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Defensive Medicine and Healthcare Costs: A Scoping Review

Soheila Rajaie[1], Samad Azari[2], Fereshte Karimi[1]*

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Abstract

Background: Defensive medicine (DM) refers to any medical examination or treatment performed primarily to shield the physician from potential negligence or medical malpractice claims. DM has several negative consequences: rising healthcare costs, diminishing the quality of healthcare delivery, and lowering job satisfaction among physicians. This study presents available evidence through a scoping review of research focused on DM and healthcare costs.

Methods: The scoping review method was employed in this study. All articles pertaining to DM from 2000 to 2023 were examined in relevant databases using appropriate keywords. Thematic analysis and MAXQDA software were utilized for data analysis.

Results: A total of 29 articles were examined in this study. The studies were published between 2006 and 2022 and were distributed as follows: 18 studies in the United States, 3 studies in Italy, and 1 study each in Jordan, China, Kenya, the UK, India, Belgium, Austria, and Australia. Based on the study questions, the findings were subsequently categorized into 3 main groups: (1) DM and standard of care; (2) DM and healthcare demands; and (3) DM and healthcare costs.

Conclusion: DM has become a common issue in the healthcare system and has caused complications for patients and doctors. Studies show that DM has increased direct and indirect costs for the healthcare system. It is suggested that more studies be conducted to estimate the costs of DM, especially in countries with limited health resources.

Keywords: Defensive Medicine, Malpractice, Healthcare, Cost, Scoping review

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Introduction

The concept of defensive medicine (DM) was first proposed in 1978 (1). DM refers to any medical examination or treatment primarily done to protect the physician against negligence or medical malpractice claims (2). The broadest definition of DM is "deviation from sound medical practice induced primarily by a threat of liability" (3). DM or defensive practice is widespread across healthcare disciplines, and extensive research has been conducted on this behavior in medicine (4).

DM includes assurance behaviors (positive DM), such as ordering extra tests, referring to another healthcare provider, or prescribing additional medications, and avoidance behaviors (negative DM)—such as steering clear of specific fields of work or certain high-risk patients (5). DM, especially avoidance behavior, includes both clinical decisions impacting individual patients and broader changes in the scope and approach of practice (6).

DM has various negative consequences: escalating healthcare expenses, diminishing healthcare delivery quality, and reducing physician job satisfaction. The DM expense is estimated to be €10 to €12 billion (approximately $11.07–$13.28 billion) per year (2016) in Italy, while the medical liability system in the United Statesincurs a cost of

Corresponding author: *Dr Fereshte Karimi, fereshtek69@gmail.com*

1. Research Center for Emergency and Disaster Resilience, Red Crescent Society of the Islamic Republic of Iran, Tehran, Iran
2. Hospital Management Research Center, Health Management Research Institute, Iran University of Medical Sciences, Tehran, Iran

↑What is "already known" in this topic:
Defensive medicine (DM) refers to medical practices primarily motivated by the fear of litigation rather than the best interests of the patient. This phenomenon manifests in 2 main forms: (1) positive DM, which involves conducting unnecessary tests and procedures, and (2) negative DM, which entails avoiding high-risk patients or procedures.

→What this article adds:
This study aimed to explore the cost implications of DM across various countries and emphasize its economic aspects.

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$55.6 billion per year (2010) (7). Research conducted primarily in the United States, and to a lesser extent in the Netherlands and the UK, has revealed that DM practices by physicians can significantly inflate global medical costs (8). A survey involving gastroenterologists indicated that 94% of respondents had encountered DM practices. This study also approximated the yearly cost of DM in 2012 at approximately €8,637,835. The cost assessment was based on the 2012 fee reimbursement schedule of Lombardy's regional healthcare system. The total expenses generated by DM in local gastroenterological practice were calculated by multiplying the reimbursement cost of a single procedure by the number of tests prescribed for defensive reasons. DM exerts an influence on the health economics and healthcare system expenditures (9).

The rise in malpractice accusations impacts physicians' conduct. The stress syndrome triggered by medical malpractice prompts physicians to resort to DM. This defensive approach results in reduced access in both public and private sectors, as it raises medical expenses and impacts the healthcare system (10). Despite the potential for DM to increase healthcare costs, reduce quality of care, and affect job satisfaction, there has been little research conducted on this topic. The medical costs associated with DM remain unknown and have only been indirectly estimated (11). This study presents the available evidence by conducting a scoping review of studies that concentrate on DM and its impact on healthcare costs.

Methods

In this study, a scoping review method was utilized. A scoping review is a type of review for secondary studies employed to examine and analyze research evidence from various research studies. When a researcher aims to uncover answers to questions like "what" and "why" within a particular topic, a scoping review emerges as a fitting choice among the review methods. This approach is particularly valuable when the primary topic of the research has not been thoroughly and comprehensively explored (12). According to the Canadian Institutes of Health Research, scoping reviews are “exploratory projects that systematically map the literature available on a topic, identifying key concepts, theories, sources of evidence, and gaps in the research.” (13).

In these studies, for the reliability of results, a clear and valid method should be used. Arksey and O’Malley’s 6-step protocol was used to conduct this research, which includes the following: (1) identifying research questions; 2. identifying related studies using valid databases, reviewing gray texts, theses, review articles, and references related studies; (3) selecting related studies from primary studies; (4) extracting data in the form of graphs and tables; (5) collecting, summarizing, and reporting the findings; and (6) voluntary consultation with experts about the obtained findings (12).

Research Questions

The following questions were presented in this scoping review:

1. What is the effect of DM on the standard of care?
2. What is the effect of DM on health services demand?
3. What is the effect of DM on healthcare costs?

Search

English databases PubMed, Scopus, and Persian databases Magiran and SID, and Google and Google Scholar search engines were used to find scientific sources for this study. The search for scientific evidence was done using a systematic search with Persian keywords and their English equivalents with all possible combinations of important, main, and sensitive words. The keywords “Defensive medicine,” “Defensive practice,” “Healthcare costs,” “healthcare demand,” and “standard of care” were combined using the Boolean terms “AND” and “OR” in all the electronic databases explored.

Inclusion and Exclusion Criteria

The inclusion criteria of studies in this part of the research were review and research articles that examined defensive medicine and its cost from December 31, 2000, to April 31, 2023. The exclusion criteria were studies published in languages other than English and Farsi. A total of 209 articles were found in the initial search. A total of 34 duplicate articles without full text were removed. In the next step, by checking the title and abstract of the articles, 113 unrelated articles were excluded. Then, 33 articles were excluded because of a lack of examination of defensive medical costs and low quality. Finally, 29 related articles were selected and reviewed (Table 1).

Data Extraction

Based on the purpose of the research, a data extraction form was designed and used. In this study, the entry criteria were Persian and English scientific evidence. The exclusion criteria included scientific evidence published in different languages, except for Persian and English. The output of this type of review, in addition to the understanding and recognition of DM, led to the preparation of a list of important dimensions and indicators in the field of defensive medical costs.

Data Analysis

The thematic analysis method was used to analyze the data. Thematic analysis is a data analysis method that is mainly used for qualitative research. In this method, the researchers collected descriptive data to answer the research

Table 1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Time	31 December 2000 to 31 April 2023	Other Time
Language	Persian & English language articles	Other languages
Document Type	Original studies, Book, Editorials, Letters, Commentaries, & Reviews	Newspaper articles

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question. After data collection, themes and subthemes were reviewed repeatedly to find patterns. This helps to classify the data (3). MAXQDA software version 10 was used for data analysis.

Results

Study Selection

A total of 209 studies were retrieved from main databases using the keywords elaborated earlier. A total of 34 articles were duplicates and were deleted. During the initial screening period, 175 studies were reviewed based on the title and abstract. After that, 113 studies were excluded and the remaining 62 studies were evaluated in full text based on inclusion and exclusion criteria. Finally, 29 studies were selected and involved in the review analysis (Figure 1).

Characteristics of the Selected Studies

Table 2 presents the studies included in the review (14-40). The studies were published between 2006 and 2022 and distributed as follows: 18 studies in the USA(11, 14-30), 1 study in Jordan (31), 1 study in China (32), 3 studies in Italy (33-35), 1 study in Kenya, 1 study in the UK (36), 1 study in India (37), 1 study in Belgium (38), 1 study in Australia (39) and 1 study in Austria (40).

Qualitative Analysis of Studies

The software was used to analyze the full text of the included studies, then the findings were categorized into three main groups based on the study questions (Table 3).

DM and Standard of Care

A major consequence of DM in the healthcare system is the increase in the standard of care. DM includes unnecessary and harmful treatments and procedures. It can be viewed as a form of medical futility, bringing risks to the patients (32). Extra tests and procedures because of DM may increase health risks for patients (14). For example, in the radiology department and among trauma patients, defensively ordered CT scans resulted in 8.8 mSv of unnecessary radiation per patient (17).

DM and Healthcare Demands

One of the reasons for DM is the increase in patients' demand for services and the pressure imposed on the medical staff (31). The behavioral patterns based on the fear of lawsuits increase the demand of physicians and do not affect the quality of care (27). Unnecessary tests and interventions—such as computed tomography and magnetic resonance imaging—are often ordered to protect physicians from legal claims (21). On the other hand, many physicians practice "rule-out medicine" rather than "diagnostic medicine" out of fear that they will miss a diagnosis or be accused of delaying the diagnosis (28).

DM and Healthcare Costs

Healthcare costs are inclusive of liability insurance, malpractice payments, tests and procedures, healthcare premiums, and DM. The US Department of Health and Human Services in 2002 estimated the practice of DM cost $60 billion to $108 billion (20). DMs accounted for approximately 10% of the total annual Italian national health expenditure in 2017 and led to an increase in unnecessary risks and additional costs for patients (33). The main concern for the healthcare system is the effect of DM on the costs, access, and quality of care (41). DM diverts limited resources in the health care system from other uses. This reduces the resources available for hospitals and systems to grow (20).

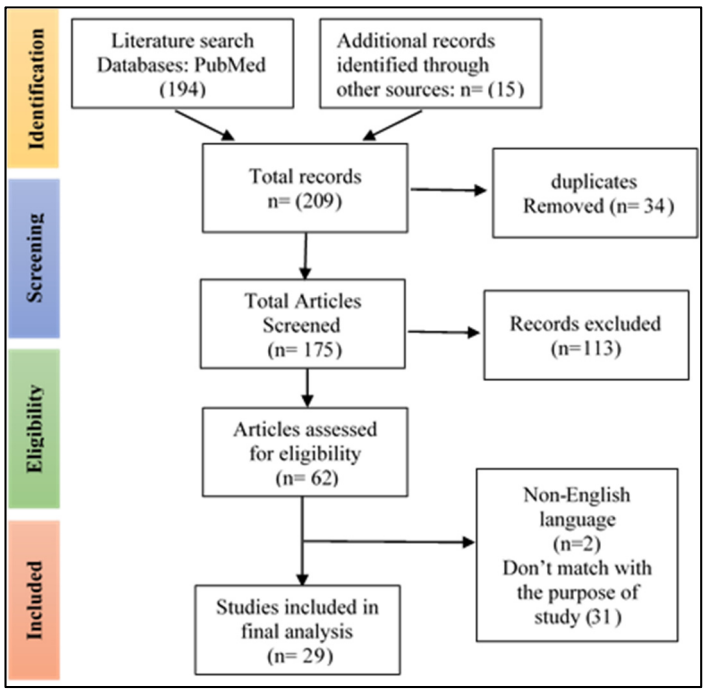

Figure 1. The process of checking the databases and finding the final studies

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Table 2. Characteristics of the studies included in the analysis

Author / Year	Country	Study Design	Keywords	Study Population
Pierce et al./2022 (14)	USA	Survey	Defensive Medicine, Cost, Diabetes	Medicare data / US census data / American Medical Association workforce statistics
Chaudhary et al/ 2022 (37)	India	Commentary	Defensive Medicine, Healthcare Expenditure, Malpractice	Documents
Panthöfer/ 2022 (38)	Belgium	Cross-sectional study	Defensive Medicine, Malpractice, Tort reform	Doctor visits form
Qosay et al. /2021 (31)	Jordan	literature Review	Defensive medicine, Litigation, Malpractice, Medical errors, Unethical practice	Jordan and other countries
Raposo /2019 (32)	China	Survey	Defensive medicine, Healthcare Demand	Documents
Schneider et al./ 2019 (15)	USA	literature Review	Defensive medicine, tort, reform, cost, healthcare	Documents
Garattini et al/ 2019 (35)	Italy	Review	Defensive medicine, Health economics, Europe	Documents
Reschovsky et al./ 2018 (16)	USA	Survey	Defensive medicine, medical malpractice liability, Medicare, healthcare costs	National physicians
Panella et al./ 2017 (33)	Italy	Cross-sectional study	Defensive medicine, defensive practice, health care costs, medical malpractice	1313 physicians
Osti et al/ 2016 (39)	Australia	Editorial	Defensive medicine, Healthcare expenditure, Malpractice	Documents
Kainberger/ 2016 (40)	Austria	Editorial	Defensive medicine, Cost, Overutilization	Documents
Chen et al./ 2015 (17)	USA	Observational study	Defensive medicine, Healthcare costs, Healthcare reform	295 trauma patients
Rothberg et al./ 2014 (18)	USA	Letter	Defensive medicine, cost, Medical services	42 physicians
Kavanagh et al./ 2014 (19)	USA	Cross-sectional study	Medicare, utilization, reimbursements, healthcare costs	50 states
Brateanu et al./2014 (11)	USA	Prospective study	Defensive medicine, Cost, Primary Healthcare	4 outpatient practices
Tuers / 2013 (20)	USA	Commentary	Defensive medicine, emergency department, medical malpractice	Emergency department
Adwok et al./ 2013 (41)	Kenya	Commentary	Healthcare, malpractice, quality, costs, defensive medicine, healthcare access.	Sub-Saharan African countries
Sethi et al./ 2012 (21)	USA	Survey	Defensive medicine, Orthopedic Surgeons, Costs	2000 orthopedic surgeons
Ridic et al./2012 (22)	USA	Survey	Medical malpractice, Defensive medicine	100 physicians
Thomas et al./ 2010 (23)	USA	Survey	Defensive medicine, Tort reform	35 clinical specialties
Mello et al./ 2010 (24)	USA	Review	Defensive medicine, medical system	Documents
Hermer et al./ 2010 (25)	USA	Letter	Defensive medicine; medical malpractice; health care costs; health care reform	Documents
Hatch/ 2010 (26)	USA	Commentary	Defensive medicine, Cost	-
Dove et al./2010 (27)	USA	Commentary	Defensive medicine, malpractice, tort reform	-
J. Healthcare / 2010 (28)	USA	e-Book	Costly defensive, defensive medicine, cost	Physicians
Traina / 2009 (34)	Italy	Survey	Medical malpractice, defensive medicine	Physicians
Frenkel / 2009 (29)	USA	Letter	Healthcare costs, medical malpractice, consensual medicine	-
Kessler et al./ 2006 (36)	UK	Review	Defensive medicine, liability, tort reform	Documents
Hellinger et al./ 2006 (30)	USA	Empirical analysis	Malpractice, defensive medicine, healthcare expenditures	Physicians

Discussion

This study aimed to examine the impact of DM on healthcare costs, standards of care, and health service demand. A total of 29 articles related to these objectives were analyzed. Most studies (n = 18 papers) originated in the United States, followed by Italy (Chart 1). The concept of DM and its contribution to the rise in healthcare costs has been explored in various countries. However, there has been no comprehensive review focusing on the cost implications and economic consequences of DM and its influence on service demand.

The physician-patient relationship is one of the most important components of providing high-quality care. Because of the information asymmetry between the physician and the patient, trust in the physician is the cornerstone of the physician-patient relationship (42). Professional collaboration in healthcare has been shown to improve patient outcomes. To avoid undermining physician-patient trust, business ethics should not be mixed with medical ethics (35).

Meanwhile, DM reduces the quality of the physician-patient relationship. Reducing the interaction between physicians and patients and the deteriorating patient-physician relationship are some of the causes of DM practice. Also, in 1 study, 42% of physicians reported that they deliberately avoided certain higher-risk treatments and procedures and patients who were medically complex or provided more unnecessary tests and treatments because of medical

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Table 3. Effects of Defensive Medicine on Standard of Care (SOC), Healthcare Demands and Costs in the Included Studies

Main Themes	Subthemes	Sample Codes
DM and standard of care	• Lack of integrated medical protocols • Increasing the standard of care • Increased risk to the patient's health •Reducing the interaction between the doctor and the patient • Reducing the quality-of-service delivery	• Increasing risks for diabetic patients • Extra tests and procedures for diabetic patients • Exposing the patient to unnecessary and harmful radiation • Leading to medical complications • Leading to subsequent litigation • Major reason for increasing the SOC • The dearth of unified medical protocols in Jordan • The deteriorating patient-physician relationship in Jordan • Avoid providing treatment to high-risk patients • Affecting the access, and quality of care in Africa • Limiting access to services
DM and healthcare demands	• Increasing patient demand from doctors • Reducing the authority of the doctor in determining the type of care • Increasing physician`s demand • Practicing "rule-out medicine" rather than "diagnostic medicine"	• Overordering of tests because of patient demands • More procedures, imaging studies, and readmissions for patients • Overwhelming pressure imposed by patients on medical staff • Defensively ordered CT scan in the workup of trauma patients (overdiagnosis) • Unnecessary admissions ordered • Increasing the days of hospital stay
DM and healthcare costs	• Increasing costs of the healthcare system • Increasing the annual costs of patients • Imposing a financial burden on the hospital • Imposing a financial burden on insurance companies • Reducing the efficiency and effectiveness of hospital management • Excessive consumption of resources • Diversion of resources	• The main concern for the healthcare costs • The negative impact on resource consumption • Unnecessary costly treatments • Overutilizing resources by physicians • Increasing health care costs per patient • Adding to overall healthcare costs • Adding financial costs to society in the USA • Charging more fees from patients and insurers due to fear of lawsuits • Considerable uncertainty in estimating DM`s costs • Protecting Physicians from lawsuits • Adoption of new medical techniques due to fear of lawsuits

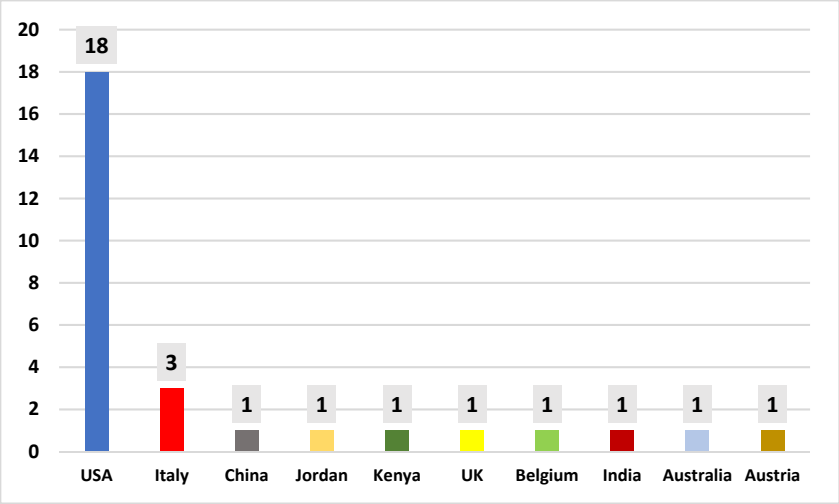

Chart 1. The number of articles from the countries included in this study

malpractice. (14, 31). Managing the medical malpractice system and increasing the accountability of healthcare professionals will improve patient outcomes and prevent underprovision of care (38).

The studies that have been conducted on the amount of testing of patients have found that about 40% to 60% of tests are unnecessary. Unnecessary tests can cause discomfort and harm to the patient and increase healthcare costs

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(43). Unnecessary tests, procedures, and admissions to hospitals expose patients to risks unrelated to their medical conditions. For example, a physician may undertreat cancer to avoid being sued by the patient for the side effects, or a child may be overexposed to radiation to "rule out" future risks (21, 22, 28). Defensive ordering of diagnostic tests may lead to overdiagnosis, which is the detection of new findings not associated with a substantial impact on health. Overdiagnosis can cause further unnecessary actions, such as labeling and unnecessary follow-up testing and treatments (40, 44). It has been observed that the United States has created a "perfect storm" of overutilization of healthcare and that there is an "unwarranted desire for treatment on the part of doctors and patients. "(45).

Increasing the provision of tests and treatment methods to prevent possible complaints leads to an increase in insurance premiums, and this increase in insurance premiums results in higher healthcare costs (46).

Most studies of DM costs are based on physicians' responses to questions about their underlying motivation for providing procedures and healthcare services (30). The demand for additional tests and medical procedures usually occurs for 2 main reasons: the physician-induced demand for financial incentives, and DM due to the fear of malpractice and lawsuits. Physician-induced demand (PID) has been observed to drive the demand in healthcare, and it occurs when "a physician influences a patient's demand for care against the physician's interpretation of the best interest of the patient"(47). Studies showed that physicians in densely populated areas, which are faced with a decrease in the number of patients per physician, compensate for the decrease in income by inducing more patient visits to respond to their financial incentives (48). DM, on the other hand, is a type of practice that is not dictated by medical considerations, but by fear of malpractice and avoidance of litigation and other negative consequences (32, 49). Finally, both PID and DM increase the costs and expenditures of the healthcare systems.

Patients have been significantly empowered and actively participate in the demand for healthcare the overordering of tests and treatments because of patient demands is not good practice for the healthcare system. In other words, physicians are under pressure from aggressive marketing from biomedical product manufacturers and the demands of patients on healthcare matters (41). Many times, such patients request specific tests and sometimes even drugs like antibiotics. Physicians often comply with these requests out of fear of losing the patient to a competing practice or to avoid arguments with the patient and their attendants (37). Health technology plays a key role in DM and malpractice liability. Specialists reported using technology to pacify demanding patients (21). Although there is considerable uncertainty in the estimation of DM costs, many studies have estimated its costs (16, 24). A "Gallup survey in 2010 found that physicians attribute 26% of overall healthcare costs to the practice of DM to protect themselves from lawsuits, they spend $1 in every $4 by ordering unnecessary treatments, and 34% of the costs connected to DM are the figure returned by a survey of 3000 physicians (20). DM has more negative effects in low-income countries. For example, any increase in healthcare costs and reduction in the access and quality of healthcare due to defensive practice could have a negative impact on sub-Saharan Africa, which currently experiences major healthcare challenges (41).

Kessler and McClellan in 1996 concluded that DM costs accounted for approximately 5% to 9% of total healthcare costs for patients with acute myocardial infarction and tort reform is necessary (25). Also, 1 study estimated that DM accounts for 8% to 20% of total costs (16). Studdert's study has shown that DM is a major problem in the United States (50). In a Japanese study by Hiyama et al, it was shown that DM has reached global dimensions and that it is very common among Japanese gastroenterologists (51). According to the findings of Elli's study, the DM cost ordered by 170 specialist doctors working in Lombardy in 2011 was estimated at €1,220,000 (approximately $1,659,200) (52). In the 2016 Osti study, annual labor costs for DM amounted to 42.4 million euros, with 11.5 million euros for orthopedic departments, 23.5 million euros for trauma surgery departments, and 7.4 million euros for radiology departments. Also, defensive imaging costs an average of 270.4 million euros annually (39).

In addition to direct monetary costs, DM causes indirect costs such as job stress, loss of doctors' time, and credibility, and avoidance of treating high-risk patients, which should also be considered (39). When physicians are involved in malpractice claims, they tend to retire early and advise their children not to work in the healthcare system (36).

In contrast, in Brateanu's study, a new method has been presented to determine the amount of costs caused by DM and concluded that DM has the least impact on primary healthcare costs. This study was conducted prospectively among primary care physicians from 4 outpatient clinics over 6 weeks. Physicians were asked to rate each of their orders on 3 separate days using a 5-point scale ranging from 0 (not at all defensive) to 4 (completely defensive). The study offers a novel tool to quantify the proportion of medical costs associated with DM. This method can be easily applied across any specialty in both outpatient and inpatient settings. (11). DM in all its forms has a negative impact on the effectiveness and efficiency of healthcare organizations. In other words, DM diverts the limited resources in the healthcare system from other effective uses and leads to a decrease in the resources available to hospitals (20, 41).

DM is significant and might add as much as 5% to 9% to overall healthcare costs and fundamental reforms are necessary to affect the psychology of DM that drives costly overuse (27). Many physicians feel like victims of the current system because they believe that inappropriate laws punish them unfairly. Therefore, most physicians promote DM to protect themselves from lawsuits (21). It means more healthcare costs charged to patients and insurers because of fear of lawsuits instead of medical necessity (26).

One way to combat DM and reduce associated costs is to implement a liability system. However, the primary goals of a liability system are rarely met, such as focusing on quality improvement, safety, and adequate compensation

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for injured patients, which increases trial cases, legal uncertainty, and the risk of potential economic harm. A legal and trustworthy guarantee for physicians and the inspiration for reasonably priced services could be produced by creative legal considerations that alter the way providers and liability insurers react to medical negligence and offer legal support for following evidence-based practice.

Reimbursement mechanisms that create financial liability for providers for medical injuries or provide pay-for-performance bonuses for reducing injuries have also been proposed (50, 53).

To reduce DM, decriminalization of medical errors, increased time spent directly with patients, re-emphasis on the importance of clinical reasoning, and institutional support for physicians who have experienced patient side effects are necessary (45).

Limitation

The primary limitation of this study is that it only focuses on the cost implications of DM within the healthcare system. However, future research could explore all facets of DM in healthcare through original studies.

Conclusion

According to the review, DM has become a prevalent issue in the healthcare system, leading to complications for patients and physicians. Studies have indicated that it has resulted in a rise in both direct and indirect costs for the healthcare system. Enhancing adherence to the standard of care, improving physician-patient relationships, following medical ethics, and revising existing laws can be effective measures. It is recommended that further studies be conducted to assess the costs of DM, particularly in countries with limited healthcare resources. The economic burden of DM in the healthcare system demands more attention.

Authors' Contributions

S.R., S.A., and F.K. contributed to the study design. F.K. and S.R. screened the records, extracted data, and appraised quality. S.R. conducted data analysis. S.R. and F.K. drafted the manuscript. S.A. provided a critical review. All authors approved the final version of the manuscript for publication.

Ethical Considerations

Not applicable.

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Conflict of Interests

The authors declare that they have no competing interests.

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