Supplementary file 1: Systematic review protocol

Title: Conflict of interest and funding in health communication on social media: a systematic review

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Ethical approval: The study involves no human subjects and requires no ethical approval.

BACKGROUND

Social media has reshaped the dissemination of information and medical education. The patient-physician relationship has been transformed with the introduction of social media especially during the COVID-19 pandemic when quarantine and restrictions were applied. Many users rely on the internet to find answers to their medical questions. Health professionals can communicate and share their health-related opinions using posts, videos, or blogs.

Within recent years, the use of social media by physicians and health care professionals has increased significantly with some estimates reporting increases from 42% in 2010 to as high as 90% in 2011 [1]. While 90% of health care professionals use social media platforms for personal purposes, 65% use them for professional reasons such as promotion of health behaviors, discussions of health care policy, communicating with colleagues, and education of patients, peers, and students [2]. However, professionals may have conflicts of interest (COI) that may bias their shared health-related recommendations on their platforms [1].

STUDY OBJECTIVES

The objective of this study was to synthesize the available evidence on the disclosure of conflicts of interests by individuals posting health messages on social media, and on the reporting of funding sources of studies cited in health messages on social media,

METHODS

Design overview and definitions

We will conduct a systematic review to identify studies that addressed reporting of conflict of interest and funding in social media health communications. We will use the following definitions:

- Conflict of interests: "a COI exists when a past, current, or expected interest creates a significant risk of inappropriately influencing an individual's judgment, decision, or action when carrying out a specific duty" [3].
- Declaration statement: any statement reporting a COI of a named individual, whether indicating the absence of COI or presence of a specific COI and describing it.

Supplemental material

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Eligibility criteria

We will include articles that meet the following eligibility criteria:

- Topic: conflict of interest on social media or funding;
- Type of social media: we will include all social media platforms that fit the Web 2.0 definition. This includes blogs, and social media applications such as Facebook, Instagram, Twitter, LinkedIn, and YouTube. We will exclude studies that involved traditional media channels (Web 1.0) such as newspapers, radio, TV, emails, and websites;
- Field: health field, including clinical, health systems and policy, public health and biomedical sciences;
- Study design: any primary study including surveys, research letters, and qualitative studies. We will exclude editorials, abstracts, letters to the editor, reviews and opinion pieces;
- Date of publication: 2005 to current, with 2005 being the year of the rise of Web 2.0;
- Language: any language.

Search strategy

We developed a search strategy, using the help of a librarian, for MEDLINE, EMBASE and Google Scholar electronic databases from 2005 to present. The search combined various keywords and medical subject headings (MeSH) terms relevant to concepts of conflict of interest, funding, and social media. We did not restrict the search to specific languages. We will also screen the reference lists of included studies as well as other relevant papers.

Article selection

Teams of two reviewers will assess in duplicate and independently the titles and abstracts of citations identified by the search for potential eligibility using Rayyan screening tool. We will retrieve the full texts of citations judged as potentially eligible by at least one reviewer. Reviewers subsequently will screen in duplicate and independently the full texts using Rayyan screening tool. They will resolve any disagreements by discussion or with the help of a third reviewer when consensus cannot be reached. We will use standardized and pilot-tested screening tools. We will record the reasons for exclusion and summarize the results of the

selection process using the 2020 PRISMA flow diagram. The reviewers will conduct calibration exercises before the screening process.

Data abstraction

The reviewers will abstract data from eligible studies in duplicate and independently. We will use a standardized and pilot-tested data abstraction form. Disagreements will be resolved through discussion or with the help of a third reviewer (EAA). We will conduct a calibration exercise to enhance the validity of the process. Study authors will be contacted for any clarification.

We will abstract the following variables from each included study:

1. General characteristics of the study:
   - Population (e.g., type of healthcare professionals: physicians, nurses, or other);
   - Year of conduct;
   - Study design;
   - Funding of the study;
   - COI of study authors
   - Country of study authors

2. Social media:
   - Type of social media (e.g., Facebook, twitter, Instagram, YouTube, LinkedIn …);
   - Number of posts, videos or blogs assessed;
   - Language of posts, videos or blogs
   - Country of the subjects of study
   - Topic focus of the study, if any.

3. Conflict of interest:
   - Type of conflict of interest
   - Subject of conflict of interest
   - Source of conflict of interest
   - Tools used to assess the presence of financial relationships
   - Prevalence of conflict of interest
   - Frequency of reporting of conflict of interest

- Proportion of undisclosed conflict of interest
- Unprofessional incidents involving conflict of interest

4. Funding:
   - Type of funding
   - Source of funding
   - Frequency of reporting of funding

Quality assessment

A team of two reviewers will assess independently the risk of bias of included studies using Mixed Methods Appraisal Tool (MMAT). This tool is designed for the appraisal stage of systematic reviews that include qualitative, quantitative or mixed methods studies [4]. We expect most of the studies to be cross-sectional and these will be assessed using the relevant part of the tool.

Data synthesis

Due to the nature of the data, we will report the results in narrative and tabular formats.

REFERENCES

1.   McCarthy CP, DeCamp M, McEvoy JW. Social Media and Physician Conflict of Interest. American Journal of Medicine. 2018;131(8):859-60.

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3.   Akl EA, Hakoum M, Khamis A, Khabsa J, Vassar M, Guyatt G. A framework is proposed for defining, categorizing, and assessing conflicts of interest in health research. Journal of clinical epidemiology. 2022.

4.   Hong QN, Fàbregues S, Bartlett G, Boardman F, Cargo M, Dagenais P, et al. The Mixed Methods Appraisal Tool (MMAT) Version 2018 for Information Professionals and Researchers. Education for information. 2018;34(4):285-91.