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Bariatric surgery on social media: A cross-sectional study

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ABSTRACT

Introduction: Bariatric Surgery (BS) represents a viable option for the treatment of obesity and its risks. Nevertheless, it is still being underused by the eligible patient population because of the general lack of information, false beliefs, and the stigmatization of obesity. Social media seems to be a solution for overcoming this problem.
Materials and methods: The search terms "Bariatric surgery", "Metabolic surgery", "Obesity surgery" and "Weight loss surgery" were employed to analyze the Twitter accounts and Facebook pages dedicated to Bariatric Surgery. The most relevant metadata from each account was collected and analyzed with descriptive statistics.
Results: 293 Facebook pages and 122 Twitter accounts were analyzed, being most of them created in the US (42%). No significant differences were found between the mean of followers of both platforms. Medical centers were the biggest creator category with 69.24% of the total number of followers. Although the promotion of medical services accounted for 68.65% of the total number of followers, the promotion of medical products had a significant higher mean of followers. ($p = 0.002$).
Conclusion: Doctors and businesses acknowledge the importance of social media for informing patients about BS and promoting their services. Accounts with commercial purposes presented the highest number of followers. The high number of supporters this commercial content has, along with the relative lack of followers in educational and support groups, could lead to undeliberate decisions in detriment of the patients and their well-being.

1. Introduction

Bariatric surgery (BS) is considered to be the most impactful and durable option for patients suffering from metabolic disorders and morbid obesity [1–4]. In virtue of this, the prevalence of BS has progressively increased in order to face the rising trend in obesity across the Western world [1–3]. Additionally, evidence has shown that this type of procedures do not only improve exercise frequency and tolerance, but also the possibility of resolution of the different obesity associated comorbidities such as dyslipidemia or insulin resistance [5,6].

Despite its clinical success, BS is rather underused by the eligible patient population nowadays due to a general lack of information, the prohibitive costs of these surgeries and the mental barriers and stigmatization established by society [1,7–9].

Social media has been proposed as a possible tool for overcoming some of these barriers, given its capacity to disseminate health related messages to a mass audience in an efficient, functional, and transparent way [10]. According to the literature, social media may be the first source patients with obesity may turn to when looking for solutions to their problem and therefore an ideal place to start with educational campaigns [11]. Despite the potentiality of these platforms to teach patients about the benefits of BS, little is known about their current use in this field. The objective of this study is to analyze the characteristics of Facebook pages and Twitter accounts related to BS from our search.

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2. Methods

2.1. Search strategy and platform selection

Facebook and Twitter are currently considered to be the most utilized social networks in online text/media-based communications in the field of general and bariatric surgery [12]. Although Instagram is considered to be the most popular image-sharing platform on the Internet, it was not used in our study due to the limitation of its search engine that only provides a maximum of 55 results even when more exist [13,14].

In virtue of this, a comprehensive search was conducted with the Facebook pages and Twitter accounts search engines on the 12th of March 2021 by using the key terms "Bariatric surgery", "Metabolic surgery", "Obesity surgery" and "Weight loss surgery". All the results of this initial search were registered in a document that would be evaluated by the authors afterwards. The inclusion criteria for the study were: Facebook pages and Twitter accounts related to BS; accounts in Spanish, Italian, English, German, and Portuguese; and accounts having more than one post to ensure that a representative amount of information was given to the users. In case the same source had a Facebook page and a Twitter account, it was decided to include both given the intrinsic differences that exist in the audience demographics, capabilities and functions between the two platforms and to not alter the results that an ordinary patient would find by using our search terms.

The manuscript has been reported in line with the *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE) Statement criteria [15].

2.2. Social media metrics and data

The population data was extracted from the Twitter accounts using the total number of followers and from the Facebook pages using the total number of "likes" per page, which is considered to be equivalent to the total number of followers [13]. Different variables related to the pages and accounts were also collected such as the existence of a link to other online resources, the possibility to establish communication with the authors other than posting on their profile, the country of origin, the year of creation, and the language of the posts.

Facebook pages and Twitter accounts were later classified according to their main objective into 6 different groups: "Diet/life habits", "General education", "Medical services promotion", "Product promotion", "Medical education" and "Support and motivation". Apart from their main objective, these sites were further analyzed to see if they promoted or facilitated bariatric medical tourism to other countries. All the pages and accounts were also classified into 7 different groups depending on the characteristics of their creators: "Business", "Healthcare professional", "Medical center", "Nonprofit organization", "Personal experience", "Research/education" and "Support group/events". The previous categories and objectives were formulated after screening and discussing the first 100 results among the authors [16]. The different pages and accounts were independently categorized and discussed in case there were any discrepancies by four independent authors.

2.3. Statistical analysis

The data was analyzed using the R version 3.6.2. Frequency distribution was calculated for qualitative variables while the mean and the standard deviation was calculated for quantitative variables. In accordance with other articles, our data did not follow a normal distribution [13,16–18]. For fitting the trend line in the time diagram the loess regression was employed. All the results with a p-value < 0.05 were considered of statistical significance. The total number of followers was evaluated with the Wilcoxon Rank-sum test. The Chi-square test of independence was used to evaluate across platforms the number of links to other online resources, additional ways of communication, the country of origin, the number of accounts promoting bariatric medical tourism and the use of different languages. The Kruskal-Wallis test was employed to evaluate the mean of followers of the different objectives studied.

2.4. Ethical considerations

The study does not require the approval of any hospital's ethics and clinical research committee, as it does not include direct evaluation or collection of identifiable personal data. All the data was extracted from publicly available sources and no interaction of any kind was established with none of the platform users. The names of the Twitter accounts and Facebook pages were omitted to preserve the privacy of the data.

3. Results

A total of 662 Facebook pages and Twitter accounts were retrieved in the initial cohort. From these, 55 accounts were duplicated, 107 were not related to BS, 39 had 1 or less posts and 6 were not written in any of the inclusion languages. The analysis was eventually conducted on 415 social media sites, from which 293 belonged to Facebook pages and 122 to Twitter accounts (Fig. 1).

Facebook pages presented a mean of 7230 followers per record while Twitter accounts a mean of 1721. However, no significant differences were found between the numbers of followers from both platforms. 82% of the studied accounts presented links to other online resources. As it was seen in similar studies the pages and accounts with these links had a significant higher mean of followers ($p < 0.001$) [13]. In total 74% of the records presented an additional mean of communication with the authors, being more frequent on those from Facebook ($p < 0.001$).

The US was the most common country of origin and English the most spoken language. 30 Facebook pages and 8 Twitter accounts offered information or client experiences to encourage users to practice bariatric medical tourism (Table 1).

Medical centers were the biggest creator category in both platforms, which accounted for the 69.24% of the total number of followers. Although the promotion of medical services accounted for the 68.65% of the total number of followers, the promotion of medical products had a significant higher mean of followers ($p = 0.002$) (Table 2).

Fig. 2 shows the time-trend of newly established pages and accounts on Facebook and Twitter, respectively. In the year 2016 there was the highest numbers of Facebook pages creation that rapidly declined

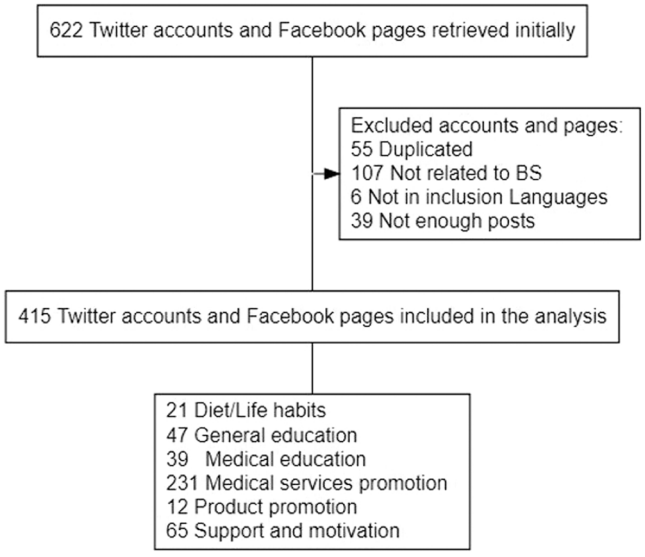

Fig. 1. Details of Facebook pages and Twitter accounts included in the study. (*BS = Bariatric Surgery*).

Table 1
Summary table dividing the studied accounts into the two platforms analyzed. Continuous variables are expressed with the mean and the standard deviation while categorical values are expressed with the absolute number followed by a relative percentage.

Characteristic	Overall (N = 415)	Facebook (N = 293)	Twitter (N = 122)	p-value
Followers	5611 (46,890)	7230 (55,676)	1721 (4531)	0.13[a]
Unknown	3	3	0	
Final Category				
Business	18 (4.3%)	11 (3.8%)	7 (5.7%)	
Healthcare professional	90 (22%)	50 (17%)	40 (33%)	
Medical center	209 (50%)	169 (58%)	40 (33%)	
Nonprofit organization	8 (1.9%)	7 (2.4%)	1 (0.8%)	
Personal experience	41 (9.9%)	25 (8.5%)	16 (13%)	
Research/ education	29 (7.0%)	13 (4.4%)	16 (13%)	
Support groups/ events	20 (4.8%)	18 (6.1%)	2 (1.6%)	
Main objective				
Diet/Life habits	21 (5.1%)	17 (5.8%)	4 (3.3%)	
General education	47 (11%)	20 (6.8%)	27 (22%)	
Medical education	39 (9.4%)	13 (4.4%)	26 (21%)	
Medical services promotion	231 (56%)	191 (65%)	40 (33%)	
Product promotion	12 (2.9%)	9 (3.1%)	3 (2.5%)	
Support and motivation	65 (16%)	43 (15%)	22 (18%)	
Link to other online resources	340 (82%)	242 (83%)	98 (80%)	0.7[b]
Other means of interaction	309 (74%)	291 (99%)	18 (15%)	< 0.001[b]
Country of origin				< 0.001[b]
Australia	24 (7.4%)	21 (9.6%)	3 (2.9%)	
India	37 (11%)	33 (15%)	4 (3.8%)	
Mexico	40 (12%)	35 (16%)	5 (4.8%)	
Other countries	87 (27%)	50 (23%)	37 (35%)	
US	136 (42%)	80 (37%)	56 (53%)	
Unknown	91	74	17	
Bariatric medical tourism	38 (9.2%)	30 (10%)	8 (6.6%)	0.3[b]
Language				0.13[b]
English	388 (93%)	270 (92%)	118 (97%)	
Other languages	27 (6.5%)	23 (7.8%)	4 (3.3%)	

[a] Wilcoxon Rank-sum test.
[b] Chi-square test of independence.

during the following years. The twitter page creation rate on the other side, established a decreasing trend from its peak in 2009. The trend line in the diagram also shows a decreasing tendency in the creation of social media sites related to BS. Similar decreasing trends were found in studies focused on epilepsy on social media [16]. A total of 2 records did not mention the year of creation and where therefore excluded from the diagram.

4. Discussion

Our study shows that physicians and healthcare businesses already acknowledge the importance of social media not only to inform their patients about BS, but also to promote their products and services. Indeed, the sites created for this purpose were the ones with the highest number of followers. On the other hand, accounts dedicated to patient education and support only accounted for 17.94% of the total number of followers. The relative lack of support these patient-centered sites have, along with the high number of followers commercial content has, could lead to undeliberate decisions in detriment of the patients and their well-being.

Our analysis showed the popularity of BS on social media, which presents a total amount of 2.328.480 followers/likes in both platforms, which clearly surpassed the popularity of other medical conditions [13]. This study showed a similar popularity between Facebook and Twitter when looking for BS-related topics given that no significant differences were found in the mean of followers from both platforms. Nevertheless, Facebook pages offered a significantly better availability to interact with its users ($p < 0.001$), which did not present any significant difference in the mean number of followers. Most of the accounts were written in English and belonged to US content creators, which may be a consequence of the relative large amount of weight loss surgeries that are performed in the country every year (250,000 surgeries in 2018) [20].

The promotion of different products to lose weight or contributing to the post-operatory period was the objective with the highest mean of followers, ($p = 0.002$) while the promotion of medical services accounted for the highest absolute number of followers. As it can be seen in Fig. 3, most of the accounts promoting medical services belonged to medical centers and healthcare professionals while business accounts were the main promoters of non-medical services. These data reflect that, healthcare professionals, medical centers and private businesses acknowledge the importance of these platforms and use them for promoting their services among social media users [12].

In virtue of the ethical principles neither a surgeon nor a medical center should disseminate false or biased information, however, we found the biggest problem in non-medical commercial accounts, which if are not properly guided by a scientific committee could voluntarily or not disseminate unreliable information to a mass audience easily. Some of these accounts may publish inaccurate or biased information in order to allure costumers to their websites and buy products or coaching services that may not benefit them [1–3,13]. Because of this reason, some authors express concern about the problem and encourage doctors and bariatric surgeons to monitor and caution their patients about the information they might consume in order to avoid potential misinformation [1,2].

A total of 38 accounts promoted bariatric medical tourism (BMT), which has recently become a rapidly expanding industry with over 650 million patients worldwide. Mexico and Turkey where the most common countries for having BS abroad, probably because of their lower average prize of surgery compared to the US and Europe, which tend to be the regions of origin of the patients treated [12,21]. Parmar et al. conducted a global survey about BMT on 383 bariatric surgeons from which 51% of participants felt that International Federation for the Surgery of Obesity

Table 2
Summary table dividing the studied accounts into the different objectives of the accounts. Continuous variables are expressed with the mean and the standard deviation while categorical values are expressed with the absolute number followed by a relative percentage.

Characteristic	Overall (N = 415)	Diet /Life habits (N = 21)	General Education (N = 47)	Medical Education (N = 39)	Medical Services Promotion (N = 231)	Product Promotion (N = 12)	Support and motivation (N = 65)	p-value
Mean of Followers	5611 (46,890)	9174 (15,626)	899 (1179)	2446 (5399)	6920 (61,973)	18,054 (35,734)	2815 (6031)	0.002[a]
Number of Followers	2.328.480 (100%)	192.661 (8.27%)	42.236 (1.81%)	95.411 (4.1%)	1.598.529 (68.65%)	216.649 (9.3%)	182.994 (7.86%)	

[a] Kruskal-Wallis test.

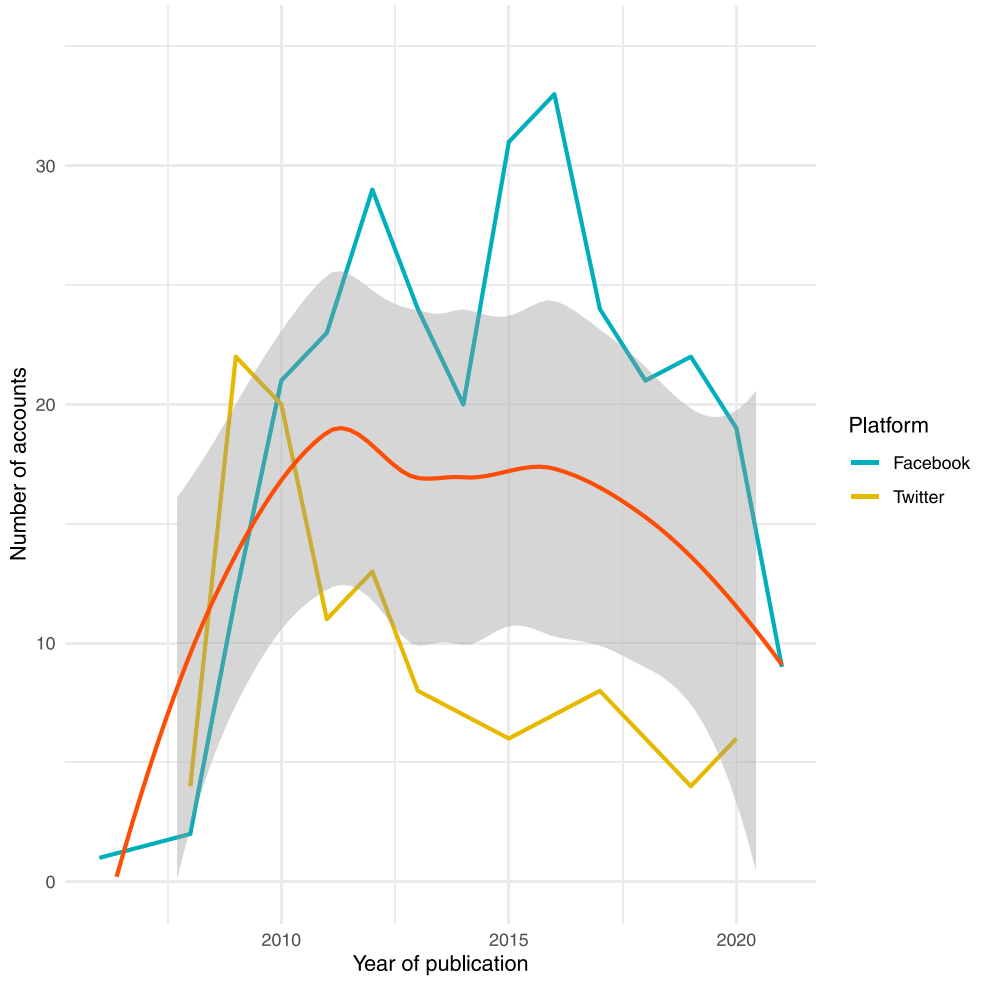

Fig. 2. Time diagram of the number of Facebook pages, and Twitter accounts created every year. The red trend line was created using a loess regression model.

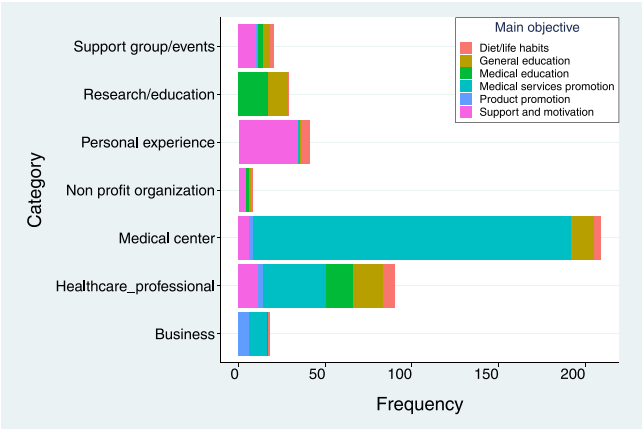

Fig. 3. Stacked bar chart showing the distribution of accounts according to their main objective and their creator category.

and Metabolic Disorders (IFSO) guidelines were not followed by the operating surgeon and 12% felt BMT was associated with a higher mortality. Most of the surgical community is aware of this problem and thus support the idea of creating a global forum to facilitate safe ethical tourism worldwide [12,21].

Only 16.39% of the accounts focused on educating patients about nutrition, healthy life habits and the possible outcomes and risks of the procedure and just 15.66% accounted for support groups and blogs with personal experiences related to BS. The sum of the followers of this type of patient-centered accounts just reached 17.94% of the total number of followers. Increasing the popularity and the amount of educational and motivational accounts is extremely necessary since this type of content provides patients with the opportunity to learn more about the procedure, find guidance and motivation during their bariatric process and become real consumers of knowledge about their disease [2,13]. This knowledge and motivation may help patients to change their negative biased perspective towards weight loss surgery and eventually decide to get operated [8].

Social media seems to be an efficient and robust method to learn about patients and their beliefs [16]. Previous studies have used these platforms to examine treatment barriers for other conditions such as breast cancer or smoking cessation [22,23]. In many of the support or educational sites in our study, patients were allowed to post questions and personal concerns. Studying and addressing some of these comments in detail could be of great importance to not only create more targeted educational campaigns but also to encourage a greater number of people to undergo BS. Similarly, social media may also help doctors and surgeons to better understand the patient perspectives and attitudes towards BS.

This analysis could contribute to the future development of scientific research, interventions, and initiatives in the field of BS and social media. However, some limitations exist. Our study only reflects the landscape of five languages and four specific search terms. Moreover, the constant fluctuations of social media groups and pages may be considered as an inherent bias. In any case, our findings support the potential impact of online platforms to bariatric surgery content

dissemination. Some of the data gathered may be utilized to establish new health policies and educational programs in benefit of BS eligible patients.

Ethical statement

All the authors have read and have abided by the statement of ethical standards for manuscripts submitted to the Obesity Research & Clinical Practice.

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CRediT authorship contribution statement

Juan Pablo Scarano Pereira: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization. **Alessandro Martinino:** Methodology, Validation, Data curation, Writing – original draft, Writing – review & editing. **Francesca Manicone:** Methodology, Validation, Data curation, Writing – original draft, Writing – review & editing. **María Luisa Scarano Pereira:** Methodology, Validation, Data curation, Writing – original draft, Writing – review & editing. **Álvaro Iglesias Puzas:** Methodology, Validation, Formal analysis, Writing – original draft, Writing – review & editing, Visualization. **Sjaak Pouwels:** Methodology, Validation, Formal analysis, Writing – original draft, Writing – review & editing, Visualization. **Julio Mayol Martínez:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization.

Disclosures

The authors have no conflicts of interest or financial ties to disclose.

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Conflicts of interest

Juan Pablo Scarano Pereira, Alessandro Martinino, Francesca Manicone, María Luisa Scarano Pereira, Álvaro Iglesias Puzas, Sjaak Pouwels and Julio Mayol Martínez have no conflicts of interest or financial ties to disclose.

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