Review Article

A scoping review of retracted publications in anesthesiology

ABSTRACT

Context: Fraudulent publication is a scourge of scientific research.

Objectives: This scoping review was aimed at characterizing retracted publications for fraud or plagiarism in the field of anesthesia. Does the reputation of the journal (Quartile and Impact Factor, IF) protect the reader from the risk of having the manuscript he read withdrawn for fraud/plagiarism?

Methods/Design: This scoping review was planned following the Joanna Briggs Institute recommendations. Data sources: PubMed and the Retraction Watch Database (http://retractiondatabase.org/RetractionSearch.aspx?). Study selection: All types of publications retracted. Data extraction: Year, first author nationality, journal name, journal category, IF, Quartile, H index. Data analysis: The association with Quartile and IF was investigated.

Results: No significant association between retraction of papers published in no-Quartile journals and retractions published in journals placed in the highest quartile.

Conclusions: The quality of the surveillance in paper submission is not higher in journals of the first Quartile than in journals not placed in other Quartiles. (The protocol was prospectively registered in the Open Science Framework https://doi.org/10.17605/OSF.IO/TGKNE)

Key words: Anesthesiology; duplicate publication; fraud; plagiarism; scoping review

Introduction

According to the National Library of Medicine (NLM), Journals may retract articles based on information from their authors, academic or institutional sponsor, editor or publisher, because of pervasive error or unsubstantiated or irreproducible data.[1] Retraction of a scientific paper can broadly be categorized as a result of unintentional or intentional misconduct. Sometimes authors duplicate their data to realize different publications; other times, authorship disputes between co-authors, or between authors

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and their institution, or any legal concern, can induce the retraction. Because publishing is mandatory to achieve career progression, funding, and prestige for academic institutions and universities, the "*publish or perish*" paradigm is most appropriate for expressing the publication pressure underlying this regrettable phenomenon.[2,3] On the other hand, unintentional misconduct can be due to numerous motivations, including mistakes of the publisher (e.g., paper published twice in the same journal, or erroneous issue assignment) or when authors discover and report a serious mistake in their work that invalidates its conclusions. Regardless of the cause, the number of retracted papers is growing rapidly, especially in the fields of medicine and biology. It has been emphasized that about 500-600 scientific papers undergo a retraction process, per year. Of note, from 2001 to 2010, the amount of annual retracted articles, from Open Access Journals, grew by approximately 1000%.[4]

Several studies have been conducted to analyze the retraction phenomenon,[5] to determine its entity in different biomedical fields such as oncology,[6] emergency medicine,[7] drug therapy,[8] radiology.[9] In anesthesiology, a huge number of papers have been retracted although most of these articles were written by only three authors: Yoshitaka Fujii, Joachim Boldt, and Scott Reuben. The "famous" authors Fujii, and Boldt occupy first and second places in the ranking of authors with most retractions in all disciplines. Recently, Dr. Carlisle conducted a statistical analysis on randomized controlled trials (RCTs) published in "anesthesia" and "general medicine" journals in order to evaluate if specific mathematical features (i.e., the mean of continuous variables) of unretracted studies could be associated with a high probability of fraud.[10] Our review was aimed at evaluating qualitative and quantitative features of retracted publications in the field of anesthesia in order to demonstrate that the deleterious impact of the Fujii-Boldt's phenomenon has increased awareness of scientific fraud in anesthesia, inducing, in turn, a substantial improvement in the publication process. Therefore, we associated the quality of the publication process with the percentage of retracted papers, assuming that journals with higher Quartile and higher impact factor (IF) had a more "careful" publication process.

Methods

Protocol design
The protocol was prospectively registered on 15 May 2019 in the Open Science Framework.[11] It has been planned, according the Joanna Briggs Institute recommendations Scoping Review Methodology Group,[12] and following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Extension for Scoping Reviews (PRISMA-ScR).[13]

Research questions
This review is designed to answer the following research question:
- Does the reputation of the journal (Quartile and IF) protect the reader from the risk of having the manuscript he read withdrawn for fraud/plagiarism?

Eligibility criteria
This scoping review considered all the retracted publications with no restrictions on the search period (NLM publishes retraction reports, since 1984), language and clinical settings (e.g., elective/emergency anesthesia, pediatric/adult anesthesia). All publication types, preclinical (in vitro/vivo) and clinical researches, editorials, reviews, guidelines, letters, case reports, and case series were included. Papers were excluded if they did not fit into the conceptual framework of the study, focused on the phenomenon of retraction in anesthesia. Moreover, studies presented an anesthesia time but not involving anesthesia protocols, or management, research in anesthesia and related topics were excluded.

Search methods
We conducted a search query on PubMed using the string "anesthesia AND retract*" and filtering for article type (Retracted Publication). We also perform research on the Retraction Watch Database version: 1.0.6.0 available at http://retractiondatabase.org/RetractionSearch.aspx? [subject: medicine/anesthesia]. Reference lists of relevant studies were also checked. The date of the last search was June 18, 2020.

Manuscript selection, data extraction, and collection
Two authors (A. C. and V. Stoia) independently identified potentially eligible studies, the full text of the retrieved studies was reviewed to select the studies to include in this systematic review. Any disagreement was resolved by consensus with a third reviewer (M. C.). For each article, we recorded the author name, year of publication, the topic of the article, article type (basic, clinical, and research type, as well as papers not involved research), first author's country (affiliation), and year of retraction. In addition, we extracted data on journal name and its metrics, including IF and Quartile, obtained from Journal Citation Report (JCR) 2017. For journal not included in the '*Anesthesiology and Pain Medicine*' category and included in more than one category, we considered the best Quartile. The motivations were obtained by the screening of retraction notices released by the journal in which each paper was published. A subsequent analysis was performed

to evaluate the scientific impact of each paper through the rate of citations, before and after its retraction (Thomson Scientific's Web of Knowledge).

Statistical methods

The percentage of retracted papers was calculated for each journal dividing number of retracted papers by total articles published during the time of observation. For each journal, this parameter was investigated for association with Quartile and IF of the same journal. Journals with no Quartile obtained from JCR were classified as a separate group (No Quartile). Due to highly skewed and not normal distribution data, the associations were tested using a non-parametric test. Kruskal-Wallis test was used to compare the percent of retracted and Quartiles using Dunn's multiple comparisons test for difference among Quartiles. The Spearman rank correlation was used to verify the correlation between the percent of retracted and IF of each journal. A two-tailed *P* value <0.05 was considered significant. Data were analyzed using R software (version 3.5.0).

Results

Study selection

Six hundred seventy-six studied were identified through databases searching (PubMed = 314; Retraction Watch = 362). Four hundred forty-eight papers were screened after removing duplicates. Of these, 21 papers were excluded by title and abstract; consequently, 427 full-text articles were assessed for eligibility. Of these, 4 articles were excluded because journal information not available. Finally, 423 retracted studies were included in the final analysis [Figure 1].

Characteristics of included studies

The list of the 427 retrieved papers and full publishing details can be found in Supplementary material. The journal metrics and number of retractions are reported in Table 1; the table synthetizes the journal name and category, the total number of retracted articles and the retraction percentage, the IF, the Quartile, and the H index of the journal and the number of the articles published per year. Almost all the paper retracted, have been retracted for several reasons. These latter were summarized in a table following the strategy used by Marcus and Oransky.[14] [Table 2]. The most common retraction reason is the author misconduct (59,10%) followed by investigation piloted by company/institution (57,21%), the misconduct of an official investigation/finding (50,12%) and the falsification or fabrication of the data (43,74%).

Figure 2 shows the number of retracted articles for year. The first author of the retracted articles is mainly from Japan and Germany while the nationalities of the journals with greater number of retracted articles are the United States and Great Britain [Figure 3].

Trend analysis

In Figure 4 was reported box plot visualization of the percent of retracted by Quartile subdivision. The Kruskal-Wallis test [H (4) = 16.01, *P* = 0.003] showed association between the two variable with only the comparison No Quartile vs. 1st Quartile statistically significant [Median (Interquartile range) - No Quartile 0.09 (0.07- 0.67) vs Q1 0.01 (0.006-0.03); *P* = 0.0055]. In Figure 5, was reported a scatter plot graph of the percent of retracted and IF. The Spearman's r correlation was -0.4 (*P* = 0.007) showing a decreasing trend between the percent of retracted and IF.

Discussion

Although recently, Nair *et al*. published a comprehensive analysis on the reasons for article retraction in anesthesiology, to our knowledge,[15] this work represents the first scoping review attempting to analyze the phenomenon of scientific retraction in anesthesiology. This phenomenon is easily characterized because three authors – the Fujii-Boldt-Reuben trio – were responsible for about the four-fifths of the retractions. Dr Yoshitaka Fujii was at the center of a famous editorial case.[16] Fujii and co-authors 'conducted' a huge number of investigations to dissect all the aspects of postoperative nausea and vomiting (PONV). Data were published on prestigious anesthesia and non-anesthesia journals, and researchers began to doubt on their sincerity.[17] The Japanese Society of Anesthesiologists Special Investigation Committee on Fujii's Papers confirmed that an incredible number of articles were fabricated and only 3 papers were verified as authentic.[18] The second striking case is the Boldt affair.[19,20] Between the beginnings 1990s and 2010 the German anesthesiologist published numerous articles on fluid management (mainly on hydroxyethyl starch, HES). Initially, a retraction of 88 Boldt's publications was due to lack of ethics approval.[21] Subsequently, Boldt was suspicioned about design and data classification, as well as data authenticity. For instance, although Boldt affirmed to use albumin in his studies on cardiac surgery, the Klinikum Ludwigshafen (Boldt's employer) stated that no albumin was used in that setting, since 1999. The last case regards the American Scott Reuben. In 2009, a notice of retraction the editorial office of the journal *Anesthesia & Analgesia* notified that 10 Reuben's articles were retracted for fabricated data.[22] In the same year, there was the retraction of others 21 articles published between 1996 and 2008.[23]

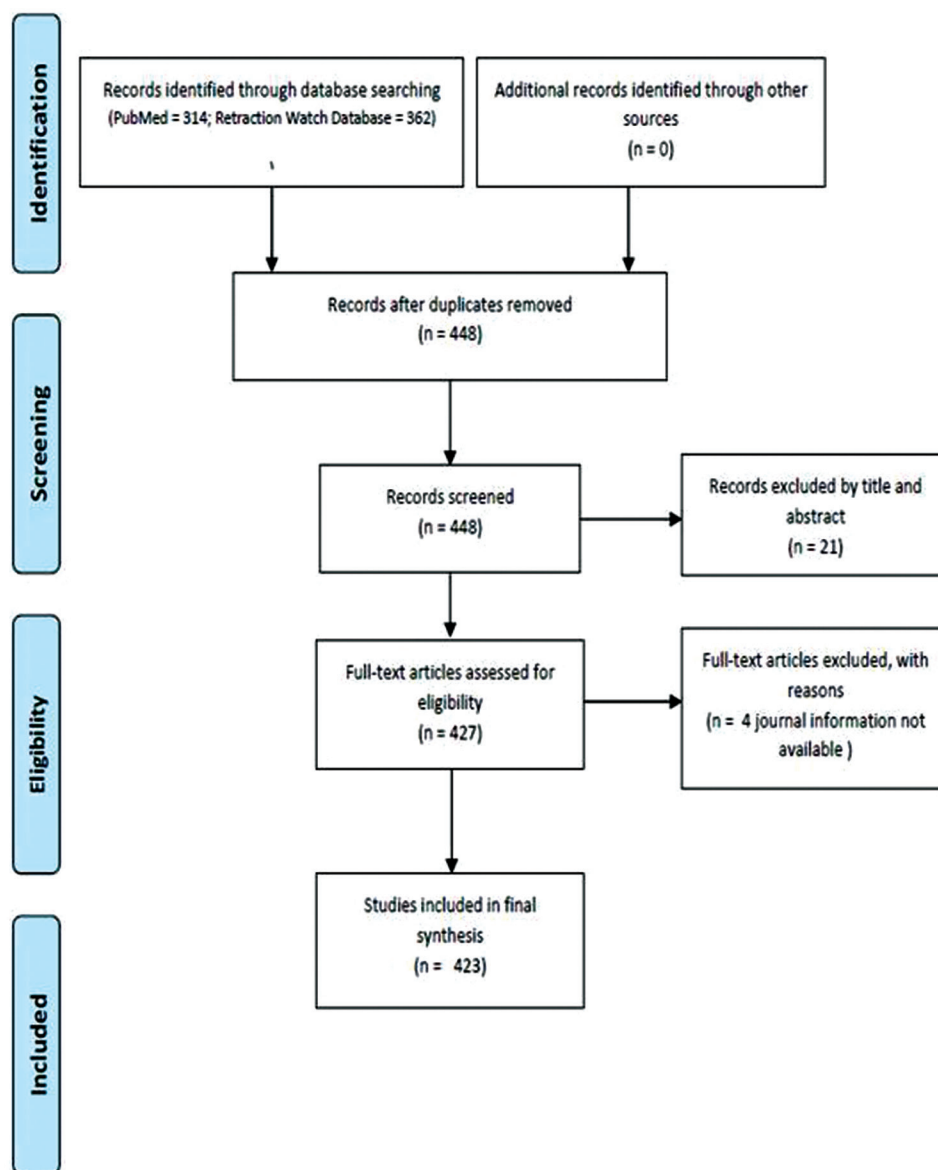The fraudulent conduct of these three authors has also influenced the country analysis and the temporal trend of

Figure 1: PRISMA flow diagram

the retraction phenomenon, because the trio have acted above all in the 1989-2008 period and after their unravelling, the trend has almost halved. Furthermore, many recent retraction reports refer to their studies published more than ten years before. Apparently, in absence of qualified editor section for the matter it can be easier for fraud to remain misunderstood. On the other hand, very important journals including some of the JAMA Network family were involved in the fraud. It is of note, however, that the most important journals with the greater IFs have not a reduced percentage of retraction, and this finding could be explained by a more a greater number of readers and therefore a greater possibility to find criticisms in published papers. In fact, our analysis showed no significant association in retraction between the journals with "No Quartile" vs journals with the highest

Quartile with a decreasing trend between the percent of retracted and higher IF.

Fraud and plagiarism are the main reasons for retraction. Furthermore, about a quarter of all the articles were retracted due to ethical problems. However, numerous Boldt's papers initially removed for ethical issue also presented altered data.

The matter of motivations for retraction is rather complex and further clarification from the scientific community should be carried out. In particular, because the word "retraction" can represent a stain in the career of a researcher, problems on fabrication or falsification of data, plagiarism, and ethical issues in research should be differentiated from other circumstances in which the retraction has been induced by an administrative

Table 1: Journal metrics and number of retractions

| Journal Name	Journal Category	Retracted n	Total Article	Retracted %	Impact Factor	Quartile	H index	Article per year
Acta Anaesthesiologica Scandinava	Anesthesiology and Pain	14	4256	0,328947	2,228	Q3	100	202,67
Acta Pharmacologica Sinica	Other	1	4348	0,022999	4,01	Q1	78	207,05
American Journal of Obstetrics and Gynecology	Other	1	10338	0,009673	6,12	Q1	203	492,29
American Journal of Rhinology	Other	1	926	0,107991	1,363	out	70	92,60
American Journal of Surgery	Other	1	6433	0,015545	2,201	Q2	140	306,33
Anaesthesia	Anesthesiology and Pain	14	3664	0,382096	5,879	Q1	106	174,48
Anaesthesia and Intensive Care	Anesthesiology and Pain	10	2402	0,416320	1,358	Q4	56	114,38
Anasthesiologie Intensive Mad Notfallmed Schmerztherapie (Anasthesiologie, Inten	Anesthesiology and Pain	6	1834	0,327154	0,265	Q4	25	96,53
Anesthesia and Analgesia	Anesthesiology and Pain	69	9522	0,724638	3,489	Q1	187	453,43
Anesthesia Essays And Researches	Anesthesiology and Pain	3				out		not indexed
Anesthesiology	Anesthesiology and Pain	12	5780	0,207612	6,424	Q1	214	275,24
Annals of Cardiac Anaesthesia	Anesthesiology and Pain	5	1216	0,411184		out	22	110,55
Annals of Thoracic Surgery	Other	2	13580	0,014728	3,919	Q1	184	646,67
Archives of Ophthalmology (JAMA Ophthalmology)	Other	1	3776	0,026483	4,399	Q1	174	222,12
Archives of physiology and biochemistry	Other	1	528	0,189394	2,11	Q4	44	58,67
Archives of Surgery (JAMA Surgery)	Other	1	2868	0,034868	7,96	Q1	156	168,71
Bariatric Surgical Practice and Patient Care	Other	1	151	0,662252	0,323	out	10	37,75
BMC Anesthesiology	Anesthesiology and Pain	1	874	0,114416	1,619	Q4	31	145,67
Brazilian Journal of Medical and Biological Research: Revista Brasileira de Pesquisas Médicas e Biológicas	Other	1	3641	0,027465	1,85	Q3	79	3,95
Breast Journal	Other	1	1151	0,086881	2,433	Q2	64	104,64
British Journal of Anaesthesia	Anesthesiology and Pain	29	4827	0,600787	6,199	Q1	159	229,86
British Journal of Ophthalmology	Other	1	6182	0,016176	3,615	Q1	137	294,38
British Journal of Oral and Maxillofacial Surgery	Other	1	3137	0,031878	1,164	Q3	65	149,38
British Journal of Surgery	Other	1	4319	0,023154	5,572	Q1	186	205,67
Canadian Journal of Anesthesia	Anesthesiology and Pain	42	916	4,585153	3,374	Q2	90	114,50
Cardiovascular and Interventional Radiology	Other	1	3560	0,028090	1,928	Q3	76	169,52
Cell Biochemistry and Biophysics	Other	1	2096	0,047710	2,32	Q4	70	123,29
Chinese medical journal	Other	1	9772	0,010233	1,55	Q3	54	465,33
Circulation	Other	4	13778	0,029032	23,054	Q1	570	656,10
Circulation research	Other	4	5715	0,069991	15,862	Q1	306	272,14
Clinical Drug Investigation	Other	6	1915	0,313316	2,158	Q3	53	91,19
Clinical Endoscopy	Other	1	1600	0,062500	0,84	out	23	228,57
Clinical Therapeutics	Other	17	3649	0,465881	2,935	Q2	123	173,76
Cornea	Other	1	4956	0,020178	2,313	Q3	108	236,00
Coronary Artery Disease	Other	1	1622	0,061652	1,554	Q4	58	77,24
Critical Care Medicine	Other	3	7588	0,039536	6,971	Q1	249	361,33
Current Biology	Other	1	7885	0,012682	9,193	Q1	290	375,48
Current therapeutic research, clinical and experimental	Other	1	863	0,115875	0,446	Q4	34	57,53
Der Anaesthesist	Anesthesiology and Pain	2	2264	0,088339	0,904	Q4	41	107,81
Diagnostic pathology	Other	1	1414	0,070721	2,528	Q2	44	141,40

Contd...

Table 1: Contd...

Journal Name	Journal Category	Retracted *n*	Total Article	Retracted %	Impact Factor	Quartile	H index	Article per year
Drug Delivery	Other	1	1600	0,062500	3,829	Q1	52	84,21
Drug Design Development and Therapy	Other	1	1953	0,051203	3,208	Q2	48	279,00
Egyptian Journal of Anaesthesia	Anesthesiology and Pain	1	2418	0,041356	0,4	Q3	9	161,20
Enfermería Intensiva	Other	1	1022	0,097847	0,16	Q3	14	53,79
European Journal of Anaesthesiology	Anesthesiology and Pain	29	2282	1,270815	4,14	Q1	69	108,67
European Journal of Pharmacology	Other	1	14268	0,007009	3,17	Q2	167	679,43
European Journal of Surgery	Other	3	1066	0,281426		out	67	213,20
Experimental Physiology	Other	1	2340	0,042735	2,624	Q2	87	111,43
Fukushima Journal of Medical Science	Other	2	837	0,238949	0,21	out	13	44,05
Gut	Other	1	4617	0,021659	17,943	Q1	262	219,86
Indian Journal of Anaesthesia	Anesthesiology and Pain	1	2272	0,044014		out	22	108,19
Injury	Other	1	6118	0,016345	1,834	Q4	109	291,33
Intensive Care Medicine	Other	4	4261	0,093875	18,967	Q1	176	202,90
International Journal of Clinical Experimental Medicine	Other	3	10963	0,027365	0,181	out	32	2192,60
International Journal of General Medicine	Other	1	1572	0,063613	1,05	out	28	174,67
International Journal of Gynecology and Obstetrics	Other	4	4649	0,086040	1,671	Q3	88	221,38
International Journal of Oral and Maxillofacial Surgery	Anesthesiology and Pain	1	1032	0,096899	1,958	Q3	47	54,32
International Journal of Oral and Maxillofacial Surgery	Other	1	3651	0,027390	1,961	Q2	90	173,86
Journal of Anaesthesiology Clinical Pharmacology	Anesthesiology and Pain	2	4535	0,044101	0,95	out	25	238,68
Journal of Anesthesia	Anesthesiology and Pain	7	1456	0,480769	1,462	Q4	39	161,78
Journal of Bone and Joint Surgery	Other	2	6417	0,031167	4,716	Q1	235	305,57
Journal of Cardiothoracic and Vascular Anesthesia	Anesthesiology and Pain	11	3853	0,285492	1,882	Q3	76	183,48
Journal of Clinical Anesthesia	Anesthesiology and Pain	7	2050	0,341463	3,542	Q1	65	97,62
Journal of clinical monitoring and computing	Other	1	3245	0,030817	0,759	out	46	170,79
Journal of experimental & clinical cancer research	Other	1	2346	0,042626	5,646	Q1	67	123,47
Journal of Gastrointestinal Surgery	Other	1	4318	0,023159	2,686	Q2	117	254,00
Journal of Huazhong University of Science and Technology	Other	1	1046	0,095602	0,957	out	24	116,22
Journal of Intensive Care	Anesthesiology and Pain	1	581	0,172117	1,34	out	21	116,20
Journal of International Oral Health	Other	2	415	0,481928	0,44	out	3	207,50
Journal of Periodontology	Other	2	4177	0,047881	2,768	Q1	142	198,90
Journal of Pharmacology & Pharmacotherapeutics	Other	1	909	0,110011	0,52	out	26	113,63
Journal of thoracic and cardiovascular surgery	Other	1	7571	0,013208	5,261	Q1	180	360,52
Journal of visualized experiments	Other	1	5054	0,019786	1,108	Q3	67	1263,50
Laryngoscope	Other	6	9049	0,066306	2,343	Q2	134	430,90
Masui	Anesthesiology and Pain	4	15401	0,025972	0,1	out	15	810,58
Medical Science Monitor: International Medical Journal of Experimental and Clinical Research	Other	2	5126	0,039017	1,98	Q3	75	269,79
Medicine (Baltimore)	Other	1	13896	0,007196	1,87	Q2	135	661,71
Microgravity Science and Technology	Other	1	710	0,140845	1,973	Q2	27	35,50

Contd...

Table 1: Contd...

Journal Name	Journal Category	Retracted n	Total Article	Retracted %	Impact Factor	Quartile	H index	Article per year
Middle East Journal of Anesthesiology	Anesthesiology and Pain	1	2694	0,037120	0,29	out	20	141,79
Minerva Anestesiologica	Anesthesiology and Pain	2	1293	0,154679	2,84	Q2	53	129,30
Neurochemical Research	Other	1	4765	0,020986	2,782	Q3	105	226,90
Neurological Sciences: Official Journal of the Italian Neurological Society	Other	1	3701	0,027020	2,484	Q3	64	205,61
Neuroscience letters	Other	1	19722	0,005070	2,173	Q3	155	939,14
New England journal of medicine	Other	1	7697	0,012992	70,67	Q1	933	366,52
Obstetrics and Gynecology	Other	3	7475	0,040134	4,965	Q1	201	355,95
Orthopedics	Other	1	4260	0,023474	1,608	Q3	60	202,86
Otolaryngology-Head and Neck Surgery	Other	2	7225	0,027682	2,31	Q2	109	344,05
Pediatric Anesthesia	Anesthesiology and Pain	11	2402	0,457952	2,037	Q3	74	171,57
PLoS One	Other	2	198098	0,001010	2,776	Q2	268	22010,89
Proceedings of the National Academy of Sciences of the United States of America	Other	1	70686	0,001415	9,58	Q1	699	3366,00
Regional Anesthesia and Pain Medicine	Anesthesiology and Pain	3	1784	0,168161	5,113	Q1	95	84,95
Resuscitation	Other	1	4449	0,022477	4,572	Q1	123	211,86
Romanian Journal of Functional & Clinical, Macro- & Microscopical Anatomy & of Anthropology	Other	1						not indexed
Saudi Journal of Anaesthesia	Anesthesiology and Pain	7	1722	0,406504	0,82	out	19	246,00
Science translational medicine	Other	1	1992	0,050201	17,2		168	249,00
Surgical Endoscopy	Other	3	8178	0,036684	3,209	Q1	141	511,13
The Journal of Pain : Official Journal of the American Pain Society	Anesthesiology and Pain	2	2066	0,096805	5,424	Q1	109	114,78
The Journal of Surgical Research	Other	1	8046	0,012429	1,872	Q3	98	383,14
Therapeutics and clinical risk management	Other	1	1063	0,094073	1,824	Q3	43	177,17
Transfusion Medicine and Hemotherapy	Other	1	735	0,136054	3	Q2	33	49,00
Wiadomości lekarskie	Other	1	7178	0,013931	0,12	out	14	377,79
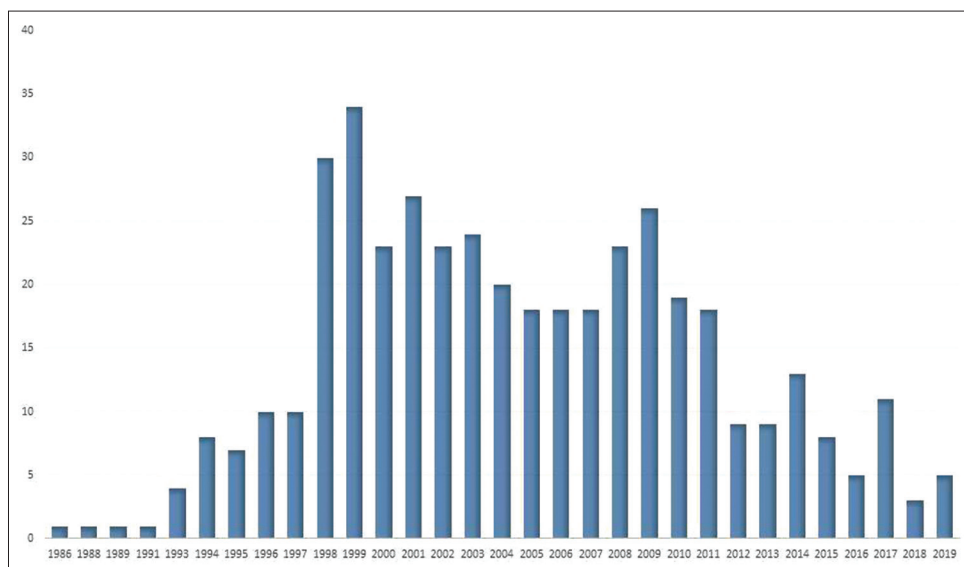
Figure 2: Number of retracted articles for year

Table 2: Retraction's reason. Adapted from[14]

Reason	*n*	%
Misconduct by Author	250	59,10%
Investigation by Company/Institution	242	57,21%
Misconduct - Official Investigation/Finding	212	50,12%
Falsification/Fabrication of Data	185	43,74%
Investigation by Third Party	179	42,32%
Lack of IRB/IACUC Approval	108	25,53%
Investigation by Journal/Publisher	61	14,42%
Falsification/Fabrication of Results	37	8,75%
Duplication of Article	34	8,04%
Concerns/Issues About Data	29	6,86%
Error in Data	24	5,67%
Ethical Violations by Author	17	4,02%
Notice - Limited or No Information	15	3,55%
Lack of Approval from Company/Institution	14	3,31%
Unreliable Results	14	3,31%
Unreliable Data	13	3,07%
Error by Journal/Publisher	12	2,84%
Plagiarism of Article	10	2,36%
Plagiarism	9	2,13%
Criminal Proceedings	8	1,89%
Error in figure	8	1,89%
Error in Methods	6	1,42%
Notice - Lack of	6	1,42%
Withdrawal	6	1,42%
Concerns/Issues About Authorship	5	1,18%
Duplication of Text	5	1,18%
Error in Materials (General)	5	1,18%
Error in Results and/or Conclusions	5	1,18%
Falsification/Fabrication of Image	5	1,18%
Informed/Patient Consent - None/Withdrawn	5	1,18%
Notice - Unable to Access via current resources	5	1,18%
Plagiarism of Text	5	1,18%
Upgrade/Update of Prior Notice	5	1,18%
Breach of Policy by Author	5	1,18%
Cites Prior Retracted Work	4	0,95%
Concerns/Issues About Results	4	0,95%
Error in Analyses	4	0,95%
Forged Authorship	4	0,95%
Date of Retraction/Other Unknown	3	0,71%
Euphemisms for Plagiarism	3	0,71%
Objections by Third Party	3	0,71%
Author Unresponsive	2	0,47%
Conflict of Interest	2	0,47%
Doing the Right Thing	2	0,47%
Error in Text	2	0,47%
Ethical Violation	3	0,71%
Investigation by ORI	2	0,47%
Updated to Retraction	2	0,47%
Duplication of Data	1	0,24%
Duplication of Image	1	0,24%
Error by Third Party	1	0,24%
Lack of Approval from Author	1	0,24%
Lack of Approval from Third Party	1	0,24%

Contd...

Table 2: Contd...

Reason	*n*	%
Miscommunication by Author	1	0,24%
Miscommunication by Third Party	1	0,24%
Plagiarism of Data	1	0,24%
Publishing Ban	1	0,24%
redundant publication	1	0,24%
Results Not Reproducible	1	0,24%
Unreliable Image	1	0,24%
Copyright Claims	1	0,24%
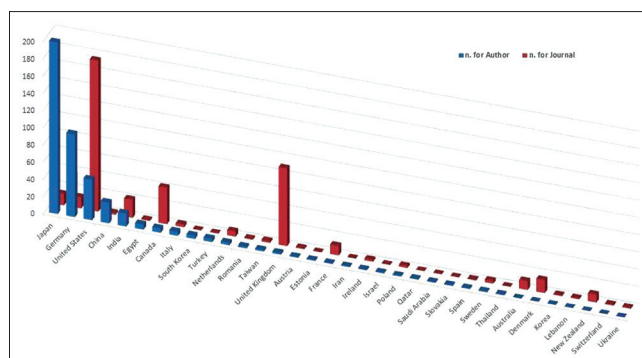
Figure 3: Number of retracted articles for Country (first author and journal)

error of problems due to editing process. Probably, in these latter conditions it should be more appropriate to indicate the paper as "withdrawal". Many publishers already use various terms for notices. For example, some adopt "removal" or "retraction" when the retraction is initiated by the editors, and "withdrawal" when it is initiated by the authors. Others use "retraction" uniformly and still others use "withdrawal". Moreover, other publishers label all notations as "errata". Thus, a uniform nomenclature seems to be needed.

How to easily detect scientific fraud? A mathematical model was used by Kranke *et al*. to launch a warning on Fujii's studies reliability[17]; a similar strategy was adopted for investigating on 3 biochemical researchers.[24] As previously mentioned, Dr Carlisle used the Stouffer's method to detect anomalies in the distributions of baseline continuous variables reported as mean to evaluate possible frauds in unretracted RCTs in anesthesiology.[10] It was the same approach used to investigate on the data integrity of the Fujii's studies.[25] The Stouffer's method was used to combine the *P* values of multiple variables. After calculation of about 30.000 variables, Carlisle found that RCTs with extreme distributions of means were far more suspicious of containing fraud data than other studies. In other words, when *P* values are so extreme it is very likely that the baseline data are fabricated.
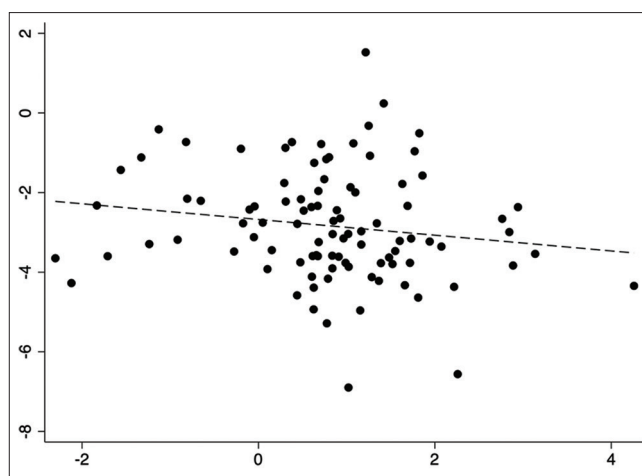
The meta-analyses issue. A tremendous bias that is dragging on is that Boldt's studies continued to be included in
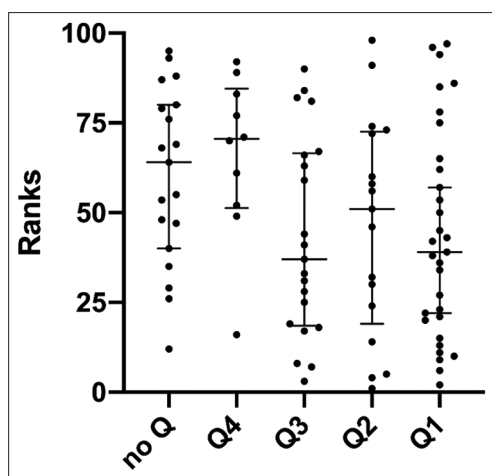
Figure 4: Box plot of the percent of retracted by Quartile subdivision. The percent values of retracted were reported as ranks. Only the comparison No Quartile vs. 1st Quartile was statistically significant (*P* = 0.0055). Legend: Quartile, Q

Figure 5: Scatter plot and linear fit of the percent of retracted on y-axis and Impact Factor (IF) on x-axis. Values were log scaled. A decreasing trend between the percent of retracted and IF was observed (*P* = 0.007). Legend: Quartile, Q

meta-analyses after retraction.[26] The same problem also regards the Fujii's studies. For instance, a Cochrane analysis on PONV have included data from Fujii's 'investigations'.[27] However, Dr. Carlisle performed a newest meta-analysis on PONV comparing findings from Fujii's trials with those of other authors.[28] As a consequence, including fraudulent data in a meta-analysis substantially prejudices the results and meta-analysts should carefully consider this bias.[29]

Strengths and limitations

Our analysis has several limitations. For example, the journals metric refers to 2017 data. However, the analysis started before the new indices were released (2020).

The research methodology certainly has several limitations. Retractions and retracted publications are not always properly crossed linked. Several papers are even indexed as corrections and can be indicated as "correction and republished article" and as "published erratum". Following the screening of the articles, many of these possible sources of bias were identified. Additionally, other important databases such as Web of Science, J-STAGE, and KoreaMed, also index retractions in anesthesia, and those journals are not all indexed in PubMed. Nevertheless, expanding the search to other databases would have taken us far from the scope of this review that was aimed at assessing the association between the journal's reputation and retraction for fraud or plagiarism.

Another important limitation concerns the lack of data on the number of articles accepted or rejected by Q1 journals. Although the knowledge of these data would have provided us with a greater awareness of the phenomenon, such an

exhaustive analysis would have considerably complicated the study, taking us outside the main purpose.

It would have been interesting to evaluate the retraction phenomenon by referring to the date of the first suspicions on Fujii's publications and to evaluate the trend of the retractions before and after. The great limitation of the analysis is in the very nature of the phenomenon. Of note, after the completion of the research, a lot of new retractions have been released.[30] We considered it appropriate not to include the new data in the analysis because the real purpose of the publication was to underline that: (i) retraction is not associated with the journal's reputation; (ii) in addition to the ability of editors and reviewers, dedicated software can help unmask fraud; (iii) the term retracted (e.g., retraction note or retraction notice) should be reserved for true fraud, while for articles canceled for non-fraudulent causes, journals should use the term "withdrawn".

Conclusions

Our analysis showed no association in retraction between the journals with "No Quartile" vs journals with the "1st Quartile" with a no significant decreasing trend between the percent of retracted and higher IF. Therefore, a careful publication process seems to reduce drastically the acceptance of fraudulent papers. In our opinion, an aspect that should be re-evaluated is the large citation of retracted articles and their use in meta-analysis.

Authorship

M. F. and A. A. designed the study. A. C., V. Stoia, and M. C. contributed to the literature search, data extraction, and data analysis. M. C., S. W., M. C. P., and S. L. contributed to the project design and writing of the manuscript. V. S.,

and P. C. performed the statistical analysis. All authors have read and approved the final version of the manuscript. All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

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Conflicts of interest

There are no conflicts of interest.

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