

Research Article

An Exploration of the Drivers of Medical Overuse Among Family Physicians: A Scoping Review

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Introduction

Medical overuse is defined as the provision of non-scientific and unnecessary medical services that are not likely to improve the quality or quantity of life; in other words, these services are more likely to cause harm than good. Patients will not request these services if they are fully aware of their benefits and harms [1]. Overuse of diagnostic and therapeutic resources is observed in all specialties [2] and at all levels of health care systems [3], and it threatens patient safety and the stability of health care systems [4]. Reducing overuse in primary care is especially relevant to family doctors as they are considered the gatekeepers of the health system. However, in many countries, the specific pattern of overuse is virtually unknown [5]. The goal of family physicians and primary care is to provide high-quality health care, and part of this goal is protecting the community

Abstract

Introduction: Health care systems, especially primary care, are becoming increasingly concerned about medical overuse. We conducted this scoping review to determine what leads to medical overuse among family physicians.

Methods: Original qualitative studies published between 1996 and July 2023 on medical overuse and primary care were included, and research that lacked sufficient relevance was excluded. Following the PRISMA-ScR checklist, a systematic search was performed on four databases (Scopus, Web of Science, Embase, PubMed), and the results were confirmed by manual search and complemented by reference tracking.

Results: From the 9899 records found in the search, seven met the inclusion criteria and were finally included in the synthesis. Four themes were finally extracted. The findings show that the drivers affecting medical overuse among family physicians were related to physicians, patients, the health system, and technological processes. The highest effect was associated with medical overuse (physician-related drivers), patient demands (patient-related drivers), guidelines (health-system-related drivers), and technological processes (technology-related drivers).

Conclusions: This review presents a synthesis of the issue of medical overuse that should be brought to the attention of family physicians. However, as technological, systemic, and patient-related drivers are beyond the control of family physicians, it seems necessary to complement the role of the physicians with higher-level policy-making to minimize medical overuse, improve the knowledge of family physicians, and increase their participation in decision-making.

Keywords: Overuse; Medical services; Primary care; Medical overuse; Family physician; Scoping review; Qualitative

and individuals against overuse [6]. As part of the family physician plan, a specific population is assigned to a physician, and this physician knows their medical records and provides the assigned population with treatment. The doctor knows what the patient's previous issues were and what steps to take. If there is a need for specialized or laboratory measures, they can refer the patient to the appropriate provider, thus preventing the wastage of resources by preventing the overuse of specialized services [7]. Physicians can play an instrumental role in controlling the costs of the health care system and making sure that health care facilities are used more efficiently [8]. A primary care physician is responsible for managing the patient's health and explaining the need for preventive and curative care [9]. A family physician acts as a referral source. Thanks to the role

the family physician plays and the patient's medical record, the referral system can regulate care delivery levels from primary prevention to complex and costly treatments [8]. This process is considered suitable for controlling the cost of care, strengthening the connection between general practitioners and specialists in the referral system, and rationing health services [10].

Family physician programs provide people with the services they need while reducing the chance of health service providers taking advantage of these needs [11]. Family physicians are first charged with ensuring their patients are cared for and understood and protecting them from excessive medicalization [12]. Family physicians are responsible for establishing and maintaining a scientific attitude towards quaternary prevention among the people entrusted to their care [13]. When deciding whether to provide medical treatment to a patient, doctors should have this type of prevention in mind [14].

In quaternary prevention, the emphasis is on identifying patients at risk of over-medicalization, evaluating the need for invasive medical interventions, and providing scientifically and ethically acceptable services [15]. The basic principle of medicine, nonmaleficence, forms the cornerstone of quaternary prevention [12]. One of the principles of medical philosophy and ethics is avoiding unnecessary diagnostic, therapeutic, and preventive action. Using something ineffectively or to the detriment of other measures is also considered unnecessary [14].

Having a family physician program implementation strategy could reduce the costs of repetitive services and impose unnecessary treatment costs. This could improve community health, better distribute health system resources, and increase the satisfaction of people and the medical community [16]. The primary goal of this study was to collect and summarize the results of all studies examining the drivers that motivate overuse among family physicians.

Materials and Methods

Overview

This scoping review following the PRISMA-ScR Checklist, consisting of 7 sections and 27 items. The sections were title, abstract, introduction, methods, results, discussion, and funding, with sub-sections identified as PRISMA-ScR Checklist items [17]. In the data charting sub-section, it was suggested to use the Arksey and O'Malley data extraction sheet, which consists of author(s), publication year, study location, intervention type, and the comparator (if present), duration of the intervention, study populations, aims of the study, methodology, outcome measures, and important results [18]. As Arksey and O'Malley's data extraction sheet did not meet the aim of this study a new data extraction sheet was designed.

The PRISMA-ScR statement was used for reporting the different phases of the literature search. This study was designed and conducted in 2023. We reviewed articles that focused on understanding the drivers and conducted a meta-synthesis to determine the drivers contributing to family physicians' overuse of medical services.

Search Strategy

The literature search was reported according to the PRISMA extension for reporting literature searches in systematic reviews [19]. The search terms were identified using the MeSH, and analyzed keywords in relevant and similar articles. Then, the keywords were reviewed by two experts. Two review team

members (AZ, RGH) designed the search strategy, which was then examined by the third member (SN) and two experts.

The final search keywords were:

"Quaternary prevention"
 "Medical overuse"
 "overmedicalization"
 "overtreatment"
 "overdiagnosis"
 "overutilization"
 "medicalization"
 "overmedication"
 "misdiagnosis"
 "polypharmacy"
 "overprescription"
 "Value-based care"
 "General Practitioner"
 "Primary Health Care"
 "Family Physician"
 "Family Practice"

Search strategies are reported in Appendix A.

We systematically searched Web of Science [core collection] (<http://webofscience.com/>), Scopus (scopus.com), PubMed/Medline, and Embase (<https://www.embase.com/>) from 1996 to 2023. Web of Science and Scopus are large interdisciplinary databases, and PubMed and Embase provide access to clinical sources. Two sequential searches were conducted and limited by publication date, first, from January 1, 1996, to December 30, 2022, run on January 17, 2023, and again from January 1, 2023, to January 17, 2023, in an updated search on January 17, 2023. Since conducted the initial search in January and it was likely to lose studies due to database update times, a second search also included 2023. The original search strategy was used to model the updated search. One of the research members conducted the searches (AZ). One level manually forward bibliography examining the included articles and relevant reviews were done to identify additional studies (RGH, SN). It finished on Jun 19, 2023.

Study Selection

Studies that were original qualitative research investigating medical overuse and overuse of primary care by primary care physicians who provide face-to-face consultations in the primary care setting were included in this review. Studies written in English collecting participants' views, experiences, opinions, and perceptions through interviews published in peer-reviewed journals were excluded. Studies were excluded if their focus lacked sufficient relevance, they were systematic reviews or reviews, they were specific articles examining a particular drug, a specific age group such as the elderly or standard patients, male, female, child or a specialized area of medicine. The study specifically focused on overuse and medical overuse and eliminated overmedicalization, overtreatment, overdiagnosis, and overprescription to conduct a meta-synthesis.

Data Extraction

EndNote X9 and Excel 2016 were used for bibliographic control and data extraction. Duplicates were removed by (AZ) using Endnote's "find duplicate" option and then manually. For those titles, the full texts were not accessible, we used the central library and document center of the Kerman University of Medical Sciences, Order Article Service. If they could not provide the full text, the corresponding author was contacted. Two independent research members (RGH, SN) screened titles, abstracts, and full texts for inclusion. In the case of conflicts, they discussed and consulted the 3rd author (MA) to reach a consensus.

As Arksey and O'Malley's data extraction did not meet the aim of this study, data were charted from the included studies using a data extraction tool developed in Excel software by the members of the review team (RGH, SN). This sheet included title, author, journal, publication year, population, time period, setting, sampling, methods, country. Two review team members extracted data (RGH, SN). Uncertainties were clarified by consulting (MA).

Synthesis Methods

Following the Thomas and Hardern approach, thematic synthesis was used to synthesize qualitative data using MaxQDA18. Two reviewers did this in three stages: (i) free line-by-line coding employing an inductive analysis of findings from primary studies; (ii) organization of these 'free codes' into related areas to construct 'descriptive' themes and (iii) development of 'analytical' themes. Reviewers conducted the repeated reading of the included study results and discussed the findings with the rest of the review team to confirm them.

Content analysis and coding of the content of the selected studies were performed in MaxQDA 18 software. At this stage, the relationship between the concepts and codes was determined by extracting each study's key concepts (codes) and putting them together using the method recommended by Patterson and Canam [20]. In this method, the analysis starts from one study, and the synthesis gradually progresses to other studies, and with the addition of each study, the list of codes is completed.

Results

Study Selection

In the initial search, 9899 articles were retrieved, of which 4136 articles came from the Pubmed database, 676 articles from Web of Science, 2894 articles from Scopus, and 7031 articles from Embase. Endnote software was used to find and remove duplicates. Out of the total number of articles found in the database, 4713 duplicates were removed. Then, the titles and abstracts of the remaining articles were reviewed, and irrelevant articles were omitted. At this stage, 203 articles remained for full-text review. Of the reviewed articles, 196 were excluded due to a lack of inclusion and exclusion criteria. Finally, 7 articles were systematically reviewed (Figure 1)

Study Characteristics

From the 7 articles reviewed systematically, 1 was mixed-method, 1 grounded theory, and 5 were qualitative studies. The cases were from Germany, India, Norway, the United Kingdom, and China. The characteristics of the studies included are shown in Table 1.

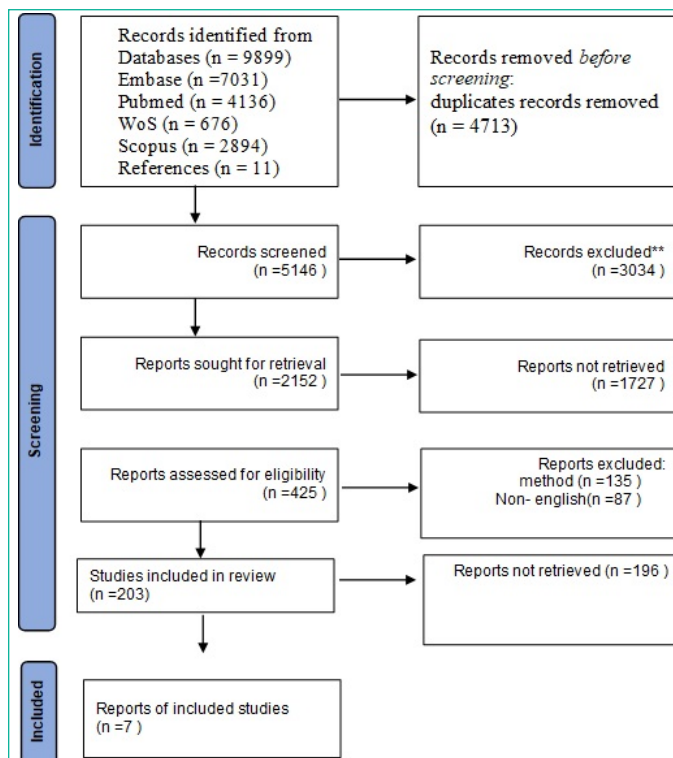


Figure 1: PRISMA flow diagram.

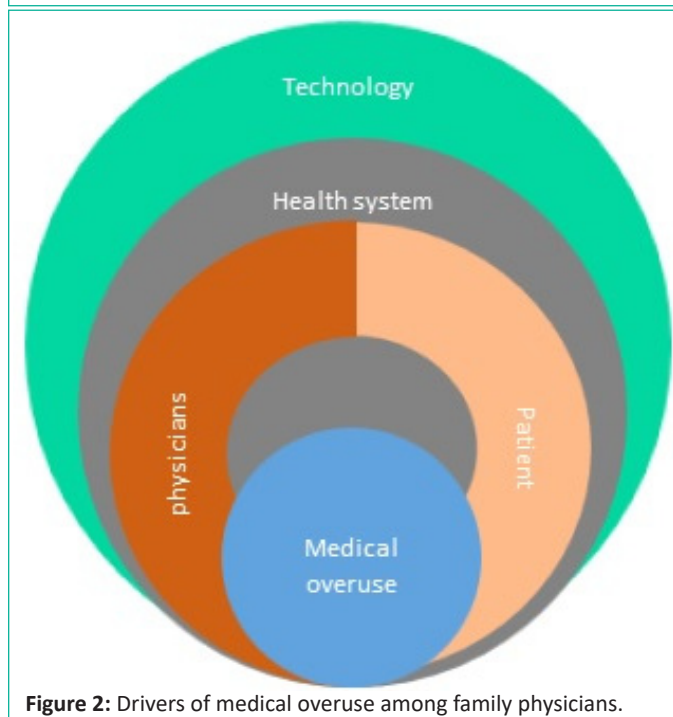


Figure 2: Drivers of medical overuse among family physicians.

Results of Synthesis

Morgan et al. [21] described medical overuse as overdiagnosis, analysis of abnormalities no longer associated with the disease, unnecessary medical evaluation, overtesting, overtreatment, wrong practice, or unwanted care – decisions which could be provider- or patient-driven. GPs described medical overuse as unnecessary investigations and treatments that do not benefit the patient or could even harm them in terms of morbidity, health-related quality of life, or mortality. The themes and codes that emerged from the review are presented in Table 2.

Physician-Related Drivers of Medical Overuse

Physician's Behavior

Several factors could cause doctors to overuse services. These include time constraints [22-24], family physician short-

Table 1: The characteristics of the studies included.

First author	Year	Study design	Location (country)	Participants and setting
Pausch	2020	Qualitative	Germany	155 GPs in the Bavarian Association of Statutory Health Insurance Physicians (Bavarian ASIP)
Sunde	2019	Mixed method	Norway	GPs who were considered to be opinion leaders among their peers and GPs in high-antibiotic-consuming municipalities
Opdal	2019	Qualitative	Norway	Focus groups with GPs working in the cities of Bergen and Oslo, and in rural districts close to these cities
Zhu	2018	Qualitative	China	11 physicians from three community health service centers and stations in China
Alber	2017	Grounded theory	Germany	GPs with academic affiliations, recommendations by interview partners, and personal contacts
Watson	2017	Qualitative	UK	23 in-depth semi-structured interviews with UK GPs within the Bristol area
Kotwani	2010	Qualitative	India	Primary care physicians from both private and public sectors working in the same five municipal wards (residential localities)

Table 2: The themes and codes that emerged from the review.

Themes		Subthemes
Physician-related drivers in medical overuse	Physician's behavior	Time constraints
		Family physician shortages
		Patient satisfaction
		Patient reassurance
		Personal routines
		Tolerance to diagnostic uncertainty
		Tactical motivations for requesting tests
		Physician's fear of litigation and the choice of defensive medicine
		Previous experiences of non-diagnosis
		Physician's belief
		Financial incentives
		Insufficient updating of knowledge by specialists
		Physician's soft skills
Neglect of the psychological root of the disease or illness		
Evidence-based medicine		
Patient-related drivers in medical overuse	Patient's behavior	Previous experience
		Patient's expectations
		Patient's demands
Health-system-related drivers in medical overuse	System structure	Misuse of diagnostic or therapeutic resources
		Upstream commitment
		Organizational structures and models of compensation
		Monitoring systems
		Rules and regulations in requesting and distribution
		Guidelines
		Laboratory equipment
		Funding for health care
		Cultural environment
Technology-related drivers in medical overuse	Technology improvement	Pharmaceutical businesses
		Technological processes
		Health information sources
		Decision support technologies
		IT-based intervention

age, patient satisfaction, patient reassurance [23], personal routines [25], intolerance to diagnostic uncertainty [25,26], tactical motivations for requesting tests [25], physicians' fear of litigation and the choice of defensive medicine [23,25,27], previous experiences of non-diagnosis [22-25,28], internship, and management of anonymous patients who tend to increase doctors' feelings of uncertainty and anxiety [25].

Family physicians sometimes overuse healthcare services for fear of incorrect diagnosis or misdiagnosis. Because a doctor's misdiagnosis leads to incorrect prescriptions, patients are required to undergo expensive tests, imaging, and other treatments that, in many cases, do not contribute to the correct diagnosis of the disease [25]. In addition, sometimes, under the conventional belief that the poorer sections of society have a higher need for antibiotics due to their unhealthy living conditions, family physicians overprescribe antibiotics [24]. Financial incentives for some family physicians could lead to prescribing medications to satisfy the patient [23-25]. At the office, the doctor thinks they should prescribe something that will reduce the patient's pain or prevent possible infection, leading to increased use of antibiotics [28].

Inappropriate drug prescription has been seen among physicians in most countries. Many patients are prescribed medication they do not need, and the appropriateness of the prescribed medication has not been proven. Despite the positive aspects of drugs, unprincipled and inappropriate prescription harms patients [24,28]. Inappropriate and unnecessary drug prescription causes adverse side effects and increases the cost of health services and pharmacotherapy. Additionally, inappropriate prescription of antibiotics leads to inappropriate use and overuse of antibiotics, which causes adverse side effects and the creation of resistant microbial strains [28]. The overuse of antibiotics is due to the poor competence of prescribers and is more prevalent in developing countries, with more than 50% of patients being referred to primary care each year for antibiotic treatment, of which less than 40% need the treatment [28]. Overuse of drugs varies in different countries; drug prescription indicators are not optimal in developing countries, and the principal indicators differ from one country to the next. Overuse of drugs leads to drug resistance, wastes resources, and increases mortality. It indicates an almost high average number of drugs per prescription and weak adherence to the Essential Medicines List (EML).

Some studies have emphasized the role of primary care physicians (family physicians) as essential inducers of the overuse of antimicrobial drugs and inappropriate prescriptions [28]. Lack of sufficient diagnostic skills [23,28], imprecision in prescribing antibiotics [27,28], failure to comply with WHO prescription standards [28], failure to improve diagnostic and therapeutic skills through continuing professional education [23,28], personal paradigms of physicians [23,25,28], sharing of wrong knowledge and beliefs about the use of antibiotics, and the gap between doctors' knowledge and the correct antibiotic treatment for common colds [28] are factors influencing medical overuse.

Other causes related to the physician in medical overuse include out-of-date knowledge in specialists, poor physician soft skills [23], repeating things that have always been done [25], neglect of the psychological roots of the disease [23], physician's personality [23,27], medical experience, medical procedures [23], evidence-based medicine and guidelines [22,23,25,27,28], economic incentives [23,27], the influence of the pharmaceutical industry [23,24], and doctor shopping [23].

According to family physicians, medical overuse could increase unnecessary diagnostic tests and revisits that are not beneficial to the patient, leading to increased health care costs. Family physicians are concerned that medical overuse would lead to the misallocation of limited resources, causing lack of treatment in other areas of health care. Almost all family physicians consider medical overuse a significant problem and believe that about 40% of medical services are medical overuse. Medical overuse is a serious issue for family physicians, but the main drivers of overuse lie beyond the physicians' control [23,26].

Patient-Related Factors in Medical Overuse

Patient's Behavior

Based on their previous experiences with the health care system, some patients have reached a high level of awareness of their rights as a patient and have understood the customer-centric approach of doctors. Most people see a doctor, preferably a specialist, as soon as the symptoms of the disease, even those of a simple cold, present and expect the doctor to prescribe medication for all of their symptoms. Consumerism (patients consider health care as their right), specific behaviors and individual irresponsibility, perceived demands or expectations, expectations for receiving capsules, pressure by them and their families for receiving antibiotics, significant need for reassurance, uncertainty about what needs to be done, finding secondary care professionals better qualified to deal with medical problems in general, requesting a large amount of counseling, and the idea that a good doctor prescribes an ultrasound and an x-ray are some of the issues surrounding patients when they are dealing with family doctors [24,26,27].

One of the main drivers is patients' expectations [23]. Patients who request diagnostic testing or treatment based on personal beliefs, the advice of other patients, or the Internet are also known to drive healthcare overuse. Suggested solutions for the reduction of health care overuse focus on shared decision-making and step-by-step diagnostic interventions [27]. In primary care, patients often request diagnostic tests, referrals to specialists, and medications, most of which are antimicrobials and painkillers.

In addition to the patient's fear of uncertainty about what is happening to them, there is also pressure from family members, the effects of health counseling and news on the Internet, headlines of medical advances, and new techniques in digital and print media. Safety arguments are helpful in reducing these kinds of patient requests [23]. In primary care, patients were much more likely to ask their family physicians than hospital physicians for tests and medical procedures (78% vs. 40%). The more patients insist on receiving services, the more family physicians provide unnecessary services, including laboratory tests and surgeries. Family physicians are more lenient towards patients' requests because they will face aggressive reactions if they do not accept their requests.

Health System-Related Factors in Medical Overuse

System Structure

Medical overuse could be one of the reasons for poor quality and misuse of diagnostic or therapeutic resources. Overuse of diagnostic and therapeutic resources exists in all specialties, in all health systems, and at all levels of the health care system and is a threat to patient safety and the stability of health systems. The initial focus should be on the overuse of resources, which exposes patients to harm and is also a crucial factor in the high cost of health care. Although there is little association between medical overuse and overall costs, it is associated with a reduction in medical overuse and a shift to less aggressive methods. Some estimates suggest that 10 to 30 percent of total health care costs are wasted due to overuse [27].

In addition to the role of family physicians in reducing overuse, there should be an upstream commitment among family physicians to decrease and support physicians' prescriptions. According to family physicians, preventing medical overuse requires extensive policy-making [27]. Organizational structures and models of compensation, lack of analysis of results and outcomes of referrals from family physicians to specialists [23], direct access to secondary care for patients [23,27], patients' desire for specialized diagnoses [23,26], inadequate information management between departments and providers, the difference in secondary care provided by specialists in inpatient and outpatient wards, shortage of psychologists, the influence of media [23], over-supply of drugs, the short expiration date of drugs [24], drug prescription by pharmacists (prescribed by non-physicians) [23,24], lenience of rules and regulations in demand and distribution [23], low efficiency of monitoring systems, lack of adequate laboratory equipment [24,28], lack of funding for health care, lack of physicians, and inefficient bureaucracy in the health care system [23] were other topics discussed in studies related to the health system regarding the factors that increase overuse.

The problem is that medical overuse is common knowledge and even driven by guidelines, protocols, and incentive systems. One of the factors influencing overuse is the guidelines for family physicians, which they consider out-of-date [22,23,27,28]. Excessively lenient guidelines have worsened the issue of medical overuse. Therapeutic guidelines are also suggested among the reasons for the overuse of antibiotics [22]. Because it causes bacterial resistance, overuse of antibiotics creates additional problems that harm not only individuals but also third parties and society as a whole.

The complexity of the factors affecting medical overuse and the potential of decreasing it should be analyzed systematically. Harm from overuse is part of everyday clinical practice in prevention, diagnosis, treatment, and rehabilitation. One of the factors related to the health system is creating a more extensive framework of legal protection for people who reduce medical overuse in practice. Management indices and annual or biennial objectives could be set concerning medical overuse, especially in areas where patient safety is most at risk. Although physicians are directly responsible for medical overuse, consideration should also be given to the role that patients' associations, accreditation system websites, and health newsmakers' associations could play in successfully reducing overuse. Revision of medical responsibility may lead to a reduction in invasive testing. Providing clear and direct information to the patient about the clinical and safety reasons why they are rec-

ommended to avoid specific tests or certain treatments is beneficial in decreasing overuse.

A recent review article outlined the causes of medical overuse in five areas: culture, the health care system, industry and technology, healthcare professionals, and patients and community. The findings of this study confirm that Norwegian general practitioners, such as health care system specialists, and the general public, think that taking excessive medical measures is better [26]. If the disease is not detected early, doctors will be responsible for this lack of diagnosis. Fear of non-diagnosis is common among physicians, patients, and the general public [25,26]. This cultural environment naturalizes consumerist attitudes toward health care and the assumption that medical technologies could alleviate uncertainty. In such circumstances, the ethical costs of harm resulting from medical overuse, loss of integrity among people, and unavailability of health services for vulnerable people are ignored or considered irrelevant [26].

Technology-Related Factors in Medical Overuse

Technology Improvement

The effect of pharmaceutical businesses on physicians' prescriptions is well known. The visits of pharmaceutical business agents significantly affect the physician's preferences in drug prescription [23,24]. Medical and technological processes, including new equipment, and new laboratory tests, also affect medical overuse [23].

The use of health information sources such as internet access or medical and health journals and newspapers could have numerous impacts on the patient's expectations and thus lead to specific changes in healthcare strategies and sometimes cause tension between the patient and the doctor. Overuse of diagnostic imaging techniques for patients with asymptomatic low back pain leads to an increase in costs and exposes patients to unnecessary harms such as radiation exposure and cascading medical procedures and expenses. However, both patients and specialists tend to ignore the damage caused by the overuse of preventive, diagnostic, and therapeutic tests.

Medical education alone is insufficient for rescuing the prescription of laboratory tests, and also, the experience is different in different countries. In Sweden, for example, education alone was sufficient to reduce the inappropriate use of general practitioners in the laboratory. However, for unknown reasons, the training of general practitioners failed to significantly change clinical practice concerning this particular issue for the current population of Finnish physicians. The purpose of decision support technology is to make optimal use of diagnostic tests in clinical practice by providing direct assistance for diagnosis and treatment by providing helpful advice on how to proceed. Computer support for clinical decision-making can also improve health outcomes and costs by preventing unnecessary overuse of diagnostic tests. Laboratory prescription forms might induce over-prescription if they have a straightforward design, and physicians who use these forms may not always consider the consequences of their actions. Therefore, the government should always be very critical of which electronic form to use for different types of prescriptions and which to avoid. The government could use IT-based interventions to modify clinicians' clinical behavior, hypothetically leading to significant cost savings [23]. The drivers of medical overuse among family physicians are shown in Figure 2 (Figure 2).

Discussion

In the present study, based on similar foreign and domestic studies, the drivers of medical overuse at the level of family physicians were investigated. The main drivers include physicians, patients, the health system, and technology.

The reach of the main types of overuse, their causes, and the solutions seem to go beyond the responsibility and influence of family physicians. Family physicians have been found to agree that medical overuse is a significant problem that needs to be addressed [2,22-27,29], but there is little incentive in the medical community to discuss medical overuse. The potential of family physicians in managing medical overuse is often ignored [27], and providing excessive care at higher levels (second and third levels) diminishes the role of the family physicians as gatekeepers in controlling medical overuse.

Medical overuse leads to the phenomenon of non-specialized and non-medical consumption of healthcare, while there is no evidence that these services are beneficial to the patient. Family physicians believe in providing lots of unnecessary care, brought about by the combination of family physicians' desire to keep the patient satisfied and the patient's consumerism [26,30]. This could cause potential harm to patients and thus increase the costs imposed on them.

The defective organizational structure of primary care delivery and lack of proper implementation of the primary care system are some reasons for medical overuse in health systems. With various social, economic, and political changes and changes in the needs of society, the system for providing primary care services needs a structure that is appropriate and relevant to these new conditions. One of the main drivers of medical overuse is the "lack of a primary care system" [23,27]. Fee-for-service reimbursement may also be a motivation, clouding physicians' decisions and leading to the overuse of medical resources [31]. It is necessary to provide guidelines that explicitly state the necessary and unnecessary items in prescriptions and indicate exactly what medical or diagnostic services need to be performed. Furthermore, published guidelines among specialists should be reviewed based on patients' requests from physicians.

Excessive provision of medical services increases the costs of health systems, which in turn disrupts funding. Cost control could guide medical overuse towards what government management wants in primary care [32]. Overuse has become a pressing threat to the sustainability of the health care system [29].

Irrational use of drugs not only does not improve the disease but also prolongs or worsens it and leads to ineffective or unsafe treatment, anxiety, and harm. Moreover, increased drug interactions, microbial resistance, and side effects are the consequences of over-prescription and irrational drug use. The economic, social, and legal consequences, such as patient dissatisfaction, weakening of physician-patient communication, extended hospital stay, higher medical costs for the patient and the health system, and ultimately, wastage of financial and human resources, have been expressed in various studies. In the family physician program, special attention is given to the supply, prescription, and rational use of medication. Rationalizing medication is one of the priorities of the family doctor program. In rational administration, the appropriate drug should be prescribed at the appropriate dose and time based on the patient's clinical condition, imposing the lowest possible cost on the pa-

tient and the community [33]. The habits surrounding the prescription and use of drugs must be corrected [25] by further educating medical students and holding more robust retraining courses [23,28,29,34], informing the public about drugs, and promoting the correct culture of drug use in the community [23,29]. Existing guidelines on the use of antibiotics are a barrier to reducing their prescription [22,34]. Overuse of antibiotics is a public problem whose adverse outcomes have caused thousands of deaths [34]. The guidelines and principles based on specialized medicine are also used in general medicine; these guidelines are among the motivating factors for medical overuse. Improving the specialized knowledge of general practitioners could be a solution to preventing medical overuse.

Given that not initiating medical cascades is much easier than trying to stop them, family physicians seem to play an essential role in preventing medical overuse. It is the role of "gatekeeper" that prevents the provision of medical overuse [26,27,29]. Family physicians are often at the forefront of the diagnosis and treatment process. They could decide whether the medical cascade will start or not. If over-medicalization has already occurred, it is much more difficult to stop than it is in the early stages [23,27,34]. However, in many countries, the actual pattern of overuse remains unknown [29]. The health system needs to work hard to strengthen family physicians' personal responsibility and commitment so that they feel they are involved. Motivation needs to match the quality and results of the actions because, ultimately, all of these problems have numerous impacts on society, the health system, and the patient.

The deep engagement of family physicians in the discussion and determining of the causes and solutions of medical overuse seems to be essential. The tendency to overuse diagnostic tests without reducing the overall risk of death, morbidity, and side effects is an example of medical overuse [14]. Physicians are able to prevent resource wastage and manage resources, but identifying unnecessary procedures and determining these guidelines and criteria are challenges that require the examination of all aspects of the problem in future studies.

The initiatives of many public and private sector centers include developing, testing, and deploying strategies to reduce medical overuse and promote proper use of medical processes, quality of care, and health outcomes. In 'Choosing Wisely,' the initiative is to develop, test, and implement strategies to reduce medical overuse and promote appropriate health care use. Supporting physicians is the most significant goal of these campaigns [5,35]. 'Choosing wisely' could positively affect physicians' attitudes, but it is still not recognized by the vast majority of specialist physicians [5,27]. The campaign presents a widespread and evidence-based effort to address the problem of medical overuse by identifying and raising awareness of low-value health care services that are provided excessively in the United States [36]. Family physicians interested in the campaign play a more crucial role in increasing awareness of medical overuse.

Conclusions

It seems more effort is necessary to increase the awareness of physicians and health care experts about medical overuse, defined as exposing patients to unnecessary health care that is either unprofitable to them or harms them more than it benefits them. Although acknowledging evidence-based advice is essential for providers to reduce unnecessary services, knowledge alone is insufficient for making significant changes in prac-

tical clinical settings. Other specific factors related to providers, patients, and organizations may block efforts to reduce medical overuse. In addition, if the patient does not trust their family doctor, they will end the doctor-patient relationship. Moreover, confusion and uncertainty will lead to unwanted costs of referring to several other physicians and paying substantial visits to different types of specialists. Therefore, an extraordinary response to preventing medical overuse is implementing the primary care system.

There were some limitations to this review. The initial search found 14570 articles, but the exclusion criteria eliminated almost all articles to meet the logistical aims of the review. Only those with specific keywords related to medical overuse were reviewed. As we decided which articles to include and what the key points in the articles were subjectively, it is possible that some excluded articles should have been included. Inevitably, if journal articles from more countries were included, the quality of the review could have been enhanced.

It seems that this study is the first to examine the drivers affecting the provision of medical overuse among family physicians. By summarizing these studies, the driving factors of medical overuse could be explained more clearly.

Author Statements

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