



Social media and flu: Media Twitter accounts as agenda setters



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ABSTRACT

Objectives: This paper has two objectives. First, it categorizes the Twitter handles tweeted flu related information based on the amount of replies and mentions within the Twitter network. The collected Twitter accounts are categorized as media, health related individuals, organizations, government, individuals with no background with media or medical field, in order to test the relationship between centrality measures of the accounts and their categories. The second objective is to examine the relationship between the importance of the Twitter accounts in the network, centrality measures, and specific characteristics of each account, including the number of tweets and followers as well as the number of accounts followed and liked.

Methods: Using Twitter search network API, tweets with “flu” keyword were collected and tabulated. Network centralities were calculated with network analysis tool, NodeXL. The collected Twitters accounts were content analyzed and categorized by multiple coders.

Results: When the media or organizational Twitter accounts were present in the list of important Twitter accounts, they were highly effective disseminating flu-related information. Also, they were more likely to stay active one year after the data collection period compared to other influential individual accounts.

Conclusions: Health campaigns are recommended to focus on recruiting influential Twitter accounts and encouraging them to retweet or mention in order to produce better results in disseminating information. Although some individual social media users were valuable assets in terms of spreading information about flu, media and organization handles were more reliable information distributors. Thus, health information practitioners are advised to design health campaigns better utilizing media and organizations rather than individuals to achieve consistent and efficient campaign outcomes.

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1. Introduction

The spread of influenza has serious consequences for individuals, private and public organizations, and governments. As reported by the Center for Disease Control and Prevention (CDC), up to 49,000 people die per year in the United States alone [9]. National and international organizations, including governments and non-governmental organizations (NGOs), attempt to deliver and disseminate information among individuals and media outlets about how the flu spreads as well as actions individuals can take to combat the transmission of the virus, including receiving the yearly

flu vaccine. The shifts in such disease prevention and public health promotion have become evident ever since the advent of the internet [20]. Indeed, governments and organizations can now promote targeted action and manage public health crises more efficiently through direct public interaction [10]. With the rise of social media, these organizations and governments have employed social media campaigns in order to meet their objectives of both informing and persuading a large swath of a given population. For example, the CDC and the World Health Organization (WHO) actively maintain a social media presence on sites like Twitter (e.g., @CDCflu, @CDCemergency, @WHO). These associations try to deliver both urgent as well as long-term flu-risk information to the public via tweets, retweets and replies. Although social media campaigns are fast becoming the norm for large organizations (e.g., [6], it is still difficult to measure and conceptualize whether these efforts are having any impact on informing and perhaps even persuading individual users, especially within a social media network.

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Nonetheless, there is little doubt that social media outlets can be useful as a relatively cheap and easily accessible tool to provide and exchange information, as seen both in political campaigns and revolutions in the Middle East [22,29]. Previous research across multiple disciplines suggests that only a handful of accounts are able to actually influence a large portion of any given network. Indeed, most networks resemble a scale-free design, with only a small number of nodes¹ having a disproportionately large number of connections through preferential attachment [3]. This suggests that it may be possible to identify the nodes, or in the case of this research, the Twitter handles, that are able to connect and thus communicate with a large number of nodes both within the core and along the periphery of the network. From the perspective of information exchange, the scale-free network design does have inherent advantages when trying to efficiently reach and apprise individuals about health crises like the spread of the flu.

This paper, thus, had two main goals. The first was to categorize and establish the network agenda setters regarding flu information based on the amount of replies and mentions. For that purpose, mentions and replies were used to calculate centrality measures in order to determine the Twitter accounts that used the keyword, “flu.” These twitter accounts were then categorized as media; an individual with medical/health professional background; an organization; a government; or an individual with no medical/health professional background. The categories were set to test the relationship between centrality measures of the accounts and their categories. The second goal was to examine the relationship between centrality measures and Twitter-specific characteristics of each individual account; including the number of tweets and followers as well as the number of accounts followed and tweets liked.² By collecting this type of Twitter data; it is possible to obtain accurate centrality measures; through social network analysis; and gain a better understanding of the relationship between account characteristics and centrality measurements. Furthermore; the results of this project build upon health agenda setting within a social network and contribute to the development of a unique method (i.e.; Social Network Analysis combined with account type content analysis) within the medical informatics discipline.

1.1. Agenda setting and social media

In their seminal study, McCombs and Shaw [25] offered empirical evidence suggesting that media influence public opinion in respect to what issues are and are not salient. By utilizing content analyses and interviews during the 1968 U.S. presidential election, McCombs and Shaw found that there was a direct and positive correlation between the amount of news coverage a certain electoral issue obtained in news reports and the saliency of that issue within the public. It was not that media directly told people what to think about, but instead influenced the citizenry on what issues were the most crucial. While Cohen [11] axiom stated that media may not be successful in telling the public how to think, but may be very successful in notifying the public what to think about was viewed as accurate, McCombs and Shaw [25] were the first to empirically test the notion using a well-established methodology. Agenda setting theory and its core first-level assumptions have received ample empirical support in a wide variety of contexts (e.g., Refs. [12,23,26,30,34]).

Since 1972, agenda setting research has been expanded to examine how media rely on individuals, institutions, and other outlets to construct stories and reports. As a relatively new medium, social

media reflects a more egalitarian environment where any individual with Internet access can be a “journalist.” The Pew Foundation recently reported that nearly 73% of American adults use some form of social media and, these outlets are increasingly used by reporters and traditional news outlets as well [13]. However, social media’s ability to set the agenda, whether the public or media, has been called into question. Some research has found that social media sites are limited in setting the agenda for more traditional media sources, especially considering media outlets now utilize sites like Twitter to direct readers to their own or other mainstream sites [27]. Instead of relying on the citizen journalist to build the news agenda, mainstream media outlets are using social networking sites to maintain and further the traditional media agenda. Other research, however, finds that although conventional outlets still set the media agenda, the role of social media sites are beginning to erode the power of the gatekeepers [21]. For example, Meraz [28] found some evidence of intermedia agenda setting within the digital blogosphere. These results suggest that “elite traditional media’s attribute agenda setting power is no longer guaranteed within socially coherent political groups” (p. 120). In medical informatics, the nature of the current information landscape, consisting of multiple media outlets and health information resources, has been captured by using the complexity of an individual’s health information-seeking behavior and decision-making to adopt health advice [1,2]. People set their own health agenda and those follow bottom-up processes. They scan the media, surf the internet and accumulate information to serve their own interest in health and disease [40]. Social networks can help people establish connections and exchange their accumulated information and experience regarding particular health and disease-related issues [31].

The recent mumps outbreak in the U.S., and the subsequent debate on the mumps vaccine showed intermedia agenda setting attributes. Traditional media and social media covered mumps outbreaks (e.g., nine NHL players contracted mumps in 2014), and these stories ended up becoming a grassroots vaccination campaign without any particular central organizer. For instance, celebrity presence on media, such as Jimmy Kimmel’s vaccination support on this show [5], and popular discussions on Twitter (e.g., tweets against anti-vaccination support tweets) on vaccination seemed to set the agenda and tone of the discussion regarding the mumps vaccine and vaccination in general.

1.2. Network centrality measures as dependent variables

Network researchers have long been quantifying the importance of nodes in information distribution networks. Social network analysis is designed to examine these networks and “measure and represent...structural relations accurately, and to explain both why they occur and what are their consequences” ([19] p. 4). From an agenda-setting standpoint, social network analysis is especially applicable since agendas can be visualized as a network (and thus be mapped), and the relationship between issues and attributes can be described within an intermedia network context [15]. Thanks to the development of relatively new network analysis tools (e.g., NodeXL, Gephi), scholars in various disciplines have started to examine the communication patterns and structures of networks. Using such an innovative methodological approach allows researchers to describe and visualize network structure. In addition, social network analysis can discover underlying patterns that may be overlooked by using traditional social-scientific research methods. Indeed, social network analysis can not only describe a communication network in detail, but it may also explain and predict how the network structure affects the attitudes and behavioral intentions of individuals and/or groups residing in the network [4,39].

One of the ways of describing a social network is by using measurements that can represent the characteristics of communication

¹ This paper uses the term both nodes and vertices interchangeably.

² Twitter changed the term “favorite” to “like” in November 2015.

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