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# How to Assess Quality of Research in Iran, From Input to Impact? Introduction of Peer-Based Research Evaluation Model in Iran

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**Abstract**

**Background:** Research evaluation is a systematic and objective process to measure relevance, efficiency and effectiveness of research activities, and peer review is one of the most important tools for assessing quality of research. The aim of this study was introducing research evaluation indicators based on peer reviewing.

**Methods:** This study was implemented in 4 stages. A list of objective-oriented evaluation indicators were designed in 4 axes, including; governance and leadership, structure, knowledge production and research impact.

**Results:** The top 10% medical sciences research centers (RCs) were evaluated based on peer review. Adequate equipment and laboratory instruments, high quality research publication and national or international cooperation were the main strengths in medical sciences RCs and the most important weaknesses included failure to adhere to strategic plans, parallel actions in similar fields, problems in manpower recruitment, knowledge translation & exchange (KTE) in service providers and policy makers' levels.

**Conclusion:** Peer review evaluation can improve the quality of research.

**Keywords:** Evaluation, Iran, Peer review, Qualitative, Research

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## Introduction

Evaluation is a systematic and objective process to measure relevance, efficiency, and effectiveness of polices or programs. The main purpose of research evaluation is to promote health research. In other words, evaluation covers a wide area and may be done in different levels with different ways from one project to country or region (www.rand.org/content/dam/rand/pubs/technical_reports/2009/RAND). Qualitative methods have been used as approaches to evaluate the impact of research since the mid-eighteenth century.[1] Evaluation methods can be divided in three types: qualitative, quantitative and qualitative-quantitative. These methods include semi-structured interviews, documentary analysis, field visit, observation, panels and peer review (www.psi.org.uk/pdf/2008/bridgingproject_report). One of the most important tools for qualitative evaluation is peer review. This tool is essential to assess the quality of research.[2] Knowledge production resulting from research could represent the social and economic development of each country. Peer reviewers have major roles in research leadership and their opinions can be considered as evidence-based decision making.[3]

Now, there are several models in the world for research evaluation, either quantitative or qualitative. In Canada, different fields of medical sciences such as clinical and biomedical sciences, research systems, health community etc. are evaluated based on the Canadian Institutes of Health Research Framework (CIHRF). In this framework, investment return by research projects is assessed (https://www.researchgate.net). In the United Kingdom, the Higher Education Funding Council for England (HEFCE) has developed projects for public research funding allocation to research institutions based on Research Excellence Framework.[4] In this framework, the social and economic impacts of research are evaluated. In a logical model for medical research, short, middle and long term achievement are assessed through evaluation

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of input, activities, output, outcome, and impact of research.[5]

In Iran, research evaluation of universities of medical sciences and research centers (RCs) has started since 2000. This annual evaluation is done using a quantitative method and the research indicators consist of leadership, knowledge production and capacity building. In this method, short term achievements such as number of research articles, number of citations, books, meeting abstracts and so on are counted.[6,7] This evaluation system has pros and cons. The main advantage and disadvantage are greater attention to research output and less attention to research outcome and impact, respectively.[8] In order to improve the quality of research, we attempted to define the research indicators to evaluate the research activities of RCs by peer review. In this paper, the main aim is presenting the peer-based evaluation indicators in RCs as a model. Finally, we will present the results of the pilot study.

## Materials and Methods

The present study was started in 2015 as a pilot study. The medical sciences RCs in Iran were considered as evaluation units. The inclusion criteria in the pilot study were having definite approval from the medical council of universities medical sciences, independent budget line from management and planning organization (MPO), and being among the top 10% RCs in their groups based on quantitative evaluation (Table 1). These centers provide the opportunity for reviewing the peer-based evaluation model in a pilot study due to the existence of enough research projects, papers and products.

Peer-based research evaluation is a qualitative method conducted according to experts' views in each field. In this way, a number of domestic and foreign experts along with the researchers of the centers (consisting of principal investigators of projects, corresponding authors of articles and so on) , by forming a panel, review the research documents, and visit the physical space, equipment and facilities in RCs based on existing indicators. At the end of the program, a descriptive report including strengths, weaknesses and suggestions are presented by peers.

In this article, we presented the whole stages from designing the research indicators, referees and RCs selection, implementing the pilot study and its results (Figure 1).

### First Stage: Program Leadership

At first, the scientific committee was established in the Ministry of Health and Medical Education (MOHME) to guide the program. Members of this committee include the research team, leading experts in evaluation systems and prominent referees in biomedical and clinical fields.

### Second Stage: Designing the Peer-Based Evaluation Indicators

All the available literature related to qualitative research evaluation systems in the world was reviewed. Then, 2 persons from the research team extracted the most important common indicators. During 5 sessions with the scientific committee, a list of objective-oriented evaluation indicators was designed in 4 axes, including "governance and leadership, structure, knowledge production and research impact."

### Third Stage: Scoring

Based on the value of axes, the weight of each axis was determined. The weights for governance, structure, knowledge production and research impact axes were 10%, 10%, 40%, and 40%, respectively. Also, a Likert scale from one (least) to 5 (greatest) was considered for each indicator. Moreover, at the end of each session, a descriptive form including strengths, weaknesses, and recommendations was completed by reviewers.

### Fourth Stage: Implementing the Pilot Study

Primitive evaluation model in the pilot study was presented to the scientific committee. All of the recommendations were gathered. Challenges and

**Table 1.** Types, Fields and Affiliated Universities of Evaluated Medical Sciences Research Centers in Iran

| Name of Field | Name of Research Center | Name of Affiliated UMS |
|---|---|---|
| Biomedical research centers | Drug Applied Research Center | Tabriz |
| | Shiraz Institute for Cancer Research | Shiraz |
| | Neuroscience Research Center | Kerman |
| | Genetics Research Center | University of Social Welfare and Rehabilitation Sciences |
| | Pharmaceutical Research Center | Mashhad |
| Clinical research centers | Endocrine Research Institute<br>Gastroenterology and Liver Diseases Research Institute | Shahid Beheshti |
| | Endocrinology and Metabolism Research Institute<br>Digestive Diseases Research Institute | Tehran |
| | Cardiovascular Research Center | Isfahan |

Abbreviation: UMS, Universities of Medical Sciences.

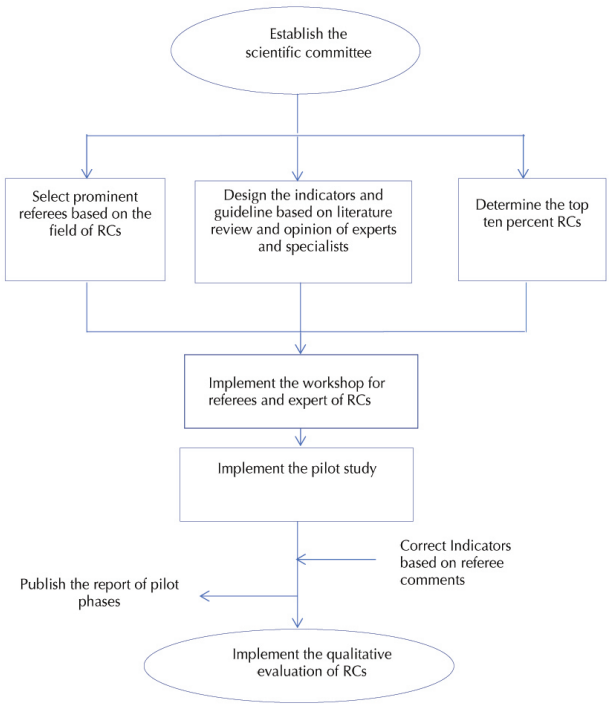


**Figure 1.** Flowchart of Qualitative Evaluation of Medical RCs in Iran.

facilities to implementation were investigated. The evaluation instruction was prepared and sent to all RCs. The qualitative evaluation model based on peer review was finalized. Also, top peer reviewers in each specific field were selected from inside and outside of Iran. For each RC, at least two national reviewers and one international reviewer were trained and participated. All research documents related to indices were evaluated for 5 years (2011–2015).

In this study, all ethical considerations have been considered.

## Results

In this section, at first, we present the finalized indicators of qualitative research evaluation based on peer review in Iranian RCs and then the pilot study results for top 10% RCs.

### Part One

The guideline of peer-based research evaluation model has 4 axes (Governance and Leadership, Structure, Research products, Research impact), 6 sub-axes (Strategic planning, National & International activities, Infra-structure, Efficiency, Knowledge production & dissemination, Technology), 13 major and 41 minor indicators (Tables 2–5).

### Part Two

The results of the pilot study on top 10% of RCs in Iran:

### Governance and leadership

This axis consists of 2 sub-axes:

a- Strategic planning: The majority of RCs did not have any documented strategic planning; in most of them, this program was not alive and active. The research line or map was not clear in some of the RCs. The interest of researchers, rather than planning, had a more decisive role. Research priorities in many centers were set, but the stakeholders' cooperation was not significant in this process. Most of them did not pay attention to the action plan for the ongoing program. In all of the RCs, at least 70% of research projects were approved based on priorities.

b- National and international cooperation: Regarding national cooperation, one of the most important problems is lack of synergy between similar RCs. Parallel activities, dispersion, and lack of identifying the components in research puzzle due to unclear research map in national level are the most important weaknesses in RCs. With regard to international cooperation, there is a wide range of not full cooperation. This activity is better in clinical types of RCs than biomedical. Grant capture in RCs with good communication was suitable.

### Structure

This axis consists of 2 sub-axes:

a- Infra-structure: In this sub-axis, five best selected research proposals by RC were presented to peer reviewers. All of the proposals were based on priorities and they had appropriate methodology but innovation and technical aspects were not very strong especially in the clinical field.

**Table 2.** Governance and Leadership Indicators in the Evaluation Model of Iranian Medical Sciences Research Centers

| Axis | Sub-axis | Indicators |
|---|---|---|
| **Governance and Leadership** | **Strategic planning** | • Research line & map<br>• Action plan for ongoing program<br>• Future plan for at least three next years<br>• Evaluation and revision of strategic planning<br>• Set the priorities<br>• Approve the research projects based on priorities (at least 70%)<br>• Publication the articles based on research projects (at least 70%) |
| | **National & International activities** | • National cooperation with domestic institutes<br>• International cooperation with foreign institutes |

**Table 3.** Structure Indicators in the Evaluation Model of Iranian Medical Sciences Research Centers

| Axis | Sub-axis | Indicators |
|---|---|---|
| Structure | ► **Infra-structure:**<br>• Quality of five approved research projects<br>• Future capacity building and projects<br>• Educational capacity in research line<br>• Biobank/registry | • Scientific or technical aspects of project<br>• Based on health priorities<br>• Innovation<br>• Appropriateness of methodology with objectives<br>• Other<br>• Set up new techniques<br>• Allocation of proper financial/human/physical resources<br>• Strengthening human capital<br>• Number of spinoff research centers<br>• Number of knowledge based company<br>• Number of biobank/registry |
| | ► **Efficiency:**<br>• Budget<br>• Human resource<br>• Physical resource/equipment | • Domestic grant capture (GO/Private/Donors)<br>• Grant capture from foreign institutes<br>• Number and expertise of human resource<br>• Physical resource<br>• Equipment<br>• Laboratories facilities |

**Table 4.** Knowledge Production Indicators in the Evaluation Model of Iranian Medical Sciences Research Centers.

| Axis | Sub-axis | Indicators |
|---|---|---|
| Research products | ► **Knowledge production & dissemination:**<br>• Quality of selected published articles | • Based on priorities and research line<br>• Average citation per article (self – citation: less than 20%)<br>• Impact factor of journal<br>• Innovation<br>• Effect on future scientific topic |
| | • Highly cited papers | • Highly cited paper / hot paper in ESI |
| | ► **Technology:**<br>• Technology products | • Foreign patents<br>• Technology production<br>• Technology localization |

**Table 5.** Research impact indicators in the evaluation model of Iranian medical sciences research centers.

| Axis | Sub-axis | Indicators |
|---|---|---|
| Research impact | ► **Research impact in following levels:**<br>• Community | • Health community<br>• Considerable scope |
| | • Service providers | • Guidelines<br>• Novel therapeutic approach |
| | • Policy makers | • National instructions<br>• Policy brief |

b- Efficiency: The launch of new techniques in RCs was well done but sharing the expensive novel equipment between RCs was not appropriate and each of them spent a great share of their budget on equipment installation. Physical space in some RCs was limited and the research activities of RCs and related faculties could not be differentiated. In fact, a number of RCs are the same research groups in university labeled with a new affiliation without any more activities. It is noticeable that almost none of the evaluated RCs had any budget problems. Setting up different bio-banks in most of biomedical RCs and system registries in especially clinical RCs were new actions of evaluated RCs. Training of human resource was done in many RCs, but manpower recruitment is still a problem in some of the RCs.

## Research Products

This axis consists of 2 sub-axes as follows:

a- Knowledge production & dissemination: Top 5 published articles were evaluated by reviewers. In this part, the number of published articles does not matter, but Scientometric indicators such as the number of citations, self-citations, hot papers, highly cited papers and journal impact factor had moderate importance. Innovation and effect on future scientific topics are the two most important indicators considered by the reviewers. In this study, the top papers and projects in the majority of RCs had appropriate quality, but the mean number of hot papers in RCs was not high enough. In some RCs, this number was suitable and in some cases, there were no hot papers.

a- Technology products: In the pharmaceutical field, the number of technology products such as new drugs, equipment, and vaccines were noticeable. Establishment of incubators and knowledge-based companies such as the number of national patents

was appropriate in the majority of RCs but foreign patents were not enough.

### Research Impact

One of the most important indicators to evaluate the quality of researches in RCs is assessing the research impact on health promotion.

This axis has 3 levels as follows:

a- Service users: Research activities in the majority of RCs had some impact on health promotion but in most cases, the extent of effects was local and only a few types of research had great impact on general population such as prevention of iodine deficiency.

a- Service providers: Novel therapeutic approaches or services had been developed in some of the RCs and applied by physicians or other health providers. The use of new technologies in the treatment of patients or manufacturing medical equipment has a major role in creating fundamental changes in this level. Using nanotechnology, biotechnology and other novel sciences are important in this field.

a- Policy makers: Evidence-based decision making is one of the most important missions of research in national level. Providing the circulars, regulations, and instructions based on research are clear examples of knowledge translation and exchange in this level. Clinical RCs are more active than biomedical.

## Discussion

In our study, research evaluation was done based on peer review. Peer review is a method to evaluate work which is employed to maintain standards of quality, performance improvement, and credibility enhancement.[10] Peer review requires a group of experts in a defined field, who are qualified and able to perform unbiased reasonably review. Although this review, especially in inter-disciplinary fields, may be difficult to do, and in some cases can be accompanied with bias,[13] expert-based evaluation is better than evaluation based on common indicators.[11] It seems that using the same impartial expert reviewers for the same field can partly solve this problem.

In Iran, the peer review evaluation model has 4 axes, namely Governance and leadership, Structure, Knowledge production and Research impact. Each axis is measured by several indicators. This method is almost similar to "Excellence in Research for Australia" model (ERA). In this model, research activities (research budget, number of students, number of academic members, etc), quality of research (number of publications, number of citations, etc) and applied research quality (patents, revenue from research , etc) are assessed.[12] In this method, research impact is not considered. Kuruvilla et al designed the research impact framework (RIF) in 2006 in London School of Hygiene and Tropical Medicine, after reviewing the literature. This framework has 4 domains, namely research-related impacts, policy impacts, service impacts and societal impacts. This model has some indicators such as article publication, evidence-based decision making, service providing and health literacy.[13] In fact, the Iranian peer review evaluation model is the combination of RIF and ERA alongside indigenous research indicators such as stewardship and so on.

Regarding the results of the pilot study, in the governance and leadership axis, the most important weaknesses in some RCs include failure to adhere to strategic plans, lack of synergy between similar RCs, unclear research map in national level and lack of identifying the components in research puzzle.

It is noteworthy that planning should become a normal part of managing daily organizational work from a strategic, integrated system prospective. After implementing the strategic planning, it is necessary for each organization to have annual strategic review (https://www.amazon.com/Thinking-Approach-Strategic-Planning). This plan is developed by running workshops in all RCs.[14]

In the structure axis, innovation and technical aspects defect is one of the weak points. It is noticeable that almost none of the evaluated RCs had any budget problems. It seems that technical training, powerful manpower recruitment and parallel actions reduction are more necessary than budget allocation.

Regarding the research product axis, the number of published articles was favorable, but the mean number of hot papers was not enough. According to Scimago country rank report, in 2016, Iran had the highest number of research documents, citations and self-citations in the Eastern Mediterranean region (http://www.scimagojr.com/countryrank.php).

The status of research impact in top RCs was not suitable. There were several problems in knowledge translation & exchange (KTE) in service providers and policy makers' levels.

In 2016, Pettman et al determined the activities related to implementing of KTE. They include knowledge brokering, networking, proportional communication, training, and needs assessments.[15] Obviously, proper implementation of these elements in research process can improve the health research impact.

In our study, some strengths in RCs based on peer review include adequate equipment and laboratory instruments, high quality research publication and national or international cooperation.

It seems that establishment of annual health research system evaluation in Iran has been very useful for knowledge production.[7]

In conclusion, a peer-based research evaluation model is an appropriate tool for qualitative assessment of research output, outcome and impact. This method can measure the achievement of goals in RCs.

**Conflict of Interest Disclosures**
The authors have no conflicts of interest.

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