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MEDICAL LIABILITY BETWEEN CLINICAL PRACTICE AND LITIGATION: A BIBLIOMETRIC THEMATIC ANALYSIS

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Abstract: Medical malpractice is a topic of constant interest in the literature, situated at the intersection of clinical practice, legal liability and professional ethics. Despite the abundance of descriptive and legal studies, few works systematically investigate the dominant themes and thematic gaps in scientific research in this area. The aim of this study was to identify, through a bibliometric analysis, the main thematic directions and under-explored areas in the recent literature on medical malpractice, with a focus on the role of the physician, the social dimension and the legal pressure associated with clinical practice.

A bibliometric technique was used, based on extracting and analyzing data from the PubMed database using the keyword „medical malpractice". Articles published in English between 2014-2025 were included, with full title, abstract and keywords. The final set of articles was analyzed using the VOSviewer software, generating two network maps: a general (title-based) and a detailed (title, abstract and keyword-based, with a co-occurrence threshold ≥5).

The analysis identified several thematic clusters, highlighting three dominant strands: professional standards and medical practice, litigation and clinical errors, risk assessment and evidence-based medicine. Terms such as „physician", „malpractice claim", „burnout" and „evidence" were the most central in the semantic networks. In addition, the maps revealed a number of thematic gaps, including under-representation of the patient perspective, institutional accountability and the educational dimension.

Medical malpractice is predominantly approached from a legal-professional perspective, with a strong emphasis on the individual responsibility of the doctor. The social dimension, although suggested by terms such as burnout or impairment, remains incompletely explored. The study highlights the need to broaden the research towards systemic, participatory and comparative approaches, including the voice of the patient, organizational aspects and the social impact of medical litigation.

Keywords: medical malpractice, bibliometric analysis, VOSviewer, physician responsibility, patient safety, litigation in healthcare, burnout in medicine, healthcare risk, co-occurrence mapping.

INTRODUCTION

Medical malpractice is increasingly recognized as a significant societal problem, given its ramifications for patient outcomes, health care costs, and the overall dynamics within the health care profession. This complexity stems from a convergence of legal, psychological, and economic factors that shape the healthcare experience for both patients and healthcare providers. Analyzing the themes present in the literature related to physician liability and medical malpractice is essential for several key reasons, each of which has a direct impact on the quality of health care, the legal and ethical responsibilities of health care providers, and the overall safety of patients. Researchers and practitioners say that understanding these issues can guide improvements in medical practice, inform policy and improve the patient-physician relationship.

The medical malpractice literature establishes a nuanced framework for assessing how legal standards influence medical practice. Although malpractice laws are ostensibly designed to deter medical errors, they may not effectively improve the quality of healthcare (1). The study of malpractice appears to focus on the ethical

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and legal standards that physicians are expected to meet (2). Another critical theme derived from the literature concerns the economic implications of malpractice claims on health systems (3). By exploring tort liability reforms and their influence on physician behavior and health care delivery costs, it becomes evident that the fear of litigation shapes medical practices and affects the economic viability of health systems in general. Numerous studies indicate that defensive medicine practices emerge as a direct response to the malpractice environment, leading to overutilization of tests and procedures that do not necessarily improve patient outcomes (4).

Reflection on communication gaps in the doctor-patient dynamic reveals another critical area of concern. As noted in various studies, including those focused on specific medical disciplines such as neurology, ineffective communication underlies many malpractice lawsuits, indicating a strong need for systematic improvements in the way physicians interact with their patients (5). Emerging themes in the literature, such as the impact of technological advances and the regulatory environment during crises (e.g., the COVID-19 pandemic) (6) , illustrate the evolving landscape of healthcare and its intersection with legal liability. Understanding these dynamics is critical for both healthcare providers and legal practitioners to manage challenges effectively and responsibly.

The nature of malpractice claims often correlates with various factors inherent in different medical specialties. Certain surgical specialties, particularly general surgery and obstetrics-gynecology, are consistently associated with higher rates of malpractice claims compared to other specialties, such as pediatrics (7, 8). Such disparities highlight the need for targeted educational initiatives to equip physicians with the skills necessary to more effectively manage malpractice risks. Emotional intelligence has been identified as a contributor to reduced malpractice claims, suggesting that promoting better interpersonal skills among physicians could mitigate litigation risks (7).

A central theme in the discussion of physician liability is the need for effective malpractice reforms that take into account the interests of physicians, patients and government. Research indicates that physicians seek lower liability outcomes and lower stress, while patients want detailed explanations of adverse outcomes and just resolutions (9). The debate on the adequacy of existing malpractice insurance systems emphasizes the need for collaboration between healthcare providers to effectively address these barriers. However, relevant literature on this collaboration is limited, indicating that further evidence is needed to fully support this claim (10).

The issues of medical liability and physician malpractice are vital to society because they reflect the state of medical practice and patient care and influence the economics of health care. Through continued research and systemic reform, it is possible to strike a balance that protects the well-being of patients while safeguarding health care providers. An examination of the themes present in the literature on physician liability and medical malpractice reveals the complex relationship between legal frameworks, medical ethics, quality of care and patient safety. Such analysis is imperative for refining the medical landscape, informing policy decisions, and ultimately ensuring that healthcare providers can deliver safe, effective and ethical care.

Studying the emergence of topics in scientific fields using bibliometric techniques has a multitude of advantages that improve our understanding of the literature, research trends and the general structure of scientific research. Bibliometrics applies quantitative analysis of various bibliographic attributes to reveal insights into the development and dynamics of a field. A main advantage of bibliometric analysis is its ability to provide a comprehensive overview of research trends in a given field. By conducting systematic assessments of publication patterns, researchers can identify not only the quantity of publications over time, but also discern changes in the thematic focus, which can highlight emerging areas of interest and research gaps (11). Bibliometric techniques have been harnessed to understand evolving themes in health policy and management, thus providing clarity on how specific themes grow and change in this context (12). The utility of bibliometric techniques extends beyond simple descriptive statistics. They can also facilitate more sophisticated analyses, such as thematic mapping and network visualization, which help to elucidate complex relationships between different research topics in a field (13). In the present research we have chosen VOSviewer, a powerful software tool widely used in bibliometric analyses to build and visualize bibliometric networks, which makes it an invaluable resource when we want to map and understand the structure of scientific knowledge in specific domains. The software, developed by Van Eck and Waltman from the Centre for Science and Technology Studies at Leiden University, specializes in creating visual representations

of data related to publications, authors and keywords using several analytical methods. One of the main functions of VOSviewer is its ability to construct co-occurrence maps based on bibliographic relationships. These can include co-authorship relationships, citation links and key term co-occurrence. The VOSviewer was used to analyze the presence of themes in the healthcare literature and provided insights into existing research gaps and potential future directions (14). Similarly, its usefulness in visualizing trends in research on specific healthcare issues was highlighted, allowing a clearer understanding of the publication landscape (15).

METHODOLOGY

A bibliometric approach was used to carry out this work, in order to identify and visualize the main thematic directions in the scientific literature on medical malpractice. The analysis was based on a PubMed portal query using the keyword „medical malpractice". Only articles published in English in the period 2014-2025 were included, which fully contained the required bibliographic data: title, abstract and keywords.

After applying the selection criteria, the annual distribution of articles revealed a minimum of 2 articles (in 2014) and a maximum of 35 articles (in 2016). The final set of articles was exported as a .txt file, compatible with the VOSviewer software used to construct network maps.

Two distinct bibliometric images were generated. The first map, of a general nature, was based on the titles of the articles and aimed at identifying the major themes addressed in the literature. The second, more complex, map was constructed based on all available metadata (title, abstract and keywords). It aimed at analyzing the co-occurrence of terms, using a minimum threshold of 5 co-occurrences for the inclusion of a term in the network.

The distribution of terms and the formation of thematic clusters were done automatically, according to the VOS (Visualization of Similarities) algorithm, which groups terms according to their frequency of occurrence and semantic connections between them. The results obtained allow a visual and synthetic understanding of recurrent sub-themes in the field of medical malpractice and how they interrelate within the scientific discourse. These visualizations allow policy makers and medical professionals to identify not only dominant research directions, but also thematic gaps or emerging areas of interest (e.g., physician's professional health).

RESULTS

The first bibliometric map is shown in Figure 1.

Figure 1 represents the general map of the themes in the literature built on the analysis of the titles of the papers included in the database. The general analysis by clusters, with the identification of the dominant theme, is presented below:

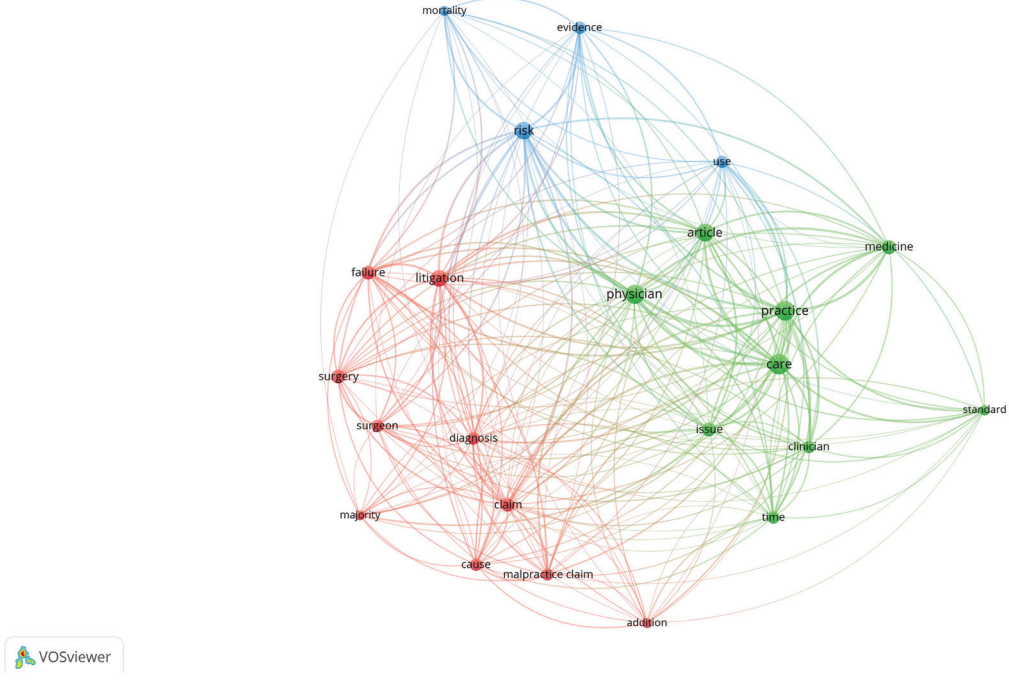

Figure 1. The general map of the themes related to malpractice obtained with VOSviewer.

Green cluster - Medical practice and standards of care

The central terms are: „physician", „practice", „who", „medicine", „clinician", „standard", „issue" and „time". The professional and ethical sphere of medicine is reflected: current practice, professional standards, patient care, responsibilities of the physician. The word „physician" is a central connecting node between all the clusters - significant, as the physician is involved in both the medical act and its legal consequences.

Red cluster - Litigation and malpractice

The dominant terms are: „litigation", „claim", „malpractice claim", „failure", „diagnosis", „cause", „surgeon", „surgery". This group indicates a focus on medical errors, particularly in surgery, and the lawsuits generated by them. The dense relationships between „litigation", „diagnosis" and „claim" suggest a high frequency of lawsuits generated by misdiagnosis or surgical errors.

Blue Cluster - Risk assessment and mortality

The main terms are: „risk", „evidence", „mortality", „use". This area refers to the likelihood of deaths or incidents in a medical context and the use of evidence to assess risk. The link with „physician" and „evidence" suggests a concern for evidence-based medicine to reduce the risk of malpractice.

Connectivity between clusters - The „physician" node is a point of intersection between the three clusters and shows that the physician is at the center of the practice-responsibility-legal consequences relationship.

The bibliometric analysis of the literature on medical litigation and professional liability highlights three major, closely interlinked thematic strands. At the center of the network is the figure of the „physician", at the intersection between professional standards, clinical practice and the legal implications of his/her actions. The green cluster reflects the ethical and professional dimension of medical practice, focusing on terms such as „practice", „standard" and „medicine". These suggest a constant concern for quality of care and compliance with established protocols. In contrast, the red cluster brings the issue of malpractice and medical litigation to the forefront, with terms such as „litigation", „claim", „malpractice claim" and „diagnosis". Their frequency highlights that medical errors - particularly in surgery or diagnosis - are a major source of legal disputes. In the blue cluster, the words „risk", „evidence" and „mortality" indicate a growing orientation towards probabilistic clinical risk assessment, supported by evidence-based medicine. This dimension suggests that litigation reduction depends not only on legal rigour, but also on the integration of predictive and standardized tools into medical practice.

Therefore, the thematic network captured in this map highlights a dialectic between practice and responsibility: at its center is the physician, caught between ethical and professional expectations and the legal risks associated with any clinical decision. The link between „standard" and „litigation" indicates that failure to meet standards of care is a common cause of lawsuits.

This map highlights an inherent tension in modern medical practice. On the one hand, it is centered on care, medical practice and professional

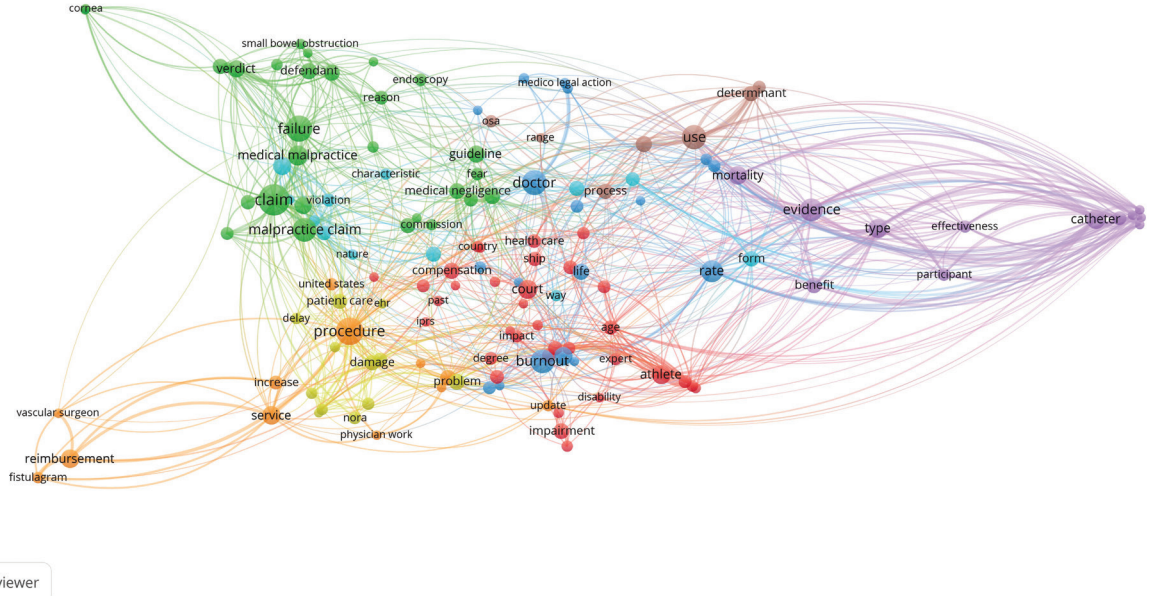

Figure 2. The co-occurrence map of terms obtained with VOSviewer.

responsibility; on the other, it reflects the legal and social pressures to which physicians are subject in cases of error. At the center is the physician as a key player in maintaining the balance between ethical standards and the risks of litigation.

The second bibliometric map is shown in Figure 2.

Figure 2 represents the co-occurrence map of terms extracted by analyzing titles, abstracts and keywords. This is a co-occurrence network of terms, significantly more detailed than the previous one, structured on several thematic clusters. The size of the nodes reflects the frequency of occurrence of each term in the analyzed literature. The interpretation is focused on the largest and most relevant nodes, i.e. the most bibliometrically central terms.

Top biggest nodes by size:

1. „catheter" (mov): very common technical term associated with clinical trials and invasive procedures. It appears in the mov cluster, together with „effectiveness", „type", „form".

2. „evidence" (light blue/mov): a cross-cutting term, indicating the importance of evidence-based medicine (EBM) in all areas: judicial, clinical, procedural.

3. „claim"/„malpractice claim" (green): very large nodes in the cluster focused on medical litigation, central to discussions about legal liability.

4. „procedure"/„damage"/„service" (yellow-orange): large nodes associated with technical and administrative aspects: interventions, damage, medical services.

5. „doctor"/„court"/„burnout" (red/center): „burnout" is very prominent - it signals concern about doctors' professional burnout, often linked to stressful environments or litigation.

6. „use"/„rate"/„mortality" (brown-blue): statistical and epidemiological terms, linked to „evidence" and „risk assessment".

Thematic interpretation of the network:

Green cluster - Medical litigation and malpractice

The dominant terms are „malpractice claim", „medical negligence", „failure", „verdict", „claim", „defendant". It signals the legal dimension of medicine, malpractice assessment and lawsuits.

Yellow-orange cluster - Administrative and economic

Includes the words „procedure", „damage", „service", „reimbursement", „physician work". It highlights health system pressures and resources.

Red cluster - Psychological and social aspects

It is dominated by „burnout", „impairment", „disability" and „athlete". It shows concern for the professional health of health professionals and the psychosocial impact.

Purple cluster - Technology and clinical evaluation

The central terms are „catheter", „type", „effectiveness" and „form". It is a cluster with a technical orientation towards procedures and comparative studies.

This map shows a complex structure of literature in which „catheter" and „evidence" are very frequent terms, suggesting a dominant technical-clinical literature. „Malpractice claim" and „burnout" are equally central, indicating an increasingly documented human and legal dimension. The network illustrates the tension between technology, professional responsibility, service management and human burnout.

The network map generated by the bibliometric analysis provides a comprehensive visual representation of the main thematic directions in the recent literature on medical practice, professional responsibility and technical-legal dimensions of the health system. The network is structured around five major clusters, each illustrating a distinct but interconnected area of scientific interest. The green cluster, centered on terms such as „malpractice claim", „medical negligence", „failure" and „verdict", reflects the legal dimension of medical practice, focusing on professional errors, litigation and the legal liability of doctors. This thematic core highlights the growing concern in the literature about the impact of medical malpractice on patients, but also on the judicial system.

In parallel, the yellow-orange cluster brings together terms such as „procedure", „service", „reimbursement" and „damage", suggesting a thematic axis related to administrative, economic and technical-procedural aspects of health care. This area emphasizes the pressures of the health system on health professionals, but also on the efficiency of medical care. The red cluster draws attention through the centrality of the term „burnout", accompanied by „impairment", „disability", „life" and „court". This thematic cluster expresses a relevant psychosocial dimension, indicating the emotional and professional effects of the stressful medical environment, often aggravated by the constant risk of litigation.

The blue-violet cluster, centered on terms such as „evidence", „use", „rate", „mortality" and „benefit", reflects a strengthened interest in evidence-based medicine (EBM) and in the assessment of effectiveness

and risk associated with medical action. It is an area of confluence between clinical analysis and epidemiologic approaches. Finally, the purple cluster, dominated by the term „catheter" (the most frequent and visible node in the network), indicates a strong technological direction in research, with a focus on medical devices, invasive interventions and testing their efficacy.

This bibliometric map therefore reflects a complex ecology of medical literature at the intersection of technological innovation, professional ethics, legal risk and human exhaustion. The centrality of the terms „evidence", „claim", „burnout" and „catheter" express the current tensions and priorities of contemporary healthcare - between performance, accountability and sustainability.

DISCUSSIONS

Thematic gaps identified

A key question is whether there are any gaps in the body of malpractice-related articles, and the answer derives from what is missing or under-represented in the bibliometric maps. Analyzing the two VOSviewer maps generated, together with the thematic networks and term centrality, we can identify the following major thematic gaps:

1. Lack of a clear presence of the patient as an active actor. There is a lack of inclusion of terms such as „patient perspective", „patient rights", „informed consent", „shared decision-making". The literature focuses on the physician, procedure, litigation, but not enough on the role of the patient in preventing litigation. The gap can be described by the under-representation of the ethical-legal dimension of the doctor-patient relationship.

2. Absence of the theme of institutional accountability. A look at the two images shows that terms such as „hospital policy", „systemic error", „institutional accountability", „protocol failure" are missing. The focus is on individual mistakes (e.g. doctor, surgeon), not on system failures. The gap can be described by the fact that the organizational dimension of malpractice is neglected.

3. Lack of training and error prevention terms. Terms that could not be identified are „training", „continuing education", „simulation", „safety culture". Prevention through medical education or simulation is not central in the literature, although it is essential in modern medical safety policies; training as a factor in reducing errors is poorly represented.

4. Under-representation of the international or comparative context. Generic terms such as „cross-national comparison", „healthcare systems", „legal framework" (in different contexts) seem to be missing. Many studies seem to focus on the United States, without comparative analysis between healthcare systems. There is, at least apparently, a lack of global perspective on malpractice and medical jurisprudence.

5. Lack of themes on inequalities or vulnerable groups. Terms such as „disparities", „minorities", „vulnerable populations", „gender bias" could not be found. There are no signals on how malpractice or burnout affect different social groups. Social justice and equity in medical accountability are ignored.

These thematic gaps suggest that the current literature on malpractice, burnout and medical liability is dominated by classical clinical-legal perspectives, while the systemic, educational, social and global dimensions remain insufficiently explored. They represent valuable directions for future research and strengthening the theoretical basis of forensic medicine and medical ethics.

Bibliometric analysis of the malpractice literature reveals not only recurring themes but also a number of significant gaps. First, the patient rarely appears as an active actor in the network, lacking terms related to informed consent, participation in decision-making or individual rights, suggesting a predominantly physician-centered perspective. The literature also focuses on individual responsibility, while the institutional dimension of medical error - such as systemic failures or lack of protocols - remains under-represented. Another major gap is the absence of topics related to prevention and continuing professional development, which are key areas in reducing the incidence of clinical errors. Furthermore, the international comparative perspective is rarely addressed, although legislative and structural differences between health systems can significantly influence how malpractice is defined and treated. Last but not least, issues of equity, social vulnerability and disparities in access to medical justice are almost completely missing from the network. All these gaps outline promising directions for future research, extending the analysis from individual accountability to a systemic, inclusive and holistic approach to medical ethics and jurisprudence.

The social dimension of malpractice

From the VOSviewer maps generated, some key observations about the social dimension of malpractice can be extracted, although this is more suggested than directly represented. A number of ideas can be

sketched, summarized on three levels: what is present, what is indicated and what is missing.

1. What appears in the network: signals of the social dimension. We can identify a number of suggestive terms interconnected in three areas. The first zone includes „burnout", „impairment", „disability" and „life"; the second zone includes „court", „claim", „malpractice", „defendant" and „verdict". In the last group are „physician", „liability" and „stress". These terms show that malpractice is not just a legal problem, but profoundly affects the professional, psychological and social life of the physician. Implications seem to lead to the idea that a psychosocial dimension is emphasized, where the pressure of litigation contributes to burnout and impaired mental health of physicians. Elements of social responsibility and public trust in the medical profession emerge - suggested by the relationship between „standard" and „court".

2. What the network indicates: interpretations of the social dimension. The network suggests that: malpractice affects the doctor-society relationship, through institutional pressures, lawsuits, perceived errors and public reaction. Physician burnout is a social phenomenon, not just an individual phenomenon - correlated with fear of error, litigation culture and lack of organizational support. The absence of terms such as „trust", „communication", „patient experience" suggests that the relational (social) dimension is still under-explored in the literature.

3. What is missing: current limitations in reflecting the social dimension. Although „burnout" appears, key terms for a complete social analysis are missing, such as: „patient perspective", „public perception", „media coverage", „societal expectations", „ethical culture", „communication breakdown" or „shared responsibility".

The social dimension is therefore present mainly through the effects on the doctor, but less through the consequences for the doctor-patient relationship, public trust or collective ethical implications.

The thematic maps emphasize that malpractice is perceived not only as a legal act, but also as a phenomenon with a profound social and human impact. Through the central presence of the term „burnout", the literature recognizes the psychological and cultural pressures to which physicians are subjected in a context dominated by fear of error and legal disputes. However, the social dimension is addressed almost exclusively from the professionals' perspective, while patients' voices, the collective ethical implications and broad societal perceptions of medical errors often remain in the shadows. This thematic imbalance opens promising directions for future research focused on understanding malpractice as a complex social, relational and institutional phenomenon.

In conclusion, medical malpractice is a phenomenon with a complex thematic structure, situated at the intersection of professional liability, the legal dimension and psychosocial aspects of clinical practice. The bibliometric maps analyzed highlight these components through the distribution of thematic clusters and the centrality of terms such as „physician", „claim", „burnout" and „evidence".

The figure of the doctor constantly appears at the center of the thematic networks, reflecting the multiple pressures to which he or she is subjected: demanding professional standards, the constant risk of medical error and the litigious potential of every clinical decision. This reveals a delicate balance between accountability and institutional protection.

The legal dimension of malpractice is clearly represented in the literature by terms such as „litigation", „malpractice claim", „verdict" and „defendant". However, it focuses predominantly on individual liability, leaving the systemic or collective aspects of medical malpractice in the background.

The social dimension of malpractice, although present, is insufficiently explored, being reflected mainly through the effects on the doctor („burnout", „stress", „impairment"), and less through the patient, public perception or social equity. Key concepts such as „informed consent", „shared responsibility", „patient perspective" or „public trust" are missing.

The thematic gaps identified - absenteeism of patient voices, lack of institutional accountability and under-representation of professional training - indicate important limitations of the current approach to malpractice in the scientific literature. These gaps open relevant directions for future research proposing a systemic and equitable analysis of accountability in the medical act.

The bibliometric tool VOSviewer proved useful for mapping the field, providing a synthetic and visual overview of the dominant sub-themes. The analysis of networks of terms provides a solid basis for the development of qualitative or comparative research to deepen the understanding of malpractice as a legal, clinical and social phenomenon.

Conflict of interest

The authors declare that they have no conflict of interest.

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