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Study on the prevalence of irrational utilization of medical diagnostic imaging services in various countries globally and in Iran.

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Abstract

Introduction: In recent years, an increase in the need for health services has been seen due to factors such as advancements in medical technology, an aging population, and it is predicted that this pattern will continue to grow. Diagnostic services play a crucial role in healthcare, contribute significantly to total healthcare costs, and are influenced by induced demand. Hence, it is crucial to examine the usage patterns of these services.

Goal: To investigate the level of inappropriate utilization of medical diagnostic imaging services in various countries globally.

Research Method: This research is focused on comparing different countries, including Iran, to evaluate the extent of unnecessary utilization of medical imaging services utilizing systematic review and meta-analysis techniques.

Findings: Results show that the percentage of unnecessary prescriptions for medical imaging services ranges from 1% to 97.5% in various countries. In Iran, unnecessary prescriptions for medical imaging services vary from 21% to 76% fluctuates. Legal issues, conflicts of interest, governance challenges, policy-making, financial incentives, service delivery structures, health culture, education and retraining systems, funding and purchasing services, political factors, and insurance system weaknesses are among the key factors that impact unnecessary prescriptions and imaging service utilization. There are three main categories of control interventions: policy interventions, monitoring and evaluation, and education.

Conclusion: The inappropriate use of health services, including in Iran, is a serious and significant challenge. Even in countries with highly regulated healthcare systems, approximately one-quarter of medical imaging services are unnecessary. Various factors contribute to this issue, the most important of which include out-of-pocket payments covered by insurance plans, legal concerns and defensive medicine, and filling knowledge gaps.

Keywords: Medical Imaging; Irrational Use; Various Countries; Iran.

Introduction:

In recent years, with the advancement of new diagnostic and treatment methods and a growing elderly population, there has been a rise in the need for health services, a trend predicted to continue (Okunade et al., 2004). In Iran, this rule also applies. Similar to other nations, Iran has experienced a substantial rise in healthcare expenses within its healthcare system. In 2004, approximately four percent of the nation's GDP (gross domestic product)was dedicated to healthcare, whereas this percentage rose to about seven percent in 2012. Furthermore, the per capita health spending increased by nearly four times, reaching around $490 in 2012 compared to $116 in 2004 (Mehrara et al., 2012; Mehrdad, 2009).

The increase in healthcare spending has exceeded the growth rate of the country's economy, posing financial challenges for the healthcare industry (Mehrara et al., 2012). The increase in healthcare spending has led policymakers and health planners to study the factors influencing healthcare expenses and assess the impact of each factor (Cromwell & Mitchell, 1986; Mehrdad, 2009).

In the majority of countries globally, for the last five decades, the increasing healthcare expenses have been a significant worry for health policymakers. This has led to many difficulties being encountered by different aspects of the healthcare system. Hence, it is crucial for health policymakers and planners to grasp the factors affecting healthcare costs, whether existing within the healthcare system (service supply) or beyond it (service demand). Recognizing these factors can aid in controlling and decreasing the rise in expenses. Consequently, the results of these studies offer important insights for policymakers, allowing them to make well-informed choices to effectively enhance public health and optimize resource allocation (Lopez-Casasnovas & Saez, 2007; Reich et al., 2012).

The growing spread of paraclinical services, specifically MRI and CT scans, throughout the nation, in addition to increased availability for doctors, insured people, and the competitive medical care market, has resulted in higher diagnostic service expenses. Currently, doctors utilize state-of-the-art medical equipment to increase the confidence of their diagnoses and ultimately enhance the level of care given to patients, alongside traditional clinical and physical evaluations (Nasri et al., 2015).

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Currently, there is a notable rise in the utilization of expensive diagnostic procedures that involve cutting-edge technology, with indications of incorrect usage, prompting worries about the cost-effectiveness of diagnostic spending (Sodickson et al., 2009). Conversely, there is a growing presence of diagnostic services in the healthcare sector, leading some policymakers and health system managers to prioritize improving the implementation of these services (Lee et al., 2007; Mitchell, 2007).

One of the key factors driving the increased need for modern diagnostic services is likely the enhancement of the diagnostic procedure and the decrease in associated uncertainties. Nevertheless, this theory is not applicable across the board, especially in high-income nations (Eddy et al., 2013). Hendee et al. (2010) have noted a clear connection between the number of imaging units available and how often they are used. Even though better availability and utilization of diagnostic services can be advantageous for patients, the unregulated and endless implementation of new technologies may result in higher demand and improper utilization of specific services, particularly in low- and middle-income nations lacking well-established health technology assessment systems (Garber, 1994).

There is no proof that these new technologies are better than previous ones and they do not enhance patient outcomes according to Akbari Sari et al. (2012). Additionally, overutilization of medical imaging services may not lead to improved health outcomes for patients. There is overwhelming evidence indicating that a considerable amount of healthcare services offered could be deemed as inappropriate or unnecessary. The percentage of inappropriate services offered can vary from 15% to 50%, depending on the country being examined (Borowitz & Sheldon, 1993; Brenner & Hall, 2007; Picano, 2004). The report mentioned that 35% of MRI services in the United States in 2011 were considered inappropriate (Flynn et al., 2011).

Several reasons play a role in the improper utilization of costly diagnostic services. One example is the notable rise in recently opened imaging centers, which offer strong financial opportunities and potential profit, resulting in induced demand. Furthermore, the need for a reevaluation of current practices is highlighted by the direct promotion of services to patients by these centers, as well as marketing strategies that do not adhere to healthcare marketing principles (Hyder et al., 2010). Moreover, the significant reimbursement provided by supplementary insurance has greatly influenced the proliferation of unnecessary services (Sorenson et al., 2008).

The progress of health technologies is moving quickly. Worldwide, information is continuously growing, with significant funds being allocated to progress in the field of medical research. The public and healthcare providers are eager to use the newest technologies, while the increasing specialization in medical education and services, along with the rising number of graduates in specialized fields, is also driving the demand for technology utilization, leading to potential misuse in some cases (Duthie & Bond).

Various health systems have created different techniques, instruments, and accreditation measures to evaluate the correct utilization of expensive diagnostic and therapeutic treatments (Keshtkaran et al., 2012; Estavar et al., 2010). The utilization of criteria and decision-making guidelines to aid doctors in determining patients with significant clinical injuries and recommending MRI and CT scans not only decreases costs and the quantity of imaging procedures conducted but also helps in reducing overcrowding in radiology and emergency departments (Shoar & Saadat, 2011).

Hence, policymakers and planners are exploring the factors affecting healthcare costs and analyzing the effects of each factor due to the increasing expenses in the healthcare system. Recognizing the factors that impact healthcare costs can help in establishing effective policies to regulate and handle healthcare expenses (Mehrdad, 2009). Examining and comprehending the usage patterns of diagnostic technologies is essential for healthcare planning systems, particularly in countries with lower incomes. The majority of research studies have concentrated on the usage trends and amounts of imaging diagnostics, with less attention given to utilization patterns (Deyo & colleagues, 2006). Experts stress that utilizing costly machinery for healthcare provision, especially in relation to diagnostic technologies, is not optimal. There is a debate surrounding the range and level of inappropriate utilization of these technologies.

In any event, this problem has persisted in the healthcare system and requires thorough investigation to pinpoint causes and recommend effective solutions. Thus, the objective of this research was to analyze why medical diagnostic imaging services are being irrationally utilized in different countries globally and in Iran specifically.

Methodology:

A systematic review method was used in this research to collect documents and scientific evidence on unnecessary imaging service

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prescriptions at national and international levels. In order to achieve this goal, searches were conducted in both international databases (Elsevier, PubMed, Scopus, and Web of Science) and national databases (SID, MagIran, and IranMedex). Moreover, the search was expanded to include the Google Scholar database in order to improve the thoroughness of the study.

This research is centered on the suitability of medical imaging requests, like x-rays, MRIs, and CT scans, and involved searching international databases using different keyword combinations such as Diagnostic imaging/Radiology, Medical Imaging, CT-scan, MRI, Rational consumption, appropriateness, Imaging, Health service misuse/Medical overuse, and Services Utilization. The Persian counterparts of these keywords were used to search through national databases. The search period ranged from 1990 to November 2021. The search method used is outlined in Box 1.

Findings and Results:

Every single one of the 22 studies that were reviewed showed that a notable portion of recommended imaging services were considered unnecessary, with different percentages of unnecessary imaging services reported (from 1% to 97.5% in various countries). In Shiraz, our country has seen unnecessary services ranging from 21% to 76% in different studies. Various factors have been linked to the high rate of unnecessary imaging services.

In a nationwide study, Ramandi et al. (2021) analyzed 119,716 cases and discovered that the provinces of Qom and Lorestan had the highest usage of imaging services due to the presence of supplementary insurance. Jamy et al. (2014) also highlighted the connection between additional insurance coverage and increased rates of imaging services. These researchers claimed that having additional insurance could potentially raise the use of imaging services by as much as 20%.

Kavousi and colleagues also observed the high frequency of referrals and the need to see multiple doctors for comparable services. Abedini and colleagues (2018) emphasized the limited regulatory authority of insurance companies. This problem has led to about 24% of imaging services not having indications according to Sadegh et al. in 2015. There is a significant issue with the lack of a comprehensive approach based on evidence for using imaging services. For example, Palash and colleagues (2010) found that a lack of suitable policy viewpoints and inconsistent management were two key elements leading to the lack of essential regulations for the use of imaging services.

According to the studies examined, neurosurgeons (25%-55%) and orthopedic specialists (11%) had the highest rates of imaging service prescriptions from the providers' point of view. On the other hand, research carried out in different nations has shown that 2% to 80% of recommended imaging procedures are considered unnecessary, with a mean of 25%. Simultaneously, it has been stressed that this problem will worsen with the increasing age of the population.

Educating physicians and consistently monitoring their prescription habits is a crucial suggested approach to improve the suitability of imaging services. It is advised to concentrate on family doctors and orthopedic experts. Furthermore, the topic of financial sanctions has also been brought up .According to the talks held up to now, in different countries worldwide, the percentage of prescribed medical imaging services considered inappropriate ranges from 1% to 97%. Studies conducted in Iran suggest that a significant percentage, ranging from 21% to 76%, of medical imaging services are deemed inappropriate.

Key factors contributing to the inappropriate utilization of medical imaging services involve extensive insurance coverage, easy access to imaging services, lack of policy development at a broad level, failure to use health technology assessment findings for implementing new technologies, absence of cost systems in healthcare facilities, deficiencies in diagnostic service tariffs, lack of valid indications, absence of medical guidelines, and managerial instability within the healthcare system.

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