Meta Analysis Article

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Malpractice lawsuits in orthopedic trauma surgery: a meta-analysis of the literature

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Abstract

Introduction: The objectives for this study were to identify whether diagnostic or procedural errors more commonly resulted in lawsuits, as well as to elucidate how specific variables affected mean indemnity.

Methods: Systematic review of English-language articles in the PubMed and Google Scholar databases (through 2020) using Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. Meta-analysis was performed to estimate measures of proportions and differences in mean indemnity.

Results: The estimated probability of lawsuits related to orthopedic trauma in overall studies was 23.3%. There were no significant rate differences between main causes of claims (diagnostic vs procedural errors) and areas of injury (upper vs lower). There was no significant difference of mean indemnity between the probabilities of trauma-related claims, diagnostic error, and procedural error.

Conclusion: Non-trauma cases were more likely to result in lawsuit than trauma cases. Procedural errors accounted for most malpractice claims. The average indemnity increased according to the higher diagnostic errors, while the indemnity was lower with a relatively higher proportion of procedural errors. The most common cause of litigation varied between studies; however, among the most cited reasons were missed diagnosis/error in diagnosis, improper/substandard surgical performance, and, though not specifically studied in this analysis, errors of informed consent.

Level of Evidence: Economic and Decision Analyses Level VI

Keywords: indemnity, lawsuits, litigations, malpractice, orthopedic surgery, orthopedic trauma

1. Objectives

Medical malpractice lawsuits are frequent and orthopedic surgery continues to be among the specialties most commonly cited in legal claims in the USA.[1] It has been reported that orthopedic surgeons have 10 times the risk of being named in a claim each year relative to baseline and are several orders of magnitude more likely to be named in a claim than the next closest specialty.[2] Not only do these claims have negative effects on the physician-patient relationship, but there are also extensive costs and use of resources related to litigation regardless of the outcome of the case. Therefore, it is important for orthopedic surgeons to recognize the common characteristics and trends of these claims.

The number of claims against orthopedic trauma surgeons has increased significantly over the past 10 years.[3] Jena et al reported that orthopedic surgeons in Italy are the fourth most likely to be sued across all medical specialties, with 88% of 45-year-old orthopedic surgeons and 99% of 65-year-old orthopedic surgeons having been sued at least once for medical malpractice during their career.[4]

Given the above, the aim of this systematic review was to study proportions of common variables (e.g., trauma vs non-trauma, affected extremity, type of error) in malpractice cases in multiple western countries and then elucidate associations between indemnity and said common variables in order to aid orthopedic surgeons in better identifying factors, which increased risk of malpractice.

2. Data sources

This meta-analysis was completed according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) standards and guidelines. A systematic search of the literature was conducted through the PubMed, Cochrane, Google Scholar, Web of Science, Embase, and CINAHL databases for studies published between 2000 and 2020. The

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This study was deemed exempt from Institutional Review Board and Animal Use Committee Review.

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studies included claims information that went back to 1985. The databases were initially searched using the terms "*orthopedic*" and "*malpractice.*" In instances where the field of results contained large numbers of irrelevant articles, the search was again performed using the aforementioned search.

3. Study selection

Inclusion criteria were those with English-reported outcomes addressing claims involving orthopedic trauma. The studies were peer-reviewed level I to IV studies. Exclusion criteria were those that included only claims against elective orthopedic procedures, only claims involving arthroscopic procedures, and only claims related to spinal surgery. Further excluded were studies in which orthopedic surgery was not the primary focus, which focused only on 1 specific procedure or only 1 cause for claim, those which did not include indemnities, studies which did not provide sufficient details or characteristics of claims related to orthopedic trauma, those which did not provide sufficient information regarding causes for claims, those which restricted the scope of claims analyzed to fewer than half of the predetermined list of total possible causes, and studies wherein the primary focus was anything other than presenting and/or analyzing raw data from claims of orthopedic malpractice.

4. Data extraction

Studies that contained information on claims related to traumatic injuries in orthopedic surgery were reviewed and analyzed for the following: type of study, total number of claims, results, recommendations, causes of malpractice claims, and indemnity.

A total of 24,400 articles were identified through Google Scholar, 403 through PubMed, 308 through Embase, 23 through CINAHL, 63 through Web of Science, and 15 through Cochrane. After exclusion by title, 17 articles remained in the Google Scholar search. EndNote© was used to remove duplicate studies between PubMed and Embase. After removal of duplicates between PubMed and Embase, 440 studies remained; this field was then narrowed to 87 by evaluation for mention and/or inclusion of trauma-related claims. Of these 207 articles, 2 were found to be duplicates.

From the 205 remaining articles, the reviewers independently assessed each article to determine which studies reported on the outcomes of interest for the current study in sufficient detail, including delineation of causes for claims, report of indemnity for various causes or groups of causes, some relation of trauma to the claims, and extremity involved. The reviewers agreed and determined that 13 of the articles reported on the outcomes of interest and these 13 were reviewed in full text for this meta-analysis (Fig. 1, PRISMA).[1,5–16]

5. Data synthesis

When grouping the listed causes of litigation, 2 primary domains of focus were created: diagnostic error and procedural error. The diagnostic error domain included diagnostic error, diagnostic delay, and treatment delay. The procedural error domain included procedure error, infection, complication, technique error, postoperative error, wrong side operated, and inadequate result. If a study provided a specific cause for litigation (e.g., nerve pain), it was assessed for its ability to fit into either of the 2 primary domains; if it was applicable to a primary domain, it was included as part of that domain. The only cause of litigation which was excluded from both domains was error in informed consent.

To compare indemnity across the studies, currency conversions were conducted to bring all reported indemnities to U. S. dollars ($). Conversions performed included euros to dollars and pounds to dollars. Conversions were conducted using present-day exchange rate provided by the United States Federal Reserve.

Estimates of event (i.e., traumatic injuries, common reasoning-specific claims, and injury area-specific claims) probabilities, mean indemnity estimates, and effect differences were calculated with 95% confidence intervals in meta-analysis using the inverse variance method for pooling. The standard deviation of indemnity was estimated using the range of the payout amount for each study. Risk ratio and the corresponding 95% confidence interval were estimated from the ratio of the 2 events (lower limb vs upper limb) probabilities. The results of the random effects model were presented to account for variations of the estimates assuming heterogeneity. A subgroup analysis was done to compare mean indemnity amount by country. Meta-regression for indemnity amount was conducted to examine associations between indemnity amount and other covariates of probabilities of trauma-related claims, diagnostic-related errors, procedural errors, and injury area-specific claims.

The Risk Of Bias In Non-randomized Studies of Interventions tool was used to assess the risk of bias of these observational retrospective studies[17]. Seven domain-level judgements were assessed including bias due to confounding, selection bias, reporting bias, and information bias.

6. Results

All studies were reviewed for claims involving orthopedic trauma. The 13 articles reviewed were published between 2003 and 2019. Collectively, the 13 studies[1,5–16] analyzed data on 23,716 claims related to orthopedic surgery from a private collection, single-center institutions, and various databases, including the Physician Insurers Association of America, VerdictSearch, and National Health Service Litigation Authority in the United Kingdom. The date ranges of claims reviewed went as far back as 1985 from the Physician Insurers Association of America to cases in 2016 from the Westlaw database. Claims related to both adult and pediatric injuries were reported.

The procedural error group demonstrated the largest number of claims; the group included procedure error, infection, complication, technique error, postoperative error, wrong side operated, and inadequate result.

Supplemental Table 1, http://links.lww.com/OTAI/A41 presents the rate of claims related to the 2 main reasons for litigation, diagnostic errors and procedural errors. Atrey et al[7] was excluded from the meta-analysis because the study reported only 57% of the diagnostic error claim rate without specifying counts due to diagnostic and procedural errors. The frequencies of diagnostic-related errors for Ahmed et al[14] and Rynecki et al[8] were counted in 1 or more of the following reasons for lawsuits: diagnostic error, diagnostic delay, and treatment delay. The overall estimate of the rate of diagnostic-related error was 33.0%. For Ahmed et al[14] and Rynecki et al,[8] the frequency of procedural errors was aggregated into 1 or more of the following 7 complaint categories: procedure error, infection, complication, techniques' error, post-op error, wrong side operated, and inadequate results. The estimated rate of the procedural error-

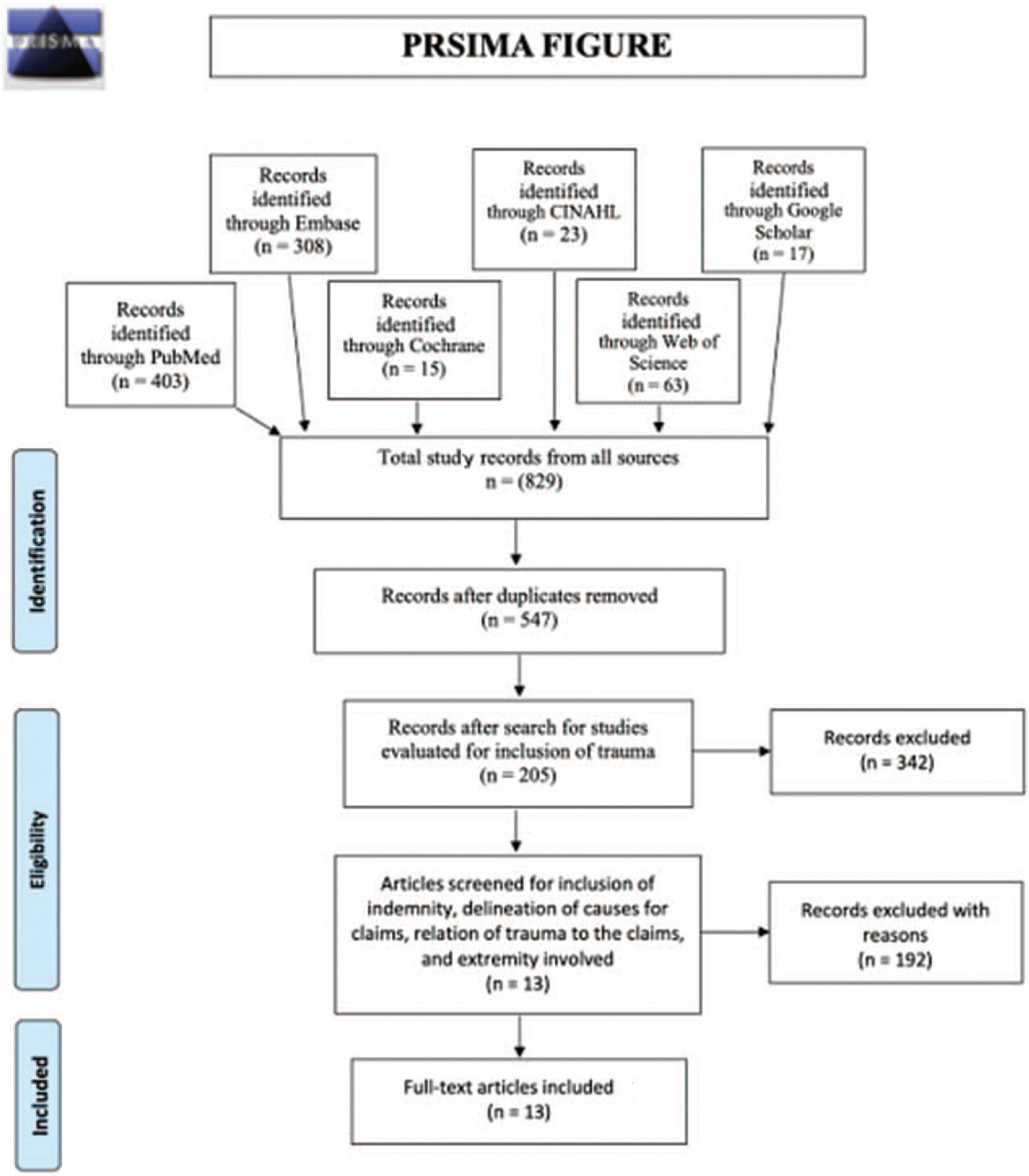

Figure 1. PRISMA figure.

related lawsuit was 43.9%. Figure 2 shows forest plots for the diagnostic-related error and procedural error probabilities. We found that procedural error was more common than diagnostic errors as the main causes for claims, however, the effect difference was not significant.

Eight of the twelve studies involved claims related to traumatic orthopedic injuries. Among these studies, it was found that lawsuits related to lower extremity injury were more common than those of upper extremity injury, which was more common than axial skeleton. The other 4 studies were specific to a body part (scaphoid, ankle, shoulder, and elbow).[5,12,13,15] The upper limb was most commonly involved in the 2 pediatric studies included in the review.[7,9]

Supplemental Table 2 (http://links.lww.com/OTAI/A42) summarizes the results for the meta-analysis of frequencies of the lower limb and upper limb injuries. The lawsuits were more common for injuries of the lower limb with a 29.8% of occurrence rate than upper limb injuries with a 22.6% chance. Figure 3 shows forest plots for the lower limb and upper limb probabilities. The risk ratio estimate of lower limb versus upper limb cases was 1.232, showing that the proportions by area of injuries are not significantly different (*P* value = .446).

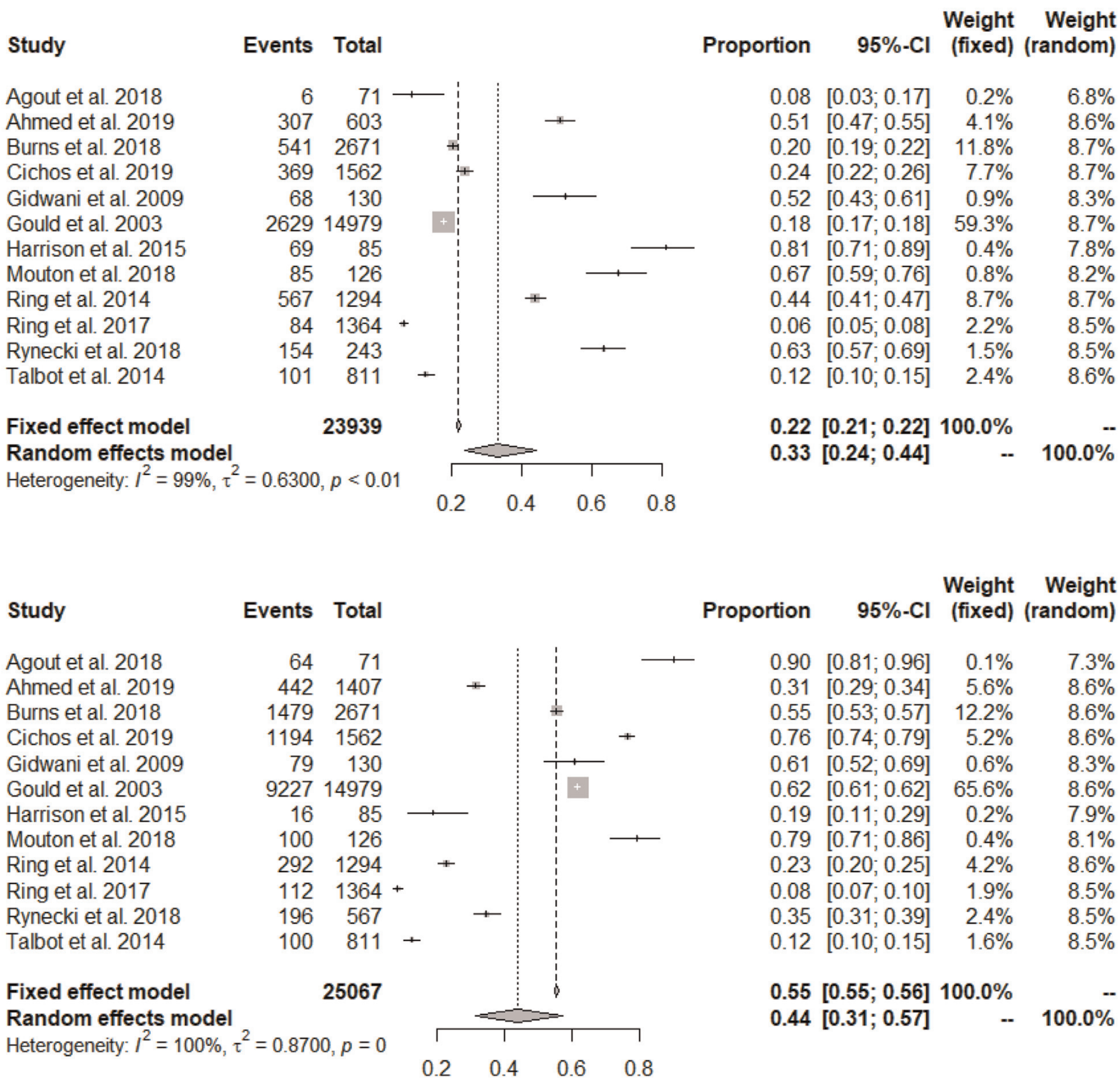

Figure 2. Forest plots for proportion of claims related to diagnostic errors (top) and proportion of claims related to procedural errors (bottom).

Forest plot for the trauma-related claim probability is shown in Figure 4. The estimated probability of orthopedic trauma in overall studies was 23.3%.

Summary measures of indemnity amount were described in Supplemental Table 3, http://links.lww.com/OTAI/A43. Supplemental Table 4, http://links.lww.com/OTAI/A44 shows the mean amount of indemnities per country. The results indicate significant heterogeneities for both between-study (P value < .001) and between-country (P value < .001). The estimates of indemnities were different per country, showing the mean amount of $871,093 in the USA, $78,533 in the UK, and $42,547 in France. A forest plot of a meta-analysis with subgroups is given in Figure 5. The subgroup differences were also tested using the meta-regression with the country variable as a covariate. The results in supplemental Table 5, http://links.lww.com/OTAI/A45 show that the country has a significant effect (P value < .001), especially showing a significant difference in mean indemnity values between lawsuits in the United States and France (P value < .001).

Results of the meta-regression for mean indemnity with a single covariate of each probability are shown in Supplemental Table 5, http://links.lww.com/OTAI/A45. Mean indemnity was found to have very weak negative associations with the probability of procedural error claims, showing decreased average indemnity with higher procedural errors (P value = .062). However, the regression models with the rate of the main reason for claims did not account for the mean indemnity variation.

In the 2 studies of pediatric orthopedic claims,[7,9] most of the errors that led to paid claims were related to errors in treatment/management (especially casting), errors in diagnosis, and failure to recognize a complication of the treatment. For unspecified reasons, possibly related to the age and complexity of caring for trauma in pediatric patients, these claims seemed to receive a higher payout on average.[9] Bar graphs of domain-level risk-of-bias assessments are shown in Figure 6. Weights were applied to present the bar graphs. Some studies included in the analysis of

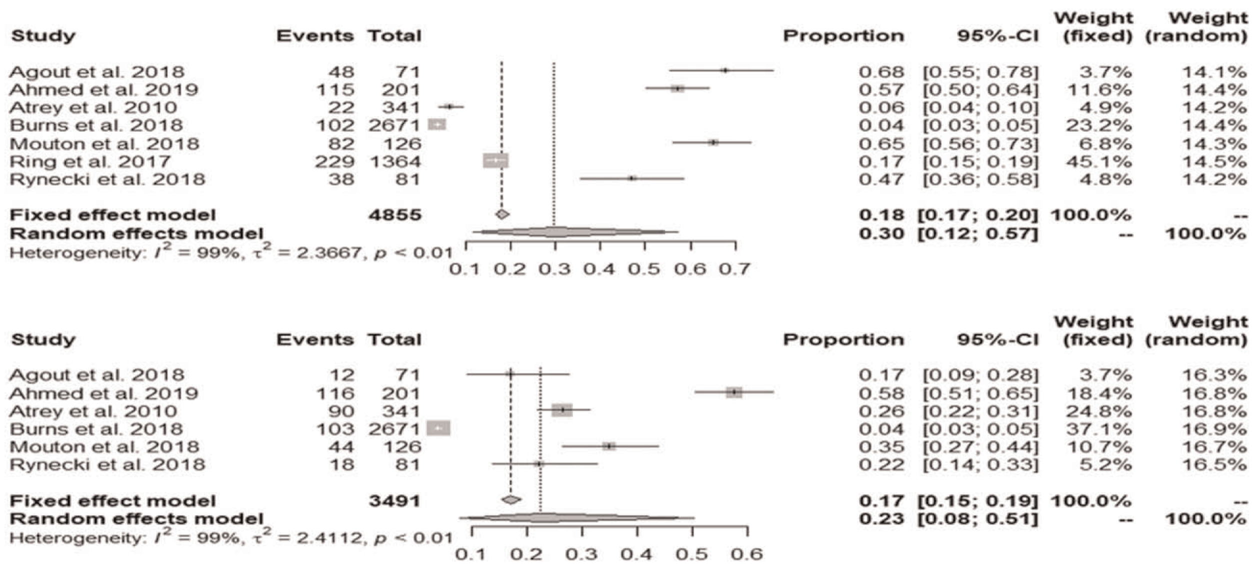

Figure 3. Forest plots for proportion of claims related to lower limb (top) and proportion of claims related to upper limb (bottom).

trauma-related claims have shown confusing biases as moderate risk. The selection bias showed a moderate risk for analysis of multiple outcomes since participants might be excluded by the design of data collection. However, other biases due to interventions, missing data, measurement bias, and reporting bias were at low risk. Supplemental Table 6, http://links.lww.com/OTAI/A46, described a Summary of Findings from the selected Literature.

7. Discussion

In a litigious society, the ability of an orthopedic surgeon to identify and understand the common causes of malpractice claims is vital to successful practice. As evidenced in Khan et al, both the number of claims and the cost of litigation have increased over time, yet the most common causes of claims have remained relatively the same, being procedural error and failure to diagnose.[18] In relation to the increase in numbers of claims, Ries et al found that orthopedic practices located in areas with high concentrations of lawyers have a higher risk of being cited in malpractice claims.[19] Contrary to common expectation, however, the total number of claims against an orthopedic surgeon does not depend on the severity of the injury; rather, in this same vein, minor injuries often lead to claims.[20]

Narrowing the focus, orthopedic trauma surgeons are viewed as being especially vulnerable to claims of medical malpractice due to a specific challenge—the nature of the injuries they treat necessitates time-sensitive intervention, often resulting in limited time being available for a thorough preoperative risk assessment, informed consent, and adequate documentation. The issues of such a challenge are highlighted by findings from Bhattacharyya et al, which showed that proper documentation is associated with a decrease in paid malpractice claims.[21]

8. Procedural versus diagnostic errors

In this present review of literature, it was found that there was no significant difference between the proportion of procedural errors and the proportion of diagnostic errors. Despite this, it is worth expounding on some of the more specific causes of litigation which exist within each domain, as individual studies demonstrated some potential relationships between specific

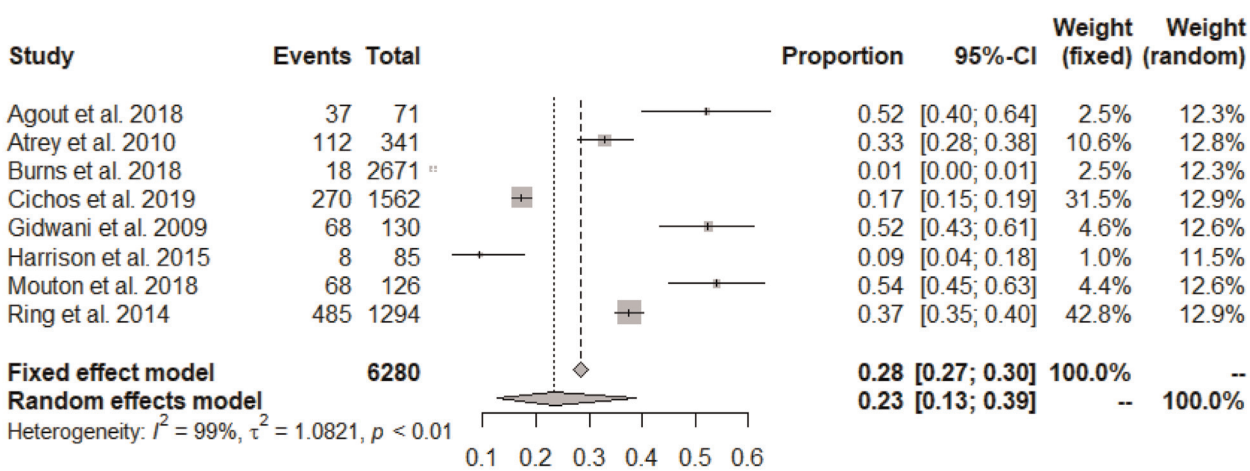

Figure 4. Forest plot for probability of trauma-related claims.

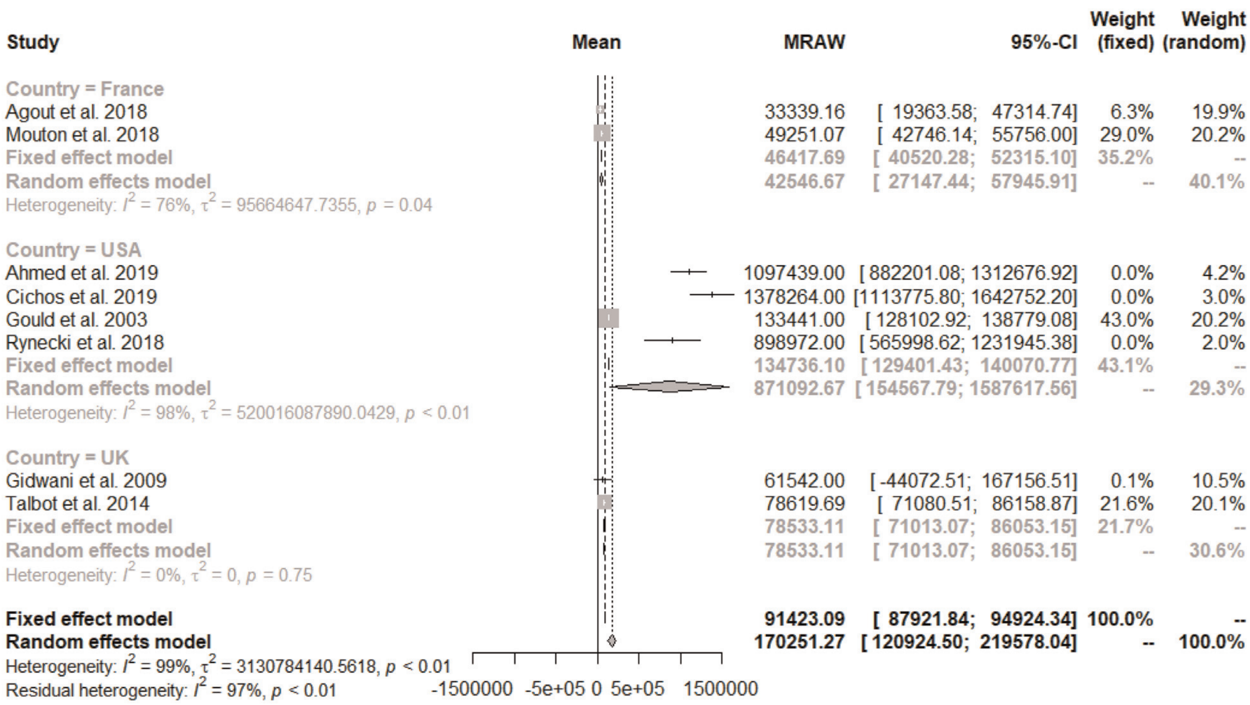

Figure 5. Forest plot with subgroup analysis for amount of indemnity (in dollars) per country.

causes and indemnity and because potential solutions for avoiding these causes can be proposed.

In Burns et al, both the most common cause of litigation and the cause with the highest average indemnity fell into the domain of procedural error—improper performance and failure to recognize a complication of treatment, respectively.[9] Further, in the procedural error domain, complications are a significant cause for malpractice claims. Prominent among complications, postoperative infection and hospital-acquired infection proved to be frequently associated with litigation.[6,11] According to Agout et al, hospital-acquired infection was the most common cause for litigation found in the cases at their single-center teaching institution.[11] These cases also resulted in the highest award in favor of the plaintiff overall. In Mouton et al, it was reported that a surgical site infection (SSI) was suspected in a large proportion of cases and, more often than not, these required revision surgeries.[6] While it is imperative to undertake the utmost caution in sterile technique and antimicrobial selection, another way to limit claims related to infection is by fully informing the patient of the risk of infection before any operative intervention. Additionally, maintaining thorough records of SSIs, infectious disease reports and recommendations, and follow-up with treatment can prove to be valuable in demonstrating that SSIs have been managed appropriately.[6,22]

Regarding malpractice in the pediatric population, both compartment syndrome and complications of casting comprised a significant number of claims. Other notable reasons for litigation also seen in the pediatric population included malunion, nonunion, vascular injury, and pulmonary embolus. Thus, with the goal of reducing or avoiding the possibility of litigation following a complication, it is imperative that a thorough explanation and discussion of possible outcomes is had with the patient—a point which is underscored as the inadequacy or lack of such discussion and documentation was found to be a contributing factor in malpractice claims and cases being lost.[10,23]

Within the domain of diagnostic errors, missed diagnosis was one of the most common causes of litigation in orthopedic malpractice claims. In line with this, a study by Guly, which provided more information on diagnostic errors, demonstrated that missed diagnosis on radiography was the most common error related to missed diagnosis; this was often related to a lack of teaching and/or poor interpretation.[24]

9. Affected extremities in malpractice claims

In the analysis of the proportions of claims related to the upper and lower extremities, random-effect modeling demonstrated no significant difference between the proportions of claims related to the affected extremity. Looking at the cases overall, lower limb injury had a relatively high frequency and often resulted in some of the highest payouts in favor of the plaintiff.[12,25] Of lower limb cases, surgeries of the hip and knee proved to be some of the most frequently performed.

Claims related to femoral neck fractures were slightly different because of their need for specific postoperative care. A common cause for claims in these cases was related to medical and nursing care during the inpatient stay or after discharge. This was usually due to a lack of patient supervision during ambulation, which increases the patient's susceptibility to fall. This puts a high burden on the medical team to keep adequate staffing levels. Other contributing factors were deficient analgesics postoperatively and lack of monitoring overall.[26]

10. Evaluation of indemnity

In the evaluation of mean indemnity, there were several factors found to have an effect on or relationship with it. Of note, both the country in which the claim occurred and the probability of whether the claim involved trauma had significant influence over the mean indemnity. Knowing the significant correlation between trauma-related cases and indemnity is useful, as one

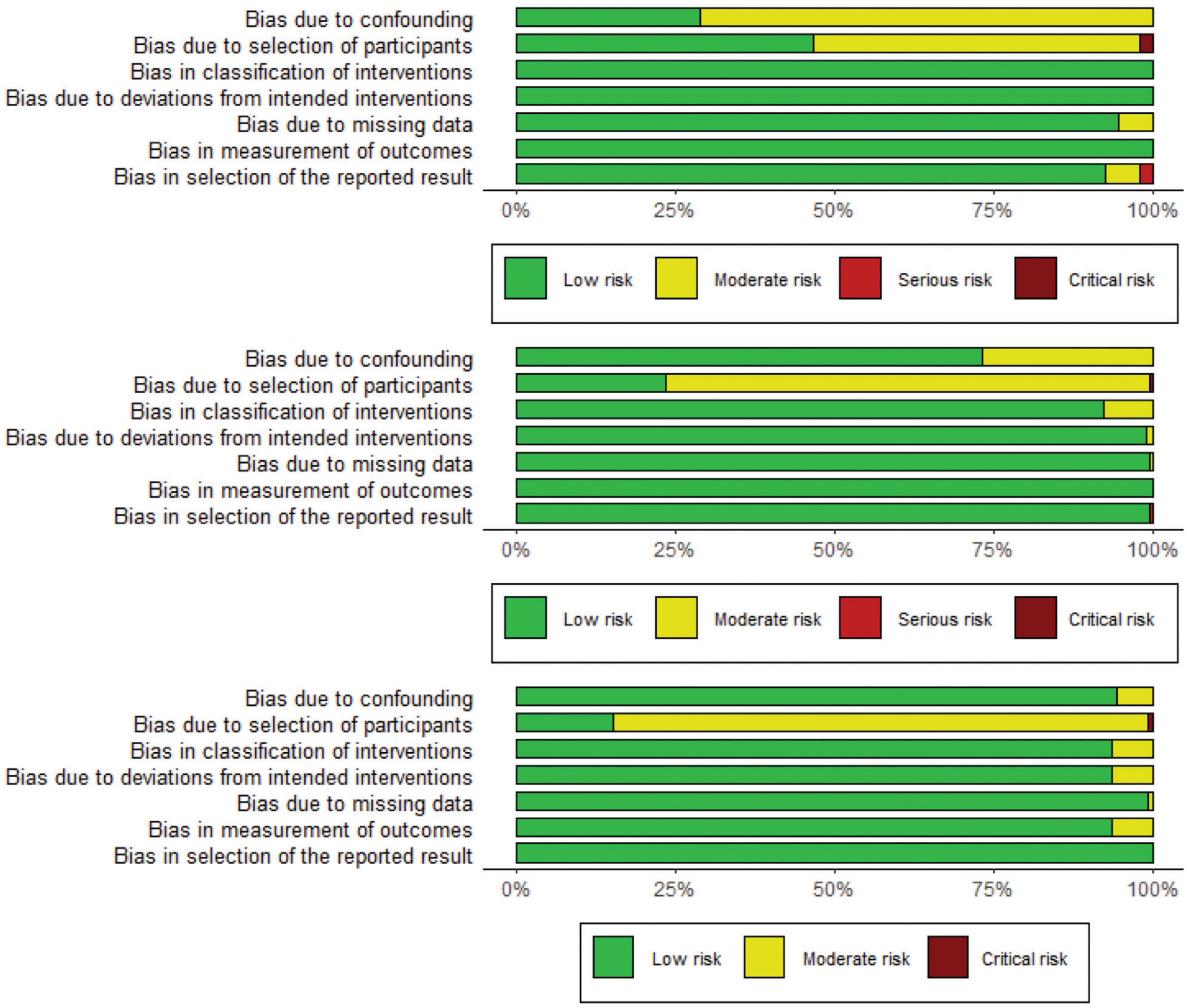

Figure 6. Summary barplots of risk-of-bias assessments for systematic reviews of trauma-related claims (top), main reasons of claims (middle), and mean indemnity (bottom).

can then be more cognizant of the potential risk of litigation and ensure that, as discussed earlier, an appropriately thorough conversation is had with the patient and/or family regarding complications and what to expect following the procedure. Of further note, the higher diagnostic error and lower procedural error increased with average indemnity.

The significant heterogeneity of indemnity and the difference in mean indemnity may be attributable to several factors. First, the studies analyzed did not all involve the same countries; several studies analyzed claims occurring in the USA, while others analyzed claims in either the UK or France. As these countries do not share the same sets of laws regarding tort and how it may be applied in the medical field, a significant level of confounding is introduced which is capable of affecting both the rate of malpractice claims and the indemnity of each case. Second, the claims analyzed in these included studies occurred across several decades and countries. During this time, significant inflation has occurred and at various rates in the countries involved. This means that within the studies themselves, there is confounding which influences the reported mean indemnity. Further, by comparing these mean indemnities which are representing different time spans across different countries, confounding is introduced into the associations with mean indemnity demonstrated in this review. Third, the studies in this review did not use a similar source for accumulating the claims data. As some of the studies looked at claims from individual academic institutions and others evaluated claims from large malpractice databases, the potential for confounding is introduced with regards to mean indemnity and the rate of a given cause for claim.

11. Limitations

The limitations of this review are the different time periods over which claims occurred, the difference in tort law across countries, and the range of types of claims being evaluated in individual studies (any orthopedic injury vs injuries specific to body part). Additionally, there was 1 cause (errors of informed consent), which was not included in either of the 2 domains created for this study, as it was neither deemed an error of diagnosis nor a procedural error. Given its prevalence throughout the reviewed studies, its exclusion likely had some effect on the results of either domain and its relationship to the proportion of claims and mean indemnity.

Given the above limitations, an ideal study would be one utilizing claims data from a single country and from a similar source (e.g., single-center studies in the USA). Further, it is recommended that one use studies, which are using a similar population as opposed to a mix of several populations. Lastly, a unique domain for errors of informed consent would be helpful, as it was prevalent throughout the studies and may well have significant associations with probability of a case leading to litigation and the result and indemnity of the case.

12. Conclusion

This review found that the mean indemnity of a case is influenced by whether or not the case is trauma related. The indemnity was found to be higher when the cause of litigation was a diagnostic error, of the countries involved, the USA was found to have the highest mean indemnity. Lastly, among the most common causes of litigation were errors in diagnosis/missed diagnosis, improper/substandard quality of surgery, and, though not directly studied in this analysis, errors in informed consent.

References

1. Gould MT, Langworthy MJ, Santore R, et al. An analysis of orthopaedic liability in the acute care setting. *Clin Orthop Relat Res* 2003; 407:59–66.
2. Taragin MI, Wilczek AP, Karns ME, et al. Physician demographics and the risk of medical malpractice. *Am J Med* 1992; 93:537–542.
3. Traina F. Medical malpractice: the experience in Italy. *Clin Orthop Relat Res* 2009; 467:434–442.
4. Jena AB, Seabury S, Lakdawalla D, et al. Malpractice risk according to physician speciality. *N Engl J Med* 2011; 365:629–636.
5. Harrison W, Newton AW, Cheung G. The litigation cost of negligent scaphoid fracture management. *Eur J Emerg Med* 2015; 22:142–143.
6. Mouton J, Gauthé R, Ould-Slimane M, et al. Litigation in orthopedic surgery: what can we do to prevent it? Systematic analysis of 126 legal actions involving four university hospitals in France. *Orthop Traumatol Surg Res* 2018; 104:5–9.
7. Atrey A, Nicolaou N, Katchburian M, et al. A review of reported litigation against English health trusts for the treatment of children in orthopaedics: present trends and suggestions to reduce mistakes. *J Child Orthop* 2010; 4:471–476.
8. Rynecki ND, Coban D, Gantz O, et al. Medical malpractice in orthopedic surgery: a westlaw-based demographic analysis. *Orthopedics* 2018; 41:e615–e620.
9. Burns J, Shrader MW, Boan C, et al. Characteristics of medical professional liability claims in pediatric orthopedics. *J Patient Saf* 2018; 00:1–9.
10. Gidwani S, Zaidi SMR, Bircher MD. Medical negligence in orthopaedic surgery: a review of 130 consecutive medical negligence reports. *Bone Joint J* 2009; 91:151–156.
11. Agout C, Rosset P, Druon J, et al. Epidemiology of malpractice claims in the orthopedic and trauma surgery department of a French teaching hospital: a 10-year retrospective study. *Orthop Traumatol Surg Res* 2018; 104:11–15.
12. Ring J, Talbot CL, Clough TM. Clinical negligence in foot and ankle surgery: a 17-year review of claims to the NHS Litigation Authority. *Bone Joint J* 2014; 96-B:1510–1514.
13. Ring J, Talbot C, Cross C, et al. NHSLA litigation in hip fractures: Lessons learnt from NHSLA data. *Injury* 2017; 48:1853–1857.
14. Ahmed, Shaan A, Steven F. DeFroda, Syed J. Naqvi, Adam EM Eltorai, Davis Hartnett, Jack H. Ruddell, Christopher T. Born, and Alan H. Daniels. "Malpractice litigation following traumatic fracture." JBJS 101, no. 7 (2019): e27.
15. Talbot CL, Ring J, Holt EM. Litigation relating to conditions affecting the shoulder and elbow: an analysis of claims against the National Health Service. *Bone Joint J* 2014; 96-b:574–579.
16. Cichos KH, Ewing MA, Sheppard ED, et al. Trends and Risk Factors in Orthopedic Lawsuits: Analysis of a National Legal Database. *Orthopedics* 2019; 42:e260–e267.
17. Sterne JA, Hernán MA, McAleenan A, et al. Assessing risk of bias in a non-randomized study. *Cochrane handbook for systematic reviews of interventions* 2019; 621–641.
18. Khan IH, Jamil W, Lynn SM, et al. Analysis of NHSLA claims in orthopedic surgery. *Orthopedics* 2012; 35:e726–e731.
19. Ries MD, Bertino JSJr, Nafziger AN. Distribution of orthopaedic surgeons, lawyers, and malpractice claims in New York. *Clin Orthop Relat Res* 1997; 337:256–260.
20. Fountain S, Brooks D, Butler D. Managing orthopaedic malpractice risk: committee on professional liability. *Rosemont Am Acad Orthop Surg* 2000; 3–78.
21. Bhattacharyya T, Yeon H, Harris MD. The medical-legal aspects of informed consent in orthopaedic surgery. *J Bone Joint Surg Am* 2005; 87:2395–2400.
22. Marmor S, Farman T, Lortat-Jacob A. Joint infection after knee arthroscopy: medicolegal aspects. *Orthop Traumatol Surg Res* 2009; 95:278–283.
23. Khan SK, Karuppaiah K, Bajwa AS. The influence of process and patient factors on the recall of consent information in mentally competent patients undergoing surgery for neck of femur fractures. *Ann R Coll Surg Engl* 2012; 94:308–312.
24. Guly HR. Diagnostic errors in an accident and emergency department. *Emerg Med J* 2001; 18:263–269.
25. Atrey A, Gupte CM, Corbett SA. Review of successful litigation against English health trusts in the treatment of adults with orthopaedic pathology: clinical governance lessons learned. *J Bone Joint Surg Am* 2010; 92:e36.
26. Probert N, Malik AA, Lovell ME. Surgery for fractured neck of femur–are patients adequately consented? *Ann R Coll Surg Engl* 2007; 89:66–69.