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VIEWPOINT

VOICES OF CARDIOLOGY

# Understanding the Analytics of Twitter in Cardiovascular Medicine

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During the past decade, the use of social media has steadily grown in the medical community. Despite the frequent claim that the use of social media, particularly Twitter, in cardiovascular medicine is widespread, the data to support such claims are not readily available. Gaining an understanding into the true global reach of discussions related to cardiovascular medicine on Twitter is complex. The purpose of this paper was to offer a better understanding of the analytics of social media, and specifically Twitter, as it relates to its use in the field of cardiovascular medicine.

## UNDERSTANDING THE USER BASE

The first question that must be addressed is "Who is on Twitter?" When an individual creates a Twitter account, there is no box to check regarding that person's role in cardiovascular medicine. There can be limited information regarding a person's sex, age, or geographical location. Indeed, all identifying information is optional and unverifiable unless one knows the individual or they identify their professional role.

Recent research implied significant global cardiologist participation and activity on Twitter (1,2). How accurate is this? The British Cardiovascular Society 2014 Workforce Survey estimated that in 2013, there were 1,379 active consultant cardiologists in the United Kingdom (3). However, in a study published in the *British Journal of Cardiology* in 2018, only 301 UK cardiologists were identified on Twitter, suggesting that in the United Kingdom, Twitter has been adopted by a relatively small percentage of cardiologists (4). Interventional cardiologists were the most represented, followed by imaging and then heart failure physicians. This information was obtained by identifying the individuals using the British Cardiovascular Society's Twitter account and then confirming the job title, specialty, and location by the General Medical Council Register, LinkedIn, and hospital and university websites.

The number of active cardiologists in the United States is >20-fold that of the United Kingdom. In 2018, it was estimated that there were 31,890 cardiologists practicing in the United States (5). The percentage of those who are active on Twitter is more difficult to ascertain and remains uncertain despite attempts to quantify these numbers by using hashtags. In a 2019 American College of Cardiology (ACC) poster presentation, it was estimated that only 2.3% of the ACC membership are active Twitter users, divided equally among practicing physicians and trainees (6). In a recent Twitter poll structured to attempt to gain a better understanding of use of the service, the majority of respondents (84%) claimed that <25% of their colleagues were on Twitter. Thus, although this sampling may be biased, it would suggest that only a minority of cardiologists are regular users of social media platforms such as Twitter. There are few robust data available that support the concept that the adoption of Twitter in cardiovascular medicine is widespread.

## USE OF HASHTAGS

A hashtag is a key word or phrase used to categorize one's tweet. Tweets that contain at least 1 hashtag can

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be indexed, searched, and analyzed. Without any true means to measure active Twitter users, the hashtag may serve as the most accurate tool. In a study comparing Twitter use during 3 of the major cardiovascular meetings (American College of Cardiology #ACC, Transcatheter Cardiovascular Therapeutics #TCT, and Heart Rhythm Society #HRS), hashtags were used to identify the number of Twitter participants (7). Based on this analysis, in 2014, there were 3212 users participating on Twitter during these 3 conferences, which would represent <10% of the conference attendees. The number of Twitter users increased dramatically in 2016 to 10,362, representing 25% of presumed conference attendees. Although the majority of attendees at these conferences are physicians, other health care providers, pharma/industry, and media comprise a sizeable portion of the audience. Furthermore, not all those using the conference hashtags were attending in person. It is difficult to determine how many of the users were in fact registered and present on-site, although 48% of the Twitter users using these hashtags were physicians. Reliable identification of users remains elusive. One must extract various pieces of information, including that derived from the profile picture and page, to properly identify an individual.

## SOCIAL MEDIA ANALYTICS

Social media analytics have been used occasionally to show the impact of knowledge dissemination across the world. How reliable are these numbers? Current means is through companies that measure analytics, the most popular of which is Symplur, a company dedicated to social media analytics in health care. Symplur has the ability to count the number of participants in a conference provided those participants use the official conference hashtag. Thus, if all users at a particular conference use that conference's hashtag, an accurate count of the number of participants can be obtained for any designated time frame provided that hashtag has been registered with Symplur. It can also provide the average number of tweets per participant but cannot provide any further demographic data regarding participants. Demographic data are extracted from the Twitter profiles of the individual users. These numbers can only be accurate if the appropriate hashtag is used. Often, several hashtags may be used at any conference, confounding an accurate estimate of social media participants.

Impressions are probably the most misinterpreted Twitter analytic. At many conferences, it is not unusual for there to be an acclamation of millions of impressions being generated, suggestive of how far and widespread the tweets are being disseminated. An impression means that a tweet has been delivered to a Twitter account's timeline and only gives one an idea of one's potential reach. It does not reflect that the tweet has been read. Indeed, Twitter itself is unable to ascertain if a tweet has been read. The misconception that impressions mean the tweet was viewed is probably due to the definition given on Twitter that impressions are "times people saw a tweet on Twitter." Impressions are really reflective of the number of active followers. The larger the number of followers, the greater the number of impressions that will be generated, which is not necessarily reflective of engagement with the author and his or her message.

For those individuals who are considered "high-volume tweeters" or who use bots to tweet at a high rate, the number of impressions they "earn" can overestimate their importance within a conversation or conference. Impressions are probably more important for accounts that are attempting to sell or promote a service or product on Twitter, which is generally not the case when used in the cardiovascular field. In business, sales of a product or service through Twitter can be ascertained reflecting the true value of impressions. This is not the case in academic medicine where Twitter is primarily used to advance medical knowledge. There is no product or service being sold that can be easily quantified. A possible exception may be in the use of a hashtag to promote a specific procedure such #RadialFirst. In 2008, 1% of coronary interventions were performed via a radial approach according to the National Cardiovascular Data Registry database. Over the following decade, this increased to 40.6% in the first quarter of 2017. In February 2017, the #RadialFirst hashtag was established, and over the following 24 months >60,000 tweets have used this hashtag across almost 7,300 users. During this timeframe, there were >120 million impressions, which seems to be a lot of impressions. How that relates to a growth of 7% in the use of radial artery access in percutaneous coronary interventions over the same timeframe is uncertain.

An example of how impressions can be misinterpreted is a recent Twitter Journal Club sponsored by *Circulation: Cardiovascular Interventions*. During a 3-h time frame surrounding a 1-h Twitter discussion, >1.6 million impressions were noted. There were a total of 219 tweets among 61 participants; almost one-half of the tweets originated from only 2 Twitter accounts. There was an average of only 4 tweets per participant. Thus, although the journal club discussion may have crossed the timeline of almost 2

million Twitter users, the interaction among users was just a fraction of that number.

In contrast to impressions, engagement rates are probably a more accurate assessment of the interaction with an individual Twitter account and are reflective of the fact that the tweet was relevant enough to interact with. Engagements include likes and retweets, and engagement rates are determined by the number of retweets per original tweet authored, number of retweets per followers, and number of followers earned per original tweet authored. All of this information is available on an individual's Twitter account for each individual tweet.

The Twitter poll of institutional cardiologists on Twitter generated a total of 13,430 impressions but only 343 engagements, a small fraction of the impressions. Engagement included 36 profile links, 31 likes, and 29 retweets. Although the poll generated a total of 461 votes, only 129 votes came directly as a result of the primary pollster, with the majority accrued as a result of individuals retweeting the poll. This latter point emphasizes the paramount importance of the retweet.

Retweets are probably the most important means by which information is disseminated, especially for those individuals who do not have many followers. They are much better indicators of the importance of the tweet content than are the number of followers and, for that matter, impressions. For individuals with a large number of followers, there are often a proportion of inactive followers who either do not read or interact with tweets. These are often referred to as lurkers. They do not engage or retweet, making the quantification of the impact of a single tweet difficult. A message that is frequently retweeted is reflective of the importance and relevance of that information to the intended audience. Retweets are thus an important measure of the actual interaction between users, which is critical to its use in medicine.

## CONCLUSIONS

Many claims have been made that social media, and specifically Twitter, is changing the conversation in academic medicine, yet the analytics to support these claims are lacking. The recently published article "The Kardashian Index of Cardiologists: Celebrities or Experts?" (8) and the accompanying perspectives by Califf (9) and De Maria (10) may provide the framework to address the use of social media in the cardiovascular arena. A better understanding of the analytics of Twitter will be key to the continued growth and success of this medium in our field.

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