

Original Articles

Social media as a tool for engaging medical students interested in orthopaedic surgery

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Objective

Instagram and Twitter are two of the most popular social media platforms today. Beyond social communication, these platforms also have the potential to enhance medical education by providing early exposure and mentorship to students and residents in training. The purpose of this study was 1) to investigate orthopaedic surgery related content posted on Instagram and Twitter 2) to analyze who posts orthopaedic surgery related content and 3) to better understand how social media may be used to supplement medical education and exposure for students interested in orthopaedics.

Design

Three hashtags, #Orthopedics, #OrthopedicSurgery, and #OrthopedicSurgeon were searched on Instagram and Twitter from March 8 to March 18, 2020. Posts on both platforms were analyzed for the hashtag used, number of likes, source type (e.g. physician, company promoting a product), and type of post (e.g. advertisement, educational). Descriptive statistics were used to analyze the results.

Setting

This study was performed at the Tulane University School of Medicine, New Orleans, LA, by medical students, with guidance and supervision from faculty in the Tulane University Department of Orthopaedics.

Results

Data was collected from 212 (47.2%) Instagram and 237 (52.8%) Twitter posts over a 10-day period. Significantly more Instagram posts used the hashtags #Orthopedicsurgeon and #Orthopedicsurgery ($P < .001$), while more Twitter posts used the hashtag #Orthopedics (72.0% $P < .001$). Companies using these hashtags posted more frequently on Twitter than Instagram ($P < .001$), while a higher number of physicians, orthopaedic practices, and personal accounts utilized Instagram ($P < .001$). There was significantly more advertising content on Twitter ($P < .001$), while Instagram included more personal anecdotes, medical imaging and procedures ($P < .001$).

Conclusion

This study demonstrated that content related to orthopaedic surgery is regularly posted on both Instagram and Twitter. Instagram is a visually driven platform that more frequently posted educational and personal content from medical professionals and individuals, while Twitter predominantly published advertisements from companies and orthopaedic practices. The current use of Instagram may make it better suited for providing information and early exposure to medical students interested in the field.

Levels of Evidence

III

INTRODUCTION

Social media is a relatively new, global platform that has drastically changed the way people are able to virtually en-

gage with one another.¹ Twitter, Instagram, and Facebook, in particular, have become powerful tools for communication between large masses of people with the majority of young people having at least one social media account.²

Institutions of higher education have investigated the use of social media in the classroom, such as Facebook Groups for professor-student facilitated discussions or mobile applications for viewing online lectures.³ Medical schools frequently use social media as an educational tool,³ with several studies showing increasing use of social media by medical students and medical personnel both inside and outside the classroom.⁴⁻⁷ Physicians, patients, and hospitals have used social media to provide information about different facets of medicine like post-operative treatment plans and sharing the patient experience.⁵⁻⁷ Through social media, medical professionals can provide students with direct access to interesting case presentations, new medical advancements, and personal motivational anecdotes in a virtual setting, which eliminates constraints such as access, geographic proximity, and time.

Engagement with social media is particularly important in the field of orthopedics. Orthopedic surgeons and certified physicians assistants frequently post-academic articles that are discussed on these platforms, in addition to promoting surgeons' practices and communicating with their audience.^{8,9} A study by Varady et al. examined the most influential Twitter users in the field of Orthopaedics,¹⁰ The authors found that the most influential orthopedic surgeons were largely board-certified orthopaedic surgeons specializing in sports medicine, with the majority (53%) being in private practice.¹⁰ Influence scores were calculated using the Right Relevance software. The study demonstrated that 78% of Twitter's top orthopedics influencers were orthopedic sports medicine surgeons who were in private practice.¹⁰

For medical students interested in orthopedic surgery, social media may facilitate a virtual mentorship and provide early exposure to students interested in the field. A study by Mulcahey et al. emphasized the importance of mentorship in the field of orthopaedics surgery, nothing that early mentoring positively influenced the personal, professional, and academic growth of orthopaedic surgeons, residents, and medical students.¹¹ Johnson et al. found that 51% of surveyed medical students who selected orthopedics as their specialty had made this decision prior to completing third-year clerkships, with some making this choice before matriculating into medical school.¹² Early exposure to orthopedic role models may specifically improve women's interest in this field and address the marked gender gap in orthopedic surgery.¹³ The need to attract more women to the field has been noted in the literature, with women making up 7% of practicing orthopaedic surgeons and 14% of orthopaedic surgery residents in 2013.^{13,14} Previous studies have examined barriers to women entering orthopaedic surgery, with one of the most frequently stated obstacles being a lack of exposure to the field before and during their medical education, with experiences in medical school having the most impact.^{15,16} The purpose of this study was 1) to analyze orthopaedic surgery-related content posted to Instagram and Twitter, 2) determine the sources of this content on each platform, and 3) to better understand how social media may be used to supplement education and exposure for medical students interested in orthopedics.

MATERIALS AND METHODS

PRELIMINARY SEARCH

A preliminary search of public posts on YouTube, Instagram, Facebook, and Twitter was performed from March 2, 2020, to March 7, 2020. Hashtags searched included #Orthopedics, #OrthopedicSurgery, #OrthopedicSurgeons, #Ortho, #Orthopod, #OrthoMedical and #MedicalStudentOrtho. Published content on each of these platforms was evaluated to determine which hashtags yielded the highest number of new posts each day.

Facebook and YouTube were removed from the analysis after discovering that new content was not published every day and content was not posted using searchable hashtags. Facebook's platform facilitates communication between people or groups using 'likes,' 'statuses,' or comments to posts. YouTube is a form of video and sound broadcasting that has a lesser focus on person-to-person interaction.¹⁷ Following a review of the posts during the 7-day period, the hashtags #Orthopedics, #OrthopedicSurgery, #OrthopedicSurgeons were selected based on the number of new daily posts on both Instagram and Twitter. #Ortho was also considered as there were several tweets identified on Twitter using this hashtag; however, when searching #Ortho on Instagram, the only published information was about orthodontics rather than orthopedics.

DATA ACQUISITION AND SAMPLING

Public posts on Instagram (www.instagram.com) and Twitter (www.twitter.com) were manually screened by one of the authors (C.W.) for ten consecutive days beginning on March 8, 2020. The username for the author of each post was recorded, in addition to the total number of likes. The following information was noted: date of the post, source, and type of post. Sources of the post included orthopaedic practices, physicians (MD), certified physician assistants (PA-C), medical technology companies (MTC), patients, and medical organizations such as the American Academy of Orthopaedic Surgeons (AAOS). Popular categories for the type of post were defined as advertisement, advertisement + educational information, only educational information, medical imaging (e.g., X-Ray, MRI), patient case, personal content, or procedural demonstration. "Personal" referred to a post of personal and sentimental nature (e.g., uplifting, motivational posts from doctors or images of success in a current position, not from patients). "Advertisements" were defined as posts intended to promote a product, practice, or generate a monetary gain. "Ad + Educational" was categorized as posts containing educational content with the intent to promote a product, practice, or generate a monetary gain. "Educational" was defined as a post whose intent was solely to provide new or interesting information and did not include any elements of advertisement. "Medical Imaging" posts contained either an X-Ray or Magnetic Resonance Imaging (MRI) scans with description and explanation (e.g., a Colle's fracture with a description of treatment). "Patient Case" and "Procedural" were defined by descriptions of a patient case or an orthopedic surgical procedure. Posts that were not related to the hashtag and posts that could not be categorized were excluded from the study.

Table 1. Type of Hashtag, Instagram vs. Twitter

	#Orthopedics		#OrthopedicSurgeons		#OrthopedicSurgery		P-value*
	N	%	N	%	N	%	< .001
Instagram	73	27.80%	64	86.50%	75	67.00%	
Twitter	190	72.20%	10	13.50%	37	33.00%	

*Analysis performed using 2x3 chi-square

Table 2. Type of Post and Mean Number of Likes: Instagram vs. Twitter

	Instagram (N)	Instagram (%)	Twitter (N)	Twitter (%)	P value
Type of Post					
Ad + Educational	3	1.42%	17	7.17%	.005
Advertisement	35	16.51%	134	56.54%	< .001
Educational	27	12.74%	37	15.61%	.42
Medical Imaging (X-Ray/ MRI)	21	9.91%	4	1.69%	< .001
Patient	3	1.42%	1	0.42%	.35
Personal	107	50.47%	43	18.14%	< .001
Procedure	16	7.55%	1	0.42%	< .001
Mean # of Likes mean, (SD)	340.41 (2679.01)		8.18 (103.27)		< .001

SPSS Statistics 21 (IMB, Armonk, New York) was used for statistical analysis. Univariate analysis of categorical variables was performed using the χ^2 test and dichotomous variables using Fischer exact test. Welch's *t*-test was used to compare continuous variables. A *p*-value < .05 was considered statistically significant.

RESULTS

HASHTAG

Over the 10-day period, a total of 449 posts were identified and analyzed. 212 posts were from Instagram (N=212, 47.2%), and 237 posts from Twitter (N=237, 52.8%). The hashtag #Orthopedics was used the most on social media platforms (N=263, 58.6%), followed by #OrthopedicSurgery (N=112, 24.9%) and #OrthopedicSurgeons (N=74, 16.5%). Significantly more Twitter posts used #Orthopedics than Instagram (72.2% vs. 27.8%, *P* < .001), while significantly more Instagram posts used #OrthopedicSurgeons (13.5% vs. 86.5%, *P* < .001) and #OrthopedicSurgery (33.0% vs. 67.0%, *P* < .001) (Table 1). The majority of sources using #Orthopedics were companies (102 of 263, 38.8%, *P* < .001) that were advertising (116 of 263, 44.1%), while the significant majority of sources using the #OrthopedicSurgeons (32 of 74, 43.2%) and #OrthopedicSurgery (38 of 112, 33.9%) were physicians (*P* < .001), the majority of whom posting personal content (N=43, 50.6%).

NUMBER OF LIKES

The number of likes per post differed substantially between

each of the two platforms. Instagram posts had significantly more likes and audience engagement than Twitter (*M* = 340.4 likes *SD* = 2679.0 likes vs. *M* = 8.2 likes *SD* = 103.3 likes, *P* = .002) (Table 2). Overall, MD physicians had a higher number of mean likes compared to other source groups (*M* = 362.5 likes, *SD* = 3336.2 likes). For the type of post, educational posts had the highest number of mean likes (*M* = 814.0 likes, *SD* = 4751.4 likes), followed by patient cases (*M* = 596.0 likes, *SD* = 859.5 likes). On Instagram, posts published by physicians (*M* = 531.4 likes, *SD* = 4043.0 likes) and posts with educational content (*M* = 1868.8 likes, *SD* = 7253.2 likes) had the highest mean number of likes. On Twitter, posts by companies had the highest number of mean likes (*M* = 15.9 likes, *SD* = 154.4 likes).

TYPE OF POST

The majority of posts in our sample were advertisements (N=169, 37.6%) and personal content posts (N=150, 33.4%). Instagram posts contained significantly more medical procedures (16 of 17, 94.1%, *P* < .001) and imaging (21 of 25, 84%, *P* < .001), while Twitter posts were significantly focused on ad + educational (17 of 20, 85%, *P* < .001) and educational content (37 of 64, 57.8%, *P* < .001) (Table 2).

SOURCE TYPE

The authorship of posts differed between the two platforms. The majority of sources were physicians (N=128, 28.5%), orthopaedic practices (N=100, 22.3%) and companies (N=124, 27.6%) (Table 3). Significantly more physicians (41.0% vs. 17.3%, *P* < .001) and orthopaedic practices (26.9% vs. 18.1%,

Table 3. Post Source: Instagram vs. Twitter

	Instagram (N= 212)	Instagram (%)	Twitter (N=237)	Twitter (%)	P value
Type of Source					
Company	18	8.49%	106	44.73%	< .001
Health Profession Student	6	2.83%	1	0.42%	.06
Hospital	1	0.47%	8	3.38%	.04
Physician	87	41.04%	41	17.30%	< .001
Medical Organization	1	0.47%	5	2.11%	.22
Medical School	3	1.42%	3	1.27%	1.00
Orthopaedic Journal	0	0.00%	11	4.64%	.001
Orthopaedic Practice	57	26.89%	43	18.14%	.03
Patient Case	8	3.77%	3	1.27%	.13
Personal	24	11.32%	16	6.75%	.09
Physician's Assistant	7	3.30%	0	0.00%	.001

$P < .001$) posted on Instagram than Twitter. Conversely, significantly more companies posted on Twitter ($N=106$, 44.7%) vs. Instagram ($N=18$, 8.5%) ($P < .001$). Overall, the majority of companies posted advertisement type content ($N=89$, 52.7%) and ad+ educational type content ($N = 16$, 80.0%) ($P < .001$), while most physicians posted personal content ($N=70$, 46.7%), as well as a majority of all procedure type content ($N=11$, 64.7%, $P < .001$) (Table 4).

DISCUSSION

This study demonstrated that content related to orthopaedic surgery is posted frequently on both Instagram and Twitter. On Instagram, physicians, orthopaedic practices, and personal (non-company or non-medically affiliated) accounts posted significantly more, while on Twitter, companies posted the most often and frequently promoted a product ($P < .001$; $P < .001$). Instagram was significantly more likely to post personal content, and Twitter posts were more likely to contain advertisements ($P < .001$; $P < .001$). Instagram also had a higher rate of medical imaging and medical procedure posts than Twitter, with significantly more likes and audience engagement ($P < .001$; $P = .002$). Additionally, there were significantly more posts using #Orthopedicsurgeon and #Orthopedicsurgery on Instagram ($P < .001$) and #Orthopedics on Twitter ($P < .001$).

The #Orthopedicsurgeon and #Orthopedicsurgery hashtags seen on Instagram are more specific to orthopaedic surgery than the #Orthopedics hashtag that was more frequently used on Twitter. This higher specificity of hashtags used may contribute to the difference in authorship seen on each of the two platforms. The present study found that physicians, orthopaedic practices, and medically unaffili-

ated personal accounts (e.g., patients) posted more frequently on Instagram than on Twitter. This is in contrast to previous literature, which demonstrated that Instagram was not widely used by physicians.^{5,18,19} A 2016 study by Ramkumar et al. evaluated social media use by 97 National Football League (NFL) team physicians and found that none had Instagram accounts.⁵ Additionally, a recent study by Garofolo et al. assessed the social media use of 116 board-certified orthopedic hand surgeons and found that none of them had Instagram profiles.¹⁹ Instagram, however, is a popular choice among patients, as patients and family members often post about their experience prior to surgery and through recovery.^{5,20,21} This is particularly common among younger patients. Curry et al. found that the greatest predictor of social media use in patients following anterior cruciate ligament (ACL) surgery was younger age, with young adults identifying Instagram as their social media platform of choice.^{17,22,23} Several studies by Ramkumar et al. observed a similar trend in the use of Instagram in ACL surgery, pediatric scoliosis, and total joint arthroplasty by patients, surgeons, and hospitals.^{5,20,21} The authors demonstrated that Instagram posts frequently shared personal content of a positive nature from patients or family who had undergone a particular surgery, or saw doctors sharing educational content about specific procedures.^{5,20,21} Instagram's focus on photographs and videos also makes the platform a conduit for social and visual learning.^{17,22} Given that the most frequent authors of Instagram posts with orthopaedic content, doctors and orthopaedic practices, are currently using hashtags more specific to orthopaedic surgery, it is reasonable to believe that they are now using the platform to publish more visual content geared towards an audience seeking medical knowledge about this topic.

Table 4. Content Posted by Sources on Instagram and Twitter

	Type of Post N (%)						
	Advertisement + educational (N=20)	Advertisement (N=89)	Educational (N=64)	Medical Imaging (X-Ray/ MRI) (N=25)	Patient cases (N=4)	Personal (N=150)	Procedure (N=17)
Type of Source							
Company	16 (80.0)	89 (52.7)	9 (14.1)	2 (8.0%)	0 (0.0%)	8 (5.3%)	0 (0.0)
Health Profession Student	0 (0.0%)	1 (0.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (4.0%)	0 (0.0%)
Hospital	0 (0.0%)	6 (3.6%)	1 (1.6%)	0 (0.0%)	1 (1.6%)	0 (0.0%)	1 (5.9%)
Physician	2 (10.0%)	10 (5.9%)	23 (35.9%)	11 (44.0%)	1 (25.0%)	70 (46.7%)	11 (64.7%)
Medical Organization	0 (0.0%)	3 (1.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (2.0%)	0 (0.0%)
Medical School	0 (0.0%)	0 (0.0%)	1 (1.6%)	0 (0.0%)	0 (0.0%)	5 (3.3%)	0 (0.0%)
Orthopaedic Journal	0 (0.0%)	0 (0.0%)	11 (17.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Orthopaedic Practice	2 (10.0%)	52 (30.8%)	13 (20.3%)	5 (20.0%)	2 (50.0%)	24 (16.0%)	2 (11.8%)
Patient	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (16.0%)	0 (0.0%)	7 (4.7%)	0 (0.0%)
Personal	0 (0.0%)	8 (4.7%)	6 (9.4%)	1 (4.0%)	0 (0.0%)	24 (16.0%)	1 (5.9%)
Physician's Assistant	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (8.0%)	0 (0.0%)	3 (2.0%)	2 (11.8%)

In contrast, medical device companies promoting products most commonly authored posts on Twitter, which included #Orthopedics. A 2020 retrospective review by Sahu et al. similarly found that tweets with “orthopedic surgery” or “orthopedic surgery” in the text were most often marketing or promotional, least often research or educational in nature, and were most frequently posted by private organizations.²⁴ These findings align with previous literature noting the high impact of third-party commercial entities on Twitter. In an analysis of 51,159 Twitter posts, Desai et al. found that commercial entities required fewer posts to reach the same level of Twitter “influence” as healthcare providers.¹⁷ This indicates a higher impact of commercial tweets that are more likely to be seen by Twitter users. Sports medicine surgeons and those in private practice frequently use Instagram.^{5,10} Orthopaedic surgeons at larger institutions may instead rely on their affiliated hospital’s Twitter accounts for publishing digital content.^{5,10} Lander et al. analyzed the social media presence of 987 members of the Pediatric Orthopaedic Society of North America (POSNA) and found that only 2.2% of members had a Twitter account, while Instagram was not analyzed.⁹

The content of social media posts varied between Instagram and Twitter, with significantly more personal content, medical imaging, and medical procedures seen on Instagram ($P < .001$). In an analysis of the potential use of social media in orthopedic surgery, Sculco et al. noted the varying roles that social media platforms may play in this specialty.²⁵ They claimed that Instagram could be used to share the progress of patients and allow providers to give helpful information during recovery.²⁵ Cherian et al. evaluated 193 posts across both platforms on national cancer survivors day, finding that images were used in 87 (74%) and 33 (44%) posts on Instagram and Twitter, respectively.²⁶ Instagram has frequently been used by patients following orthopaedic surgery to share personal stories with a positive, uplifting tone.^{5,20,21,26} This visual platform has also been used to enhance medical education. In 2019 Douglas et al. performed an audit-based inquiry by searching terms associated with anatomy, medicine, and education on Instagram.²⁷ They observed 80 Instagram accounts and found that most of the accounts focused on anatomy began posting within the past two years, using the visual resource to share diagrams much like a medical atlas. The authors found that medical education was the most frequently used “subject field” in their analysis of Instagram posts.²⁷ Previous literature has also observed the use of social media in teaching anatomical concepts and found that Instagram posts often include photographs and videos, making the platform a good conduit for social and visual learning.^{17,22} In addition, content posted to Instagram is often used to document patients’ long-term trajectories, from initial injury through surgical intervention and eventual recovery.²⁷

While Instagram posts are more often anecdotal accounts of individual experiences, Twitter is a largely text-based microblogging resource where posts tend to be less personal and contain more generalized information. Twitter has been known as a resource for medical journals. Hughes et al. examined the use of Twitter by orthopedic and trauma surgery journals and found that journals with Twitter profiles had higher Impact Factors than those with-

out.²⁸ A 2019 study by Varady et al. also noted the importance of Twitter in disseminating educational content, such as blogs discussing topics like injury prevention, rehabilitation, and sports technology, in their examination of the most influential people posting about orthopaedic surgery on social media.¹⁰ The authors examined whether or not these influential social media users were orthopaedic surgeons, their geographic location, and the subspecialty of users, in addition to what content was correlated to higher Twitter mentions. They found that Twitter mentions containing orthopedics-related information correlated with citation numbers, emphasizing the role of social media in academic research to disseminate information.¹⁰ The results of the current study show a similar trend, where 11 (4.6%) Twitter posts and 0 (0.0%) Instagram posts were posted by orthopaedic journals ($P < .001$). However, while Twitter has been used in academic medicine, its application has not been well-described in sharing the patient experience or for teaching medical students. Previous literature notes that anatomy professors and educators using the resource to supplement anatomy education have not been able to correlate Twitter use with improved student performance.^{27,29}

There are several limitations to this study. Every effort was made to ensure accurate and objective analysis of information, categorization of source type, and type of post. Posts were categorized at the discretion of investigators, which may be subject to dispute or human error. Additionally, hashtags were searched on social media accounts every day over ten days; however, it is possible that not every post using the included hashtags was captured and analyzed. Orthopedic content that was posted on Instagram and Twitter during the data collection period also may not have used one or more of the hashtags identified in this study and would not have been included in the results of the search. Other common hashtags, such as #Orthotwitter, were not included in this study and limited the number of posts that were observed. The data collection for this project occurred during March 2020, at the beginning of the COVID-19 pandemic and near the time of Matchday for graduating medical students. All posts associated with COVID-19 or Matchday-related content were removed from the analysis in an effort to maintain the integrity of the data analysis.

CONCLUSION

Overall, the data from this study suggest that Instagram is the social media platform used more frequently by physicians, orthopaedic practices, and patients, publishing more educational images and personal anecdotes. Twitter, on the other hand, more frequently posted advertisements from medical device companies and generally posted less personal and experiential content. Instagram had higher rates of user engagement. This study demonstrates that Instagram is the preferred social media platform for young people to find visually-based educational and personal content from physicians and patients and to gain early exposure to orthopaedic surgery, which may benefit students, particularly women interested in pursuing this specialty.

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