring cardiac care quality in CCU at the level of Iranian health care system.

Materials and methods

This study is a part of a larger study on selecting and developing clinical governance performance indicators for hospitals of East Azerbaijan – Iran which is in progress by Tabriz University of Medical Sciences clinical governance committee. Due to the importance and extent of cardiac care indicators, the committee decided to conduct this part of the study separately and specially. In this part of the study, various methods were used to select and develop proper indicators for evaluating provided service quality for cardiovascular patients.

Systematic review

In the first phase of this study a systematic review was conducted to identify and collect the indicators for cardiac care in published resources. In this systematic literature review, Pubmed, Science Direct, Ovid, Medline, Magiran, SID (Scientific Information Database), Irandoc database, and relevant websites (Australian Council of Healthcare Standards, Agency for Healthcare Research and Quality, Joint Commission, ...) were searched with key words of: cardiac care indicator*, quality indicator*, CCU performance indicator*, hospital performance indicator*, clinical effectiveness indicator*, clinical indicator* hospital accreditation indicator*, and cardiac care standard* to ensure that we searched strategies which cover the most relevant domains of cardiac care. A conceptual framework was developed consisting of the following aspects: primary prevention of cardiac disease, secondary prevention of cardiac disease, acute coronary syndromes, cardiac interventions (CI), percutaneous coronary (PC), coronary artery bypass grafting (CABG), congestive heart failure (CHF) and rehabilitation of cardiac disease, as well as the Persian equivalents for these keywords. Searched indicators in all articles and reports had been published in English and Persian from 1980 to 2012. Manual search was also conducted through the index listings and peer-reviewed medical journals. Additional search was conducted using Cochrane Collaboration and Evidence-Based Medicine. Eligibility criteria for selected relevance indicators included: indicators in hospitals. Adequate descriptive information was provided about the indicators. The results were extracted, summarized and reported in appropriate tables.

Interviews

After collecting and summarizing indicators from published resources, two interviews were conducted with a cardiologist and an epidemiologist. Interviews lasted for 90 minutes and several numbers of indicators were excluded and many indicators and other information were added.

Delphi survey

After collecting indicators from published resources and modulating by specialists' comments, selected indicators were intended to Delphi survey phase. Delphi questionnaire contains 43 indicators and questions in the following fields:

Indicators on secondary prevention of cardiac disease: 4 indicators
Indicators on acute coronary syndromes: 4 indicators
Indicators on cardiac interventions: 5 indicators
Indicators on congestive heart failure (CHF): 3 indicators
Indicators on mortality and morbidity: 2 indicators
Indicators on length of stay: 2 indicators
Indicators on provider of health care: 12 indicators
Indicators on general information: 11 indicators

Delphi questionnaire form was designed using an extensive literature review and experts' comments based on RAND Corporation Delphi form[18] (form 1). Questionnaires were sent to 10 cardiologists. Specialists rated each indicator individually on a scale of 1–9 regarding its "applicability" and "importance ". Median scores and cases of disagreement for two aspects of applicability and importance were calculated in the first round of Delphi for each indicator. Indicators which received scores of 7–9 were accepted, while indicators which received scores 4–6 entered the second phase of Delphi, and indicators which received scores of 1–3 were excluded from study.

Experts' Panel

After identifying related indicators from resources and modifying them according to conditions of Iran and evaluating them by two rounds of Delphi technique, an experts' panel including specialists and beneficiary persons was formed in order to finalize indicators list and

to make decision about collecting methods for needed information of each indicator. Members of panel were 2 cardiologists, 1 methodology and statistics specialist, 1 epidemiologist, and 1 nurse.

Results

As a result of systematic literature review, 2800 articles were found from databases. After screening the titles, abstracts, and full-texts, 2779 articles were excluded due to non-relevance, duplication, poor accordance with the study aim, and not mentioning to indicators. Finally, 21 more relevant articles were included to the study. Through detailed reading of 21 articles a list of 48 potential indicators were obtained.

After identifying indicators two interviews were conducted in order to get more familiarity and remove ambiguities which resulted in exclusion of 32 indicators due to difference in services and facilities, social and economical conditions, and lack of information and replaced by 27 indicators in accordance to conditions of hospitals in Iran. Finally, 43 indicators entered the Delphi evaluating stage. At first, Delphi round questionnaires were sent to 10 cardiologists and by its consequence, 8 indicators entered the second Delphi phase because of acquiring low mean score of 4-7. In the second Delphi phase, questionnaires were also sent to 8 persons and only one indicator acquired score of more than 7 and remaining 7 indicators were excluded (Table 1).

All 7 above-mentioned indicators were excluded from the study due to low scores in "applicability". After analyzing Delphi phase results, experts' panel was formed consisting of cardiologists, CCU nurses, and epidemiologists resulting in omission of 6 available indicators and replacement of other 10 indicators. Also content and form of some indicators were modified and decisions were made about measurement method and other executive issues (Table 2).

Discussion

Development of preventive, therapeutic, and rehabilitative technologies had an important role in treatment and prevention of cardiovascular diseases. However, there is limited information available for measuring effectiveness of these items in decreasing mortality and burden of these diseases and there are differences between world countries in strategies on decreasing and controlling cardiovascular diseases.[19,20] Quantitative information on patient management, outcomes, and diagnosis are required for better understanding of these differences. Nowadays, indicators of evaluating service quality provided to these patients in the level of health and medical systems in different countries are used for this objective.[21] As the results of our search show, there is no proper scientific and practical action for developing and using indicators of measuring the quality of services provided to patients. In this study it was tried to develop and design indicators for evaluating provided service quality for cardiovascular patients in Iran using a four-stage process including reviewing systematic review articles in premier bibliographic databases, interview, performing two rounds of Delphi technique, and holding experts' panel by attendance of experts in different fields. In most points of the world studies have been conducted using a combination of these methods in order to develop indicators, such as the study of Canadian Cardiovascular Outcomes Research Team (CCORT) who used reviewing the articles and two-phase Delphi to develop indicators for evaluating quality of provided services to cardiovascular patients.[22] In another study in Canada, it has been tried to develop congestive heart failure (CHF) indicators using article reviews and two-phase Delphi and 29 indicators as well as five test indicators were recommended in total.[23] The reason for higher number in selected indicators of present study could have resulted from indicators added in interviews due to different conditions of hospitals and provided services for cardiovascular patients in Iran. The first attempts to develop indicators were made in the US when RAND organization, department of cardiology, and American Heart Association developed indicators for measuring quality of provided services for cardiovascular patients.[24] Later on, the project of improving quality of cardiovascular cares and Joint Commission on Accreditation of Healthcare Organizations (JCAHO) also tried to develop indicators for evaluating quality

Form 1.Delphi survey questionnaire form

Indicators on secondary prevention of coronary heart disease																		
Title : Aspirin on discharge after acute MI																		
Measure: those prescribed aspirin at discharge / discharged patients with AMI without aspirin contraindications																		
Your comment:																		
Applicability									**Importance**									
9	8	7	6	5	4	3	2	1	9	8	7	6	5	4	3	2	1	

Table 1. Excluded indictors in Delphi survey rounds

Denominator	Numerator	Indicator
Number of unique individuals hospitalized with a primary diagnosis of AMI	number of deaths in any setting that occurred within 1 year of hospital admission for a primary (principal) diagnosis of AMI	1- One-year mortality following AMI
All non-maternal/non-neonatal discharges with procedure code for CABG in any field. Age 40 years and older	Number of deaths per 100 discharges with procedure code for CABG in any field. Age 40 years and older	2- CABG in-hospital mortality rate
Number of people who have been discharged from hospital who have had a CABG operation	number of people who have had a CABG operation who have died after 1 year of discharge of a CABG	3- One-year mortality rate following CABG
Number of unique individuals discharged following a CABG operation Numerator: number of deaths in hospital in patients with PTCA	number of unique individuals undergoing CABG re-operations within 6 months of discharge Measure proposed by panel members	4- CABG re-operation within 6 months of discharge
Number of PTCA performed	number of unique individuals having a second PTCA performed within 30 days of discharge	5- Repeat PTCA within 30 days of discharge
-	Mean of cardiac specialist presence time in CCU per each patient in CCU	6- Cardiac specialists
-	Mean of cardiac specialist presence in hour in afternoon and night shifts	7- Cardiac specialist in afternoon and night shifts

Table 2. Some of Final Indicators to Measure the Quality of Services Provided to Patients in CCU Wards

Indicator	Numerator	Denominator
Aspirin prescription after acute MI on discharge[8]	Patients prescribed aspirin at discharge	Patients discharged with AMI lacking aspirin contraindications
ACE inhibitor prescription at discharge after AMI[8]	prescribed an ACE inhibitor at discharge	patients discharged with left ventricular systolic dysfunction and without ACE inhibitor contraindications
βBlocker prescription at discharge after AMI[4]	Patients prescribed β-blockers at hospital discharge	discharged patients with AMI without β- blocker contraindications
Statin treatment after a cardiac event[4]	Patients attending primary care with a history of statin prescription after a cardiac event	Patients attending primary care with a history of cardiac event
Thrombolytic timing for patients with AMI[4]	The time in minutes from time of arrival at hospital to time of administration of the thrombolytic	confirmed AMI patients who received thrombolytic treatment and have had adequate documentation of the time of arrival and the time of starting the thrombolytic
Timing of emergent PTCA for patients with AMI[8]	Minutes from arrival at the hospital until starting the PTCA	all patients with confirmed AMI receiving a PTCA within 12 hours after arrival at the hospital and having adequate documentation of the time of arrival and the time of the PTCA
Aspirin at admission to hospital for AMI[29]	number who received aspirin within 24hours before or after hospital arrival	hospitalized AMI patients without aspirin contraindications
Same-day CABG surgery rate after PTCA[6]	number of unique individuals who have had a CABG within 24 hours following a PTCA /	number of unique individuals who have had a PTCA
Proportion of patients with CHF receiving ACE inhibitor on discharge	number of individual patients with a principal diagnosis of CHF (ICD-9 428, ICD-10 I50) who are prescribed an ACE inhibitor at discharge	number of individual patients discharged with a principal diagnosis of CHF
Rate of βblocker prescription at hospital discharge for CHF[8]	number of individual patients with a diagnosis of CHF (ICD-9 428, ICD-10 I50) who are prescribed a β blocker at discharge	number of individual patients discharged with a diagnosis of CHF
CHF in-hospital mortality rate[6]	number of deaths per 100 discharges with principal diagnosis code for CHF	number of discharges with principal diagnosis code for CHF, exclude discharges with cardiac procedure codes in any field
Length of stay for patients with heart failure	Median length of stay for heart failure patients	
The ratio of monthly CCU admissions due to ACS ,CHF and cardiac arrhythmias	Number of patients admitted due to ACS ,CHF and cardiac arrhythmias per month	Total number of CCU admissions per month

and measuring them by available primary data.[25,26] In their study, Ulla et al.[21] introduced 17 indicators for measuring quality of provided services for cardiovascular patients in the level of Organization for Co-operation and Development in countries using the methods of systematic review, Delphi, and experts' panel and mentioned that cardiovascular diseases had a high mortality rate and there were many differences in provided services for these patients between different countries. As a result, using indicators of evaluating quality of services is one of the most proper available strategies to decrease these differences and observe global standards. Based on claims of ULLA one of the strategies to improve the quality of services and decrease current differences is

using indicators of evaluating services' quality. It can be a justification to the higher number of indicators in this study since provided services in Iran are distant from global standards in some aspects and this is a factor that due to the weakness of system, we should pay more attention to these aspects which have lower significance in high income countries. In another study in Canada[26] using experts' panel 15 indicators for evaluating provided service quality for cardiovascular patients were developed in hospital level and in the 4 domains similar to that of our study. Also in another study using experts' panel and two phases of Delphi technique, it has been tried to develop indicators for evaluating the quality of provided services for patients with congestive heart failure.[27] By investigating conducted studies mentioned above it is possible to conclude that designing and developing indicators is a process which is used in studies in a combined way. Three stages of systematic review, Delphi technique, and experts' panel have the most usage in the process of developing indicators for evaluating the quality of services and in this study personal interview was added to these stages. Tu et al.[28] suggested 38 indicators for evaluating service quality provided for patients suffering from heart attack. Although the number of indicators in these two studies is similar but in this study, indicators are designed for all cardiovascular patients hospitalized in CCU while in the study mentioned above, designed indicators are limited to heart attack patients. It should be mentioned that since there were no designed indicators for measuring the quality of provided services for cardiovascular patients, it seems that it is better to use general indicators. However, in the future when using these indicators would be more conventional, specific indicators should be designed and used for each specific domain of cardiovascular diseases.

In this study in spite of identifying some indicators from texts in the domain of primary cares, they were excluded due to lack of relevance between primary care system and hospitals and difficulty in evaluating of primary care services. However, much attention is paid to primary level cares and management of chronic diseases by patients themselves due to the studies conducted in most of the countries. Regarding to this point, in a study Fredrick et al.[29] attempted to design indicators for evaluating primary care services using systematic review and conducting four-phase Delphi technique and finally introduced 31 indicators for evaluating primary preventive services provided for cardiovascular patients. Due to the importance of primary cares and their role in preventing and decreasing the burden of cardiovascular diseases and available potentials in the level of primary cares in Iran, it could be very useful to pay attention to indicators proper to these levels in Iran.

The main reason for omission and exclusion of some indicators in this study was their low applicability scores and of the most important problems which were mentioned in interviews and "Suggestions" parts of Delphi technique forms one can list the items of lack of a useful and comprehensive informative system, lack of co-operation by personnel and specialist physicians in particular, lack of proper and adequate facilities, high workload, shortage in human resources, and etc.

As it was mentioned, it is possible to point to main weaknesses of this study as lack of selecting relevant indicators in the field of primary cares due to lack of proper relationship between primary care system and hospitals which makes it difficult to evaluate these services. Despite all mentioned weaknesses for the first time in the country it was tried to develop and design indicators for evaluating service quality provided for cardiovascular patients using a complete combination of systematic review, interview, Delphi technique, experts' panel and making benefits of ideas of different beneficiary groups and experts, and it could be used in health and medical system of Iran. However it seems necessary to conduct similar and more complete studies and also to develop specific indicators for each of different aspects of cardiovascular diseases.

Conclusion

Considering high prevalence of cardiovascular diseases in Iran and its costs and side effects on patient, patient's family, and society, and also since results of the review study showed that quality of life in cardiovascular patients of Iran is not so acceptable[30], we need to provide cares with higher degrees of quality for these patients. In order to be sure about the quality of provided services for these patients, using indicators for evaluating the quality of provided service as a proper and effective strategy have attracted a great deal of attention in recent years in the most points of the world. Since this important fact has been ignored hitherto in Iran, in this study it was tried to design indicators proper to our country using a complete process including systematic review of articles, interview, Delphi technique, holding experts' panel, and making advantage of the thoughts and ideas of specialists and experts of different fields. Finally 40 indicators were introduced for this objective which due to their informative richness could be used for improving the quality of services, decision makings, and policy makings, by managers, policy makers, health service providers, and even by insurance agencies.

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