How defensive medicine is defined in European medical literature: a systematic review

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ABSTRACT

Objectives Defensive medicine has originally been defined as motivated by fear of malpractice litigation. However, the term is frequently used in Europe where most countries have a no-fault malpractice system. The objectives of this systematic review were to explore the definition of the term ‘defensive medicine’ in European original medical literature and to identify the motives stated therein.

Design Systematic review.

Data sources PubMed, Embase and Cochrane, 3 February 2020, with an updated search on 6 March 2021.

Methods Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses, we reviewed all European original peer-reviewed studies fully or partially investigating ‘defensive medicine’.

Results We identified a total of 50 studies. First, we divided these into two categories: the first category consisting of studies defining defensive medicine by using a narrow definition and the second category comprising studies in which defensive medicine was defined using a broad definition. In 23 of the studies (46%), defensive medicine was defined narrowly as: health professionals’ deviation from sound medical practice motivated by a wish to reduce exposure to malpractice litigation. In 27 studies (54%), a broad definition was applied adding … or other self-protective motives. These self-protective motives, different from fear of malpractice litigation, were grouped into four categories: fear of patient dissatisfaction, fear of overlooking a severe diagnosis, fear of negative publicity and unconscious defensive medicine. Studies applying the narrow and broad definitions of defensive medicine did not differ regarding publication year, country, medical specialty, research quality or number of citations.

Conclusions In European research, the narrow definition of defensive medicine as exclusively motivated by fear of litigation is often broadened to include other self-protective motives. In order to compare results pertaining to defensive medicine across countries, future studies are recommended to specify whether they are using the narrow or broad definition of defensive medicine.

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INTRODUCTION

The term defensive medicine (DM) originated in the US medical research literature in the late 1960s. DM has been associated with rising healthcare costs, overtreatment and diagnosing of patients, and decreased trust in the physician–patient relationship, leading patients to mistrust physicians’ motives and physicians to regard patients as potential plaintiffs. Moreover, physicians report a development towards decreased medical authority, decreased job satisfaction and increased inequality in healthcare as possible consequences of DM.

The original, what we have termed ‘narrow’, definition of DM states that DM is defined as ‘physicians deviating from sound medical practice due to fear of liability claims and lawsuits’. DM can be active, also called positive, for example, when ordering extra tests and procedures; and DM can be passive, also called negative, indicating that high-risk patients and procedures are avoided. In the USA, DM is considered a consequence of the legislation not adequately protecting the physicians from tort, expensive individual malpractice insurance and the fact that the risk of malpractice claims decreases with increasing use of medical resources. However, contrary to the USA, malpractice...
litigation is rare in many European countries, such as the Netherlands, Denmark, Switzerland and the UK. The medicolegal systems in these European countries do not hold physicians financially liable for malpractice or other treatment-related adverse events. Furthermore, in some European countries patients entitled to it are compensated for avoidable injuries by the government not requiring prove of healthcare provider negligence. This is known as a no-fault system. Nevertheless, DM is frequently reported in Europe and a substantial part of research on DM originates from Europe. This raises the question whether the definition of DM as deviations motivated primarily by litigation concerns holds true in European countries where physicians are not subjected to tort legislation to the same degree as in the USA. A recent study found that Danish general practitioners understand DM in a broader way, including motives without relation to fear of lawsuit. To interpret the increasing number of European studies of DM correctly, it is relevant to explore the definition of DM found in European studies. Hence, this systematic review aims to explore the definition of the term ‘DM’ in European original medical literature and to identify the stated motives therein.

METHODS
This systematic review was conducted in concordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA).

Patient and public involvement
Patients or the public were not involved in the design, conduct, reporting or dissemination of our research.

Protocol and registration
The protocol is published in BMJ Open, doi:10.1136/bmjopen-2019-034300 (see online supplemental file 1).

Amendments to the published study protocol
For clarification, the aim was rephrased from ‘To analyse variations in the definitions and understandings of the term ‘DM’ in European research articles’ to ‘To explore the definition of the term ‘DM’ in European original medical literature and to identify the stated motives therein’. Inclusion criteria 5 was simplified from, ‘DM is stated as part of the study’s aim/objective in at least one of the following ways: a. DM is included in the publication’s aim/objective. b. DM is implicitly a significant part of the aim/objective’ to ‘DM is a significant part of the aim/objective’. Inclusion criteria 6 was rephrased from ‘European data are included in the study’ to ‘The study includes data from Europe’. Eligible studies were searched on 3 February 2020, with an updated search on 6 March 2021.

Eligibility criteria
Studies were included in the systematic review based on the following criteria:

- Inclusion criteria
  1. One or both terms ‘DM’ and ‘defensive practice’ are stated in the title or the abstract.
  2. The study is available in full-text and English language.
  3. DM is performed by or related to physicians.
  4. The study is original research (quantitative, qualitative or mixed-methods primary research or systematic review) published in a peer-reviewed medical, scientific journal.
  5. DM is a significant part of the aim/objective.
  6. The study includes data from Europe.

Information sources
Eligible studies were searched in three databases: PubMed, Embase, and Cochrane, 3 February 2020, with an updated search on 6 March 2021.

Search strategy
In the database PubMed, the MeSH term ‘defensive medicine’ was combined with the entry terms ‘defensive practice’, ‘defensive practices’ and ‘medicine, defensive’. Consequently, the search string: ‘defensive medicine OR defensive practice OR defensive practices OR medicine, defensive’ was applied. Reference lists of eligible studies were manually checked for additional relevant studies. The literature search was updated before the final analysis. See online supplemental appendix 1, online supplemental file for detailed search string.

Study records
Data management
Publications found by the search strategy were exported into the reference management software EndNote and Covidence, where the systematic screening and data extraction were performed. Studies not existing in full text in the selected databases were searched at the library. Numbers of citations were found in Web of Science on 7 May 2021.

Selection process
To ensure inter-rater reliability and compliance with the inclusion criteria, in a two-phase screening, two researchers (NB and PLS) independently reviewed the full texts of all potentially relevant studies for eligibility. Disagreements were resolved through discussion in the research group until consensus was reached.

Data collection process
Data extraction
NB and PLS independently registered the following information for all eligible studies: name of the first author, year of publication, research design, country of origin, sample size, medical specialty investigated, number of citations, study objective, any stated definition of DM, and all motives regarded as defensive in the study.

Data synthesis
For each study, the stated definition of DM was reviewed and assessed by all the six researchers. The stated
definitions were extracted if they comprised constructions such as: ‘DM is...’; ‘DM is defined as...’; ‘DM refers to...’ or ‘DM is characterised by...’. If a study did not explicitly state a definition of DM, an interpretation of the study’s introduction to DM was made and excerpts to support the interpretation were extracted. If a study’s definition of DM was stated with references, these references were recorded and, by chain searching, followed back to the original source. The stated definitions of DM were categorised according to the included actions (eg, ‘deviation from sound medical practice’) and motivations (eg, ‘fear of lawsuit’) using qualitative content analysis.30

Next, any motives regarded as defensive were identified in the text, tables, figures as well as in the data collection methods in order to examine whether they differed from the motives stated in the study’s definition of DM. Studies where researchers differed in the extraction and categorisation of DM motives were discussed among all researchers sometimes leading to rephrasing, merger, or de novo creation of categories. This was an iterative process until consensus could be reached.

Quality assessment
The researchers independently assessed the quality of the studies. Qualitative studies were assessed using the Critical Appraisal Skills Programme.31 Quantitative, mixed-methods and cross-sectional studies were all assessed using the Cross-Sectional Appraisal Tool with questions adapted from Guyatt et al.32 33 Any relation between the studies’ quality and definition of DM were assessed.

Outcomes and prioritisation
The main outcome is categorisation of the identified definitions of DM in the European medical studies based on actions and motives for practising DM. Furthermore, studies applying different definitions of DM are compared regarding year of publication, country, medical specialty, study design, research quality and number of citations.

RESULTS
Study selection and characteristics
We identified 151 studies on DM worldwide meeting inclusion criteria 1–6, of which 101 studies were from countries outside of Europe (figure 1). The studies were published during 1972–2021. Among those, the 50 European studies included in this systematic review3 3 5–8 16–20 22–25 31–68 were published during 1995–2020 with a steep increase in publications in the recent years (table 1, figure 2).

The European studies were performed in 12 different countries, mainly UK (n=12), Italy (n=10) and Spain (n=6). One study included data from 74 countries36 and one study only mentioned the continents included.61 The studies encompass 39 medical specialties with general practice (n=14), obstetrics and gynaecology (n=12), emergency department (n=9), general surgery (n=8) and anaesthesiology (n=8) emerging as dominant sources of research data. Forty-eight studies (96 %) have a cross-sectional design, of which 37 (74 %) are surveys, 6 (12 %) are interview studies and 3 (6 %) are combined survey and interview studies. One study is an evolutionary game theory and one study is a theoretical analysis model.

No systematic reviews regarding DM were identified. The studies have various aims, including how physicians practice DM, the prevalence of DM, the cost of DM, the motives/reasons for practising DM, medical overuse, the adverse effects of DM, medicolegal systems, impact of complaints and litigations, how complaint processes can be improved, the quality and cost of healthcare, the experience of regret following diagnostic decisions, solutions to reduce DM, doctors’ well-being, low-value medical practice, and how DM is understood (online supplemental table 1).

Definitions of DM
We identified the following two main categories of DM definitions (online supplemental table 1).

1. A narrow definition of DM as health professionals’ deviation from sound medical practice motivated by a wish to reduce exposure to malpractice liability, n=23 (46 %).
2. A broad definition of DM adding … or other self-protective motives, n=27 (54 %).

Based on the 27 studies applying a broader definition of DM, we identified other self-protective motives different from fear of malpractice liability influencing DM. We grouped these additional self-protective motives into the following four categories.

Fear of patient dissatisfaction
Panella et al,3 Tanriverdi et al45 and Osorio et al63 state that having a poor physician–patient relationship or a challenging communication with patients will motivate physicians to conduct DM in order to establish a better relationship to the patient. Tanriverdi et al45 suggest that physicians’ fear of exposure to patients’ verbal and/ or physical violence motivates them to conduct DM. According to Tanriverdi et al,45 Rohacek et al67 and Osorio et al63 physicians feel pressured to practice DM due to demands from an increasing population of ‘consumeristic’ patients and/or relatives who request specific more or less indicated medical tests and examinations. Osorio et al, p. 46463 suggest that DM ‘may contribute to building trust between professionals and patients’. Panella et al8 state that DM can be performed to increase patient satisfaction, reduce patient risk and put the patients’ needs at the centre. Likewise, Van Boven et al,16 Symon60 and Elli et al38 find that physicians’ wish to reassure the patient was a motive for them practising defensively.

Fear of overlooking a severe diagnosis
Rohacek et al,17 Tebano et al46 and Osorio et al63 find that fear among physicians of missing out on something, or of making medical errors that have serious consequences for the patient, leads physicians to act defensively. Fear of receiving complaints or lawsuits following such errors...
are not necessarily part of the physicians’ main concerns as stated by Panella et al, p. 465: ‘A second victim is likely to be a physician that experiences liability. On the other hand, a physician can be a second victim with or without having been sued. We believe that being a second victim is a better predictor of practising DM than the mere liability experience and exposure, because it better measures the personal anxiety and emotional toll of physicians that harmed their patients and suffered for their own actions’. In line with this argument, Summerton22 states that diagnostic difficulties and uncertainty motivate physicians to act defensively. Moreover, Müller et al62 state that physicians’ insight into colleagues’ incident reports and experiences contributes to an increase in defensive practice. Lindenthal et al, p. 176162 define DM as ‘increasing referrals and diagnostic tests for fear of missing something or making the wrong diagnosis’.

**Fear of negative publicity**

Panella et al,3 Catino and Celotti,6 Ramella et al25 and Passmore and Leung46 state that physicians act defensively due to fear of negative publicity and mass media being negatively biased towards physicians. Moreover, Ramella et al, p. 42425 highlight that ‘more than 68% of physicians stated that the climate of opinion that exists towards doctors was one of the major issues for practising DM, and there is an upward trend with regard to more experienced respondents’. Physicians’ fear of compromising their professional reputation, image and/or career is thus seen as contributing to DM.3 6 25 47 51

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**Figure 1** Flow chart of study selection process

Inclusion criteria: (1) One or both terms ‘defensive medicine’ and ‘defensive practice’ are stated in the title or the abstract. (2) The study is available in full-text and English language. (3) Defensive medicine is performed by or related to physicians. (4) The study is original research (quantitative, qualitative or mixed-methods primary research or systematic review) published in a peer-reviewed medical, scientific journal. (5) Defensive medicine is a significant part of the aim/objective. (6) The study includes data from Europe, USA, New Zealand, China, Japan, Iran, Israel, Sudan, Canada, Australia, South Africa, Singapore, India, Hong Kong, Brazil and one study from both USA, Canada and South Africa.
Table 1  Studies included in the analysis listed after year of publication

| Study                        | Year of publication | Country of origin | Specialty                              | Study design                  | Sample size, N | No of citations 7 May 2021 |
|------------------------------|---------------------|-------------------|----------------------------------------|-------------------------------|----------------|---------------------------|
| Summerton et al⁸               | 1995                | UK                | General practice                       | Cross-sectional study (survey) | 300            | 110                       |
| Van Boven et al⁴⁶              | 1997                | The Netherlands   | General practice                       | Cross-sectional study (survey) | 18             | 19                        |
| Lindenthal et al⁴⁲             | 1999                | The Netherlands and USA | Physicians*                                | Cross-sectional study (survey) | 2355           | 6                         |
| Summerton et al⁷²              | 2000                | UK                | General practice                       | Cross-sectional study (survey) | 339            | 26                        |
| Symon et al⁵⁴ (Litigation and defensive clinical practice: quantifying the problem) | 2000                | UK and Scotland | Obstetrics and Midwifery               | Cross-sectional study (survey) | 2001           | 24                        |
| Symon et al⁵³ (Litigation and changes in professional behaviour: a qualitative appraisal) | 2000                | UK and Scotland | Obstetrics, Neonatology and Midwifery | Cross-sectional study (interview) | 30             | 11                        |
| Vimercati et al⁵⁷              | 2000                | Italy             | Obstetrics                             | Cross-sectional study (survey) | 63             | 23                        |
| Passmore et al⁵⁹              | 2002                | UK                | Psychiatry                             | Cross-sectional study (survey) | 96             | 34                        |
| Brilla et al²⁴                | 2006                | Germany and USA   | Neurology                              | Cross-sectional study (interview + survey) | 67            | 11                        |
| Catino et al⁴                 | 2009                | Italy             | General practice, general surgery, Specialist (uncategorised), Anaestheology | Cross-sectional study (survey) | 431            | 19                        |
| Steurer et al¹⁸                | 2009                | Switzerland      | General practice, Internal medicine    | Cross-sectional study (survey) | 231            | 15                        |
| Feess⁹                        | 2012                | Germany           | Physicians*                            | Theoretical analysis, model   | 0              | 11                        |
| Rohacek et al¹⁷                | 2012                | Switzerland      | Emergency department                   | Cross-sectional study (survey) | 140            | 29                        |
| Elli et al⁴⁸                  | 2013                | Italy             | Gastroenterology                       | Cross-sectional study (survey) | 64             | 22                        |
| Ortashi et al⁴⁶               | 2013                | UK                | Medicine, surgery, obstetrics and gynaecology, paediatrics, other specialties | Cross-sectional study (survey) | 204            | 52                        |
| Domingues et al⁴⁷             | 2014                | Portugal          | Obstetrics                             | Cross-sectional study         | 168 cases      | 4                         |
| Garcia-Retamero et al¹²       | 2014                | Spain             | General practice                       | Cross-sectional study (survey) | 160            | 25                        |
| Litchfield et al⁴³             | 2014                | UK                | General practice                       | Cross-sectional study (survey) | 11             | 2                         |
| Renkema et al⁴²                | 2014                | The Netherlands   | Physicians*                            | Cross-sectional study (survey) | 22             | 16                        |
| Solaroglu et al⁴¹              | 2014                | Turkey            | Neurosurgery                           | Cross-sectional study (survey) | 404            | 9                         |
| Bourne et al⁴⁵                | 2015                | UK                | Physicians*                            | Cross-sectional study (survey) | 7926           | 72                       |
| Motta et al⁴⁴                 | 2015                | Italy             | Otolaryngology                         | Cross-sectional study (survey) | 100            | 6                         |
| Osti et al⁴⁷                  | 2015                | Austria           | Orthopaedic surgery, trauma surgery, radiology | Cross-sectional study (survey) | 183            | 12                        |
| Ramella et al²⁵                | 2015                | Italy             | Radiation oncology                     | Cross-sectional study (survey) | 361            | 13                        |
| Tanriverdi et al²⁵             | 2015                | Turkey            | Oncology                               | Cross-sectional study (survey) | 146            | 1                         |

Continued
| Study                  | Year of publication | Country of origin | Specialty                          | Study design                  | Sample size, N | No of citations 7 May 2021 |
|-----------------------|---------------------|-------------------|------------------------------------|-------------------------------|---------------|--------------------------|
| Antoci et al<sup>16</sup> | 2016                | Italy             | Physicians*                        | Evolutionary game theory      |               |                          |
| Bourne et al<sup>36</sup> | 2016                | UK                | Physicians*                        | Cross-sectional study (survey) | 100           | 17                       |
| Panella et al<sup>48</sup> | 2016                | Italy             | 13 specialties†                    | Cross-sectional study (survey) | 1313          | 10                       |
| Assing Hvidt et al<sup>9</sup> | 2017                | Denmark           | General practice                   | Cross-sectional study (interview) | 28            | 15                       |
| Bourne et al<sup>34</sup> | 2017                | UK                | 11 specialties‡                    | Cross-sectional study (survey) | 6144          | 9                        |
| Olcay et al<sup>45</sup> | 2017                | Turkey            | Cardiology                         | Cross-sectional study (survey) | 250           | 0                        |
| Panella et al<sup>3</sup>   | 2017                | Italy             | 13 specialties†                    | Cross-sectional study (survey) | 1313          | 19                       |
| Vandersteegen et al<sup>53</sup> | 2017              | Belgium           | 31 specialties§                    | Cross-sectional study (survey) | 508           | 7                        |
| Yan et al<sup>20</sup>  | 2017                | The Netherlands   | Neurosurgery                       | Cross-sectional study (survey) | 45            | 9                        |
| Kucuk<sup>40</sup>      | 2018                | Turkey            | Obstetrics and gynaecology         | Cross-sectional study (survey) | 108           | 10                       |
| Mira et al<sup>67</sup> | 2018                | Spain             | General practice, paediatrics and nurses | Cross-sectional study (survey) | 1904          | 6                        |
| Tebano et al<sup>56</sup> | 2018                | 74 countries¶     | Infectious diseases and clinical microbiology | Cross-sectional study (survey) | 830           | 6                        |
| Assing Hvidt et al<sup>9</sup> | 2019                | Denmark           | General practice                   | Cross-sectional study (interview) | 28            | 2                        |
| Bourne et al<sup>95</sup> | 2019                | UK                | Obstetrics and gynaecology         | Cross-sectional study (survey) | 3073          | 8                        |
| Laarman et al<sup>61</sup> | 2019                | The Netherlands   | General practice, medical specialists and Other. | Cross-sectional study (survey) | 210           | 2                        |
| Aranaz Andrés et al<sup>58</sup> | 2020              | Spain             | Surgeons and anaesthetist          | Cross-sectional study (survey) | 370           | 1                        |
| Calikoglu et al<sup>49</sup> | 2020                | Turkey            | 12 specialties**                   | Cross-sectional study (interview + survey) | 190           | 0                        |
| Ferorelli et al<sup>60</sup> | 2020                | Italy             | Emergency department               | Cross-sectional study         | 100 cases     | 1                        |
| Gadžradj et al<sup>61</sup> | 2020                | Europe, Africa, Asia and Oceania, North America and South America | Neurosurgery and other | Cross-sectional study (survey) | 490           | 2                        |
| Müller et al<sup>62</sup> | 2020                | Germany           | General practice                   | Cross-sectional study (survey) | 29            | 1                        |
| Osorio et al<sup>83</sup> | 2020                | Spain             | 31 specialties††                   | Cross-sectional study (survey) | 184           | 2                        |
| Pausch et al<sup>68</sup> | 2020                | Germany           | General practice                   | Cross-sectional study (survey) | 135           | 0                        |
| Vargas-Blasco et al<sup>64</sup> | 2020              | Spain             | Urology                            | Cross-sectional study (survey) | 202           | 0                        |
| Vizcaíno-Rakovski et al<sup>65</sup> | 2020            | Spain             | Physicians*                        | Cross-sectional study (survey) | 282           | 0                        |
| Young et al<sup>66</sup>  | 2020                | UK                | Ten specialties‡‡                  | Cross-sectional study (interview) | 28            | 0                        |

Continued
Unconscious DM

The above-listed categories capture motives behind DM as a conscious act performed by the physician. However, Brilla et al., Küçük, Motta et al., Panella et al., Solaroglu et al., Vandersteegen et al., Calikoglu and Aras, and Olcay et al. call attention to how DM might exist as an unconscious phenomenon, that is, physicians conduct DM on a daily basis without reflecting on why and how they do it. Supporting this argument, Yan et al., p. 2347 stated that ‘DM has partly become ingrained in the institutional culture of some clinics’. Therefore, the prevalence of DM is challenging to estimate, as Küçük, p. 204 stated: ‘Naturally, the conscious practice of DM could be investigated in our study. We do not know the dimensions of unconscious DM practice in this regard’.

Stated definitions

The chain search revealed that most studies refer to the same two narrow definitions of DM: 8 (16%) studies refer to Office of Technology Assessment (OTA), 3 studies (6%) refer to Hershey 11 and 16 studies (32%) refer to both definitions (online supplemental table 1), online supplemental appendix 2, (online supplemental file). Seventeen studies (34%) refer to OTA or Hershey, but nevertheless apply the broad definition of DM. Thirteen (26%) studies refer to other studies than OTA and
The report rejected that the sole purpose of DM. OTA presented a definition in their report from cant influencers on how European researchers define broader understandings of DM. Our systematic review exposure to malpractice liability (red.) opening for a result, the definition of DM was rephrased as follows:

"The definition of DM was to protect the physicians against lawsuits. As generally originates from the same two references: OTA10 The definitions presented in this systematic review, The definition of DM was used."

Our results show that in the European scientific medical literature, already since the first studies in the late 1990s, DM has had a narrow and a broad definition. The narrow definition implies that defensiveness is motivated by the wish to reduce the health professional’s exposure to malpractice claims while the broad definition includes other self-protective motives. The self-protective motives included in the broad definition include, among others, fear of patient dissatisfaction, fear of overlooking a severe diagnosis, and fear of negative publicity. Furthermore, several studies point to unconscious DM being deeply culturally imbedded and without relation to legal concerns. No pattern was found between studies applying the narrow or broad definition regarding year of publication, country, medical specialty, study design, number of citations or research quality.

The definition of DM
The definitions presented in this systematic review, generally originates from the same two references: OTA10 and Hershey.11 These US sources are the most significant influencers on how European researchers define DM. OTA presented a definition in their report from 1994, p. 3.10 The report rejected that the sole purpose of DM was to protect the physicians against lawsuits. As a result, the definition of DM was rephrased as follows: ‘primarily (but not necessarily solely) to reduce their exposure to malpractice liability (red.)’ opening for broader understandings of DM. Our systematic review shows that 27 out of the 50 European studies on DM apply a definition of DM where deviations from sound medical practice are considered as DM also if motivated solely by other self-protective motives than fear of patient complaints.3 6–8 16 17 20 22–25 38 40 42 44 45 47–49 51 53–56 59 62 63

We often encountered the abovementioned additional motives in the studies’ questionnaires. Some of the additional motives may to some extent be associated with fear of lawsuit. As an example, the category fear of patient dissatisfaction may be a result of a token threat of a complaint, even if it is not clarified in the study. If this is the case, the authors should bring explicit attention to this and, for example, distinguish between DM motivated by fear of litigation and fear of patient dissatisfaction. Other identified motives such as fear of overlooking a severe diagnosis clearly goes beyond a fear of litigation and can be seen as a motive that is related to the concept of becoming a second victim, that is, physicians suffering and feeling personally responsible from an adverse patient event.48

Few researchers explicitly question the narrow DM definition nor discuss the concept of DM. When researchers do not agree on the definition of DM, it may result in an inability to compare studies. Our findings question whether the DM researched in many European studies can rightly be termed DM. Our systematic review indicates that a revised definition of DM may be needed in European countries to capture the right meaning of the medical actions that are being investigated under the label of ‘DM’. Using the narrow definition of DM without reflecting on its adequacy may lead to misconceptions and consequently result in an underestimation of DM. A definition is a statement or description of the exact meaning of a word or concept.69 We have shown that the term DM is not a uniformly understood term—neither analytically nor empirically. In a scientific contribution from 2020, Bester70 examines DM from an ethical and professional perspective. In order to define DM, Bester70 outlines what DM is and what it is not. The need to describe what DM is not, in order to understand the concept, emphasise the growing necessity of using precise and explicit conceptualisations of DM and descriptions of how the term is understood, when it is used and in which particular research context.

The complex phenomenon of DM
DM can be perceived as a complex phenomenon comprising a number of actions provoked by various motives, dependent on contextual factors that make it difficult to compare results pertaining to DM across countries.38 48 Specific contextual factors derive from the underlying medicolegal, welfare or healthcare systems.38 48 Two European studies from 2020 find that the debates on DM are both ‘confusing’71 and ‘slippery’72 which emphasises the complexity of DM. An increased understanding of DM, and the societal and cultural factors that have contributed to its existence, is essential in order to raise the level of consciousness in clinicians of why they
act defensively. As highlighted in some of the studies above, the practice of so-called unconscious DM is likely to lead to an underestimation of the prevalence of DM. Awareness of the aspects of DM calls for a public debate and professional discussion among physicians within and across medical specialties.

Our results have expanded the definition of DM identifying numerous additional motives for practising DM. This, we hope, will contribute to an improved understanding and more nuanced discussion of the phenomenon of DM. According to several European studies, there is a need for a more detailed and clear definition of DM in order to understand the internationally widespread phenomenon more thoroughly.8 48 31 34 35

Strength and limitations
This systematic review is based on a systematic and thorough search of the literature on DM strictly using the PRISMA guidelines which increases the validity and reliability of the results.

Although there are multiple languages used in Europe, only studies written in English have been included. However, most high-ranking scientific journals reporting on DM are written in English and we specifically aim to support future research on DM targeting an international research audience. Furthermore, DM was originally conceptualised in English.

A limitation of this systematic review is the limited number of included synonyms of DM. Other synonyms were discussed, such as defensive treatment, defensive testing, defensive behaviour, overtreatment, unnecessary treatment, unnecessary medical care and defensive medical decision making. These terms were not included to secure the highest possible accuracy of the research question and definition of DM and thus to avoid confusion of different terms. However, during the last fifty years, other synonyms for DM may have been used increasingly in some countries or during some time periods. Additionally, the exclusion of studies due to unavailable full text or wrong study design may have left out various reflections and comprehensions of DM.

Studies where DM is a significant part of the aim/objective were included in this systematic review. This inclusion was based on the researchers’ assessment that cannot be characterised as objective, thus other researchers might not assess and include in exactly similar ways.

As this is the first study systematically studying the definition of DM in European medical literature, it was not possible to compare our results with other similar studies.

Future research
The phenomenon of DM has only been examined in few qualitative studies, cf. table 1. More qualitative study designs are needed, using different types of data generation methods, for example, observation of the clinician-patient interaction in the clinic, individual interviews or focus group interviews with clinicians across specialties and/or with patients in order to investigate the understandings of the term and the perceived consequences of DM for the physician–patient relationship and for the physician’s job satisfaction. Insights from studies employing these research designs will enable future work with clarifying and reconceptualising the phenomenon of DM. The geographical delimitation to Europe excluded countries like New Zealand and Canada that has medicolegal systems like that in the UK.73–75 DM studies from these countries are likely to deviate from the original, narrow definition of DM in ways similar to what we have demonstrated in the European studies. However, it is beyond the scope of this systematic review to identify and analyse the underlying medicolegal systems of countries worldwide. Investigating the interrelationship between medicolegal system and DM in future research could contribute to an understanding of how medicolegal systems influence the motives for practising DM.

CONCLUSION
This systematic review addresses the variations in the definition of the term ‘DM’ in European studies and the motives for practising DM. As such, it provides a broader and more nuanced definition of the complex and non-beneficial phenomenon of DM, hereby supporting the quality of future research on DM.

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Contributors
NB: conceptualisation, protocol design, development of search strategy, study screening and inclusion, data extraction, quality assessment, data analysis/synthesis, drafting and writing of protocol and manuscript, guarantor. PLS: conceptualisation, development of search strategy, study screening and inclusion, data extraction, quality assessment, data analysis/synthesis, designing figures, review and editing of protocol and manuscript. EAH: conceptualisation, protocol design, study inclusion, data extraction, quality assessment, data analysis, review and editing of protocol and manuscript. HG: conceptualisation, protocol design, study inclusion, data extraction, quality assessment, data analysis, review and editing of protocol and manuscript. MKA: conceptualisation, protocol design, study inclusion, data extraction, quality assessment, data analysis, review and editing of protocol and manuscript. JL: conceptualisation, protocol design, study inclusion, data extraction, quality assessment, data analysis, review and editing of protocol and manuscript.

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Supplemental material
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