

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.^{1,2}

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Overuse can take place in different areas including medication, test, or procedure.³ 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.⁴ 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.⁵

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.⁶ Also, overuse in medical care is one of the obstacles to achieving universal health coverage (UHC).⁷ 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.^{8,9}

Over the years, many efforts have been made to identify overuse in medical care across health systems around the world.^{10,11} In Iran, as in many other countries, there is little evidence about the amount of medical overuse in the healthcare system.¹ 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.¹² The review protocol was registered in PROSPERO before starting our study (registration no. CRD42017075481) and published in BMJ Open journal.¹

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>.¹

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.

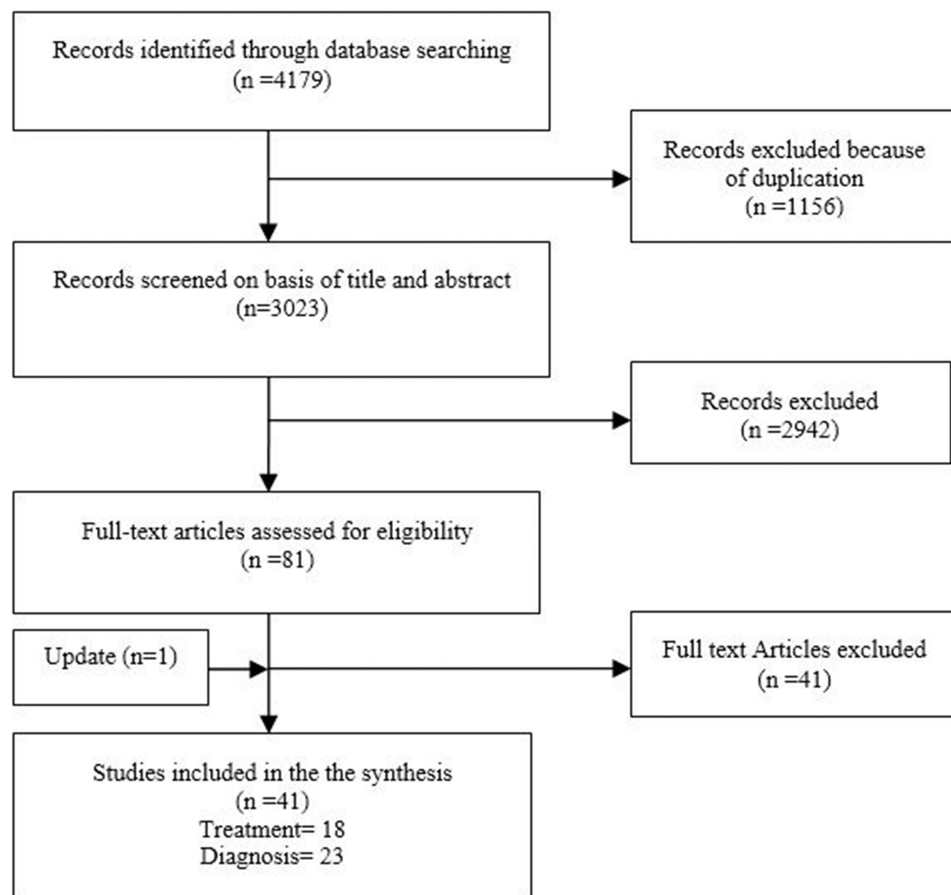


Figure 1 Study flow diagram.

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 ¹³	2006	Fa	Cross-Sectional	400
Ahmadizar et al ¹⁴	2011	En	Cross-Sectional	4,456,755
Amidi et al ¹⁵	1975	En	Cross-Sectional	40
Alavi et al ¹⁶	2014	En	Cross-Sectional	410
Alavi et al ¹⁷	2014	En	Cross-Sectional	8586
Azami et al ¹⁸	2006	Fa	Cross-Sectional	150
Ahmadi et al ¹⁹	2014	En	Cross-Sectional	1309
Alizadeh et al ²⁰	2012	En	RCT	200
Bijani et al ²¹	2014	En	Cross-Sectional	1543
Hatam et al ²²	2011	En	Cross-Sectional	1000
Khakhshour et al ²³	2011	Fa	Cross-Sectional	292
Refahi et al ²⁴	2016	En	Cross-Sectional	115
Sobhani et al ²⁵	2001	Fa	Cross-Sectional	4750
Saadat et al ²⁶	2008	En	Cross-Sectional	1650
Sadeghi et al ²⁷	2015	Fa	Cross-Sectional	2105
Taghizadeh et al ²⁸	2013	En	Cross-Sectional	234
Zargar et al ²⁹	2014	En	Cross-Sectional	400
Vessal et al ³⁰	2011	En	Cross-Sectional	155
Bakhit et al ³¹	2014	En	Cross-Sectional	270
Bayani et al ³²	2014	Fa	Cross-Sectional	400
Bilehjani et al ³³	2017	En	Cross-Sectional	620
Davoodian et al ³⁴	2012	En	Cross-Sectional	206
Eini et al ³⁵	2012	Fa	Cross-Sectional	100
Fard et al ³⁶	2001	En	Cross-Sectional	279
Forouzanfar et al ³⁷	2014	En	Cross-Sectional	2607
Ghadimi et al ³⁸	2011	En	Cross-Sectional	2041
Ghaffarpasand et al ³⁹	2011	En	Cross-Sectional	1679
Ghazizadeh et al ⁴⁰	2009	En	RCT	60
Jame et al ⁴¹	2014	En	Cross-Sectional	400
Moussavi et al ⁴²	2015	En	RCT	100
Khaji et al ⁴³	2006	En	Cross-Sectional	1209
Meidani et al ⁴⁴	2017	Fa	Cross-Sectional	361
Meidani et al ⁴⁵	2016	En	Cross-Sectional	384
Memari et al ⁴⁶	2012	En	Cross-Sectional	345
Moghim et al ⁴⁷	2008	Fa	Cross-Sectional	1220
Mohammadi et al ⁴⁸	2016	En	Cross-Sectional	279
Mokhtari et al ⁴⁹	2014	En	Cross-Sectional	1219
Nikbakhsh et al ⁵⁰	2010	En	Cross-Sectional	498
Raji et al ⁵¹	2018	En	Cross-Sectional	112
Paydar et al ⁵²	2012	En	Cross-Sectional	5091
Saboor et al ⁵³	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 ¹⁵	Treatment	Antibiotic	92.5	Clinical guideline
Khakhshour et al ²³	Treatment	Antibiotic	70	Clinical guideline
Alavi et al ¹⁶	Treatment	Antibiotic	41.4	Clinical guideline
Vessal et al ³⁰	Treatment	Antibiotic	31.6	American Society of Hospital Pharmacists (ASHP) guidelines
Hatam et al ²²	Treatment	Antibiotic	98	ASHP
Alavi et al ¹⁷	Treatment	Antibiotic	44	Mangram's guideline
Taghizadeh et al ²⁸	Treatment	Antibiotic	61	NR
Ahmadi et al ¹⁴	Treatment	Drug-Drug Interaction	0.77	National guideline
Bijani et al ²¹	Treatment	Polypharmacy	16.5–35.1	National guideline
Sobhani et al ²⁵	Treatment	Polypharmacy	88	NR
Ahmadi et al ¹³	Treatment	Polypharmacy	39.6	National guideline
Azami et al ¹⁸	Treatment	Blood transfusion	26.8	Scientific criteria
Ahmadi et al ¹⁹	Treatment	Intravenous Acetaminophen	NR	NR
Alizadeh et al ²⁰	Treatment	Heparin	NR	Heparinization protocol
Ghadimi et al ³⁸	Treatment	Prescribing pattern	30	Beers criteria and WHO indicators
Ghazizadeh et al ⁴⁰	Treatment	GnRH antagonist	NR	Study protocol
Memari et al ⁴⁶	Treatment	Psychotropic medication	80	DSM-IV-TR criteria
Saboor et al ⁵³	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,^{54,55} 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^{56,57} for example

screening tests,⁵⁸ admission and hospitalization,⁵⁹ and elective surgeries.^{60,61} 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 ²⁴	Diagnostic	MRI	45.2	Local guideline
Zargar et al ²⁹	Diagnostic	MRI	46.5	Clinical guideline
Saadat et al ²⁶	Diagnostic	MRI	82.8	Clinical guideline
Sadeghi et al ²⁷	Diagnostic	MRI	76	Clinical guideline
Bakht et al ³¹	Diagnostic	Diagnosis of dizziness	NR	Clinical guideline
Bayani et al ³²	Diagnostic	Clinical diagnosis and candida culture	NR	Clinical guideline
Bilehjani et al ³³	Diagnostic	Erythrocyte Sedimentation Rate (ESR)	NR	NR
Davoodian et al ³⁴	Diagnostic	Urinary catheters	20.6	NR
Eini et al ³⁵	Diagnostic	Antibacterial therapy	97	Clinical guideline
Fard et al ³⁶	Diagnostic	Venous duplex ultrasonography (VDUS)	NR	Scientific criteria
Forouzanfar et al ³⁷	Diagnostic	Chest X-ray (CXR)	7.5	Thoracic Injury Rule out Criteria (TIRC)
Ghaffarpasand et al ³⁹	Diagnostic	Radiography	NR	ATLS protocol
Jame et al ⁴¹	Diagnostic	Computed tomography	19.8–51.6	Glasgow coma score
Moussavi et al ⁴²	Diagnostic	Computed tomography	NR	Glasgow coma score
Khaji et al ⁴³	Diagnostic	Computed tomography	66.5	Glasgow coma score
Meidani et al ⁴⁴	Diagnostic	Computed tomography	14.1	ACR criteria
Meidani et al ⁴⁵	Diagnostic	Laboratory test	26.4	ACR criteria
Moghim et al ⁴⁷	Diagnostic	Preclinical test	1.3–9.6	NR
Mohammadi et al ⁴⁸	Diagnostic	MRI	33	NICE and AHRQ guidelines
Mokhtari et al ⁴⁹	Diagnostic	Venous thromboembolism (VTE) prophylaxis	NR	ACCP guidelines
Nikbakhsh et al ⁵⁰	Diagnostic	electrocardiogram (ECG)	77.3	American Society of Anesthesiologists status (ASA) criteria
Raji et al ⁵¹	Diagnostic	Pulmonary CT angiography	NR	Geneva score and Wells' criteria
Paydar et al ⁵²	Diagnostic	Routine chest radiography for stable blunt trauma	19.8	ATLS
Salari et al ⁶²	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.

References

1. Arab-Zozani M, Pezeshki MZ, Khodayari-Zarnaq R, Janati A. Medical overuse in the Iranian healthcare system: a systematic review protocol. *BMJ open*. 2018;8(4):e020355.
2. Brownlee S, Chalkidou K, Doust J, et al. Evidence for overuse of medical services around the world. *Lancet*. 2017;390(10090):156–168.

3. Morgan DJ, Dhruva SS, Coon ER, Wright SM, Korenstein D. 2017 update on medical overuse: a systematic review. *JAMA internal med.* **2018**;178(1):110–115.
4. Korenstein D, Chimonas S, Barrow B, Keyhani S, Troy A, Lipitz-Snyderman A. Development of a conceptual map of negative consequences for patients of overuse of medical tests and treatments. *JAMA Intern Med.* **2018**;178(10):1401. doi:10.1001/jamainternmed.2018.3573
5. Korenstein D, Falk R, Howell EA, Bishop T, Keyhani S. Overuse of health care services in the United States: an understudied problem. *Arch internal med.* **2012**;172(2):171–178.
6. Morgan DJ, Leppin A, Smith CD, Korenstein D. A practical framework for understanding and reducing medical overuse: conceptualizing overuse through the patient-clinician interaction. *J hospital med.* **2017**;12(5):346.
7. Kleinert S, Horton RJTL. From universal health coverage to right care for health. *Lancet.* **2017**;390(10090):101–102.
8. Berwick DMJTL. Avoiding overuse—the next quality frontier. *Lancet.* **2017**;390(10090):102–104.
9. Elshaug AG, Rosenthal MB, Lavis JN, et al. Levers for addressing medical underuse and overuse: achieving high-value health care. *Lancet.* **2017**;390(10090):191–202.
10. Rosenberg A, Agiro A, Gottlieb M, et al. Early trends among seven recommendations from the Choosing Wisely campaign. *JAMA internal med.* **2015**;175(12):1913–1920.
11. Rumball-Smith J, Shekelle PG, Bates DWJJ. Using the electronic health record to understand and minimize overuse. *Jama.* **2017**;317(3):257–258.
12. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol.* **2005**;8(1):19–32. doi:10.1080/1364557032000119616
13. Ahmadi B, Alimohamadian M, Mahmoodi M. Polypharmacy among older adults in Tehran. *Tehran Univ Med J TUMS Publ.* **2006**;64(9):65–71.
14. Ahmadizar F, Soleymani F, Abdollahi M. Study of drug-drug interactions in prescriptions of general practitioners and specialists in Iran 2007–2009. *Iran J Pharm Res.* **2011**;10(4):921–931.
15. Amidi S, Solter S, Rashidian B, Zokaian AR, Razmjooian F. Antibiotic use and abuse among physicians in private practice in Shiraz, Iran. *Med Care.* **1975**;13(4):341–345. doi:10.1097/00005650-197504000-00006
16. Alavi SM, Roozbeh F, Behmanesh F, Alavi L. Antibiotics use patterns for surgical prophylaxis site infection in different surgical wards of a teaching hospital in Ahvaz, Iran. *Jundishapur J Microbiol.* **2014**;7(8):11. doi:10.5812/jjm.12251
17. Alavi SM, Sharifi M, Egtesad M. Bacterial sepsis: challenges of diagnosis and treatment in a teaching hospital Southwest of Iran. *Jundishapur J Microbiol.* **2014**;7(3):3. doi:10.5812/jjm.9082
18. Azami A, Amani F, Khorasani S. Unnecessary blood and blood products transfusion to patients admitted to Ardabil Dr Fatemi Hospital, 2003. *J Ardabil Univ Med Sci.* **2006**;6(4):345–350.
19. Ahmadi K, Hashemian AM, Pishbin E, Sharif-Alhoseini M, Rahimi-Movaghar V. Impact of intravenous acetaminophen therapy on the necessity of cervical spine imaging in patients with cervical spine trauma. *Chin j Traumatology.* **2014**;17(4):204–207.
20. Alizadeh A, Yazdi AH, Kafi M, Rad MA, Moradi M, Emkanjoo Z. Predictors of local venous complications resulting from electrophysiological procedures. *Cardiol J.* **2012**;19(1):15–19. doi:10.5603/CJ.2012.0004
21. Bijani A, Roshan ARH, Yazdanpour S, Hosseini SR. Are older women likely to use medicines than older men? (Results from AHAP study). *Caspian J Internal Med.* **2014**;5(2):77–81.
22. Hatam N, Askarian M, Moravveji AR, Assadian O. Economic burden of inappropriate antibiotic use for prophylactic purpose in Shiraz, Iran. *Iran Red Crescent Med J.* **2011**;13(4):234–238.
23. Khakhshour A, Taherpour M, Khorashadi Zadeh F, Maddi I, Nojomi S, Shaikhi Z. Unnecessary antibiotic therapy in children with diarrhea may cause antibiotic resistance. *J North Khorasan Univ Med Sci.* **2011**;3(2):29–33. doi:10.29252/jnkums.3.2.29
24. Refahi S, Kachooei AR, Farsadpour M, et al. IS PRESCRIPTION OF KNEE MRI ACCORDING TO STANDARD CLINICAL GUIDELINE? *Acta Med Mediterr.* **2016**;32:1207–1211.
25. Sobhani A, Shodjai H. Prevalence of polypharmacy and correlations with sex, age and drug regimen in insurance prescription. *J Guilan UnivMed Sci.* **2001**.
26. Saadat S, Ghodsi SM, Firouznia K, Etminan M, Goudarzi K, Naieni KH. Overuse or underuse of MRI scanners in private radiology centers in Tehran. *Int J Technol Assess Health Care.* **2008**;24(3):277–281. doi:10.1017/S0266462308080379
27. Sadeghi A, Keshavarz K, Ahmadzadeh MS, Yousefi A. Survey of Appropriate Use of Magnetic Resonance Imaging Services Provided in Shahid Chamran Hospital of Shiraz. *J Health Res Community.* **2015**;1(3):33–40.
28. Taghizadeh S, Haghdost M, Mashrabi O, Zeynalikhasraghi Z. Antibiotic usage in intensive care units of Tabriz Imam Reza hospital, 2011. *Am J Infect Dis.* **2013**;9(4):123–128. doi:10.3844/ajidsp.2013.130.135
29. Zargar BJS, Sari AA, Majdzadeh R, Rashidian A, Arab M, Rahmani H. The extent of inappropriate use of magnetic resonance imaging in low back pain and its contributory factors. *Int J Prev Med.* **2014**;5(8):1029–1036.
30. Vessal G, Namazi S, Davarpanah MA, Foroughinia F. Evaluation of prophylactic antibiotic administration at the surgical ward of a major referral hospital, Islamic republic of Iran. *East Mediterranean Health J.* **2011**;17(8):663–667. doi:10.26719/2011.17.8.663
31. Bakhit M, Heidarian A, Ehsani S, Delphi M, Latifi SM. Clinical assessment of dizzy patients: the necessity and role of diagnostic tests. *Glob J Health Sci.* **2014**;6(3):194–199. doi:10.5539/gjhs.v6n3p194
32. Bayani M, Asghar Sefidgar SA, Basirat Z, et al. Association of clinical symptoms and laboratory results in diagnoses of Candida vaginitis. *J Babol Univ Med Sci.* **2014**;16(1):50–55.
33. Bilehjani E, Fakhari S, Farzin H, et al. The correlation between preoperative erythrocyte sedimentation rate and postoperative outcome in adult cardiac surgery. *Int J Gen Med.* **2017**;10:15–21. doi:10.2147/IJGM.S121904
34. Davoodian P, Nematee M, Sheikhvatan M. Inappropriate use of urinary catheters and its common complications in different hospital wards. *Saudi j Kidney Dis Transplant.* **2012**;23(1):63–67.
35. Eini P, Mobaien A, Agha Sharif M. Importance of diagnostic laboratory methods of beta hemolytic streptococcus group A in comparison with clinical findings in the diagnosis of streptococcal sore throat and unnecessary antibacterial therapy. *ISMJ.* **2012**;15(1):59–68.
36. Fard MN, Mostaan M, Anaraki M. Utility of lower-extremity duplex sonography in patients with venous thromboembolism. *J Clin Ultrasound.* **2001**;29(2):92–98. doi:10.1002/1097-0096(200102)29:2<92::AID-JCU1004>3.0.CO;2-0
37. Forouzanfar MM, Safari S, Niazazari M, et al. Clinical decision rule to prevent unnecessary chest X-ray in patients with blunt multiple traumas. *Emergency Med Australas.* **2014**;26(6):561–566. doi:10.1111/1742-6723.12302
38. Ghadimi H, Esmaily HM, Wahlstrom R. General practitioners' prescribing patterns for the elderly in a province of Iran. *Pharmacoepidemiol Drug Saf.* **2011**;20(5):482–487. doi:10.1002/pds.2106
39. Ghaffarpassand F, Paydar S, Foroughi M, et al. Role of cervical spine radiography in the initial evaluation of stable high-energy blunt trauma patients. *J Orthop Sci.* **2011**;16(5):498–502. doi:10.1007/s00776-011-0132-5
40. Ghazizadeh S, Pourmatroud E, Shariat M, Masomi M, Bagheri M. Study of Positive and Negative Consequences of Using GnRH Antagonist in Intrauterine Insemination Cycles. *Int J Fertil Sterility.* **2009**;3(2):56–61.
41. Jame SZB, Majdzadeh R, Sari AA, Rashidian A, Arab M, Rahmani H. Indications and Overuse of Computed Tomography in Minor Head Trauma. *Iran Red Crescent Med J.* **2014**;16:5.

42. Moussavi N, Davoodabadi AH, Atoof F, Razi SE, Behnampour M, Talari HR. Routine Chest Computed Tomography and Patient Outcome in Blunt Trauma. *Arch Trauma Res.* 2015;4(2):2. doi:10.5812/atr.25299v2
43. Khaji A, Eftekhari B, Karbakhsh M, Ardalan KM. The use of head CT scanning in mild head injury. *Neurosciences.* 2006;11(4):248–251.
44. Meidani Z, Moosavi G, Hamidian Y, Farzandipour M, Aliasgharzadeh A, Nazemi BZ. Assessing the appropriate utilization of CT scan in triage units. *Hospital.* 2017;16(2):27–35.
45. Meidani Z, Farzandipour M, Farrokhan A, Haghighat M. A review on laboratory tests' utilization: A trigger for cutting costs and quality improvement in health care settings. *Med J Islam Repub Iran.* 2016;30:1.
46. Memari AH, Ziaee V, Beygi S, Moshayedi P, Mirfazeli FS. Overuse of psychotropic medications among children and adolescents with autism spectrum disorders: perspective from a developing country. *Res Dev Disabil.* 2012;33(2):563–569. doi:10.1016/j.ridd.2011.10.001
47. Moghimi M, Marashi S, Salehian M, Motavalizadeh K. Unnecessary paraclinical tests before elective surgeries. *J Iranian Soc Anesthesiology Intensive Care.* 2008;30(62):33–70.
48. Mohammadi N, Farahmand F, Kharazi HH, Mojdehipanah H, Karampour H, Nojomi M. Appropriateness of physicians' lumbosacral MRI requests in private and public centers in Tehran, Iran. *Med J Islam Repub Iran.* 2016;30(1):1–7.
49. Mokhtari M, Attarian H, Norouzi M, et al. Venous thromboembolism risk assessment, prophylaxis practices and interventions for its improvement (AVAIL-ME Extension Project, Iran). *Thromb Res.* 2014;133(4):567–573. doi:10.1016/j.thromres.2014.01.006
50. Nikbakhsh N, Alijanpoor E, Adabi F. Preoperative medical evaluation in elective surgery versus standard criteria. *Caspian J Internal Med.* 2010;1(2):53–57.
51. Raji H, JavadMoosavi SA, Dastoorpoor M, Mohamadipour Z, Mousavi Ghanavati SP. Overuse and underuse of pulmonary CT angiography in patients with suspected pulmonary embolism. *Med J Islam Repub Iran.* 2018;32(1):3. doi:10.14196/mjiri.32.3
52. Paydar S, Johari HG, Ghaffarpasand F, et al. The role of routine chest radiography in initial evaluation of stable blunt trauma patients. *Am J Emergency Med.* 2012;30(1):1–4. doi:10.1016/j.ajem.2010.08.010
53. Saboor M, Kamrani AA, Momtaz YA, Sahaf R. Prevalence and associated factors of potentially inappropriate medications among Iranian older adults. *Medicinski Glasnik.* 2019;16(1):121–127. doi:10.17392/989-19
54. Arab-Zozani M, Janati A, Zakaria Pezeshki M, Khodayari-Zarnaq R. Policy package for preventing overuse and underuse of health care services in the Iranian health care system: A study protocol. *Med J Islam Repub Iran.* 2019;33:86. doi:10.34171/mjiri.33.86
55. Arab-Zozani M, Pezeshki MZ, Janati A, Khodayari-zarnaq R. 6 Medical overuse: how to define, detect and prevent? *BMJ Evidence Based Med.* 2019;24(Suppl 2):A10–A10.
56. Emanuel E, Navathe A. *Will 2020 Be the Year That Medicine Was Saved?* The New York Times; 2020. <https://www.nytimes.com/2020/04/14/opinion/coronavirus-hospitals.html>. Accessed July 23, 2020.
57. Reisman J, Wexler A. Covid-19: exposing the lack of evidence-based practice in medicine. *Hastings Center Report.* 2020;50(3):77–78. doi:10.1002/hast.1144
58. Bewley S. Things should never be the same again in the screening world. *BMJ.* 2020.
59. Arab-Zozani M, Pezeshki MZ, Khodayari-Zarnaq R, Janati A. Inappropriate rate of admission and hospitalization in the Iranian hospitals: a systematic review and meta-analysis. *Value Health Reg Issues.* 2020;21:105–112. doi:10.1016/j.vhri.2019.07.011
60. Elshaug A, Duckett S. Hospitals have stopped unnecessary elective surgeries – and shouldn't restart them after the pandemic. *Conversation.* 2020. <https://theconversation.com/hospitals-have-stopped-unnecessary-elective-surgeries-and-shouldnt-restart-them-after-the-pandemic-136259>
61. Prasad S. An Unexpected Opportunity Presented by the COVID-19 Pandemic. *Clear Health.* 2020. https://www.realclearhealth.com/articles/2020/04/03/an_unexpected_opportunity_presented_by_the_covid-19_pandemic_111011.html
62. Salari H, Omranikhoo H, Amini A, et al. Examining the amount of unnecessary knee MRI prescription in the MRI center of bushehr university of medical sciences in 2018. *Evidence Based Health Policy Manage Econ.* 2020;4(2):82–88.

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