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Reporting and Methodological Qualities of Published Surgical Meta-analyses

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Abstract

Objectives: To assess the overall qualities of published surgical meta-analysis and predictive factors for high qualities.

Study Design and Setting: All meta-analyses pertinent to surgical procedures published in year 2013 were selected from PubMed and EMBASE. The characteristics of the included meta-analyses were collected, and their reporting and methodologic qualities were assessed by the PRISMA (27 items) and AMSTAR (11 items) checklists, respectively. Independent predictive factors associated with these two qualities were evaluated by univariate and multivariate analyses.

Results: Hundred ninety-seven meta-analyses representing 10 surgical subspecialties were included. The mean PRISMA and AMSTAR adherences (by items) were 22.2 ± 2.4 and 7.8 ± 1.2, respectively, and a positive linear correlation was found between them with an R^2 of 0.793. Those meta-analyses conducted by the first authors having meta-analysis publication previously had significantly higher reporting and methodologic qualities than those who did not ($P = 0.002$ and $P = 0.001$). Meanwhile, there were also significant differences in these two qualities between studies published in Q1-ranked and (Q2 + Q3)-ranked journals as rated by the SCImago indicator ($P < 0.001$ and $P < 0.001$). On multivariate analyses, region of origin (non-Asia vs. Asia), publishing experience of first authors (ever vs. never), rank of publishing journals (Q1 vs. Q2 + Q3), and preregistration (presence vs. absence) were independently associated with superior reporting and methodologic qualities.

Conclusions: The reporting and methodologic qualities of current surgical meta-analyses remained suboptimal, and first authors' experience and ranking of publishing journals were independently associated with both qualities. Preregistration might be an effective measure to improve the quality of meta-analyses, which deserves more attention from future study conductors.

Keywords: Meta-analysis; Surgery; Reporting quality; Methodologic quality; PRISMA; AMSTAR

1. Introduction

A meta-analysis is a statistical technique that provides quality information by appropriately summarizing numerous studies into one concise conclusion, which, along with systematic review of the available literature, is regarded to give the highest level of evidence (level 1a) [1,2]. It is of critical value to clinicians, researchers, health policy makers, and medical educators as a source of credible evidence [3–5]. In the last 2 decades, there is a soaring trend in publishing meta-analyses on a variety of specialties or subspecialties in medicine. A brief PubMed search conducted by us has revealed that the quantity of meta-analyses doubled in the period of 2009–2013 compared with 2004–2008 (26,554 and 11,366 articles, respectively). Apart from its inherent importance, the geometrically growing number of meta-analyses might be attributed to some other reasons: on one hand, compared with the work of an original clinical research, conducting a meta-analysis

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What is new?

Key findings

- Not every published meta-analysis represents the highest level of evidence because of possible flaws in methodologic and reporting qualities.
- There was a positive linear correlation between reporting and methodologic qualities of published meta-analyses.
- Although nearly a half of enrolled surgical meta-analyses came from Asia (predominantly China), their reporting and methodologic qualities were significantly inferior compared with those from non-Asian regions.
- The qualities of first authors and publishing journals were independently associated with reporting and methodologic qualities of published meta-analyses.
- Preregistration is a potential solution to improve the quality of future meta-analyses.

needs additional training of the concept and practice of this specific methodology, as well as the assistance of professional expertise when necessary; on the other hand, most professional medical journals are more likely to publish meta-analysis nowadays because of its potentially higher citation rate, but not every journal requires a standardized criteria of this type of study to be met by articles to be published. Consequently, we have to face the reality that many meta-analyses are at high risks of having suboptimal qualities as well as overlapping on the same topic [6], and these low-quality studies are prone to be inferior in power and credibility, which can even mislead clinical decision making [7]. In short, not every meta-analysis represents level 1a evidence [8].

Several tools have been developed for quality assessment of meta-analyses, aiming at improving completeness in reporting. The most prominent and the first one published was the Quality of Reporting of Meta-Analyses (QUOROM) in 1996 [9], followed by its update: the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) [10,11]. On the other hand, the Assessment of Multiple Systematic Reviews (AMSTAR) is an ideal measuring tool to assess the methodologic quality of systematic reviews and meta-analyses, which has been shown to have good agreement, reliability, construct validity, and feasibility [12,13]. It is a combination of the enhanced Overview Quality Assessment Questionnaire (OQAQ), a checklist created by Sacks et al. [5], and three additional items which have recently been shown to be of methodologic importance [14,15].

By either assessing reporting or methodologic quality, previous studies have mainly investigated the associations between characteristics of the studies themselves and the quality of meta-analyses [16–21]. However, a comprehensive appraisal evaluating the impact of the study conductors and the publishing journals on the overall qualities of meta-analyses has never been reported.

Because of susceptibility to methodologic flaws, as well as limited number and size of included randomized controlled trials (RCTs) in surgical meta-analyses, they are more prone to have inferior quality than other studies [21,22]. In the present study, we specifically focused on those meta-analyses pertinent to surgical procedures published in 2013, with the aim to assess the reporting and methodologic qualities of those surgical meta-analyses published currently, as well as to identify predictive factors associated with their qualities using univariate and multivariate analyses.

2. Methods

2.1. Search strategy

We performed a comprehensive search in PubMed (MEDLINE) and EMBASE for articles dating from January 2013 to December 2013 with the language limitation of English. We used free words "meta?analy*" and "surg*," as well as the combination of the MeSH word "Surgical Procedures, Operative" and publication type of "meta-analysis." We also expanded our research by checking the references of the included studies and using a previously reported method [23]. The search was limited to articles published in professional journals cited by the Science Citation Index (SCI) in the year 2013. Duplicated publications, abstracts only, and conference proceedings were excluded. The latest search was conducted in August 2014. Surgical procedures were defined as "medical procedures involving an incision with instruments, performed to repair damage or arrest disease in a living body" (according to Princeton's WordNet). Thus, surgical procedures included minimally invasive operations such as laparoscopic and robotic procedures. A meta-analysis is defined as "a statistical analysis combining results from independent studies, which produces a single estimate of effect, using appropriate pooling methods (e.g., the random- or fixed-effect models)" [24].

2.2. Eligibility criteria

In the present study, inclusion criteria were (1) a study with the meta-analytic methodology pooling results from primary studies (e.g., articles of meta-analysis alone or systematic reviews containing meta-analyses) and (2) the primary endpoint was to specifically assess values or outcomes of surgical procedures. Exclusion criteria were (1) non–meta-analysis (e.g., narrative reviews, commentary, or expert opinions); (2) meta-analyses evaluating other