

# A denigration curve to delineate the spread of communication about obstetric staff errors in Italy and its practical application

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## Abstract

**Background.** Mistrust of doctors and the desire for compensation are driving a rise in malpractice litigation worldwide.

**Aim.** To estimate the extent to which Italians view birth complications as malpractice in obstetric care, and how widespread this perception is.

**Method.** WhatsApp® and Facebook® contacts of one of the authors were invited to respond to an online questionnaire. The answers of 265 Italian respondents were used to estimate how common the perception of obstetric staff errors is and how this perception spreads over time: the denigration curve. To test if the denigration curve is reliable, the curve has been plotted along with the trend of the rate of litigation in Italy.

**Results.** Almost a 50% of respondents deemed that birth complications are due to obstetric staff errors. The likelihood of the perception that one has experienced a birth complication was 64.5%. The communication of obstetric staff error seemed low overall among the respondents. The denigration curve shape is almost coincident with the curve of claim rates in Italy, proving that it would be reliable.

**Conclusion.** The respondents provided an estimate of the rate of birth complications that was higher than the real occurrence rate, and attributed these complications to obstetric staff errors. The denigration curve could predict whether and when there might be litigation related to any birth complications (both error related and non-error related).

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## Introduction

In the late 1993, a Canadian anesthesiologist published his experience on a case of an amniotic fluid embolism titling: "Medicolegal Nightmare: a Tragic Case, a Needless Trial" (1). The article reported by the colleague underlined his legal ordeal with multiple lawsuits after his patient suffered an amniotic fluid embolism during a cesarean section, which left her brain dead. Amniotic fluid embolisms occur very rarely, are very hard to diagnose and treat, and are acknowledged to present poor prognosis (2). The colleague (1)

was able to promptly recognize and treat the amniotic fluid embolism, and in the end, he was judged not responsible for the patient's adverse outcome. Even so, the colleague concluded that "even if you win you can still lose" because his vindication in court was not accepted in the small town where he practiced; the local community stigmatized him as incompetent and guilty for his patient's tragedy.

The unfortunate conclusion of the story led the authors of this article to postulate that malpractice litigation is mainly motivated by patients' perceptions about the physicians' culpability (or lack thereof) for adverse outcomes in their practices. In this sense, true errors of the physicians are not perceived as malpractice if people do not observe adverse outcomes, while when there are bad outcomes (specifically, the most severe bad outcomes) the physician is perceived as guilty, even though people do not know the facts of the case. Such a kind of criminalization has been proved in the case published in (3), and have been also issued by authors in literature so far (4-6).

In Italy, according to the 2015 "MedMal" insurance report (7), there has been an increase in the number of malpractice claims. This rise can be attributed to several factors. First, there seems to be systematic distrust of physicians, with the belief that these professionals do not act in the best interests of their patients (8). Thus, the primary interest in malpractice lawsuits is not so much to receive compensation for harm, but to punish the physician (3, 5, 6).

Second, the media plays a role, with its suggestions that medical errors are common (9) and that it is easy to obtain compensation, though they fail to specify how compensation will meet the expectations of claimants.

Third, Italian jurisprudence tends to posit a broad framework of malpractice liability, and to seek compensation from various actors, though it often fails to assess causality in order to identify who is truly guilty in the case (10-12).

Fourth, like the media, Italian jurisprudence also seems to reflect a belief that it is easy to obtain malpractice compensation (13,14). The last Italian law (15) simplified rules on compensation for adverse outcomes, but this has not reduced the number of malpractice claims.

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This increase in malpractice litigation has harmed both physicians and patients. The former fear the impact of patient complaints on their practice and personal life. Following a complex juridical framework, Italian law seeks to attribute liability to several actors (10), and doctors find themselves subject to lawsuits whose meaning and outcome they struggle to understand (16). This situation harms not only the physicians but also patients, because in order to protect themselves from this irrational system of accusation, doctors practice so-called defensive medicine, which leads to substandard treatment of patients and increased expenses for them and the healthcare system (17-19).

To summarize, “to err is human, to apologize is hard” (20) and, in Italy, also devastating in terms of lawsuits. There is a vicious cycle of defensive medicine and malpractice lawsuits (21): physicians who fear litigation practice defensive medicine, which only exacerbates the bad perceptions and feelings of patients, and makes them more apt to sue when problems arise.

The aim of this study was to estimate the extent to which Italians view birth complications as malpractice in obstetric care, and how widespread this perception is.

## Materials and Methods

The two end points of this study were to calculate the PERCEIVED probability of errors of obstetric caregivers and to assess variations in this PERCEIVED probability in terms of time.

To meet these end-points, we conducted a Computer Assisted Web Interview (CAWI) with sixteen questions, four of which requested personal data (Table 1). A questionnaire was constructed using Google Forms®, and a link was shared with the Facebook® and WhatsApp® contacts of author CA between December 2019 and January 2020, with the invitation to share it in turn with their own contacts. The authors chose to share the questionnaire this way in order to receive feedback from a sample of adult in Italians (respondents under fast 18 years old were excluded). In accepting to answer, respondents agreed that their answers and personal data would be treated anonymously. The questionnaire was set up so that the authors would not know who answered in a certain way. This implies that privacy of respondents was preserved according to Italian law, but at the cost of not being able to know which characteristic of those interviewed was linked to the answers provided. A time frame of three months was set for collecting answers. Questions were administered from the first one to the last one listed in Table 1, and respondents gave their permission to participate before answering.

The questions were formulated using the expression “complication” rather than “adverse event,” because “complication” encompasses “adverse event,” defined as an injury to the patient’s health, related to care received, rather than to disease evolution (22), and because respondents would not understand the distinction. The reasoning behind this choice was the following: people generally view every complication as an adverse event, and every adverse event as an error by the medical professional. Thus, it is necessary to know the extent to which people believed they have experienced a

complication, and then calculate the real probabilities of adverse events and errors. Thus, for example, when a woman gives birth, she bleeds. A blood loss greater than 500 ml (post-partum hemorrhage) is a complication. The medical staff deal with the complication by giving the patient a blood transfusion, and this has a side effect. There is an adverse event (the need for a blood transfusion with a side effect) but there has been no error by the medical staff. Instead, in a situation in which the medical staff do NOT face the problem well and there is need for a blood transfusion, which causes harm through a side effect, this is an adverse event caused by medical staff error. Patients do not understand this distinction. Has patient lost more than 500 ml of blood? Well, it is malpractice. She may or may not sue. Legal action is not pursued because no harm has been suffered, and patient is not hostile toward the physician, who in any case committed an error.

So, to summarize, given that respondents would not know the distinction in meaning between “complication” and “adverse event,” we chose to use the word “complication” in question A to obtain data for estimating the rate of perception of an “adverse event.” First, we estimated the perception of obstetric staff error in case of any complications, following these steps: we combined the mean rate of answer A ( $\bar{a}$ ) with a positive answer to Question H ( $h$ ):  $\bar{a} \cdot h$ . Then, we recalculated the rate of severe, preventable adverse events using data and information from Tartaglia et al (22), who examined 7573 medical charts in Italy and reported that 4.4% of all the adverse medical events were in obstetrics. They also reported that a half of all adverse events were due to errors. The estimate of 9.824 true, severe, and preventable adverse birth events out of 7573 patients ( $E=0.1\%$ ) was calculated by applying the proportion of 0.076 (208 severe and fatal events out of 2754 adverse events) as extrapolated by the Heinrich pyramid of errors customized for healthcare organizations (23).

Finally, in the case of a severe, preventable adverse birth event, we estimated the probability ( $E_r$ ) of believing that obstetric staff was at fault (when error had occurred) by using the mean answer scores for Question A ( $\bar{a}$ ), combined with positive answers to Question H ( $h$ ) and with the true rate of severe, adverse preventable birth events in Italy:  $E_r = \bar{a} \cdot h \cdot E$ .

To estimate the probability that people will share their perceptions of staff error, we applied the first, simpler formulation of the Reed and Frost rule (24), an exponential function developed for assessing the spread of infectious diseases over time. The choice was done because information (specifically, bad information) spreads as a viral infectious disease (25). The Reed and Frost rule assumes that each infected subject may transmit the disease to susceptible subjects in a given population over time. With the ongoing of diseases, susceptible subjects proportion will reduce because some subjects became refractory to the disease and this proportion is used for modeling the spreading of diseases, knowing the numerosity of the population and the probability to be infected in each contact. The latter probability, concerning the spread of obstetric staff errors communication, is unknown. Therefore, for calculating the probability of spread of the perception of obstetric staff malpractice, we should know at different time how many

Table 1. List of answers, results, descriptive statistics on the aggregate level.

Part 1. Outcome questions.		
Questions	Answers	Results
A) From 0 to 100, to what extent do you think that birth complications are due to obstetric staff error?	0 to 100 score allowed	mean 49.8% (0.498);
B) From 0 to 100, to what extent do you think good obstetric outcome is due to good obstetric staff care?	0 to 100 score allowed	mean 68.7% (0.687)
C) In the case of a birth complication, how many people would you tell that it was due to obstetric staff error, within a month?	Open answer	mean 34.06
D) In the case of a birth complication, how many people would you tell that it was due to obstetric staff error, within two months?	Open answer	mean 197.6
E) In the case of a birth complication, how many people would you tell that it was due to obstetric staff error, within six months?	Open answer	mean 467.62
F) In the case of a birth complication, how many people would you tell that it was due to obstetric staff error, within a year?	Open answer	mean 725.84
G) If someone tells you about a birth complication, to what extent do you think it is due to obstetric staff error?	0 to 100 score allowed	mean 52.0% (0.520)
H) Do you think you have experienced a complication during birth?	Yes/No	Yes: 64.5% (0.645); h
I) Do you know someone who has experienced a birth complication?	Yes/No	Yes: 81.5% (0.815)
L) After a birth complication, how likely do you think people are to sue for malpractice?	0 to 100 score allowed	mean 45.0% (0.450)
M) If you experienced any birth complication, how likely would you be to sue for malpractice?	0 to 100 score allowed	mean 54.5% (0.545)
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Part 2. Demographic information.		
Questions	Answers	Descriptive statistics
N) Where do you live?	North/Center/South and islands of Italy	North: 83 (31.3%) Center: 111 (41.9%) South and islands: 71 (26.8%)
O) How old are you?	Open answer	median 36 (range 18 -71)
P) What is your gender?	Male Female	50 (18.9%) 215 (81.1%)
Q) What is your job?	Open answer	Students: 22 (8.3%) Workers: 9 (3.4%) Doctors: 38 (14.3%) Freelancers: 18 (6.8%) Teachers/Professors: 29 (10.9%) Nurses: 8 (3.0%) Employees: 34 (12.8%) Housewives and mothers: 27 (10.2%) Lawyers: 8 (3.0%) Unemployed: 11 (4.2%) Others: 61 (23.0%)
R) How do you communicate any birth complications?	Open answer	Social networks: 10 (3.8%) Verbally: 245 (92.5%) Phonically: 10 (3.8%)

people are “susceptible” to believing that staff error caused an adverse birth event, and how many people would believe that obstetric staff committed errors - the “infected” subjects of the Reed and Frost rule. We estimated the “susceptible” people from answers C, D, E, F at each point in time (one month, two months, six months, and a year). Similarly, we estimated the percentage of “infected” subjects of the Reed and Frost rule (24) from answers to questions C, D, E, and F (In the case of a birth complication, how many people would you tell that it was due to obstetric staff error, within a month, two months, six months, a year?) applying the Pluchino et al (26) model of “opinion changing rate” which is based on evidence that there is a predictable pattern to the human behaviour of changing opinion. Extrapolating from the differences in each respondent’s answers to questions A and G, we can quantize a quantitative and qualitative fluctuation of error and no error opinion. Therefore, from “susceptible” people, we were able to calculate a probabilistic trend that describes the PERCEIVED belief of obstetric staff error: we were able to obtain the proportion of “infected” people, that is those who, having received communication about an error involved in an obstetrics complication, believe that the staff truly committed an error. This estimate of the “infected” was performed at the times of one month, two months, six months and a year. The proportion of the “infected,” combined with the estimates of the frequency of severe and preventable adverse events ( $E_r$ ) determines the probabilistic trend of the perception that there was an error in the case in which the error was actually committed and that it caused an adverse event.

Trough questions from A to F we sought to assess the empathetic footprint of people answering the CAWI, and then to use this estimate based on the “wisdom of the crowd” to assess the empathetic diffusion of bad opinions along with communication of birth complications.

Libre Office 7.0 Calc© was used to perform the calculations.

The School of Law Council of the University of Camerino (Italy) approved the research project on 6 November 2019. Studies based on CAWI, in agreement with Italian law, do not need any ethical opinion.

## Results

Two-hundred and sixty-five respondents answered all the questions in the questionnaires and one person returned the questionnaire without answers but with strongly worded insults against the questionnaire authors, without any explanation of his or her reasons. From this bad feedback, we decided to set the rate of 1 out of 266 respondents (0.4%), as the proportion of people who had a strong belief in obstetric staff malpractice, independently of any adverse birth outcome.

Most of the respondents were women (81.1%), mainly from central Italy. Most reported that they had heard about a birth complication by word of mouth.

Table 1 reports the results of answers from the 265 respondents. Applying the Heinrich pyramid of errors customized for healthcare organizations (23), we can estimate the true rate of preventable birth “complications” (mild adverse

events along with other complications with no consequences) due to obstetric staff error as 0.311 (31.1%, 95% confidence intervals (CI) 27.7%-32.5%) from the Tartaglia et al obstetric severe adverse events rate ( $E$ ) of 0.1% in Italy (22). Heinrich was the first to demonstrate that there is a fixed ratio between mild and severe adverse events. Thus, knowing this ratio, if one knows the number of mild adverse events one can calculate the severe ones, and vice versa. This rate does not overlap with the estimate of 0.498 (49.8%, 95% CI 43.8%-55.8%), extracted from the mean score of Question A answers (Table 1) – the first end-point.

The rate extracted from Question B about the merit of obstetric staff in cases of favorable birth outcomes (NO “complications”) is 0.687 (68.7%). Therefore,  $1-0.687=0.313$  (31.3%, 95% CI 25.7%-36.9%) would be another, more objective, estimate of obstetric staff error rate. The 31.3% rate of errors of obstetric staff does not overlap with the mean of answers to Question A (0.498 – 49.8%), being more in line with the true rate of obstetric staff errors of 31.1%, extracted from Heinrich’ customized pyramid of errors. Thus, some persons give positive feedback about obstetric caregivers and would be somewhat reluctant to form a more negative opinion about them. However, 64.5% of respondents indicated that they have experienced a birth complication, and 81.5% said that they know someone who experienced a birth complication (Questions H and I).

One-hundred-twenty-two (46.0%) people changed opinion in situations in which they received communication about any errors in case of birth complications. Among them, 71 out of 265 (26.8%) worsened their opinion, believing that obstetric staff committed errors in cases of birth complications. The other 19.2% of respondents changed opinion, reducing their impression of obstetric staff errors. Overall, the mean percentage of people believing that errors were involved in any birth complication, calculated from the answers to Question G, was 0.520 (52.0%, Table 1), slightly higher than the 0.498 (49.8%) mean value obtained from the answers to Question A. Therefore, in cases of birth complications, the spread of opinion about obstetric staff errors does not significantly increase the percentage of people who believe in obstetric staff errors – the second end-point. About 45% of respondents who had birth complications thought they would be likely to sue for malpractice, and 54.5% of respondents believed that others who suffered birth complications would be likely to sue (Question L and M).

Figures 1 and 2 illustrate the trends of a blue line denigration curve (the spread of the probability ( $E_r$ ) that people would feel that obstetric staff have committed errors) when a severe preventable adverse birth event has occurred. These trends were calculated from cities of 10,000, 25,000, 50,000, 100,000, 500,000, and 1,000,000 inhabitants. The blue line was calculated by applying the Reed and Frost rule, composed with the probability of true preventable adverse birth event ( $E_r$ ). To this probability, we added the rate of 0.004 (1/266, 0.4%) to express the proportion respondents who insulted the questionnaire authors and healthcare in general. The curve is exponential and is reported in natural logarithmic scale. The number of people who were “susceptible” to changing their opinion about obstetric staff were 34.06 (Question C) at a month, 197.6 (Question D) at two months, 467.62 (Question E) at six months, and 725.84



Fig. 1. Rates of "infected" people (those who feel that obstetric staff has committed errors in cases of severe preventable adverse birth events) are described by blue lines, while red lines depict the likelihood of claims for litigation for any birth complication. Both lines are reported in natural logarithmic scale. The lines are built in hypothetical cities of 10,000, 25,000, and 50,000 inhabitants. The x-axis numbers are days.

(Question F) at a year. From these numbers, applying the Pluchino et al model (26) for the change of opinion, we were able to calculate the number of "infected" subjects as the ones whose opinion changed into a hostile feeling as follows: 34.71 at a month, 166.65 at two months, 240.44 at six months, 27.07 at a year.

To test the hypothesis that the denigration blue curve predicts the trend of litigation in Italy, Figures 1 and 2 also report the trend of probability of litigation (red line). The red line is also reported in natural logarithmic scale. The red line of probability of suing for malpractice was obtained by combining the rate of litigation for obstetric malpractice (real Italian world data from insurance information, 2015 (7)) with mean answer scores to Question L and M (applying Bayes' theorem). The red line trends were also calculated out of a population of cities with 10,000, 25,000, 50,000, 100,000,



Fig. 2. Rates of "infected" people (the ones who feel that obstetric staff has committed errors in cases of severe preventable adverse birth events) are described by blue lines, while red lines depict the likelihood of claims for litigation for any birth complication. Both lines are reported in natural logarithmic scale. The lines are built in hypothetical cities of 100,000, 500,000, and 1,000,000 inhabitants. The x-axis numbers are days.

500,000, 1,000,000 inhabitants. The intersection points between blue lines and red lines indicate that the likelihood of suing for ALL KINDS of "complications" is equal to the rate of people believing in errors of obstetric staff in cases of severe and preventable adverse obstetric events (Figures 1 and 2). Moreover, the blue lines and the red lines follow same trends and are almost coincident, which is what it was desired to show, according to what reported in the introduction section of the present article.

## Discussion

This study illustrates how apt Italian people are to believe that birth complications are attributable to obstetric staff errors, and the degree to which this perception is spread

among the population as denigration of obstetric staff. It can be used as a tool for estimating the likelihood of lawsuits against obstetric wards and staff in Italian cities.

The questionnaire respondents felt that almost 50% of birth complications were due to obstetric staff error, while the estimated actual rate for obstetric malpractice in Italy would be about 31%.

In addition, in questions H and I the respondents indicated quite a high perception of birth complications in their own experience and that of people they know (64% and almost 82%). Similarly, they indicated in questions M and L that they themselves and others would be quite likely to sue for malpractice in cases of birth complications (almost 55% and 45% respectively), a finding that might indicate that Italian people are not shy of litigation. Contrary, for comparison, the British author Oyebode (4) estimates that 1 out on 7 adverse events results in a medical claim. Finally, the communication of errors among the sample population was higher at 30 to 120 days, and did not seem very high in absolute numbers.

In real-world settings, the highest likelihood of litigation would be linked with the occurrence of severe adverse birth events. In these situations, it is possible to quantize the true impact on patient health, the impact can be demonstrated to be severe, and it can be shown that errors caused the adverse event (27). Of course, lawsuits may also be brought even in cases of no error or mild adverse events. According to answers to questions M and L, the questionnaire respondents seem to overestimate their own propensity to sue and that of others. This can be deduced by evaluating the 2015 national data for malpractice claims (7), corrected with the frequencies extrapolated from the respondents' answers to questions L and M, and illustrated in the red lines in the Figures 1 and 2. However, respondents also acknowledged that the good practices of obstetric caregivers lead to favorable birth outcomes (68.7%, Question B). This datum is strengthened by the finding that 19.2% of people do not feel that any errors are made by obstetric staff in case of communications of obstetric staff errors when a preventable birth complication occurs (Pluchino et al (26) change of opinion model, from answers C, D, E, F).

For example, if a patient has a complication during childbirth because Doctor X committed an error, and she tells ten people, how many of these people believe that Doctor X committed an error? More or less half of them. However, among these ten people, 19% (two subjects) who already believed that obstetric staff commit errors change their opinion and do not believe it was an error, precisely because they received communication that Doctor X committed an error. This is part of the dynamic of opinion changes (28-31). For the others among the ten (three to four people, from answers to Question A), the information does not change their previous opinion.

Therefore, if someone communicates a preventable birth complication to these "refractory" people, they are induced to improve their good opinion about caregivers.

These results could be used to predict the risk of litigation for all birth complications during the time period from 30 days after the event, and onwards. Specifically, when there is a spread of communication denigrating obstetric staff after preventable severe adverse birth events, calculation of the

rate of people who attribute damage to obstetric staff errors can serve as a predictor for the propensity to sue. It would be interesting to assess the ratio between the number of lawsuits for severe and preventable adverse birth events and the total number of lawsuits for birth complications in Italian cities. This index could serve as a measure of litigiousness of the city inhabitants, and could be used for customizing the red line (the probability to sue for malpractice based on 2015 (7) or more recent insurance company data, combined with question L and M mean scores). The higher the index, the lower the litigiousness. Ideally, the communication and sharing of positive feedback about obstetric staff and local obstetric facilities would increase the value of the index by reducing claims for mild birth complications, thereby reducing both line trends at any time and in any Italian city size.

Moreover, by introducing data from other countries into equations, country-customized curves could be developed, thereby allowing a global generalization of the model.

One limitation of this study could be that it was based on only 265 subjects. We could improve it by reaching many more respondents in about three months of CAWI. However, the fact that only 265 people took the survey may indicate that the topic is not interesting, or, on the contrary, that it is too pertinent and painful. While concepts of opinion formation have been largely assessed in the literature (28, 32), we were unable to delineate the process by which opinions about health issues and malpractice develop. Many more women than men responded, and it may well be that they are more interested in the topic than men. Similarly, they may be more involved than men in spreading information about obstetric staff errors. Therefore, while the sample is unbalanced and small, it can also provide a realistic description of the dynamics of obstetric staff denigration among Italians. Otherwise, if the sample does not depict real behavior of obstetric staff error communication in Italy, this would be assumed as a bias. In future work, we hope to test the concepts expressed in this model in real word contexts, by conducting more interviews and by comparing findings with the rate of claims provided by some Italian health care organizations.

Another point to be highlighted is that the model has not been tested in real world contexts. Therefore it cannot be assumed that the model reported here is appropriate for describing the epidemic of mistrust among Obstetric staff. It would be interesting to test the model by cross-linking the blue line trend constructed from questionnaires, with data on adverse birth outcomes and malpractice suits from an Italian health organization. It also would be useful to explore whether litigation would be reduced if not only perceptions about obstetric staff error were spread, but also good feelings about obstetric care were communicated.

Litigation for malpractice causes an explosion of costs to health systems without improving the quality of care (19, 33-42) and damaging physicians well-being (43-51). Hopefully, the health system should limit malpractice suits. In U.S., this goal has been reached by introducing the compensation cap legislation (52). Moreover, Antoci et al (53) proved that the maximum advantage is achieved by both patient and physician when zero compensation for any errors occurs, meaning that patients do not pursue their physician with malpractice litigation and physicians do not flee from patients by practicing defensive medicine.

However, in real law contexts it is hard to imagine zero claims for medical errors. Additionally, in Italy, it would be difficult to set a cap on malpractice compensation because the legislation on malpractice suits gives the highest priority to the patient's right to proper compensation (5). Ostensibly in the defense of this right, but actually in the pursuit of profit (4, 6), lawyers and patients thrive on malpractice lawsuits, and this business market is detrimental for the healthcare system and its stakeholders. In these conditions, the effectiveness and sustainability of any healthcare system is doomed to fail. Therefore, with the results of the present study, we wish to provide a key-concept and a practical tool to Italian healthcare managers for containing legal expenses and improving healthcare: they should work actively to spread positive feedback about healthcare workers and healthcare in general, thus improving perceptions about them, limiting the propensity to sue and monitoring the propensity to claim.

#### Supplementary Materials

The URL reported at reference (7) is currently not available online. The pdf file recalled by the URL can be provided upon request by mailing to the corresponding author.

#### Data Availability

The database can be provided upon request, contacting the corresponding author.

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#### References

1. St-Amand J. Medicolegal nightmare: a tragic case, a needless trial. *CMAJ*. 1993; 148(5):806-809
2. Shamshirsaz AA, Clark SL. Amniotic fluid embolism. *Obstet Gynecol Clin North Am*. 2016; 43(4):779-790. <https://doi.org/10.1016/j.ogc.2016.07.001>
3. Indraco U. Punches and knocks to the physicians: choosing wisely or self protection? *Recenti Prog Med*. 2016; 107(11):607-608. <https://doi.org/10.1701/2484.25982>
4. Oyebo F. Clinical errors and medical negligence. *Med Princ Pract*. 2013; 22(4):323-333. <https://doi.org/10.1159/000346296>
5. Di Landro A. Medical malpractice as a tort in U.S., as a crime in Italy: factor causes, paths and outcomes. *Age Hum Rights J*. 2019; 12:13-34. <https://doi.org/10.17561/TAHRJ.N12.2>
6. Pienaar L. Investigating the reasons behind the increase in medical negligence claims. *PELJ / PER*. 2016; 19:1-22. <https://dx.doi.org/10.17159/1727-3781/2016/v19i0a1101>
7. Marsh. <https://www.marsh.com/it/it/insights/research-briefings/medical-malpractice--il-tasso-di-rischio-di-sinistri-epari-a-1-.html> Accessed 11 September 2019
8. Il Fatto Quotidiano. <https://www.ilfattoquotidiano.it/2018/12/11/dottori-tra-aggressioni-e-denunce-la-paura-e-un-nemico-tutelarli-significa-difendere-il-paziente/4825209/> Accessed 12 May 2023
9. Toraldo DM, Vergari U, Toraldo M. Medical malpractice, defensive medicine and the role of the "media" in Italy. *Multidiscip Respir Med*. 2015; 10(1):12. <https://doi.org/10.1186/s40248-015-0006-3>
10. Treglia M, Pallocci M, Passalacqua P, et al. Medical liability: review of a whole year of judgments of the Civil Court of Rome. *Int J Environ Res Public Health*. 2021;18(11):6019. <https://doi.org/10.3390/ijerph18116019>
11. Ares118. [http://www.ares118.it/pdf/rischio\\_qualita/stampa/Rassegna%20stampa%20sul%20Risk%20Management%202014%20dai%20principali%20siti%20internet.pdf](http://www.ares118.it/pdf/rischio_qualita/stampa/Rassegna%20stampa%20sul%20Risk%20Management%202014%20dai%20principali%20siti%20internet.pdf) Accessed 11 September 2019
12. Altax. <https://www.altalex.com/documents/altalexpedia/2018/05/07/responsabilita-medica> Accessed 12 May 2023
13. Vento S, Cainelli F, Vallone A. Defensive medicine: it is time to finally slow down an epidemic. *World Journal Clin Cases*. 2018; 6(11):406-409. <https://doi.org/10.12998/wjcc.v6.i11.406>
14. la Repubblica. [https://www.repubblica.it/cronaca/2018/12/28/news/\\_quella\\_pubblicita\\_danneggia\\_i\\_medici\\_e\\_la\\_rai\\_blocca\\_lo\\_spot-215377258/](https://www.repubblica.it/cronaca/2018/12/28/news/_quella_pubblicita_danneggia_i_medici_e_la_rai_blocca_lo_spot-215377258/) Accessed 12 May 2023
15. Gazzetta Ufficiale della Repubblica Italiana. <https://www.gazzettaufficiale.it/eli/id/2017/03/17/17G00041/sg> Accessed 30 October 2022
16. Marjoribanks T, Good MJ, Lawthers AG, et al. Physicians' discourses on malpractice and the meaning of medical malpractice. *J Health Soc Behav*. 1996; 37(2):163-178
17. Bobbio M, Venero S. Choosing Wisely, the reasons for its success. *Monaldi Arch Chest Dis*. 2019; 89(2). <https://doi.org/10.4081/monaldi.2019.1104>
18. Traina F. Medical malpractice: the experience in Italy. *Clin Orthop Relat Res*. 2009; 467(2):434-442. <https://doi.org/10.1007/s11999-008-0582-z>
19. Mello MM, Frakes MD, Blumenkranz E, et al. Malpractice liability and health care quality: a review. *JAMA*. 2020; 323(4):352-366. <https://doi.org/10.1001/jama.2019.21411>
20. Krakower TM. To Err is human, to apologize is hard. *JAMA*. 2021;326(3):223-224. <https://doi.org/10.1001/jama.2021.10840>
21. Garattini L, Padula A. Defensive medicine in Europe: a 'full circle'? *Eur J Health Econ*. 2020;21(4):165-170. <https://doi.org/10.1007/s10198-019-01151-1>
22. Tartaglia R, Albolino S, Bellandi T, et al. (Adverse events and preventable consequences: retrospective study in five large Italian hospitals). *Epidemiol Prev*. 2012; 36(3-4):151-161
23. Health and Safety Executive. <https://www.hse.gov.uk/pubns/books/hsg101.htm> Accessed 31 October 2022
24. Abbey H. An examination of the Reed-Frost theory of epidemics. *Hum Biol*. 1952; 24(3):201-233
25. Rastogi A. Modeling and combating misinformation spread. *Nat Comput Sci*. 2022; 2(7):413. <https://doi.org/10.1038/s43588-022-00290-5>
26. Pluchino A, Latora V, Rapisarda A. Changing opinion in a changing world: a new perspective in sociophysics. *Int J Mod Phys C*. 2005;16(4):515-531. <https://doi.org/10.1142/S0129183105007261>
27. Dunbar F, Sabry F. The propensity to sue: why do people seek legal actions? *Bus Econ*. 2007; 42:31-42. <https://doi.org/10.2145/20070203>
28. Xie Z, Song X, Li Q. A Review of Opinion Dynamics. In: L. Zhang X, Song Y, Wu Y (Eds). *Theory, Methodology, Tools*

- and Applications for Modeling and Simulation of Complex Systems. AsiaSim SCS AutumnSim 2016. (Communications in Computer and Information Science. Vol. 646). Springer, Singapore; 2016. [https://doi.org/10.1007/978-981-10-2672-0\\_36](https://doi.org/10.1007/978-981-10-2672-0_36)
29. Chacoma A, Zanette DH. Opinion formation by social influence: from experiments to modeling. *PLoS One*. 2015; 10:e0140406. <https://doi.org/10.1371/journal.pone.0140406>
  30. Moussaïd M, Kämmer JE, Analytis PP, et al. Social influence and the collective dynamics of opinion formation. *PLoS One*. 2013; 8:e78433. <https://doi.org/10.1371/journal.pone.0078433>
  31. Medo M, Mariani MS, Lü L. The fragility of opinion formation in a complex world. *Commun Phys*. 2021; 4:75. <https://doi.org/10.1038/s42005-021-00579-3>
  32. Giardini F, Vilone D, Conte R. Consensus emerging from the bottom-up: the role of cognitive variables in opinion dynamics. *Front Phys*. 2015; 3:64. <https://doi.org/10.3389/fphy.2015.00064>
  33. Tuers DM. Defensive medicine in the emergency department: increasing health care costs without increasing the quality? *Nurs Adm Q*. 2013; 37(2):160-164. <https://doi.org/10.1097/NAQ.0b013e318286de06>
  34. Studdert DM, Mello MM, Gawande AA, et al. Claims, errors, and compensation payments in medical malpractice litigation. *New Engl J Med*. 2006; 354(19):2024-2033. <https://doi.org/10.1056/NEJMsa054479>
  35. Katz ED. Defensive medicine: a case and review of its status and possible solutions. *Clin Pract Cases Emerg Med*. 2019; 3(4):329-332. <https://doi.org/10.5811/cpcem.2019.9.43975>
  36. Hoffer EP. America's health care system is broken: what went wrong and how we can fix it. Part 5: malpractice, fraud, waste, and the EMR. *Am J Med*. 2019; 132(10):1129-1132. <https://doi.org/10.1016/j.amjmed.2019.05.009>
  37. Raeissi P, Taheri Mirghaed M, Sepehrian R, et al. Medical malpractice in Iran: a systematic review. *Med J Islam Repub Iran*. 2019; 33:110. <https://doi.org/10.34171/mjiri.33.110>
  38. Al-Balas QAE, Al-Balas HAE. The ethics of practicing defensive medicine in Jordan: a diagnostic study. *BMC Med Ethics*. 2021;22(1):87. <https://doi.org/10.1186/s12910-021-00658-8>
  39. Hambali SN, Khodapanahandeh S. A review of medical malpractice issues in Malaysia under tort ligation system. *Glob J Health Sci*. 2014; 6(4):76-83. <https://doi.org/10.5539/gjhs.v6n4p76>
  40. Miziara ID, Miziara CSMG. Medical errors, medical negligence and defensive medicine: a narrative review. *Clinics* (Sao Paulo). 2022; 77:100053. <https://doi.org/10.1016/j.clinsp.2022.100053>
  41. Specchia ML, Cadeddu C, Lovato E, et al. (Burden of medical errors in Italy: an analysis of the literature). *Ig Sanita Pubb*. 2015; 71(4):405-417
  42. Ignagni K. Moving beyond the blame game. *Front Health Serv Manage*. (2003 Fall); 20:3-14
  43. Stehman CR, Testo Z, Gershaw RS, et al. Burnout, drop out, suicide: physician loss in emergency medicine, Part I. *West J Emerg Med*. 2019; 20(3):485-494. <https://doi.org/10.5811/westjem.2019.4.40970>
  44. Menon NK, Shanafelt TD, Sinsky CA, et al. Association of physician burnout with suicidal ideation and medical errors. *JAMA Netw Open*. 2020;3:e2028780. <https://doi.org/10.1001/jamanetworkopen.2020.28780>
  45. Birmingham PK, Ward RJ. A high-risk suicide group: the anesthesiologist involved in litigation. *Am J Psychiatry*. 1985; 142(19):1225-1226. <https://doi.org/10.1176/ajp.142.10.1225b30>
  46. Visanuyothin T, Srivaranunth K, Siriweij P, Suttineam K, Kongkum C, Kunrattanayan D, Sithisarankul P, Wattanasirichaigoon S. Risk factors for suicide among Thai physicians. *J Med Assoc Thai*. 2004;87(Suppl4):S14-S18
  47. Aasland OG. Physician suicide-why? *Gen Hosp Psychiatry*. 2013;35(1):1-2. <https://doi.org/10.1016/j.genhosppsych.2012.09.005>
  48. Duthel F, Aubert C, Pereira B, et al. Suicide among physicians and health-care workers: a systematic review and meta-analysis. *PLoS One*. 2019; 14:e0226361. <https://doi.org/10.1371/journal.pone.0226361>
  49. Berlin L. Medical errors, malpractice, and defensive medicine: an ill-fated triad. *Diagnosis (Berlin)*. 2017; 4(3):133-139. <https://doi.org/10.1515/dx-2017-0007>
  50. Hanganu B, Manoilescu IS, Paparau C, et al. Why are patients unhappy with their healthcare? A Romanian physicians' perspective. *Int J Environ Res Pub Health*. 2022; 19(15):9460. <https://doi.org/10.3390/ijerph19159460>
  51. Wallace JE, Lemaire JB, Ghali WA. Physician wellness: a missing quality indicator. *Lancet*. 2009; 374(9702):1714-1721. [https://doi.org/10.1016/S0140-6736\(09\)61424-0](https://doi.org/10.1016/S0140-6736(09)61424-0)
  52. Studdert DM, Hall MA. Medical malpractice law - doctrine and dynamics. *New Engl J Med*. 2022; 387(17):1533-1537. <https://doi.org/10.3290/j.qi.a39106>
  52. Antoci A, Fiori Maccioni A, Russu P. The ecology of defensive medicine and malpractice litigation. *PLoS One*. 2016;11:e0150523. <https://doi.org/10.1371/journal.pone.0150523>