

Influencing Learning: How Instagram can Play a Role in Anesthesia Education

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Abstract

Purpose: To determine what influence our Instagram account, @accigunbosque, can have on the spread of medical knowledge, as well as the impact it may have on the actual learning process, in order to describe the utility of these accounts on social media within the medical community.

Methods: A longitudinal, prospective, descriptive study and a narrative perception analysis. Interaction data was recollected for 26 weeks, and evaluations were carried out with 2 posts from the page, in order to assess the quality of interaction with educational material. The differences between before and after scores of the participants in the educational modules were calculated with the Wilcoxon signed-rank test for related samples. Finally, the texts of comments from publications were analyzed with NVivo11.

Results: The page generated 48 infographic posts and held 3 webinars throughout the study period. The maximum number of accounts reached was 15,368, the average number of visits to the profile was 380, the average amount likes received on posts was 316, and the maximum number of saves was 414. The median of comments per publication was 3, ranging from none to a maximum of 27. Participation in the quizzes was 16/568 and 3/502, and a significant difference was found ($p = 0.024$) in the first quiz. The content of 186 comments was reviewed and only 4% made additional contributions or left constructive remarks, with the rest being composed of emoticons and admiration.

Conclusions: For means of data sharing, Instagram can be a very useful tool as seen within our study. However, the actual learning process behind Instagram may prove to be deficient, considering the little participation in our two educational modules. This allows one to hypothesize that many Instagram users are likely to passively view and interact with educational Instagram posts, but may not actively retain information as expected.

Key words: Medical Education; Social Media; Instagram; Learning

INTRODUCTION

Social media (SM) is slowly joining the forefront of medical education delivery, allowing users to interact with the vast amount of exponentially growing information. Being up-to-date on the latest in medical education is important to both physicians and students, as the growing amount of information allows for a deeper understanding of pathological processes, new disease treatments, as well as advances in all aspects of medical knowledge. This could easily be seen throughout the COVID-19 pandemic, with growing databases full of new treatments and symptomatic management. Being able to read the most updated guidelines or articles on a disease may prove to be difficult considering the existence of

certain obstacles such as journal subscriptions, which can be costly; which is why “free open access medical education” (FOAMed) has been on the rise. FOAMed describes a movement to share educational resources from altruistic professionals who use accessible online resources^{1,2} of which social networks, such as Instagram, are slowly being incorporated. Instagram is an image-based SM platform with more than 700 million monthly active users and more than 400 million daily active users.^{3,4} This platform allows users to upload images and videos that will be shared with the community of followers that they have, and also permits users to interact with one another via direct messaging, commenting on posts, and content sharing.

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This has many advantages, such as opportunities for more peer-to-peer interactions, professional development and advancement, creation of learning networks, and a means of connecting students with resources and activities to which their access would otherwise be limited by geographical location, as well as boasting much popularity among medical students.⁵ With this, many medical influencers have come to light, such as Dr. Rishi Kumar (@rishimd), Dr. David Convissar (@countbackwardsfrom10), and Dr. Jed Wolpaw (@accrapodcast) who are excellent examples of FOAMed seen within Instagram, considering that the content of their publications is directly related to the dissemination of medical information on various topics within the field of anesthesiology and critical care. However, there is a lack of information about the quality of interaction and education that can be generated through Instagram.

In addition, it is necessary to take into account the COVID-19 pandemic that has restricted many in-person activities, leading to a growing popularity with virtual learning. Considering all the above, the question was raised as to what influence our Instagram account, @accigunbosque, can have on the spread of medical knowledge, as well as the impact it may have on the actual learning process of our followers, in order to understand if Instagram promotes active learning, and describe the utility of these accounts on SM.

METHODS

Our research was deemed a study without risk considering that complete anonymity will be maintained and current social media policies would be abided, therefore subsequent approval was obtained from the ethical committee/institutional review board. Likewise, participants of the quiz portion of the study were required to give their digital informed consent before accessing the content, as approved by the institutional review board (considering the quiz portion was advertised via Instagram, making it impossible to obtain written informed consent from the participants). Every week, at least one educational post was created by members of the group (2nd to 6th year medical students) accompanied by an expert (anesthesiologist) on the topic, and then published on our Instagram page (@accigunbosque). The topics were centered around anesthesia, such as inhaled and intravenous anesthetics, arterial blood gas interpretation, and management of cardiac arrhythmias, among others. Additionally, the group would hold webinars open to the public on topics such as intubation in COVID-19, basic mechanical ventilation and pre-anesthetic assessment (Supplemental Figure 1). Throughout the study period, the page posted 48 infographics and held 3 webinars. The profile has a wide audience, such as high school students, different health science students, professionals, and specialists. This study has a mixed approach, as it describes the use of a social communication platform on education from a quantitative point of view, and also qualitatively analyzes user interactions to determine the perception of the utility of Instagram in the transfer of knowledge.

Study design type

It is a mixed design study, in which the first phase is represented by a longitudinal, prospective, descriptive study and a second phase consisting of a narrative perception analysis.

Data Recollection

The interaction data produced by Instagram was recollected weekly using Microsoft Excel from September 1st, 2020 to February 6th, 2021 for a total of 26 weeks. The parameters used were: Reach, impressions, profile visits, number of followers, absolute increase in followers, number of likes, comments, saves and shares. Similarly, comments were collected throughout the 26 weeks in order to analyze the quality of interactions. Finally, 2 evaluations were carried out using Google Forms, with 2 publications (infographic posters) in order to evaluate the quality of interaction with educational material and the influence that this may have on learning. This was done using a pre-exposure quiz (before reviewing the post) and a post-exposure quiz (after reviewing the post), in order to compare the scores obtained. These quizzes consisted of the same 4 questions and were evaluated by a senior anesthesiologist before releasing the questionnaire to the public.

Control of error and bias

The information was obtained directly from the Instagram application, so there was no room for subjectivities; and the data were transferred to the recollection spreadsheet and later to the statistical software using import tools, so there was no risk of manipulation or loss of data.

Data processing and analysis techniques

The variables (accounts reached, impressions, profile visits, number of followers, post likes, post comments, post saves and post shares) were described by medians, interquartile ranges (difference between 75th and 25th percentile), and minimum and maximum values; and all variables were plotted to observe patterns or trends with line and area graphs.

Regarding the analysis of the evaluations, differences between the before and after scores were calculated with the Wilcoxon signed-rank test for related samples. Finally, the texts of the comments of the publications were analyzed with NVivo11.

RESULTS

During the 26 weeks of account activity monitoring, the maximum number of accounts reached was 15,368 (Table 1). The median weekly reach was 2,002 with peaks in weeks 4, 9 and 13 of approximately 1 to 3 weeks in duration (Figure 1). Week 4 had posts that corresponded to vasodilators, a webinar on vasopressors and inotropes, and a post on beta blockers. Week 9 had posts on hypovolemic shock, cardiogenic shock and a webinar on pre-anesthetic evaluation during the COVID-19 pandemic and a webinar on anesthesia for cesarean section. And week 13 had a post on renal blood flow physiology as well as an informative post on the acceptance of posters for a medical conference. The median of weekly impressions was 7,929, and visits to the page was 331. The impressions and reach had a trimodal behavior with peaks during the same weeks (Figure 2).

Average number of visits to the profile throughout the 26 weeks was 380. In the 4th week (September 20th - September 26th) the maximum number of visits (929) was obtained which corresponded to posts on cardiac output/venous return, epinephrine, norepinephrine and phenylephrine. A minimum of 161 visits was seen in week 19

Table 1: Description of the interactions on @accigunbosque

Variable	Value*
Accounts Reached	2002 ± 808 [1254–15368]
Impressions	7929 ± 8296 [2120–34256]
Profile Visits	331 ± 260 [161-929]
# of followers	2451 ± 324 [1770-2532]
Increase in Follows	25 ± 52,5 [-4-193]
Post likes	273 ± 325 [35-700]
Post Comments	3 ± 5 [0-27]
Post Saves	110 ± 153 [5-414]
Post Shares	30 ± 34 [3-128]

*Median ± Interquartile Range [Minimum – Maximum]

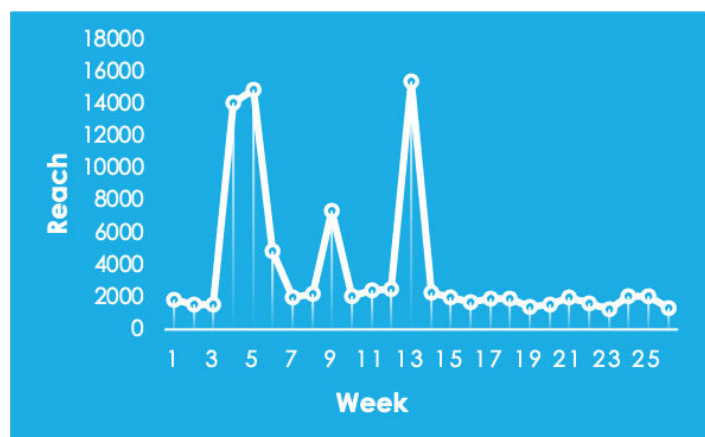


Figure 1: Accounts reached on a week by week basis for @accigunbosque. Trimodal behaviour with peaks in weeks 4, 9 and 13

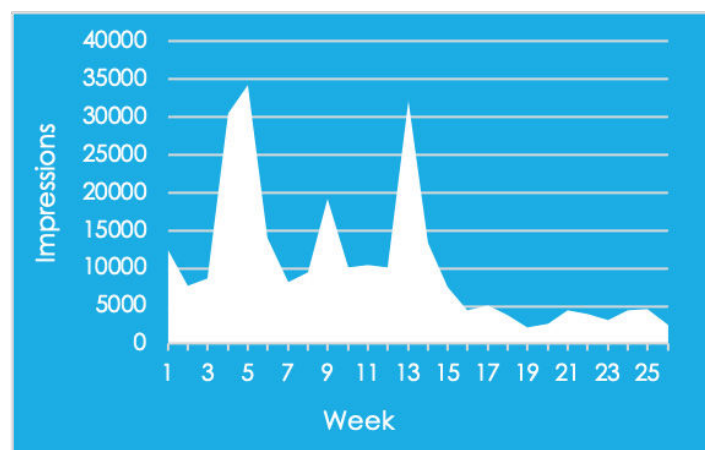


Figure 2: Number of impressions achieved by the weekly publications of @accigunbosque. Trimodal behavior with peaks in weeks 4, 9 and 13, as seen in Figure 1.

(December 20th - December 26th) which corresponded to 2 posts on medically challenging cases that were accepted in the American Society of Anesthesiologists conference. The average weekly follower increase was 2%, with a maximum weekly increase of 193 seen in the 4th week of data collection. The range of likes received in the publications was from 35 to 700 (with a weekly average of 316); the median of comments per publication of 3 comments, with

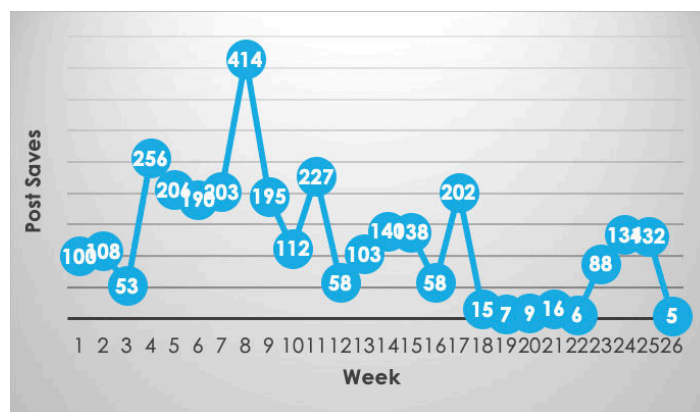


Figure 3: Number of accounts that saved @accigunbosque posts throughout the 26 weeks. The maximum number of post saves can be seen in week 8, while a minimum number of saves is seen in week 26

comments ranging from none to a maximum of 27 seen in the 13th week. The maximum number of publication saves was 414 seen during week 8 (Figure 3), and corresponds to posts on rapid sequence intubation, hypovolemic shock and cardiogenic shock. Week 4 had the most shared publications (128) which corresponded to posts on vasodilators, a webinar on vasopressors and inotropes, and a post on beta blockers.

The 2 evaluations were carried out to determine the impact of educational interventions on the topics of intravenous anesthesia and inhaled anesthesia. On the first topic (intravenous anesthesia), the participation was 16/568 (followers who participated in the quiz/followers who received the invitation), finding a significant difference after the educational module ($p = 0.024$) with a pre-exposure quiz mean of 3.1875 and a post-exposure quiz mean of 3.75. In the inhaled anesthesia quiz, the participation was 3/502 (0.6%), however, the qualification of the participants was the same before and after the educational module (mean of 3.66).

The comments corresponding to the publications made during the observation period were exported and analyzed in NVIVO11, showing that 67% of the publications received comments. The content of 186 comments was reviewed and 92 (49%) of the comments exclusively made use of emoticons to show support, admiration or to extend congratulations, another 55 (30%) comments sent congratulations and messages of encouragement expressed in words, and 7 (4%) comments made additional contributions or left constructive comments. There were 2 opportunistic messages of self-promotion of pages or services, and 4% of the messages requested additional information about webinars or research groups. Finally, 2 comments could not be classified as they were incomprehensible, and the remaining were comments between group members or responses from the account's community managers. The low variability of the comments did not allow for a cluster analysis.

DISCUSSION

Measuring the impact of SM on learning can be challenging, considering that the audience is anonymous users, which creates an obstacle when trying to measure retention of educational information. The available statistics, such as the number of users who have seen or interacted with the content, are the only indicators

currently available to measure the possible learning that can result from an educational post. These indicators are known as reach, impressions, and engagement (likes, comments, saved posts, shared posts, etc.).⁴ Impressions are a standard metric used to measure a post's impact on Instagram; furthermore, this interaction is counted when a user performs an action on the content, such as opening it for an expanded view, liking it, commenting on it, or clicking on a link within the content. Because this engagement requires more from the user, it is believed to be a more important indicator of a post's success.⁴ For example, a user may save a post for future reference or a more focused review at a later time when they are not busy. Likewise, a user may share a post with other users in order to discuss the post's contents, share knowledge, or begin a discussion on the topic. Other important metrics that can be seen are reach and followers. The reach of a post is the number of unique people who have seen a post anywhere on Instagram, which differs from impressions. For example, one person can view a post three times, share it with one person and comment once, which will result in five impressions but only a reach of one. Followers can also be an important metric considering that many users will only follow an account that they feel is truly interesting to them in order to get updates on new posts and activities.

In our study, it was possible to quantify and analyze the large number of impressions and interactions that our audience had with the content of the @accigunbosque Instagram page. In addition, we were able to objectively evaluate learning potential through two educational modules, which demonstrated little participation by the community, and a significant difference between pre-exposure and post-exposure quiz scores in 1 of the interventions but no difference in the 2nd. The 2nd intervention may not have shown a difference due to the small sample size from the lack of participation, which was a significant limitation in this section of the study. There are various reasons for why the participation could have been low, such as the wide diversity of followers that the page has. If the page or interventions would have been restricted to those only with direct or indirect relationships with anesthesia, there may have been more participation due to more interest in the topic area. Similarly, a page with more followers does not necessarily mean that they all constantly interact with the content. Many pages may amass a certain amount of followers simply from peers or friends who wish to show support, but do not interact with the content (such as quizzes) because it is not of their interest.

It is important to analyze the peaks that were seen in figure 1 and 2 (Weeks 4, 9 and 13 of recollection) as this can help others understand what content is most interesting to the medical community on Instagram. During week 4 there was a post advertising a webinar on vasopressors and inotropes, while in week 9 there was a post advertising a webinar on the pre-anesthetic evaluation during the COVID-19 pandemic. During these weeks there were also various other posts, but we hypothesize that the reason for the peaks in week 4 and 9 were due to the webinars being offered. Week 13 would be an outlier to this theory, as in this week there was only one post on renal blood flow physiology and another post which was an update on the acceptance of posters for a medical conference.

More than half of the publications received comments, which indicates that the audience is active, however, most were emoticons and messages of admiration. The goal of educational content generators should be to seek comments more related to the publication content by way of feedback and debate within the commentary section. Taking into account what has been observed, we consider that these types of social network accounts are of great importance, and can be useful for the continuous updating and passive teaching of academic subjects.

When used for educational purposes, SM can be an excellent tool, however this can be challenging considering the vast number of distractions that exist within different platforms, especially Instagram. A meta-analysis found that the purpose of using SM is based primarily on communication (58.3%), followed by content sharing (25%), content creation (12.5%), and social capital (4.2%). Similarly, it was found that social networks helped express ideas, create and transmit digital content among peers, as well as combine study and leisure.⁶ A more objective study, conducted by Javaeed et al., found that the median exam score of medical students after integrating SM learning was higher than compared to learning without SM integration, however, these results were identified by applying the use of SM networks within the classroom as the main learning method, and not as an extracurricular activity, such as passive browsing on Instagram.⁷ This allows one to hypothesize that many Instagram users are likely to passively view and interact with educational Instagram posts, such as those found on the accigunbosque account, but may not actively retain information as expected. This conclusion can also be supported by a meta-analysis in which it was shown that 75% of the medical students included in the study used social networks only for communication purposes, while 25% used this medium for educational purposes.⁸ Furthermore, in our study it was seen that a great amount of users interacted with our posts, however when it came down to an actual learning evaluation, not many participated.

A systematic review by Cheston et al. found that ten studies reported that student participation is an important benefit of using SM. By stimulating interaction and student-created content, SM appears to promote active learning. Additionally, it is evidenced that social networks facilitate the feedback process through comments, as reported in eight of the studies, facilitating feedback from teachers and peers.⁹

SM offers opportunities to encourage collaborative learning and participation.⁹ Our findings suggest that the use of Instagram can have a positive impact on the results of students and health professionals. However, it is important to understand the possible limitations that are seen within Instagram. With the large number of participants on SM, it is often difficult to determine the quality or accuracy of a teaching point. Additionally, users rely on the comments of others to correct a mistake within their content, considering that information shared on Instagram is not peer-reviewed, leading to the possible spread of erroneous information.⁶ However, Instagram is an excellent catalyst for the spread of information, considering the grand amount of interaction and views that an account can generate, such as seen with our account; which explains the growing FOAMed community seen within this platform. It is also important to understand what

impact other platforms, such as Twitter, can have on learning and spread of information. Current studies comparing different SM platforms and their utility for learning have not been explored, and we invite the scientific community to continue searching for answers to these questions. Currently, there is a deficit of information about learning within Instagram and our study is a step forward; however, we believe that Instagram remains an effective medium for sharing educational information considering its vast audience.

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