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Hernia mesh and social media: misinformation, legal solicitation, and conflict of interest

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Abstract

Background Patients often utilize social media platforms as a resource for medical information. Lately, hernia mesh has been surrounded by controversy due to highly publicized mesh recalls. We aimed to assess the rates of misinformation, legal solicitation, and conflict of interest of hernia mesh information on Facebook and YouTube.

Methods We conducted a cross-sectional study of Facebook posts and YouTube videos using the search term "hernia mesh." The first 150 public Facebook posts and YouTube videos were initially selected, in addition to the first 30 posts of public Facebook groups. Video/post characteristics and the presence of misinformation, legal solicitation, and conflict of interest were independently recorded by three trained raters. Fleiss' kappa coefficient (κ) was calculated to determine Inter-rater agreement.

Results A total of 129 Facebook posts and 108 YouTube videos were analyzed. 29% of posts/videos were uploaded by a law firm and 24% were uploaded by medical professionals. The raters indicated that an average of 11% posts/videos contained misinformation, 17% involved legal solicitation, and 21% included conflicts of interest. Inter-rater agreement was fair for misinformation (κ = 0.380–0.382), substantial/almost perfect for legal solicitation (κ = 0.780–0.876), and moderate for conflict of interest (κ = 0.448–0.505).

Conclusions With regard to hernia mesh, misinformation, legal solicitation, and conflict of interest are somewhat common on popular social media platforms. Trained raters had a high level of agreement on legal solicitation but limited agreement on misinformation. Our findings suggest that recognizing misinformation on social media regarding hernia mesh is difficult.

Keywords Hernia mesh · Misinformation · Social media · Lawsuit · Conflict of interest

Social media is a popular method for navigating health information. The COVID-19 pandemic highlighted the rampant amounts of medical misinformation which might have contributed to a greater number of hospitalizations, deaths, vaccine hesitancy, and socioeconomic burden [1]. Social media accounted for over half of all misinformation or "fake news" during the first few months of the COVID-19 pandemic [2]. Although misinformation is prominent, it remains difficult for the average person to identify, as only a minority of misinformation is false. The majority of misinformation contains partially true information which can be reconfigured to be misleading or presented out of context [3].

Hernia mesh is widely used for the repair of abdominal wall hernias. Over the last decade, there have been several highly publicized recalls from mesh manufacturers and an increase in mesh-related lawsuits. Those contribute to some public mistrust relating to mesh use in hernia repair driven by mesh complications [4–6].

Our objective was to assess the rates of misinformation, legal solicitation, and conflicts of interest related to hernia mesh information on YouTube and Facebook.

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Materials and methods

We conducted a cross-sectional design study of Facebook posts and YouTube videos after obtaining the approval of our Institutional Review Board.

Search method

To minimize the impact of prior searches/demographics on the social media platform search algorithm, the browser history and cookies were cleared, and new YouTube and Facebook accounts were created prior to the search. A new e-mail account was created with the birth date set to January 1st, 2000, and the gender set to "prefer not to say"; this e-mail account was used to create these accounts. Filter and search settings were kept as default. The search was conducted on July 6th, 2023, using the term "hernia mesh." The posts, groups, and videos were then archived on a secure, encrypted file.

Rater training

Three raters independently reviewed the posts/videos and collected their characteristics and whether they contained misinformation, legal solicitation, or conflict of interest. Legal solicitation was broadly defined as the advertisement of services by a lawyer or law firm, and conflicts of interest included content created by any entity which could benefit from the creation and distribution of the content. Two of the raters (EA and HM) were first year medical students, and one (AG) was a premedical undergraduate student at the time of data collection. Prior to the search, the raters attended a training session moderated by the senior author (MA), a general surgeon with expertise in the subject. References provided during the training session were used to judge misinformation and included clinical practice guidelines and formal statements by the United Stated Food and Drug Administration, American Hernia Society, European Hernia Society, and the Society of American Gastrointestinal and Endoscopic Surgeons. The senior author (MA) presented a general overview of hernias and the surgical principles, and then each reference was reviewed with the raters to build general knowledge and to ensure that each rater felt comfortable accessing and utilizing the reference material. A pilot was conducted where each rater extracted the data from 20 posts/videos and a meeting was conducted after the pilot in an effort to standardize the data collection process and to clarify any ambiguities with the senior author regarding the classification of misinformation, legal solicitation and conflict of interest.

Inclusion and exclusion criteria

We included the first 150 posts/videos that resulted using the search term "hernia mesh" and included content that used mesh for ventral and inguinal hernia repair. The 150 cut-off was chosen arbitrarily as it is unlikely for a user to exceed this limit. This arbitrary value has been chosen in other similarly structured studies [7–10]. In addition, for Facebook, we included the first 30 posts of each public group. We excluded posts/videos if they were duplicate, in languages other than English, did not mention (or only minimally mentioned) mesh, described mesh use for non-abdominal wall hernia indication (e.g., hiatal hernia, pelvic floor) or had inaccessible content (removed or had non-functional links) (Fig. 1).Video/post/group characteristics were collected. Each rater independently reviewed the video and reported whether the video/post contained misinformation, legal solicitation, or conflict of interest. Links, pictures, and videos attached to Facebook posts were accessed and used in the analysis.

Statistical analysis

Continuous variables were reported as medians and interquartile ranges while categorical variables were reported as frequencies and percentages. To measure inter-rater agreement, we calculated the Fleiss Kappa (k). As a general guide, a kappa of less than 0.00 indicates poor agreement, 0.00–0.20 slight agreement, 0.21–0.40 fair agreement, 0.41–0.60 moderate agreement, 0.61–0.80 substantial agreement, and 0.81–1.00 almost perfect agreement [11].

Results

A total of 129 Facebook posts and 108 YouTube videos were included in the final analysis. With regard to the Facebook posts, the median duration since posting was 323 days while it was 1483 days for YouTube videos. Facebook posts had a median like and comment counts of 13 and 3, respectively; while YouTube videos median like and comment counts were 71 and 11, respectively. Differences were found in the focus of the posted content between Facebook and YouTube, as 84% of YouTube videos were educational compared to 5% of Facebook posts. This is contrasted with 35% of Facebook posts which discussed personal experiences as compared to 5% of YouTube videos. The most common source of Facebook posts was non-medical user generated contents (53%) followed

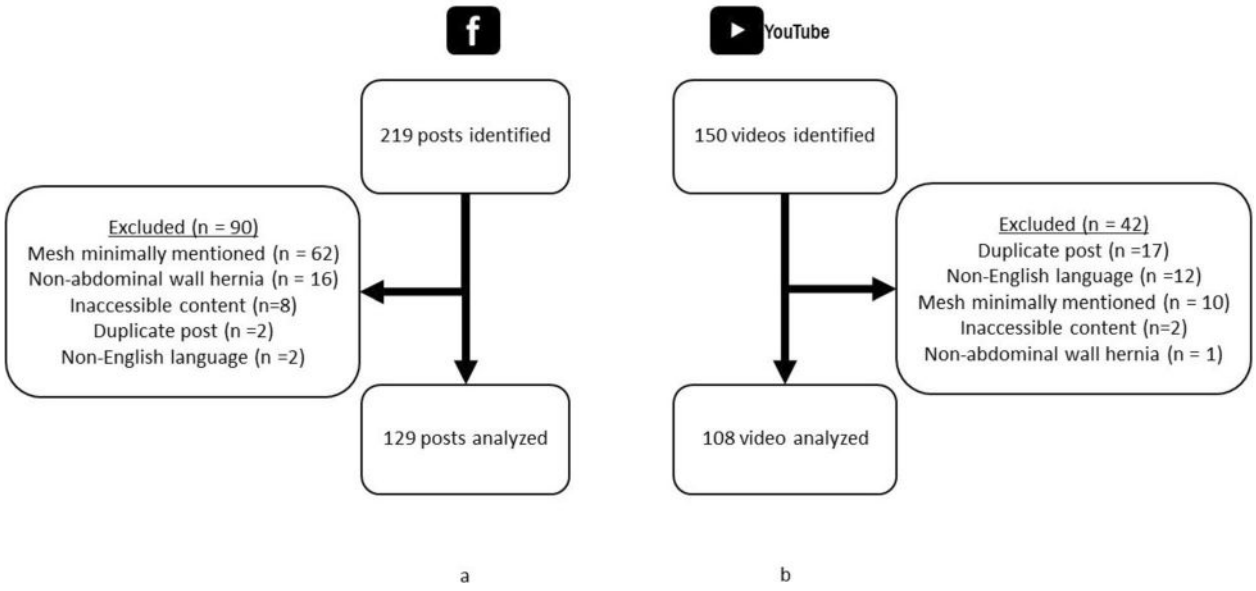

Fig. 1 Flow chart of inclusion and exclusion criteria for Facebook posts (**a**) and YouTube videos (**b**)

Table 1 Facebook posts characteristics

	Facebook ($n=129$)
Days since post, median (IQR) *†	323 [67,1132]
Like count, median (IQR)	13 [3,43]
Comment count, median (IQR)	3 [0,15]
Share count, median (IQR)	0 [0,2]
Post contains picture, *n* (%)	47 (36.4%)
Post contains video, *n* (%)	36 (27.9%)
Posts contains link, *n* (%)	41 (31.8)
Post focus, *n* (%)	
Educational	6 (4.7%)
Giving/requesting advice	16 (12.4%)
Marketing/Advertising	8 (6.2%)
Lawsuit-related	23 (17.8%)
Personal opinion/testimonial	45 (34.9%)
Other mesh-related content	15 (11.6%)
Content irrelevant to hernia mesh	16 (12.4%)
Post Source, *n* (%)	
Facebook page	9 (7.0%)
Medical center/Health care provider	24 (18.6%)
Law firm	21 (16.3%)
Non-medical user generated content	68 (52.7%)
Other	7 (5.4%)

*IQR interquartile range

†Data missing in 3%

Table 2 YouTube video characteristics

	Total ($n=108$)
Days since upload, median (IQR)*	1483 [546,1963]
Video duration, median (IQR), (seconds)	199 [90,381]
View count, median (IQR)	14,566 [2222,50296]
Like count, median (IQR)	71 [14,339]
Comment count, median (IQR)†	11 [0,53]
Video type, *n* (%)	
Educational	91 (84.3%)
Marketing/Advertising	3 (2.8%)
News	9 (8.3%)
Personal/testimonial	5 (4.6%)
Video Source, *n* (%)	
Medical Society	10 (9.3%)
Medical center/Health care provider	22 (20.4%)
Law firm	48 (44.4%)
Medical Device Company	18 (16.7%)
News channel	3 (2.8%)
Other	7 (6.5%)

*IQR interquartile range

†Comment function turned off in 7.4%

by medical professionals (19%) and law firms (16%). The most common video source on YouTube was law firms (44%) followed by medical professionals (20%) and medical device companies (17%) (Tables 1 and 2).

The average rate of misinformation in Facebook posts was 7% and in YouTube videos was 16% with fair inter-rater agreement ($k=0.380$ and 0.382, respectively). On average,

Table 3 Misinformation, legal solicitation, and conflict of interest rates and inter-rater agreement of Facebook posts and YouTube videos

	Facebook					YouTube				
	Rater #1	Rater #2	Rater #3	Average	kappa	Rater #1	Rater #2	Rater #3	Average	kappa
Misinformation, *n* (%)	11 (8.5%)	8 (6.2%)	7 (5.4%)	26/387 (6.7%)	0.382	79 (73.1%)	72 (66.7%)	78 (72.2%)	229/324 (70.7%)	0.404
Legal solicitation, *n* (%)	19 (14.7%)	21 (16.3%)	19 (14.7%)	59/387 (15.2%)	0.780	21 (19.4%)	25 (23.4%)	6 (5.6%)	52/324 (16.1%)	0.380
Conflict of interest, *n* (%)	29 (22.5%)	27 (20.9%)	26 (20.2%)	82/387 (21.2%)	0.505	23 (21.3)	19 (17.6%)	17 (15.7%)	59/324 (18.2%)	0.876

15% of Facebook posts and 18% of YouTube videos included legal solicitation with a substantial to almost perfect inter-rater agreement ($k = 0.780$ and 0.876, respectively). Conflict of interest was present in an average of 21% of Facebook posts and 32% of YouTube videos with moderate inter-rater agreement ($k = 0.448$ and 0.505, respectively) (Table 3).

Discussion

Our study found that misinformation, legal solicitation, and conflict of interest regarding hernia mesh were somewhat common on popular social medial platforms. While there was substantial inter-rater agreement with regard to legal solicitation, there was moderate agreement regarding conflict of interest and only fair agreement for misinformation. Our study is among the first to investigate social media as a source of information for the controversy surrounding hernia mesh use in abdominal wall hernia repair, and it highlights the difficulty for the public in determining what constitutes misinformation regarding this subject.

In our study, the rate of misinformation, legal solicitations, and conflict of interest on Facebook and YouTube content with regard to hernia mesh ranged between 7 and 32%. At these rates, patients who seek health information on this subject from social media sources stand a good chance at coming across such content. While it is not clear what proportion of patients receive their health information from social media, it has been shown that 55–67% of hernia patients conduct internet searches prior to their surgical consultation and that 93% of these patients learned about hernia mesh via media outlets [12, 13]. A survey conducted on hernia patients demonstrated that 38% reported concern about mesh [14]. Another study showed that negative attitudes towards mesh are more likely to be exhibited by patients who searched the internet on the subject [13]. We believe that misinformation and legal solicitation contribute to these negative attitudes.

We found it a bit surprising that law firms were the source of 16% Facebook posts and 44% of YouTube videos in our hernia mesh search. This suggests that law firms may be influencing how the public perceives the relative safety of hernia mesh. This finding mirrors that of Miller et al. who studied search engine searches (Google, Yahoo, and Bing) for hernia mesh and found that legal advertisements accounted for 20% of the search results, and that websites offering legal services held the top position on every search page. Legal advertisements were found to be the most skewed toward mesh complications compared to its benefits[9]. Fadaee et al. analyzed hernia mesh-related posts on both Facebook and Twitter and found that 95 and 37% of posts, respectively, had a negative sentiment. And that three of the top 5 Tweeters were sourced from law firms who were

involved in mesh-related litigation. They concluded that the negative sentiment and steering of social medial discussions by lawyers may directly affect surgical care [15].

An interesting finding in our study is that while the three raters in our study (who are in their early medical training) had substantial agreement on legal solicitation they had moderate agreement on conflict of interest and only fair agreement on misinformation. This highlights the challenges that face the general public in identifying health misinformation. We believe that surgeons and surgical societies need to increase their social media footprint and provide medically focused, balanced information on this subject. This would serve to provide reliable, high-quality content that would dilute the misinformation and counterbalance the plethora of legal solicitation advertisements that tend to overemphasize risks and underemphasize the benefits of hernia mesh.

Our study has a number of limitations. While we looked at Facebook and YouTube, other social media platforms may be commonly used by patients as a source of health information. This is particularly important since we found differences in the focus of the posts with Facebook being frequently used to communicate personal experiences and YouTube primarily utilizing educational videos. In addition, the search results may not be reproducible considering that the search algorithms for these platforms oftentimes use pre-existing information to provide targeted results. By creating new accounts and clearing the history of the internet browsers we aimed to limit these concerns. However, certain variables (such as geographic location) could not be accounted for. Another limitation is that we only evaluated public Facebook groups, content from private groups could be evaluated primarily due to human subject research concerns (e.g., invasion of privacy). The private nature of these groups may permit certain discussions that the public groups do not, and this may introduce selection bias. Future studies are needed to investigate whether an exposure to misinformation, legal solicitation, and conflict of interest is associated with perioperative outcomes after hernia repair (e.g., pain and quality-of-life scores).

Conclusion

This study evaluated content discussing hernia mesh on Facebook and YouTube, two of the largest social media platforms by active users. We found that misinformation, legal solicitation, and conflict of interest are to be relatively common in these posts. Social media content on hernia mesh is frequently posted by law firms. There was a high inter-rater agreement for legal solicitation, but moderate and fair agreement for conflict of interest and misinformation, respectively. Future efforts should emphasize producing high-quality, balanced social media content on this subject by surgeons and surgical societies as well as research studies evaluating the association between exposure to misinformation, legal solicitation, and conflict of interest on hernia-related patient reported outcomes.

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Declarations

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