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The discussion and disclosure about dental biomaterials in social media. Is this a new way to knowledge dissemination?

KEYWORDS

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ABSTRACT *The objective of this research was to analyze the distribution process and spread of knowledge about biomaterials in the social media. It was collected 3159 Facebook and Twitter posts. In Brazil and Egypt the number of shares about clinic cases is greater than in the United States and the number of articles published is smaller. Most of the messages or tweets shared are positive and in 661 tweets posted by companies, only one had a retweet, suggesting that the communication with the public must be improved to increase the number of shares. There is a necessity in research to identify the terms that translate the dentists and public perception about health.*

INTRODUCTION

The social networks have been widely used for dissemination and discussion by health by dentists and patients. The knowledge diffusion has been common in social media. The knowledge translation can be as a dynamic and iterative process that includes the synthesis, dissemination, exchange and ethically sound application of knowledge to improve health, provide more effective health services, products and strengthen the health care system. (Straus, Tetroe, & Graham, 2009). Diffusion is the way by which an innovation circulates through communication channels in social media (Cobban, Edgington, & Clovis, 2008).

The internet has offered new forms of interpersonal communication, providing a rich set of empirical data for research, but one must be careful to use these data. Consumer choice is influenced in a direct and meaningful way by the actions taken by others. The breadth and depth of online conversation data can be both a blessing as well as ruin. The curses occur due to difficulty of to process and understand such data in large volumes (Godes et al 2005).

The fast changes in the communication scenery increase the importance to develop a better comprehension of those technologies and the impact caused in the communication about biomaterial products utilized in health. Identify the profile of the media users became relevant to understand their perceptions about products and utilize the data produced by the user's messages generating reports capable of track, inform and promote a better health (Chou et al., 2009).

Batts et al., 2008 reported that when the users discussed science with their social contacts more informed they felt that were about nanotechnology, however, these perceptions can not necessarily real. The interpersonal discussion with others about science can widen knowledge gaps; however, with exchange information between the users can decrease the disparities of level of knowledge about science. Analyze user perception about science not has been a simple job. Su et al., 2014 revealed that the way that researchers decide to measure knowledge could affect study results.

The microblogging is potentially rich way for companies understand customers, improve marketing strategies and transform microblogging into a source of competitive intelligence. (Jansen, Zhang, Sobel, & Chowdury, 2009). The companies choose strategies based on opinions and needs about their consumer. Consumers share their opinions, observe the behavior of other users and can cause a significant impact on the market of certain products. (Sengupta & Greetham, 2010). The biomaterials factory are includes in this context. Social network analysis is an approach to study the interactions and exchange of resources among people. (Yousefi-Nooraie, Dobbins, Brouwers & Wakefield, 2012).

Microblogging is a place where clients declare in real time their opinion about a company and their opponents. The sentiment scoring process uses feature engineering methods to identify works (unigrams) that translate the consumer perception. After the general data collection it was selected a unigram (one word), bi-grams (two terms) and tri-grams (three terms) to create a training method for the machine using the lexicon method accomplish the tweets classification according to the positive, negative or neutral categories. Lexicon use specific for Twitter offered resources to the brand to recognized points about itself. Results may influence the company's decisions about brand marketing allowing Twitter to be used as a tool for better perception of their influence in the public (Ghiassi, Sninner and Zimbra, 2013).

Facebook has 1.450.000.00 users and Twitter has 288.000.000 users in social networks ranked, as statista.com in August 2015.

The objective of this study was to analyze the process of knowledge divulgation and dissemination about biomaterials utilizing microbloggings from Facebook and Twitter.

METODOLOGY

The study was realized in two phases. At the first phase Facebook were analyzed. Initially was defined by a model for the studied. It was only analyzed posts from users identified as dentist professionals, which share or discuss about biomaterials, the use techniques and their applications. Publicity shared not professional discussions were dismissed. It was collected data from four specific groups, , Florida dental implants and dental surgery- United States with 14 with 14.000 like – open group, Golpa dental im-

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plant center- Las Vegas- United States with 148.000 like – open group, World dental association- Egypt with 41.351 members- closed group, Grupo perio-implantar- Brazil with 19837 members – closed group. It was captured data from posts for 7 days, totaling 2892 messages. The posts that did not fit in the model were excluded, producing a final 2179 posts considering comments. The Facebook does not have free access to the data captured by the R program utilized in this research.

The posts from the groups Brazil and Egypt presented greater number in comments when compared to American groups. In the other hand, the American groups present greater links for the scientific publications. TABLE 1- Terms unigrams and more frequents bi-grams in selected Facebook messages.

Terms	Terms to lexical analysis					
Unigrams - positive	favorite	whites	prefer	pretty	nice	easy
bi-grams - positive	smile again	new person	my wish	very nice	can eat	had success
Unigrams- negative	broken	pain	lost	expensive	difficult	fractured
bi-grams negative	sad patient	reinstall implant	difficult technique	was bad	unhappy patient	very expensive

In the second step, data was collected date from Twitter. The posts are limited to 140 letters. Pictures and emoticons were not considered. The data collection from Twitter was realized using the statistic program R. The analysis realized used the lexicon method utilizing the bi-grams term implant dental in English exclusively. Data was collected for a 9 days period, totaling 2112 tweets. Retweets were excluded, resulting in 1961 tweets. In the first human analysis it was eliminated all messages from companies, which was considered everything with more than 6% of the tweets. It was identified 661 company tweets, resulting in 1400 tweets to be classified manually. The database consisted of 17 variables including user ID, retweet, longitude, latitude, date and time, amount of tweets, company identification and message text. Variables were transferred to a dynamic table, according figure 1, containing some tweets analyzed in this study. The identification of users are not included because they were not expressly authorized, despite the tweets are public.

Figure 1 – Database with seventeen variables containing some sample-analyzed tweets. OO ID and user name on Twitter are not complete for not having authorization for disclosure.

Column 1	Text	favorited_TRUE FALSE	favorited (1=sim, 0=nao)	favorite Count	date/time created	ID USERS	screen Name	retweet Count	isRetweet	favorited (1=sim, 0=nao)2	retweeted	favorited (1=sim, 0=nao)3	longitude	latitude	Number Tweets	Company ID (1= sim, 0=nao)
2	Stem-Cell Dental Implants Grow New Teeth Right In Your Mouth http://t.co/TQG480xJXa via @PopSci #wow	FALSO	0	0	09/08/2015 14:33	6,30386E+17	coaching4minds	0	FALSO	0	FALSO	0	NA	NA	1	0
3	Stem-cell treatment grows teeth in your mouth! Seriously! : http://t.co/dN1je5lxJc	FALSO	0	0	09/08/2015 14:32	6,30386E+17	Artfor	0	FALSO	0	FALSO	0	NA	NA	1	0

The 661 tweets from companies had only one retweets, what suggests that new approaches must be realized so this companies can have a greater share about biomaterials information. In the remaining tweets, 11.7% was a retweets where the majority of the content was positive with relevant information or innovating technology. he negative manifestation occur not just about the biomaterial product, but also services provided by the company. Negative reviews about the indication, technique or application of the biomaterials were used sometimes as irony. The neutral messages were mostly related to information about the biomaterial, but without any indication or discussion about the product. Many techniques and clinical applications were presented and discussed in the social media by professionals. On Facebook, this occurred mostly in the closed groups. The freedom of speech of professionals

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was more evident in closed groups. There was a smaller number of link posts with scientific articles in the Brazilian research groups compared to the North American one, but there was a greater comment number discussing the posts in the Brazilian group. Many posts shared in the open and closed groups were detected, but not many comments were verified about the content of courses, suggesting that the social media can be a channel to share content and other media can be used to obtain complementary information.

The data collection by the R program and the initial analysis realized by the machine was more efficient in Twitter, including finding the terms for this research. The data collection from Facebook and the posts selections was slower and with less access to determine the profile selection as a profile model.

The data verified during the analysis shown that the dentists are utilizing the social media to share not only about biomaterials, but also about techniques and clinical cases with negative outcomes.

CONCLUSION

- Dentists are using the social media to distribute information about biomaterials and spread knowledge using microbloggings, but they are normally associating scientific articles with those messages.
- Dentists and patients present their perceptions about the dental implant treatments using social media.
- There is a need for intense research about the themes that express opinions and perceptions from dentists and patients.
- The machine training with proper terms become more dynamic and effective than the data collection realized by humans.
- There is no retweets from companies posts, which suggests that there is a need to improve the communication with the public to increase the share of information.
- The machine training by a human with knowledge in the subject is essential for better results.

Suggestions for Further Research

- Extensive research to define the terms used by health professionals who translate the positive perception, neutral and negative about the products used in health care.
- Research on the model of knowledge management and business management, which also considers social networks as a means of knowledge dissemination of health care products.

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