



## **Developing Appropriate Indications for Prescriptions of Brain MRI using RAND Appropriateness Method**

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### **ABSTRACT**

**Background:** Evidence Based Medicine can be define as the process of systematically finding, critically appraising, and using recently published researches as a basis for making decisions regarding individual patients. One of the most prevalent MRI procedures is Brian MRI. This study aimed to identifying and developing appropriate indications for prescriptions of Brain MRI in Iran.

**Methods:** This is a consensus based study using one of the practical methods, RAND Appropriateness Method. The study sample was among experts in the treatment and diagnostic field of brain disorders. The experts consisted of nine specialists: Four neurosurgeons and five neurologists, all of whom were faculty members and worked in educational hospitals. The list of indications and scenarios sent to 9 experts for scoring. They scored the scenarios according to RAM (Rand Appropriateness Method) instruction.

**Results:** A total of 104 indications and scenarios were extracted. After that, Finally 80 scenarios fall in the category of appropriate scenarios, 20 in uncertain and 4 in the category of inappropriate scenarios.

**Conclusion:** Currently a huge number of medical imaging prescriptions may be unnecessary in Iran and there is need for developing clinical practice guidelines. The findings of this study can be used for developing national guidelines, conducting research to assess whether the criteria are followed in practice and whether their application can curb the growing rate of unnecessary care in all countries. In Iran, a limited amount of resources are allocated to the health sector.

**Key words:** Developing, Clinical Practice Guidelines, MRI, Brain

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## Introduction

Evidence Based Medicine can be define as the process of systematically finding, critically appraising, and using recently published research as a basis for making decisions regarding individual patients (1). Clinical Practice Guidelines are alliance with Evidence Based Medicine. Clinical practice guidelines are “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical Circumstances.”. Compliance with guidelines leads to improve both the quality and process of care and patient outcomes. When physicians order inappropriate medical imaging procedures, it may result in serious problems in terms of both healthcare economy and quality (2). Some published research in Iran show that a large proportion of medical prescriptions are inappropriate and may be not according to Clinical Guidelines (3-5).

This is the first study conducted in Iran that used RAND Appropriateness Method to develop indications of Brain MRI. The RAND appropriateness method is very useful in identifying the opinion of stakeholders in systems with limited resources.

In developed countries, developing evidence-based clinical guidelines have been helpful, but in middle and low income countries there are some limitations about developing clinical guidelines. In order to overcome these limitations, adaptation of available clinical guidelines has been recommended MRI is expensive medical equipment and Iran spend a significant financial resources for import it. One of the most prevalent MRI procedures is Brian MRI. It is assumed that many of Iranian physicians diagnostic prescriptions are not according to the indications (3,4). Indeed, Iran health care system need to applying clinical indications that are based on evidence and also match with own economical and social background. This study aimed to identifying and developing appropriate indications for prescriptions of Brain MRI in Iran using RAND Appropriateness Method.

## Material and Methods

RAND Appropriateness Method (RAM) was selected for the present study since it allows the development of the appropriateness criteria based on the available evidence which is supplemented by the expert panels' opinion. It should be noted that such methods are useful when there are disagreements or variation in practice and reliable evidence is limited. In these circumstances, formal consensus methods are valuable and their use is inevitable.

This method was designed in the 1980s by the RAND institute and the University of California in Los Angeles (UCLA) and has been used in many studies in North America and Europe. RAM involves generating clinical scenarios or criteria. RAM has been used in many studies (6, 7) especially for development of the appropriateness criteria in surgical care as well as investigative procedures (6, 8). The present study was conducted in Tehran in 2014.

### Identifying Indications

The study started by searching for available evidences. In the process of the literature review for extracting indications, the focus was on clinical practice guidelines and evidence reviews. Following databases were searched in the period of 2000-2016. Medline, Embase, Google scholar. The keywords were “Brain MRI indications”, “Brain MRI guidelines”, “Head MRI indications, “Head imagings”.In this way,5 relevant documents were identified (9-13). Then, we reviewed and verified the identified documents and selected a guideline and evidence reviews which provided a relatively comprehensive coverage of the issues related to MRI for Brain. Authors used the Persian translation of the AGREE (Appraisal of Guidelines for Research and Evaluation) tool (14) in order to assess the guidelines and finally selected one of them from which the indications were extracted.

### Experts

The experts consisted of nine specialists: Four neurosurgeons and five neurologists, all of whom were faculty members and worked in educational



hospitals. Before the process of consensus making, we talked to all the experts and described the objectives of the study as well as the process of consensus making. If they agreed, we invited them to participate in the study.

**Consensus Making**

The process of consensus making among the nine specialists was implemented in two rounds, in Tehran. In the first round, we sent the first form (including the list of scenarios, summaries of the clinical guidelines and the scoring system) to each expert. We asked them to select the best score for each scenario based on their professional judgment and summary of evidence. The scores ranged from one (absolutely inappropriate) to nine (absolutely appropriate). Then, they sent the scored scenarios back to us. We entered all the specialists’ scores to the second form and prepared it for the second round of consensus development. The second forms provided an opportunity for each member to be informed about the other members’ scores anonymously. In the second round, we asked them about each indication and if necessary, changed their first round scores. Then, the new

indications presented by the specialists were collected and discussed.

**Statistical Analysis**

Median scores were used to judge the appropriateness of the scenarios. The scores were categorized into three groups: appropriate (score = 7 - 9), uncertain (score = 4 - 6), and inappropriate (score = 1 - 3). Of course, in order to reach agreement, another condition had to be met: if minimum and maximum scores are ignored, all the other scores must fall in the same scoring group.

**Results**

A total of 104 indications and scenarios were extracted. After that, the list of indications and scenarios sent to 9 experts for scoring. They scored the scenarios according to RAM instruction. Finally 80 scenarios fall in the category of appropriate scenarios, 20 in uncertain and 4 in the category of inappropriate scenarios. Table 1 shows some of indications and scenarios by appropriateness status.

**Table 1.** The result of appropriateness status of indications after consensus among experts

Number	Indication /Scenario	Appropriate indications	Uncertain indications	Inappropriate indications
1	Abnormalities detected on other imaging studies which require additional clarification to direct treatment.	✓		
2	Arnold chiari I and II malformations.	✓		
3	cerebral palsy .		✓	
4	CNS Finding/Deficit - New Onset Or Progressive Neurological Abnormalities			
1.4	Anosmia (loss or impairment in sense of smell)		✓	
2.4	Ataxia (inability to coordinate voluntary muscular movements)	✓		
3.4	Bell’s Palsy		✓	
4.4	Dysgeusia (dysfunction in sense of taste)		✓	
5.4	Facial Numbness	✓		
6.4	Gait Disorder	✓		
7.4	Other Movement Disorders	✓		
8.4	Nystagmus (rapid, involuntary, oscillating ocular movements)		✓	
9.4	Paresis or Paralysis	✓		
10.4	Tinnitus (ringing or roaring auditory sensation; may be		✓	



Number	Indication /Scenario	Appropriate indications	Uncertain indications	Inappropriate indications
	unilateral or bilateral; either pulsatile or non-pulsatile)			
11.4	Any other cranial nerve impairment	✓		
5	Cerebrovascular Accident (Cva Or Stroke) And Transient Ischemic Attack (TIA)			
1.5	sudden onset of weakness,	✓		
2.5	Focal sensory loss	✓		
3.5	speech disorder	✓		
6	Congenital Anomaly			
1.6	Chiari Malformations	✓		
2.6	Dandy-Walker Spectrum	✓		
3.6	Encephalocele	✓		
4.6	Holoprosencephaly	✓		
5.6	Macrocephaly	✓		
7.6	Microcephaly	✓		
8.6	Schizencephaly	✓		
9.6	Septo-optic Dysplasia	✓		
7	Dementia		✓	
1.7	Initial evaluation		✓	
2.7	Rapid progression	✓		
8	Developmental Delay			
1.8	MRI is the preferred imaging modality over CT, in developmental delay	✓		
2.8	The likelihood of making a specific neuroimaging diagnosis increases in the presence of physical exam abnormalities such as focal motor findings or microcephaly	✓		
9	Encephalopathy.	✓		
10	Headache In Adult - When Any One Of The Following Criteria Are Met			
1.10	Sudden onset and severe, including thunderclap or worst headache of life		✓	
2.10	Increased frequency and severity	✓		
3.10	With new focal neurologic signs, particularly papilledema, visual field defects and nuchal rigidity		✓	
4.10	New-onset headaches after age 50 years; age is not an absolute requirement	✓		
5.10	New-onset headaches in cancer or immune deficient patient	✓		
6.10	With mental status changes	✓		
7.10	With fever, nuchal rigidity and other meningeal signs		✓	
8.10	With nausea and vomiting	✓		
9.10	With exertion		✓	
11.10	Frequently awakened from sleep		✓	

A: Appropriate  
 U: Uncertain I: Inappropriate

**Discussion**

Evidence-based medicine in the country is faced with many problems. As mentioned in the

introduction, a considerable amount of medical imaging prescriptions are unnecessary. Iran's Ministry of Health to solve such problems is to



formulate guidelines for some of medical procedures in recent years. But there is no a national clinical practice guideline for MRI in the country. Previous studies also have taken steps in this direction and the results achieved.

The study authors believe that the results of this study can be used at the national level (4, 15-17).

Our results will help decision makers in identifying appropriate procedures and focusing their efforts on decreasing unnecessary focusing their efforts on decreasing unnecessary care.

Since MRI is an expensive method of medical diagnosis, doctors have to prescribe it after the easier ways of diagnosis. MRI is a very expensive diagnostic procedure and imposes huge financial and emotional burden on both the society and patients. These unnecessary healthcare procedures could impose high intangible costs on the patients such as wasting time, energy, and money. Therefore, physicians should prescribe them only when necessary. Moreover, making clinical guidelines practical can lead to the improvement of quality of care in the healthcare system.

### Conclusion

The findings of this study can be used for developing national guidelines, conducting research to assess whether the criteria are followed in practice and whether their application can curb

the growing rate of unnecessary care in all countries. In Iran, a limited amount of resources are allocated to the health sector.

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### Conflicts of interest

There is no any conflict of interest in this research.

### Authors' contributions

Salari H, Esfandiari A, Akbarisari A, Farzaneganand Gh, Ravanbod M, designed research; Salari H, Esfandiariand A, Farzanegan Gh analyzed data; and H. Salari, A. Esfandiari, A. Akbarisari and MR. Ravanbod wrote the paper. Salari H had primary responsibility for final content. All authors read and approved the final manuscript.

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