Funding Bias in Shoulder Arthroplasty Research

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INTRODUCTION:

Prior research has shown that industry funding can impact the outcomes of medical literature. Industry funding yielded a 3.3x higher number of positive results when compared to other funding sources in one study of orthopaedic spine literature. However, two different studies of the biases in articles published in the J*ournal of Shoulder and Elbow Surgery (JSES)* did not show an effect from industry associated conflict of interests and disclosure statements on study outcomes. Limited data exists on the degree of bias that industry funding may have on shoulder arthroplasty literature outside of *JSES*, where a wider scope of journals may have differing policies for declaration of funding sources. The purpose of this study is to characterize the type and frequency of funding for recently published shoulder arthroplasty studies and the impact of industry funding on reported outcomes. We hypothesized that studies authored by attendings who receive industry funding are more likely to report positive outcomes than those who do not.

METHODS:

We performed a retrospective study searching all articles with the term “shoulder arthroplasty,” “reverse shoulder Arthroplasty,” “anatomic total shoulder arthroplasty,” or “total shoulder arthroplasty” on PubMed from the years January 2020 to December 2022. Studies with participants under the age of 18 years old, articles not in English, Letters to the Editors/Comments, Systematic Reviews/Meta-analysis, Abstracts, and poster presentations were all excluded. The primary outcome of studies was coded as either positive, negative, or neutral. A positive result was defined as one in which the null hypothesis was rejected, or the result favored the group in which the industry-funded implant was included. A negative result was defined as one in which the result did not favor the group in which the industry-funded implant was used. A neutral result was defined as one in which the null hypothesis was confirmed. A non-applicable (NA) result was defined as one that did not fit these criteria. Article funding type, subcategorized as National Institute of Health (NIH) funding, federal government funding, specialty society funding, institutional funding, and industry funding, was also recorded. Author disclosures were recorded to determine conflicts of interest. The journal name was recorded for each study. Statistical analysis was conducted using the Chi-squared test and Fisher exact test.

RESULTS: A total of 1,626 articles met initial inclusion criteria. Of those articles 53.4% (869) did not have available disclosure of funding source and 34.4% (560) were not industry funded. This left 197 studies (12.1%) with industry funding (Table 1). A higher number of industry funded studies were found to have a positive primary endpoint (57.9%, 114/197), as compared to a negative (7.6%, 15/197), neutral (34.0%, 67/197), or NA endpoint (0.5%, 1/197)(p=0.031). A higher proportion of the studies that were not funded by industry had negative primary endpoints (12.9%, 72/560) compared to the proportion of studies with negative primary endpoints among those funded by industry (7.6%, 15/197) (p=0.031). Of the 1,626 articles, 363 reported conflicts of interest related to industry funding, and the majority of these studies had positive primary endpoint (55.6%, 202/363) as compared to negative (9.1%, 33/363), neutral (34.4%, 125/363), or NA (0.3%, 3/363) endpoints (p=0.007) (Table 2). The proportion of studies with a positive primary endpoint in this group with conflicts of interest (55.6%, 202/363) was significantly higher than the proportion of studies with a positive primary endpoint in the group without conflicts (43.4%, 168/387) (p=0.007).

DISCUSSION AND CONCLUSION:

The results of this study supported our hypothesis, with data suggesting that there is a significant relationship between the type of funding and the primary outcome of shoulder arthroplasty-based studies. Industry funding and author conflict of interest may be more likely to lead to biased study results with positive outcomes. Shoulder and elbow surgeons should be aware of potential bias when choosing to base clinical practice on published data.