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Journal of Pediatric Surgery: Effects of an automated social media strategy for knowledge dissemination

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ABSTRACT

Background/Purpose: With increasing publications, it's hard to keep up with surgical literature. Social media is a valuable educational resource with global reach. We sought to analyze the impact of an automated social media strategy for the Journal of Pediatric Surgery (JPS).
Methods: Analytics for March–August 2019 were retrospectively reviewed for automated posts using a SocialPilot queue from the journal's RSS feed. Descriptive and inferential statistics were utilized to analyze performance, including journal article views.
Results: One hundred sixty-five posts amassed 512,316 impressions and 9,795 article views. Facebook had greater overall impact ($p < 0.01$). Twitter was stronger when adjusted by number of followers ($p < 0.01$). Engagements and article views had strong correlation between platforms ($p < 0.01$). Day of the week had limited impact. Photographs were the preferred content format ($p < 0.05$). Topic had the highest effect on performance ($p < 0.05$) – with colorectal, EA/TEF, and general pediatric surgery leading to higher reach and engagement. ECMO/CDH was the least popular. Comments and shares were negligible.
Conclusions: We reached 3,105 users, with 59 article views per post. Topic had the strongest effect on performance. For comparison, custom infographics reached 7,368 users and averaged 101 article views. Alternative knowledge dissemination strategies are likely needed to foster online discussion and build more robust forums for collaboration.
Type of Study: Retrospective, Non-clinical Study.
Level of Evidence: Level III.

Social media and its use as an accessible means to share digital medical content has grown exponentially, with physicians entering the workforce today coming from a generation of *digital natives* [1]. Platforms like Twitter and Facebook have enabled the medical community to participate in global networking and education and have an impact on advocacy and public health [2]. The power of social media in surgical research and dissemination is evident throughout the research process – from idea generation to post-publication commentary. Social media platforms can be utilized to connect investigators with common interests, fine-tune scientific inquiry, support clinical trial networks, engage and recruit research participants, and to improve understanding of patient-reported outcomes. They also provide an avenue for information sharing, knowledge dissemination, and promotion of research while increasing visibility of surgeon-scientist role models and generating input for data-driven analytics [3]. The leverage these platforms provide for rapid idea sharing and multilateral communication has attracted the attention of academic surgeons, trainees, journals, and organizations due to the potential for visibility and influence [4].

Journals with social media profiles have significantly higher academic metrics, and increased social media activity from their accounts has been shown to predict academic influence [5]. Altmetrics, or alternative metrics, are impact measures used in conjunction with traditional research metrics to assess the impact of individual articles, authors, journals, and organizations by utilizing mass media and social media as sources of data [6]. In prior studies in pediatric surgery, Altmetric scores have not yet strongly correlated with traditional metrics; however, their correlation with citations was strongest for the most well-established journal Twitter accounts [7].

In this study, we sought to analyze and describe the impact of a managed social media strategy for the *Journal of Pediatric Surgery* to create awareness of new methods of scientific communication within our subspecialty community.

1. Methods

Social media analytics for automated posts to the Journal of Pediatric Surgery Facebook and Twitter profiles during a six-month period from March to August 2019 were retrospectively reviewed. Automated posts were defined as those published through SocialPilot© (Walnut,

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CA: SocialPilot), a social media marketing tool, utilizing a scheduled release based off the journal's RSS (Really Simple Syndication) feed that fetches all new publications. For Facebook, our data points included number of followers, reach, engagements, reactions, comments, shares, and link clicks. For Twitter, these included number of followers, impressions, engagements, likes, replies, retweets, and link clicks. For both platforms, engagement rates were calculated to represent the rates at which people who saw a post interacted with it; link click rates were

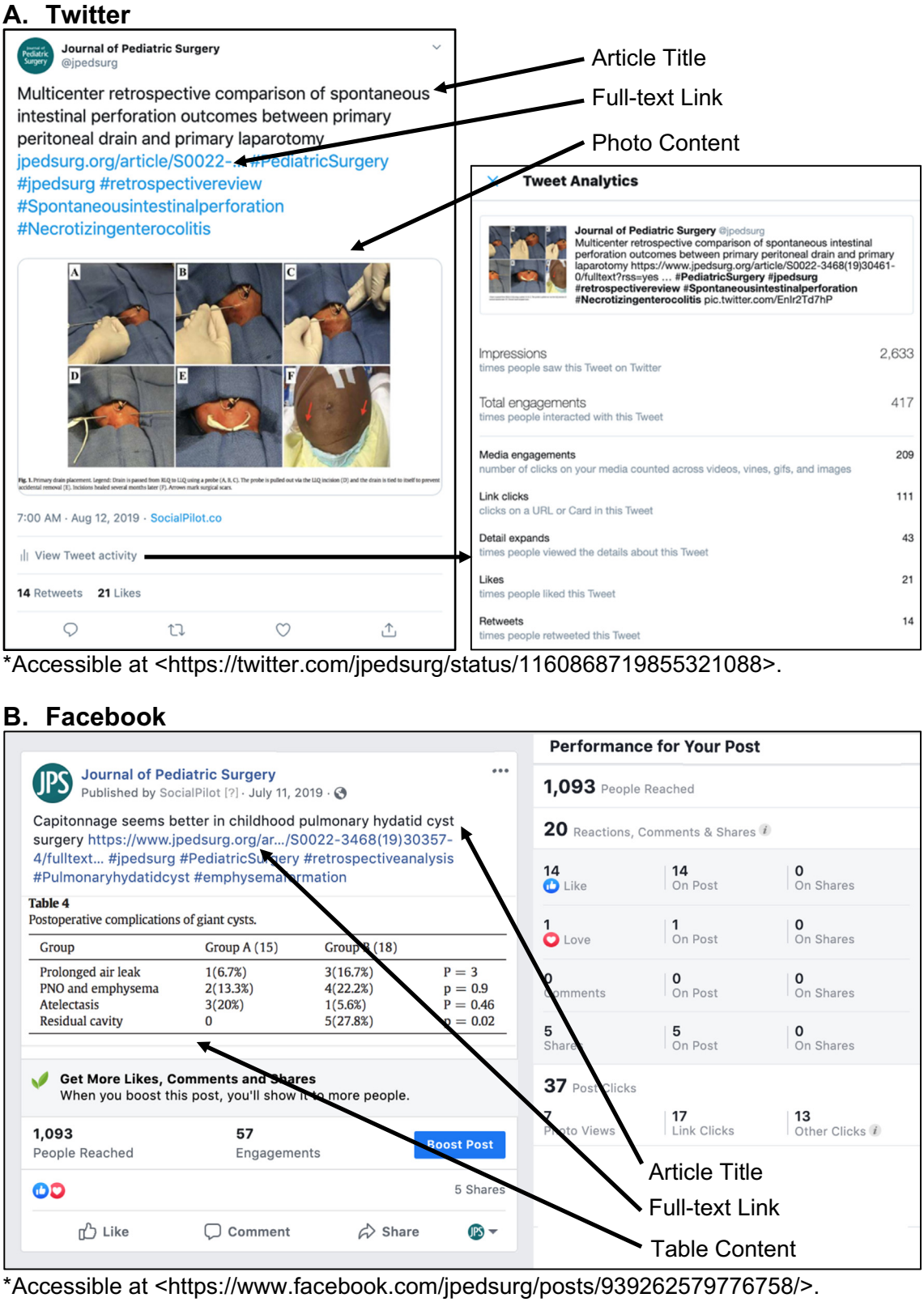

Fig. 1. Sample SocialPilot posts with social media analytics. A. Twitter *Accessible at <https://twitter.com/jpedsurg/status/1160868719855321088>. B. Facebook *Accessible at <https://www.facebook.com/jpedsurg/posts/939262579776758/>.

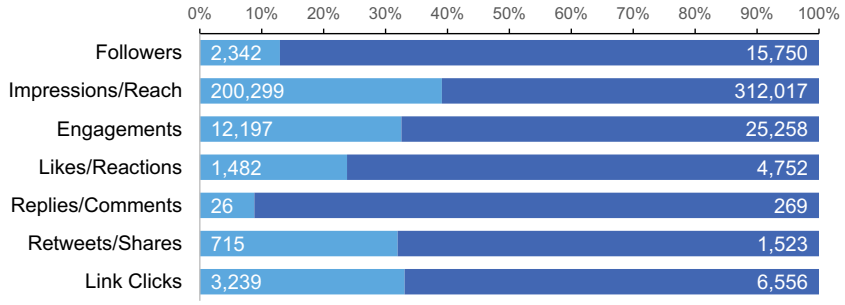

Fig. 2. Social media activity by platform.

calculated as the percentage of users who accessed the full journal article after seeing the posts. Sample SocialPilot posts with basic analytics are presented in Fig. 1.

Descriptive statistics were performed. Between-platform comparisons were made with paired t-tests and correlation was assessed numerically and presented categorically as strong or weak. Comparisons by characteristics (day of publication, content format, and topic) were made using ANOVA. Effect size by characteristic was computed using partial eta squared and interpreted as small, medium, or large. Significance was established as a p-value <0.05. Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 26.0 (2019; Armonk, NY: IBM Corp).

2. Results

A total of 165 posts amassed 512,316 impressions that led to 9,795 journal article views during the study period. This indicates that, on average, each post was seen by over 3,000 users and led to 60 journal article views. The distribution by platform is presented in Fig. 2. Posts were published evenly, Monday through Sunday, with an average of 24 posts by day of the week. There were 44 posts with photographs, 44 with color figures, 43 with black and white figures, and 34 with tables. Topic distribution was as follows: general pediatric surgery ($n = 31$), practice (including business and education) ($n = 24$), colorectal ($n = 17$), trauma ($n = 15$), thoracic ($n = 13$), oncology ($n = 12$), transplant and hepatobiliary (TXP/HPB) ($n = 11$), basic science ($n = 10$), esophageal atresia (EA) and tracheoesophageal fistula (TEF) ($n = 9$), extracorporeal membrane oxygenation (ECMO) ($n = 8$), urology and gynecology ($n = 8$), and other (including fetal, endocrine, and rare disease) ($n = 7$).

In unadjusted analyses, Facebook outperformed Twitter by reach, engagements, reactions, comments, shares, link clicks, and click rate ($p < 0.001$). After adjusting for number of followers, Twitter had higher impressions, engagements, likes, retweets, and link clicks ($p < 0.001$). There was a strong correlation for performance between platforms for engagement and link clicks ($p < 0.001$). Significant differences and correlations by platform are presented in Table 1.

There were no differences in performance of automated posts by day of publication. Time of publication was not evaluated as a variable given that it is was a constant for this automated campaign – 7 am EST. In our analysis by content format, photographs had slightly higher and tables had slightly lower link click rate on Twitter (1.9% vs 1.2%, $p = 0.02$); the effect size was medium ($\eta^2 = 0.07$). On Facebook, photographs were the most impactful content format with significant differences on reach, engagements, reactions, shares, link clicks, and link click rates ($p < 0.02$); the effect size was medium ($\eta^2 = 0.07$–0.12).

Analysis by topic revealed best performance for general pediatric surgery, colorectal, and EA/TEF and worst performance for ECMO/CDH. On Twitter, this translated to statistically significant differences in impressions, engagements, engagement rates, and retweets ($p < 0.05$) with a medium to large effect size ($\eta^2 = 0.12$–0.18). On Facebook, it represented differences in reach, engagements, engagement rates, shares, link clicks, and link click rates ($p < 0.01$) with a large effect size ($\eta^2 = 0.16$–0.24). Performance by topic displayed as deviation from the mean is presented in Fig. 3.

3. Discussion

Our managed social media strategy, which requires minimal input to run, reached over 3,000 users and led to 60 journal article views per post – reflecting increased visibility for publications in the *Journal of Pediatric Surgery*.

Facebook had the largest overall impact in dissemination during this campaign, an expected finding given that it accounts for seven times the size of our Twitter user base. Twitter had a stronger impact when adjusted by number of followers, mirroring trends in popularity from other medical and surgical specialties and decreasing use of Facebook as a professional platform. Engagements and article views had a strong correlation between platforms, suggesting that post performance is ultimately related to the content of the post. Day of the week had minimal impact on post-performance. Posts with photographs were the most impactful content format; however, we are unable to establish a causal relationship for this association given known limitations of this kind of study design and proprietary algorithms for these platforms that preferentially promote certain types of content.

Table 1
Performance by social media platform.

n = 165, mean (SD)	Unadjusted (raw)			Adjusted (per 1000 followers)			Correlation	Strength	p-Value
	Twitter	Facebook	p-Value	Twitter	Facebook	p-Value			
Impressions/ Reach	1214 (531)	**1891 (1351)**	**<0.001**	**518 (227)**	120 (86)	**<0.001**	**0.18**	**Weak**	**0.02**
Engagements	74 (55)	**153 (224)**	**<0.001**	**32 (23)**	10 (14)	**<0.001**	**0.56**	**Strong**	**<0.001**
Engagement rate	6.2% (3.5%)	6.5% (3.6%)	0.29	6.2% (3.5%)	6.5% (3.6%)	0.29	**0.62**	**Strong**	**<0.001**
Likes/reactions	9 (5)	**29 (39)**	**<0.001**	**4 (2)**	2 (2)	**<0.001**	**0.37**	**Weak**	**<0.001**
Replies/comments	0 (1)	**2 (6)**	**<0.001**	0 (0)	0 (0)	0.09	0.08	Weak	0.33
Retweets/shares	4 (3)	**9 (9)**	**<0.001**	**2 (1)**	1 (1)	**<0.001**	**0.38**	**Weak**	**<0.001**
Link clicks	20 (16)	**40 (44)**	**<0.001**	**8 (7)**	3 (3)	**<0.001**	**0.67**	**Strong**	**<0.001**
Link click rate	1.6% (1.1%)	**1.8% (1.1%)**	**<0.001**	1.6% (1.1%)	**1.8% (1.1%)**	**<0.001**	**0.63**	**Strong**	**<0.001**

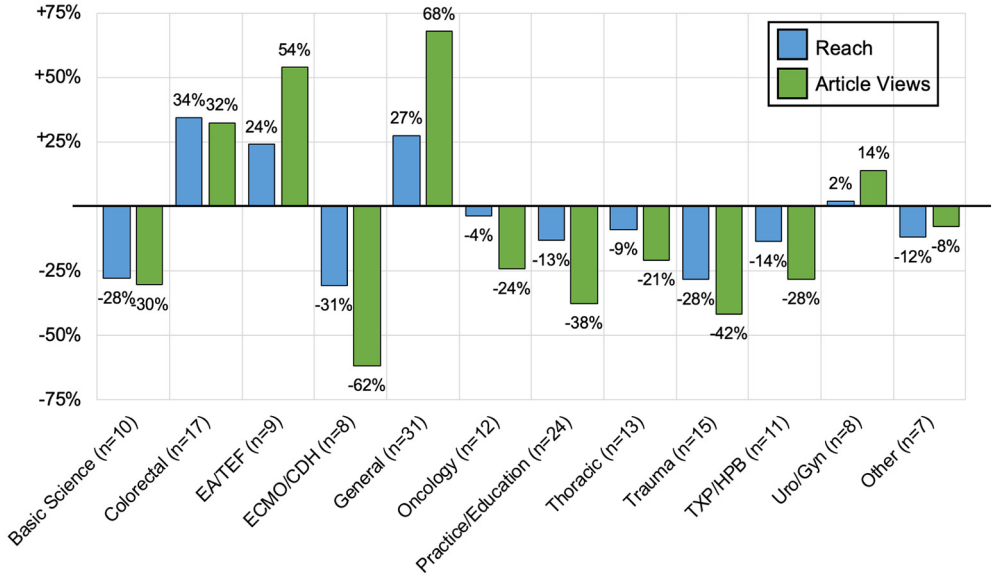

Fig. 3. Performance by content topic. *EA, esophageal atresia; TEF, tracheoesophageal fistula; ECMO, extracorporeal membrane oxygenation; CDH, congenital diaphragmatic hernia; TXP, transplant; HPB, hepatobiliary.

Topic had the highest effect on performance – with colorectal, EA/TEF, and general pediatric surgery leading to higher reach and engagement in both platforms. This may represent higher interest in these topics from our user base and more widespread impact in clinical practice. ECMO/CDH was the least popular content category, which could be related to its smaller proportion of clinical volume in pediatric surgery. It is also important to acknowledge that a significant limitation in this study is that our follower base may not provide an adequate representation of the pediatric surgery community at large, and proportions of relevant subspecialties and subspecialty interests were not analyzed. Although post popularity could also be impacted by author or institution of origin of the articles being promoted in these posts, we are unable to evaluate this given the limited scope of our study. However, in a similar study reviewing the top performing articles in plastic surgery, their popularity across social media platforms was associated to the journal's social media audience, not the magnitude of the authors' social media presence [8].

Tweets have even been shown to predict which articles will be highly cited within the first 3 days of publication – this may reflect the ability of social media to either functionally increase citations or highlight the underlying qualities of the articles in question that would independently predict citations [9]. Twitter impact was strongly associated with article citations over 16 years in *Gastrointestinal Endoscopy*; this was reproducible, to a lesser degree, using Facebook metrics [10]. This effect was not observed for *Circulation*, where a randomized social media strategy failed to demonstrate an increase in article views for those promoted in social media [11].

A disappointing finding in this study was the negligible volume of comments and shares over this six-month period. This indicates that although successful in increasing dissemination and visibility of the articles, this campaign was unable to foster further online discussion among our audience members. This calls for a more critical reevaluation of our social media strategies to promote interactions between users that enhance the learning experience and may help improve research questions and understanding within an established community.

Social media has been shown to increase distribution of the message – or findings – of an article, in addition to dissemination of the article itself, when utilized in ways that are more personal [12]. Although more resource-intensive, manual content creation has been shown to improve user engagement. Visual abstracts, for example, have been associated with higher levels of dissemination [13]. In our personal experience, visual abstracts published through these same social media platforms for the *Journal of Pediatric Surgery* reached an average of 7,368 users and lead to 101 article views each – a significant difference from the figures presented above. Other strategies that have been successful in the medical field include online live chats and journal clubs [14]. These are activities we could consider to increase interaction between the *Journal of Pediatric Surgery* and its audience.

Social media is already changing the conversation in academic medicine [15], and significant developments have occurred recently that impact pediatric surgery specifically. The American Pediatric Surgical Association has increased its social media presence, inviting users to participate in weekly activities on Facebook and Twitter. The hashtag, #SoMe4PedSurg, has also been coined as an extension of the global #SoMe4Surgery campaign. We all have the opportunity to contribute to and benefit from these kinds of platforms, and quick start guides are widely available to welcome newcomers [16]. As more surgeons continue to embrace these online communities, pediatric surgery presence will likely increase – strengthening the networking, research, and knowledge sharing benefits of these platforms.

In conclusion, an automated social media strategy increased dissemination and visibility for the *Journal of Pediatric Surgery*. Content topic had the strongest effect on post-performance. Alternative knowledge dissemination strategies are likely needed to foster online discussion and build more robust forums for collaboration in the field of pediatric surgery.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpedsurg.2020.09.037.

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