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From Social Media to Peer Review: How Can we Evaluate Medical Content for Misinformation and Bias?

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Traditionally, ophthalmologists stay current by referring to peer reviewed papers found on scientific databases, such as PubMed, where rigorous publication standards reduce the potential for bias. We now access medical information from diverse online sources and social media allowing for fast-paced dissemination of content. Access to this rapidly evolving online information has allowed us to be more versed in our specialized knowledge than ever before. However, the rise of social media use in medicine may challenge the traditional methods aimed to limit misinformation and bias. How can we identify and evaluate bias when we access information from multiple disparate online sources in 2023?

EVALUATING BIAS IN PEER REVIEWED LITERATURE

Bias is a systematic error that can be introduced during planning, subject selection, data collection, analysis, and publication phases of studies.¹ Biases can be explicit, within our awareness, or implicit, where an unconscious belief surreptitiously influences judgement and decision making. Thus, when evaluating a study's conclusions, we need to consider sources of bias that might reduce the validity of the findings.

Low-level evidence, such as case reports, case series and expert opinions, are common in peer reviewed literature and are inherently at increased risk of bias.^{2,3} Low-level evidence carries major limitations including a lack of ability to generalize, no possibility to establish cause-effect relationship, and a publication bias that heavily favours

positive-outcome findings.⁴ We should not over-generalize the conclusions of low-level evidence papers. Instead, where possible, we can look for high-level evidence such as well-designed (RCTs), with high internal and external validity. Having high internal validity means being confident that study design, implementation and data analysis have yielded non-biased findings. High external validity also means that study findings can be generalized to other groups or populations.^{1,2}

Given the busy nature of our ophthalmology practices, many will seek out review articles to remain up-to-date and access clinical information. Systematic review and meta-analyses are preferred over unstructured reviews since they have formal methodologies for study inclusion and publication bias assessment. These methodologies reduce the risk of studies being selectively excluded to overestimate the effect of a treatment.

In addition to systematic review methodologies, some factors that seem to protect against bias are reviews of clinical interventions and being published in a higher impact factor (IF) journal.^{2,5} One study found that higher IF journals may be helpful in bias assessments given that industry sponsorship and reporting positive results were not found to be connected with publishing in these journals.⁶ However, we need to be cognizant that IF is vulnerable to self-citation manipulations. These manipulations can over-inflate the importance or impact of a journal, with recent increased rates of self-citations reported across many journals.⁷

Recognizing the risk of bias in peer reviewed literature, we can use tools to critically appraise the information we are accessing. Guyatt and colleagues have developed a GRADE (Grading of Recommendations Assessment, Development, and Evaluation) approach for evaluating bias in literature and an open-access user's guide on how to adopt evidence into practice.^{2,8} The GRADE system helps readers and organizations grade the quality of evidence and the strength of a study's recommendations.⁸

WHICH DATABASE SHOULD I USE?

Google Scholar is commonly used by physicians due to its intuitive search interface and greater access to free full-text articles than other search engines.⁹ However, significant differences exist in how Google Scholar extracts information compared with other academic search engines. One study attempted to reverse-engineer Google Scholar's classified ranking algorithm and raised concerns regarding the accuracy and validity of search results.¹⁰ Google Scholar uses automated robot web crawlers with citation counts as the highest weighted factor, with author and journal name also having meaningful impact.^{10,11} Another study found that Google Scholar has a limited search syntax which does not allow for advanced search limits or filters and does not consider variations in search term sequence or spelling.¹¹ Although it retrieves a large number of hits per search, the results are of low precision and are poorly indexed for topic relevance. Finally, Google Scholar presents challenges for non-English colleagues, as one study concluded there could be bias in multilingual searches with Google Scholar downgrading non-English documents in their search to virtually invisible positions.¹²

ASSESSING FOR BIAS IN SOCIAL MEDIA PUBLICATIONS

Scientific information is often published by Key Opinion Leaders (KOLs) on social media platforms such as Twitter, YouTube, Instagram and Facebook, before publication in peer-reviewed journals. Leigh and colleagues found that academic expertise and seniority are not consistently correlated with digital influence and less established researchers with smaller academic networks can be considered KOLs through self-promotion of their content on social media platforms such as Twitter.¹³ Additionally, industry influence of KOLs and sponsored content is a concern, with US pharmaceutical companies spending nearly 70% (20 billion USD) of their promotional budget for medical marketing on KOLs in 2016.¹⁴ KOLs can influence sales through their strong social media following and perceived expertise in the field, and can impact the clinical practices of their colleagues more successfully than traditional industry-sponsored talks and educational materials.^{14,15}

Video-heavy social media platforms, such as Instagram and YouTube, are also at risk of influence and the absence of regulations regarding the need for medical content to disclose conflicts of interest (COI) is concerning. The Federal Trade Commission recently provided some

guidance to address this situation, stating "a connection that might affect the weight or credibility that consumers give the endorsement – that connection should be clearly and conspicuously disclosed."¹⁶ Non-enforceable recommendations are made on how KOLs are to specifically disclose sponsorships on fast-paced videos and posts.¹⁶ No higher standard is required of medical content which may render FTC guidance insufficient.

Surgical-related videos posted on social media platforms can be powerful tools for educating learners and give procedural exposure to patients. However, videos, especially those posted on YouTube, can also be used by KOLs for self-promotion or industry promotions. YouTube's algorithm can be subverted through top of the page advertisement. It is biased toward popularity instead of quality and accuracy, and several studies of ophthalmology surgery content suggest the YouTube algorithm presents variable-quality educational resources.^{17,18}

A recent Canadian study looked at the most popular cataract surgery videos on YouTube and while only 8% of the videos were uploaded by a commercial manufacturer, 21% of the videos had a fundamental commercial focus promoting the surgeon's practice or a specific product.¹⁹ Ophthalmology-specific video-sharing on social media platforms can offer high-quality surgical videos categorized by subspecialty but are likely at risk of similar sources of bias if social media algorithms are used.

Almost all social media platforms have indexing functions using hashtags (#) which permit easy access to posts containing specific keywords.²⁰ A search of #ophthalmology, creates a filtered list blocking out any other non-hashtagged posts. Users can "tag" other accounts to identify specific people or organizations to boost their posts' exposure. The information shared through the indexing function is non-peer reviewed, with no formal process in place to account for industry sponsorship, COI and publication bias.

One way to access peer-reviewed material through social media is by following respected medical organizations and high IF journals, which tweet out links to published articles.²⁰ Ophthalmology, American Academy of Ophthalmology (AAO) and Canadian Journal of Ophthalmology (CJO-JCO) use hashtags and social media indexing to make their postings more visible and to disseminate pertinent information.

TAKE-AWAY POINTS

Any type of information presented to us in today's online environment is at risk of bias and we need to develop a personalized approach to evaluating evidence (**Figure 1**). We can use tools such as GRADE; we can avoid lower levels of evidence; and we can seek out systematic reviews with a formal assessment of publication bias.^{2,8}

Social media can disseminate information in a timely fashion, but if left unchecked, potentially biased

Tips to reduce risk of bias in ...

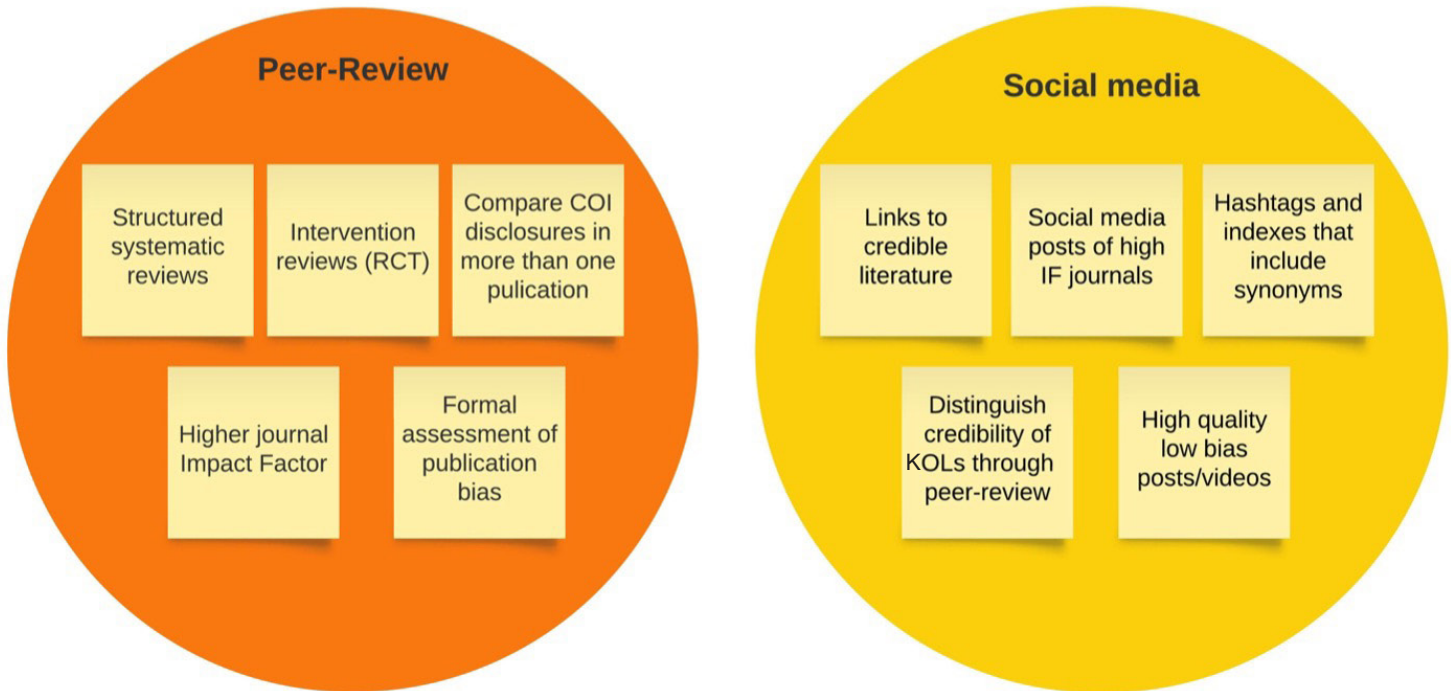


Figure 1. Tips to reduce risk of bias; courtesy of Chryssa McAlister MD, Hannah Chiu MD and Amin Hatamnejad BSc
Legend: Randomized control trial (**RCT**), conflict of interest (**COI**), key opinion leader (**KOL**).

misinformation on social media platforms can have deleterious effects. We need to be thoughtful about the manner in which social media and online content can be manipulated and presented to us based on algorithms that prioritize sponsored content and popularity over relevance and quality. We can reflect on the role of self-promotion, true expertise and COI of KOLs as we engage with content. We can preferentially follow known trustworthy sources with citations from peer reviewed literature and appropriate disclosures that are less susceptible to bias and misinformation. Finally, KOLs active on social media need to be familiar with their respective medical college policies surrounding promotion and advertising on social media, which in Canada prohibit references to drugs, devices or equipment.

Medical organizations and leaders representing the medical community can help encourage social media companies to adjust algorithms in order to reduce bias and improve transparency and relevance. A recent systematic review concluded that YouTube could improve the quality of videos available on their website by incorporating medical- and health-related expert reviews into their algorithm.¹⁸ There

also needs to be a call for uniform in-depth COI disclosure policies across all platforms where we access medical information so that we can better evaluate the risk of bias. Until meaningful changes are made, we need to be cautious in how we engage with medical content on social media and be cognizant of how bias and misinformation may impact our clinical judgment.

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