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# **How Social Media Analytics Can Inform Social Content Strategies: Evidence from Healthcare Sector**

*Completed Research Paper*

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## **Keywords**

Social media analytics, social content strategy, Facebook, user engagement, healthcare.

## **Extended Abstract**

Social media platforms provide businesses with unprecedented opportunities to communicate with customers and stakeholders. To use this access effectively, companies should set social media objectives, regularly post content related to those objectives, and periodically measure the effectiveness of their efforts. A key way to assess social media effectiveness is via user engagement metrics, which include outcomes such as number of likes, shares, retweets, and/or comments. Higher user engagement has been shown to enhance brand awareness, broaden word-of-mouth promotion, and extend social media community reach and impact (Fan and Gordon 2014; Hoffman and Fodor 2010). Thus, it is critical for firms that use social media to regularly, objectively, and properly analyze users' engagement with posted contents, understand the determinants of engagement, and take actions to improve future engagement outcomes.

Very few prior studies have focused on the application of social media analytics in the healthcare sector in order to understand how different types of content influence engagement outcomes. Further, little research has focused specifically on how such findings can be incorporated back into healthcare organizations' social media content strategies in order to continually improve outcomes. This study addresses this gap in the literature. Specifically, we demonstrate a method for measuring the influence of post content themes and vividness on user engagement outcomes and discuss how the findings can be used to better structure future post content to achieve social media goals.

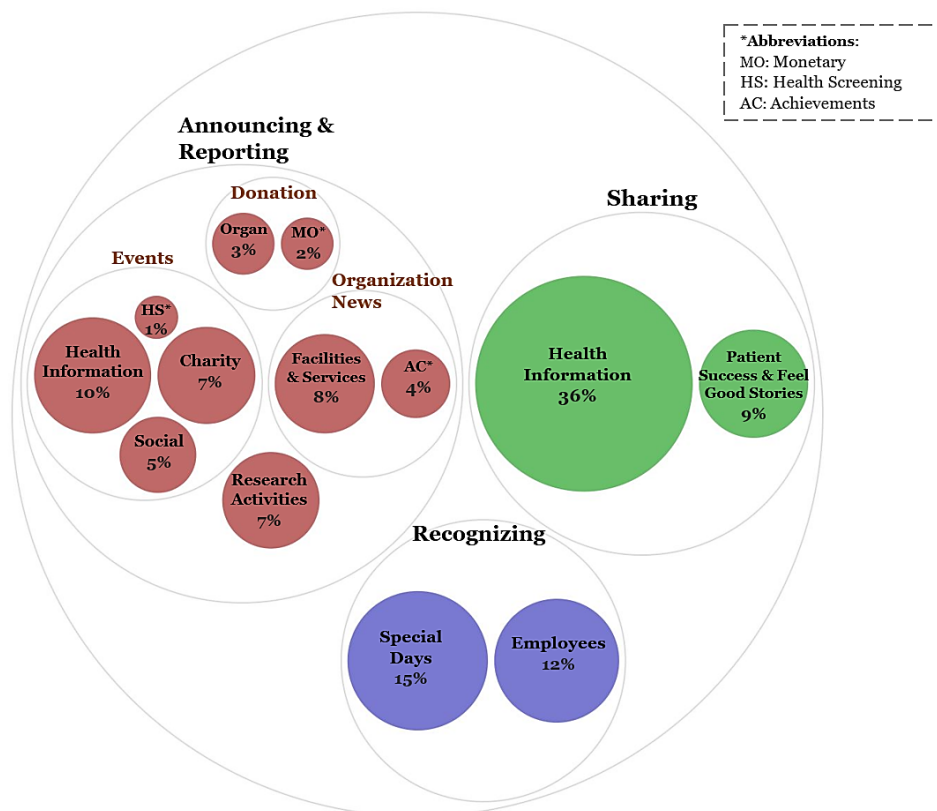
Healthcare organizations embark on social media strategies and use platforms such as Facebook, Twitter, and YouTube to interact with their audience. Sharing health information, promoting healthcare services and facilities, managing brand reputation, and stimulating recognition in the community are among the main reasons hospitals use social media (Bermúdez-Tamayo et al. 2013; Kordzadeh and Young 2018; Richter et al. 2014; Thaker et al. 2011). As of July 2018, over 1300 hospitals in the United States maintained official pages on Facebook (Bennett n.d.). For example, Brigham and Women's hospital (located in Boston) and Northwestern Memorial Hospital (located in Chicago) had more than 50,000 and 72,000 followers on this social media platform, respectively. Those hospitals regularly post content on their Facebook pages hoping that their followers read the posts and possibly react to them by pressing the *like* button, leaving a *comment*, or *sharing* the post. It is, however, unclear what content themes are more interesting to the followers of hospitals' pages and how moderators of those pages can enhance user engagement by posting more appealing and engaging content on their pages.

This study proposes that, in order to maintain a sustainable and effective presence on social media, healthcare institutions, like organizations in other industries, should utilize analytics tools and techniques to assess users' reactions to different types of social content and adjust the institution's social media strategies and activities in ways that promote heightened user engagement. To do so, hospitals and clinics

should first determine the main themes of the posts on their pages, as well as the contents posted on fellow institutions' pages. This can be performed either manually or using text mining techniques (Batrinca and Treleaven 2015; He et al. 2016; Kordzadeh and Young 2018). Then, statistical methods and machine learning algorithms can be used to understand the types of content that are more effective in provoking user engagement. Accordingly, a social media strategy and action plan can be developed. This process, including data collection, analysis, interpretation, and social content strategy development, should be performed periodically as users' preferences and social media features that affect user engagement change over time. In the present study, we show how an analytics technique, namely negative binomial (NB) regression, can be employed in this context.

## Method

To perform the quantitative analysis and to account for the differences between content themes posted on Facebook, we draw on a thematic web of content (Braun and Clarke 2006) that we developed during a two-phased, thematic content analysis project (Figure 1) (Kordzadeh & Young, 2018). The analysis involved Facebook posts made by 17 US hospitals' during a three-month period (March 2014 – May 2014). In total, 1722 posts were reviewed and thematically categorized by the authors (i.e., coders) based on induced intent and topic of each post.



**Figure 1. Hospitals' Thematic Web of Content (adapted from Kordzadeh and Young, 2018)**

Beyond the post text, we also collected user engagement statistics for each post (number of *likes*, *comments*, and *shares*), information concerning the presence of visual elements including pictures and videos in each post (theoretically named as post vividness (Cvijikj and Michahelles 2013; Trefzger et al. 2016)), as well as the date the content was posted. We included this information in our quantitative analysis because prior studies have suggested that these attributes may influence user involvement in social media activities, in particular in the healthcare context (Kite et al. 2016; Rus and Cameron 2016).

## Data Analysis

To demonstrate how data analytics can shed light on the impact of social content on user engagement, we used SPSS 25 to perform three negative binomial (NB) regression models. Accordingly, these three user engagement measures (*likes*, *comments*, and *shares*) were included as the dependent variables in the three models used in this study. The purpose of the models was to determine the influence that the different content themes and post vividness had on the user engagement measures. We included 16 dummy variables to account for the potential impacts of sample institutions on the results. Additionally, we included length of time between posts to control for the influence of post frequency on the response variables. The regression coefficients in the NB models were estimated using the following general equations:

- (1):  $Ln(\mu_i) = \beta_0 + \sum_{j=0}^{15} \beta_{j+1} * Hospital_{ij} + \sum_{j=0}^2 \beta_{j+17} * Vividness_{ij} + \beta_{20} * Days\_Passed_i + \sum_{j=0}^{12} \beta_{j+21} * Content\_Theme_{ij} + \varepsilon_i$
- (2):  $E(Y_i) = \mu_i$

where  $Y_i$  = number of *likes*, *comments*, and *shares* associated with post  $i$  in models A, B, and C, respectively (see Table 1).  $Hospital_{ij}$  is a series of 16 dummy variables that determine whether post  $i$  has been made by hospital  $j$  (=1) or not (=0).  $Vividness_{i0}$  and  $Vividness_{i1}$  are two dummy variables that denote whether post  $i$  contains zero ( $Vividness_{i0} = 0, Vividness_{i1} = 0$ ), one ( $Vividness_{i0} = 1, Vividness_{i1} = 0$ ), or more than one picture ( $Vividness_{i0} = 0, Vividness_{i1} = 1$ ).  $Vividness_{i2}$  is a dummy variable that shows whether post  $i$  includes a video (=1) or not (=0).  $Days\_Passed_i$  shows the number of days between post  $i$  and the previous post made by the same hospital.  $Content\_Theme_{ij}$  is a dummy variable that determines whether post  $i$  is tagged with content theme  $j$  (=1) or not (=0).

## Results and Conclusion

Table 1 presents the model results. Accordingly, the types of content that hospitals post are tightly associated with user engagement outcomes. Specifically, the post content themes of *sharing patient success and feel good stories*, *organizational news (new facilities, services, and achievements)*, and *recognizing special days and employees* were all associated with an increase in the number of *likes*, *shares*, and *comments*. These content themes are all associated in some way with the concept of accomplishment and success. In line with Kim and Johnson (2016) and Lee and Hong (2016) findings regarding emotional content attracting attention and triggering responses, our findings indicate that posts that focus on success, achievement, and recognition for the healthcare institution, its patients, and its constitutions result in heightened user engagement outcomes. Conversely, *event-related* posts, which do not normally stimulate emotions, were shown to be negatively associated with engagement outcomes (Table 1).

The findings associated with the impacts of post vividness on user engagement supported the argument that including one or more pictures in a post positively influences user reactions to, and engagement with, the post. The only exception detected was that posts with more than one picture did not receive higher number of shares than those with no pictures. This non-significant result could be due to specific content themes used in the posts with more than one picture. The results also showed that embedding videos in posts makes them more engaging in terms of *likes* and *shares*, but not *comments*. The control variable, namely *days\_passed*, did not show any significant association with user engagement in any forms.

Our findings imply that healthcare institutions should link their social media posting activities to the objectives behind their social media presence. In addition, they should regularly assess users' engagement with posted content and adjust posting activities accordingly. For example, the *sharing health information* content themes was the most frequently identified theme in our sample. This theme, however, was shown to be negatively related to both number of likes and number of comments. One potential way that hospitals can improve the engagement outcomes associated with the posts containing health information is to link health information in the posts to associated special days, employees, patient success, or organization news. The positive influence of those content types could offset the negative influence of the sharing health information content type.

	Model	(A)	(B)	(C)
	Outcome variable	# of likes	# of comments	# of shares
	Intercept	4.391***	1.367***	2.148***
Hospital	Barnes-Jewish Hospital Washington University	-0.483**	-0.781***	-0.009
	Brigham & Women's Hospital	0.069	-0.360*	-0.354*
	Cedars-Sinai Medical Center	-0.015	-0.610***	-0.344*
	Florida Hospital	-2.058***	-2.224***	-2.158***
	Magee-Women's Hospital	-2.36***	-1.262***	-2.914***
	Massachusetts General Hospital	0.375	0.097	0.532*
	Mount Sinai Medical Center	1.388***	0.300	1.391***
	National Jewish Health, Denver-University of Colorado Hospital	-0.483**	-0.781***	-0.009
	New York-Presbyterian University Hospital of Columbia and Cornell	0.437**	0.578***	0.072
	Northwestern Memorial Hospital	-1.495***	-1.695***	-2.203***
	NYU Langone Medical Center	-1.211***	-1.997***	-1.832***
	Rush University Medical Center	0.401	-0.356	0.076
	Shepherd Center	-0.129	-0.724***	-0.104
	Stanford Hospital and Clinics	-0.584**	-1.475***	-1.023***
	Thomas Jefferson University Hospital	-2.070***	-2.466***	-3.143***
University of Pittsburgh Medical Center	-0.701***	0.114	-0.518***	
Yale-New Haven Hospital	-2.006***	-1.962***	-2.645***	
Vividness of the post	Picture [1]	0.502***	0.398***	0.672***
	Picture [more than 1]	0.655***	0.712***	0.250
	Video [1]	0.176*	0.107	0.762***
Posting frequency	# of days between posts	0.019	0.017	0.069
Theme of Content	Sharing health information	-0.539***	-0.581***	0.246**
	Sharing patient success & feel good stories	0.699***	0.773***	0.605***
	Donation – monetary	-0.307	-0.584	-0.565
	Donation – organ	0.023	-0.198	0.494**
	Event – charity	-0.154	-1.000***	-0.348*
	Event – health information	-0.870***	-1.391***	-1.199***
	Event – health screening	-0.988***	-2.462***	-1.376***
	Event – social	0.087	-0.451*	-0.325
	Research activities	-0.055	-0.106	0.244
	Organization news – new facilities and services	0.513***	0.611***	0.801***
	Organization news – achievements	0.655***	0.898***	1.059***
	Recognizing – special days	0.298***	0.249*	0.522***
	Recognizing – employees	0.567***	0.870***	0.233*
	Deviance (value/df)	1.071	1.473	2.209
Pearson Chi-Square (value/df)	1.900	2.786	4.254	
Goodness of fit	AIC	14941.070	5786.929	8603.706
	BIC	15122.900	5968.759	8785.536
	Omnibus test: Likelihood Ratio Chi-Square	1970.923***	1457.736***	2144.436***
Sample size	N	1553	1553	1553

Note: \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

**Table 1. Negative Binomial Regression Model Results**

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