



# Medical Overuse in the Iranian Healthcare System: A Systematic Scoping Review and Practical Recommendations for Decreasing Medical Overuse During Unexpected COVID-19 Pandemic Opportunity

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**Purpose:** To perform an inclusive search for original studies that report medical overuse in the Iranian healthcare system and discovering the area of overuse.

**Patients and Methods:** A systematic search of the literature is conducted in bibliographic databases including PubMed, Embase, Scopus, Web of Sciences, Cochrane and Scientific Information Database using a comprehensive search strategy without time limit until the end of 2018, updated by 1 July 2020, accomplished by reference tracking, author contacting and expert consultation to identify studies on the overuse of medical care.

**Results:** We reviewed 4124 published articles based on predetermined inclusion criteria. The author's consensus included a total of 41 articles. Of these, 32 were in English and 9 in Farsi, published between 1975–2019. The result categorized into two distinct clinical areas: treatment (18 articles) and diagnostic (23 articles) services. Almost all of the studies only described the magnitude of unnecessary overuse. Unnecessary overuse of antibiotics, MRI, and CT-scan were the most reported topics. The ranges of their overuse proportion were as follows: antibiotic (31 to 97%); MRI (33 to 88%), and CT-scan (19 to 50%).

**Conclusion:** Our review showed, even so, the magnitude of unnecessary overuse of medical services is high but there are only a few interventional studies in clinical and administrative level for finding effective methods for decreasing these unnecessary services. Researchers should be encouraged to conducting interventional studies. We suggest the ministry of health to use the golden opportunity of COVID-19 epidemic for designing Iran national policy and action plan for controlling and preventing unnecessary healthcare services and including a section for “Interventional Research” in the action plan.

**Keywords:** medical overuse, healthcare system, COVID-19, Iran

## Introduction

Medical overuse means services that are more harmful than beneficial, does not seem to increase the quality and quantity of life, impose excessive cost on the patients and their healthcare system, has low quality and if the patient has enough information, he or she will not ask for it.<sup>1,2</sup>

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Overuse can take place in different areas including medication, test, or procedure.<sup>3</sup> Recent studies have shown that overuse of tests and treatments can lead to serious consequences on patients in six domains including physical, psychological, social, financial, treatment burden, and dissatisfaction with healthcare.<sup>4</sup> Medical overuse can delay access to the goals of health systems-improved health, responsiveness, financial risk protection, and efficiency-by increasing cost and decreasing the quality of medical care.<sup>5</sup>

Given the fact that medical overuse is one of the problems that can make system performances problematic, its identification is of great importance for a health system.<sup>6</sup> Also, overuse in medical care is one of the obstacles to achieving universal health coverage (UHC).<sup>7</sup> If we want to achieve better UHC, we need to be able to manage costs, and one of the most important tasks in this direction is to reduce overuse in medical services.<sup>8,9</sup>

Over the years, many efforts have been made to identify overuse in medical care across health systems around the world.<sup>10,11</sup> In Iran, as in many other countries, there is little evidence about the amount of medical overuse in the healthcare system.<sup>1</sup> So, the identification of medical overuse is an essential issue for the Iranian healthcare system and also helps health policymakers, health and medical managers, researchers, general practitioners, patients, and their families to cope with harms, costs, and quality of services. Ultimately, identifying the overuse of medical care can bring our health system to balance in the right use of services. Thus, the objectives of this systematic scoping review were 1) to review the literature on the overuse of medical care, (2) to identify the areas in which the overuse of medical care take placed (3) to determine the rate of overuse of medical care in the Iranian healthcare system and its drivers and (4) to identify the interventional studies in clinical and administrative level for decreasing the rate of overuse.

## Materials and Methods

We conducted a systematic scoping review on medical overuse following the PRISMA-ScR checklist ([supplementary material](#)) and the five stages outlined in the Arksey and O'Malley framework.<sup>12</sup> The review protocol was registered in PROSPERO before starting our study (registration no. CRD42017075481) and published in BMJ Open journal.<sup>1</sup>

## Stage 1: Identifying Research Questions

The following questions guided this scoping review of medical overuse in the Iranian healthcare system: How much literatures have dealt with this issue in the Iranian healthcare system? Which area does medical overuse occur? What is the rate of medical overuse in the Iranian healthcare system?

## Stage 2: Identifying Relevant Studies

All original articles that investigated the overuse in medical care were included in the study. Of these, only studies were included those have addressed overuse in the Iranian healthcare system. All the included studies were limited in English and Farsi languages. Articles were excluded if the researchers did not have access to the Full-text.

We searched six databases including PubMed, Web of Science, Embase, Scopus, Cochrane and Scientific Information Database (SID) without a time limit until the end of 2018 (31 December 2018). We also contacted the authors of included studies and use reference tracks to get the articles we probably did not find in the search. We used a set of Medical Subject Headings (MeSH) terms and free terms to maximize the sensitivity of the search. For more information on search strategy, see study protocol at: <https://bmjopen.bmj.com/content/8/4/e020355#ref-17>.<sup>1</sup>

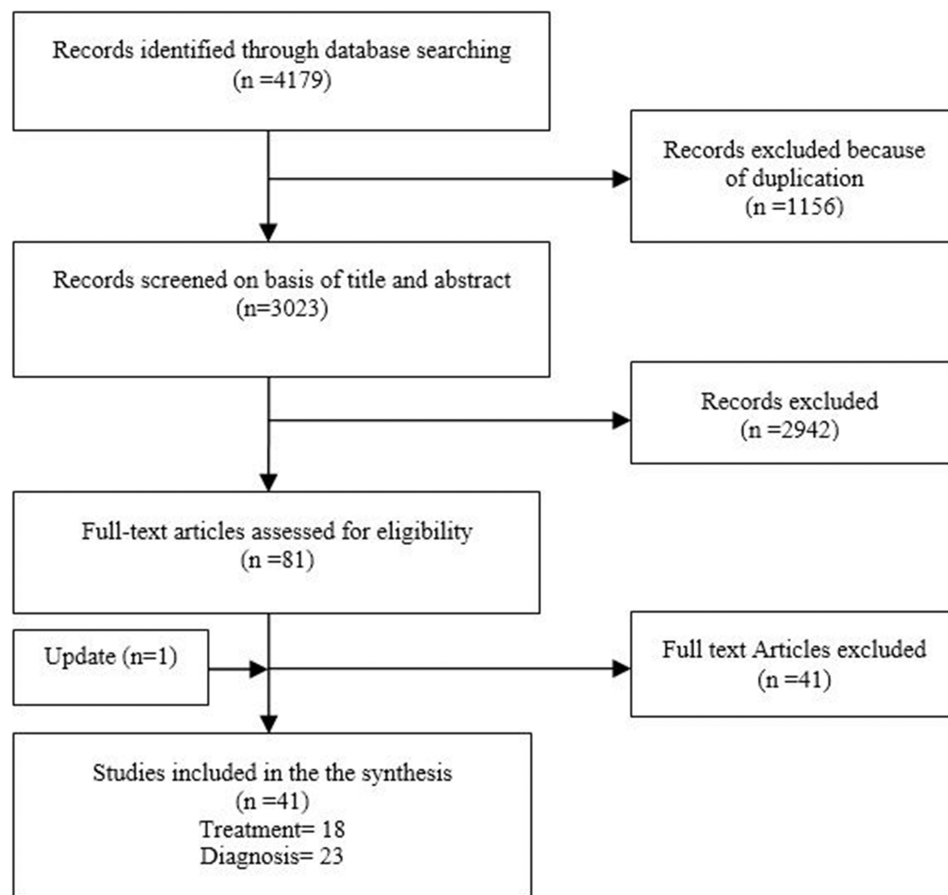
After the article was finished and before the article was published, we searched the PubMed database again and updated our results until July 1, 2020. Details about search strategy are provided in the [supplementary material](#).

## Stages 3 and 4: Study Selection and Data Charting Process

After the search was completed, duplicate records were removed. Then, two reviewers screened the records based on the title, abstract and full text, and extracted the data about authors, publication year, type of study, study population, type of service, clinical area, and overuse rate or range. All potential disagreements in each level of study were resolved by consensus with a third researcher.

## Stage 5: Summarizing Results

We categorized the results of the included studies based on publication year, clinical area, type of service (treatment and diagnostic area), and range or rate of overuse.



**Figure 1** Study flow diagram.

## Results

Initially, a total of 4179 records were screened. After removing duplicates, 3023 records were considered for eligibility. Of these, 41 studies were included. The study selection process is outlined in the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) diagram (Figure 1).

Most studies were published in English (78.04%). Included studies published between 1975 and 2019. Most studies were published in 2014 (25%), 2012 (15%) and 2011 (12.5%). Also, in terms of design, 38 were cross-sectional, and three RCT studies. The summary characteristics of the included studies are shown in Table 1.

The result categorized into two distinct clinical areas: treatment (18 articles), and diagnostic (23 articles) area. Unnecessary overuse of Antibiotics, MRI, and CT-scan were the most reported topics. The ranges of their overuse proportion were as follows; Antibiotic (31 to 97%); MRI (33 to 88%), and CT-scan (19 to 50%). Among the studies in the area of treatment, the most studied were antibiotics

(7 studies, 38.8%), and three studies (16.6%) did not compare the results with any other standard. Also, among the studies in the area of diagnosis, the most studied were related to MRI (4 studies, 17.3%), and CT (4 studies, 17.3%), and three studies (13%) did not compare the results with any other standard. For more details see Tables 2 and 3.

## Discussion

This systematic scoping review aimed to perform an inclusive search for original studies that report medical overuse in the Iranian healthcare system. Finally, 41 original studies were included in our study, of which 18 articles related to the treatment area and 23 articles related to the diagnostic area. Antibiotics and MRI were the most reported issues in each category where overuse has been reported.

Tables 2 and 3 shows the majority of studies only have focused on the magnitude of unnecessary diagnostic and treatment services. There are only a few interventional

**Table 1** The Summary Characteristics of the Included Studies

Authors	Year	Language	Study Design	Sample Size
Ahmadi et al <sup>13</sup>	2006	Fa	Cross-Sectional	400
Ahmadizar et al <sup>14</sup>	2011	En	Cross-Sectional	4,456,755
Amidi et al <sup>15</sup>	1975	En	Cross-Sectional	40
Alavi et al <sup>16</sup>	2014	En	Cross-Sectional	410
Alavi et al <sup>17</sup>	2014	En	Cross-Sectional	8586
Azami et al <sup>18</sup>	2006	Fa	Cross-Sectional	150
Ahmadi et al <sup>19</sup>	2014	En	Cross-Sectional	1309
Alizadeh et al <sup>20</sup>	2012	En	RCT	200
Bijani et al <sup>21</sup>	2014	En	Cross-Sectional	1543
Hatam et al <sup>22</sup>	2011	En	Cross-Sectional	1000
Khakhshour et al <sup>23</sup>	2011	Fa	Cross-Sectional	292
Refahi et al <sup>24</sup>	2016	En	Cross-Sectional	115
Sobhani et al <sup>25</sup>	2001	Fa	Cross-Sectional	4750
Saadat et al <sup>26</sup>	2008	En	Cross-Sectional	1650
Sadeghi et al <sup>27</sup>	2015	Fa	Cross-Sectional	2105
Taghizadeh et al <sup>28</sup>	2013	En	Cross-Sectional	234
Zargar et al <sup>29</sup>	2014	En	Cross-Sectional	400
Vessal et al <sup>30</sup>	2011	En	Cross-Sectional	155
Bakhit et al <sup>31</sup>	2014	En	Cross-Sectional	270
Bayani et al <sup>32</sup>	2014	Fa	Cross-Sectional	400
Bilehjani et al <sup>33</sup>	2017	En	Cross-Sectional	620
Davoodian et al <sup>34</sup>	2012	En	Cross-Sectional	206
Eini et al <sup>35</sup>	2012	Fa	Cross-Sectional	100
Fard et al <sup>36</sup>	2001	En	Cross-Sectional	279
Forouzanfar et al <sup>37</sup>	2014	En	Cross-Sectional	2607
Ghadimi et al <sup>38</sup>	2011	En	Cross-Sectional	2041
Ghaffarpasand et al <sup>39</sup>	2011	En	Cross-Sectional	1679
Ghazizadeh et al <sup>40</sup>	2009	En	RCT	60
Jame et al <sup>41</sup>	2014	En	Cross-Sectional	400
Moussavi et al <sup>42</sup>	2015	En	RCT	100
Khaji et al <sup>43</sup>	2006	En	Cross-Sectional	1209
Meidani et al <sup>44</sup>	2017	Fa	Cross-Sectional	361
Meidani et al <sup>45</sup>	2016	En	Cross-Sectional	384
Memari et al <sup>46</sup>	2012	En	Cross-Sectional	345
Moghimi et al <sup>47</sup>	2008	Fa	Cross-Sectional	1220
Mohammadi et al <sup>48</sup>	2016	En	Cross-Sectional	279
Mokhtari et al <sup>49</sup>	2014	En	Cross-Sectional	1219
Nikbakhsh et al <sup>50</sup>	2010	En	Cross-Sectional	498
Raji et al <sup>51</sup>	2018	En	Cross-Sectional	112
Paydar et al <sup>52</sup>	2012	En	Cross-Sectional	5091
Saboor et al <sup>53</sup>	2019	EN	cross-sectional	1591

studies regarding diagnostic and treatment services. Also, there is not any study regarding unnecessary clinical preventive services like unnecessary check-ups and also unnecessary public health services. Unfortunately, as the Tables show there is not any study at the regional or national level that clarifies the drivers of unnecessary services in Iran and how to address them. To address the shortage of study regarding the interventions for

decreasing the overuse rate in Iran we already conducted qualitative research at the national level to clarify the drivers of overuse and strategies for controlling these drivers in Iran. In this qualitative study, we interviewed 21 well respected old hand policymakers and researchers of Iran. After analyzing the interview, our study showed that the main drivers of unnecessary overuse in the Iranian healthcare system are physician, patient, organizational,

**Table 2** The Characteristics of Included Studies in Treatment Area

Authors	Clinical Domain	Subject	The Ranges of Overuse Proportion (%)	Standard
Amidi et al <sup>15</sup>	Treatment	Antibiotic	92.5	Clinical guideline
Khakhshour et al <sup>23</sup>	Treatment	Antibiotic	70	Clinical guideline
Alavi et al <sup>16</sup>	Treatment	Antibiotic	41.4	Clinical guideline
Vessal et al <sup>30</sup>	Treatment	Antibiotic	31.6	American Society of Hospital Pharmacists (ASHP) guidelines
Hatam et al <sup>22</sup>	Treatment	Antibiotic	98	ASHP
Alavi et al <sup>17</sup>	Treatment	Antibiotic	44	Mangram's guideline
Taghizadeh et al <sup>28</sup>	Treatment	Antibiotic	61	NR
Ahmadizar et al <sup>14</sup>	Treatment	Drug-Drug Interaction	0.77	National guideline
Bijani et al <sup>21</sup>	Treatment	Polypharmacy	16.5–35.1	National guideline
Sobhani et al <sup>25</sup>	Treatment	Polypharmacy	88	NR
Ahmadi et al <sup>13</sup>	Treatment	Polypharmacy	39.6	National guideline
Azami et al <sup>18</sup>	Treatment	Blood transfusion	26.8	Scientific criteria
Ahmadi et al <sup>19</sup>	Treatment	Intravenous Acetaminophen	NR	NR
Alizadeh et al <sup>20</sup>	Treatment	Heparin	NR	Heparinization protocol
Ghadimi et al <sup>38</sup>	Treatment	Prescribing pattern	30	Beers criteria and WHO indicators
Ghazizadeh et al <sup>40</sup>	Treatment	GnRH antagonist	NR	Study protocol
Memari et al <sup>46</sup>	Treatment	Psychotropic medication	80	DSM-IV-TR criteria
Saboor et al <sup>53</sup>	Treatment	Inappropriate medication	26	Beers' criteria 2012

**Abbreviation:** NR, not reported.

socio-cultural, market, and mass media factors. Also, a Policy Delphi analysis as part of our national study and based on the key informant's opinion,<sup>54,55</sup> showed that the main interventions for decreasing unnecessary overuse of medical services include; implementing strategic purchasing, active engaging of insurance companies, promoting payment system, use of clinical practice guideline in decision making, and increasing political commitment and reducing conflicts of interest. We are going to publish the results of our study in detail. COVID-19 pandemic has created a golden opportunity for addressing the drivers of unnecessary overuse of medical services by countries because of the three main reasons: 1) There is a shortage of healthcare resources for controlling COVID-19 pandemic and unnecessary services waste the resources 2) Overuses of healthcare services unnecessarily expose the patients and healthy individuals to the virus in outpatient clinics and hospitals, 3) Overuse of medications may suppress the immune response and predispose people to COVID-19 infection. Our preliminary search shows that the COVID-19 pandemic has decreased the use of several clinical interventions in countries<sup>56,57</sup> for example

screening tests,<sup>58</sup> admission and hospitalization,<sup>59</sup> and elective surgeries.<sup>60,61</sup> Considerable proportions of these clinical interventions are unnecessary. We suggest the Iranian ministry of health to use the golden opportunity of COVID-19 pandemic to develop national policy and action plans for controlling and preventing unnecessary healthcare services in Iran. These policies will facilitate the controlling of the COVID-19 epidemic and preventing underuse of necessary services during the COVID-19 epidemic and after the end of the epidemic.

Since this study was the first study in this field in Iran, there have been some limitations in conducting the study. One of the limitations has been related to the search strategy and how to search, which has made it difficult to research in this area due to the wide range of keywords. Researchers have tried to cover this limitation as much as possible by selecting multiple keywords, searching multiple databases, and using reference tracking and author contacting. Another limitation is the lack of evidence for some of the purposes of the study. For example, there has been no study on interventions to prevent medical overuse at the regional or national level, and we have limited

**Table 3** The Characteristics of Included Studies in Diagnostic Area

Authors	Clinical Domain	Subject	The Ranges of Overuse Proportion (%)	Standard
Refahi et al <sup>24</sup>	Diagnostic	MRI	45.2	Local guideline
Zargar et al <sup>29</sup>	Diagnostic	MRI	46.5	Clinical guideline
Saadat et al <sup>26</sup>	Diagnostic	MRI	82.8	Clinical guideline
Sadeghi et al <sup>27</sup>	Diagnostic	MRI	76	Clinical guideline
Bakhit et al <sup>31</sup>	Diagnostic	Diagnosis of dizziness	NR	Clinical guideline
Bayani et al <sup>32</sup>	Diagnostic	Clinical diagnosis and candida culture	NR	Clinical guideline
Bilehjani et al <sup>33</sup>	Diagnostic	Erythrocyte Sedimentation Rate (ESR)	NR	NR
Davoodian et al <sup>34</sup>	Diagnostic	Urinary catheters	20.6	NR
Eini et al <sup>35</sup>	Diagnostic	Antibacterial therapy	97	Clinical guideline
Fard et al <sup>36</sup>	Diagnostic	Venous duplex ultrasonography (VDUS)	NR	Scientific criteria
Forouzanfar et al <sup>37</sup>	Diagnostic	Chest X-ray (CXR)	7.5	Thoracic Injury Rule out Criteria (TIRC)
Ghaffarpassand et al <sup>39</sup>	Diagnostic	Radiography	NR	ATLS protocol
Jame et al <sup>41</sup>	Diagnostic	Computed tomography	19.8–51.6	Glasgow coma score
Moussavi et al <sup>42</sup>	Diagnostic	Computed tomography	NR	Glasgow coma score
Khaji et al <sup>43</sup>	Diagnostic	Computed tomography	66.5	Glasgow coma score
Meidani et al <sup>44</sup>	Diagnostic	Computed tomography	14.1	ACR criteria
Meidani et al <sup>45</sup>	Diagnostic	Laboratory test	26.4	ACR criteria
Moghimi et al <sup>47</sup>	Diagnostic	Preclinical test	1.3–9.6	NR
Mohammadi et al <sup>48</sup>	Diagnostic	MRI	33	NICE and AHRQ guidelines
Mokhtari et al <sup>49</sup>	Diagnostic	Venous thromboembolism (VTE) prophylaxis	NR	ACCP guidelines
Nikbakhsh et al <sup>50</sup>	Diagnostic	electrocardiogram (ECG)	77.3	American Society of Anesthesiologists status (ASA) criteria
Raji et al <sup>51</sup>	Diagnostic	Pulmonary CT angiography	NR	Geneva score and Wells' criteria
Paydar et al <sup>52</sup>	Diagnostic	Routine chest radiography for stable blunt trauma	19.8	ATLS
Salari et al <sup>62</sup>	Diagnostic	Knee MRI	24	National guideline

**Abbreviation:** NR, not reported.

evidence. However, it is one of the interesting and important results of the study.

## Conclusion

Our systematic review shows even so the magnitude of unnecessary overuse of medical services is high but there are only a few interventional studies at the clinical and administrative levels for finding effective methods for decreasing these unnecessary services. Researchers should be encouraged for conducting such researches. It is necessary to be included a section for “Interventional Research” in the action plans we suggest to the ministry of health for controlling and preventing unnecessary healthcare services in Iran.

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## Disclosure

The authors report no conflicts of interest in this work.

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