

# Hashtags in healthcare: understanding Twitter hashtags and online engagement at the American Association for the Surgery of Trauma 2016–2019 meetings

Kristen Santarone,<sup>1</sup> Dessy Boneva,<sup>1,2</sup> Mark McKenney,<sup>1,2</sup> Adel Elkbuli <sup>1</sup>

<sup>1</sup>Department of Surgery, Division of Trauma and Surgical Critical Care, Kendall Regional Medical Center, Miami, Florida, USA

<sup>2</sup>Department of Surgery, University of South Florida, Tampa, FL, USA

## Correspondence to

Dr Adel Elkbuli; adel.elkbuli@hcahealthcare.com

Received 16 April 2020

Revised 22 June 2020

Accepted 29 July 2020

## ABSTRACT

**Background** Social media amplifies the accessibility, reach and impact of medical education and conferences alike. The use of hashtags at medical conferences allows material to be discussed and improved on by the experts via online conversation on Twitter. We aim to investigate the utilization of hashtags at the American Association for the Surgery of Trauma (AAST) meetings from 2016 to 2019 and its potential role in knowledge dissemination and meeting participations.

**Methods** Symplur Signals software was used to analyze hashtags for the AAST meetings by year: #AAST2016, #AAST2017, #AAST2018, #AAST2019.

**Results** Number of tweets decreased significantly from 2016 to 2019 (4500 to 4400 to 3600 to 2600, respectively,  $p < 0.05$ ). Retweets also decreased significantly from 2016 to 2019 (3600 to 3300 to 2600 to 1900, respectively,  $p < 0.05$ ). Users decreased from 2016 to 2019 (1600 to 1400 to 937 to 743, respectively,  $p < 0.05$ ). Despite this decrease, impressions were 5.8 million in 2016, increasing to 8.6 million in 2017, then 9.6 million in 2018 and finally peaking in 2019 where impressions reached 10 million ( $p < 0.05$ ). The top influencer for 2016–2019 was the AAST Twitter account.

**Conclusion** Twitter #AAST 2016–2019 online engagement and interactions have declined during the last 4 years while impressions have grown steadily indicating potential widespread dissemination of trauma-related knowledge and evidence-based practices, and increased online utilization of conference material to trauma surgeons, residents and fellows, trauma scientists, other physicians and the lay public. #AAST online engagement and impressions did not have influence on meeting attendance rates.

## BACKGROUND

The use of internet platforms has changed the way that modern technology and novel research influences the world of medicine. Online discussion boards are being used to grade medical students, lectures are available on various streaming resources and telehealth is becoming a more popular avenue for improving accessibility to healthcare. With all the advancements in medicine, the field of trauma surgery would benefit from adopting similar practices.

One of the new trends in medical education is holding online journal clubs using forums such as Twitter or WhatsApp. A dermatology program

highlighted several of the benefits of using Twitter as a platform for education.<sup>1</sup> The wider audience allows for more comprehensive topics to be reviewed as more participants allow for a more thorough exploration of new articles. Participation is not limited by geographic area and there is a public record of topic discussion that can be returned to and viewed at any time. Twitter is useful for subspecialties such as dermatology or trauma surgery by allowing the public to have access to relevant cutting edge information. Conversation on Twitter also facilitates discussions between different specialties allowing for improved comprehension of the topic. The benefits of Twitter can be used for many educational endeavors, including journal clubs, undergraduate medical education and conferences.

Twitter is available to the public, free of charge and simple to operate. By including lay people, medical students and other health professionals in the same forum as subject matter experts, Twitter allows mutual participation in topic discussions. Academic resources can be incredibly costly for students and potentially inaccessible to the public. Accessibility to experts and their breadth of knowledge is an advantage to the public as well as those in medicine who may be unable to attend the conference. Twitter's format allows physicians to share links to research articles, YouTube videos and websites, along with text on their own intellectual interpretation of the material. The structure of this format is beneficial for facilitating education and communication. For these reasons, Twitter provides a distinct advantage in comparison to other social media platforms.

Research on the use of social media in trauma surgery, specifically in regard to hashtag use at American Association for the Surgery of Trauma (AAST), an international surgical meeting, is limited. We aim to investigate the utilization of hashtags at the AAST meetings from 2016 to 2019 and its potential role in knowledge dissemination and meeting participations.

## METHODS

This is a review of Twitter data collected by Symplur regarding the use of the AAST meeting hashtag from 2016 to 2019. Information was collected for each of the following hashtags: #AAST2016, #AAST2017, #AAST2018 and #AAST2019.

© Author(s) (or their employer(s)) 2020. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

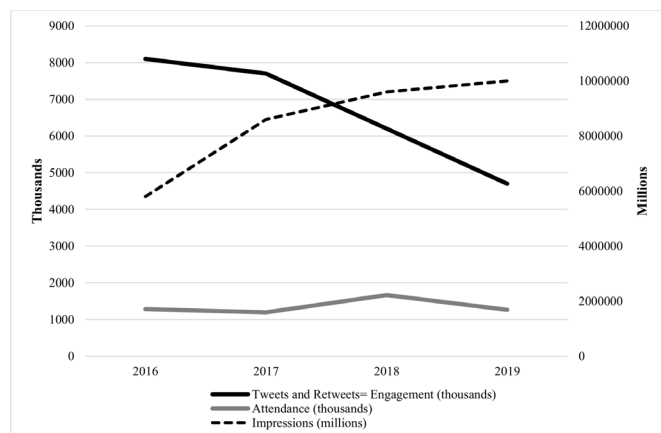
**To cite:** Santarone K, Boneva D, McKenney M, et al. *Trauma Surg Acute Care Open* 2020;**5**:e000496.

To obtain this information we used Symplur Signal software (Upland, CA) which is designed specifically for healthcare-related hashtags. This software allowed us to gather data on tweets, retweets, impressions, influencers, users and titles of research articles tweeted during the conference. Filters were placed on the data sets to allow the most accurate information to be obtained from the software, and languages other than English were excluded. Additional filters were placed to ensure that we were only capturing data during the month that the conference took place (September 1 to September 30), meaning data were analyzed yearly and not cumulatively. The AAST Twitter hashtag data were analyzed within the time frame of all of the meetings. Meeting dates were September 14–17, 2016; September 13–17, 2017; September 26–29, 2018; and September 18–21, 2019.<sup>2</sup> Using the information from Symplur on the top 10 influencers, data on number of followers and specialty were obtained on analyzing their Twitter profiles. IBM SPSS statistics software V.22 was used for analysis and statistical significance was defined as  $p < 0.05$ .

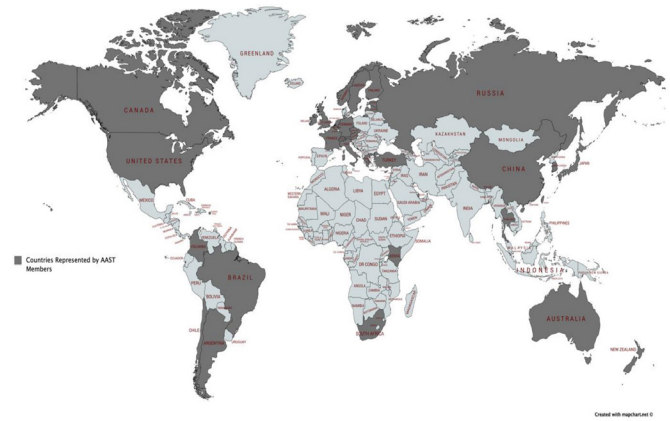
Certain definitions were used to explain our data. Engagement is an active form of social media interaction, defined in this study as a tweet or retweet incorporating the meeting hashtag. Impressions are a passive form of interaction, indicating that content containing the meeting hashtag was viewed but no action (such as a comment or retweet) was taken. Influencers are users who had high utilization of the meeting hashtag. Twitter users agreed to participation via general Twitter terms and conditions. This study was reviewed by our Institutional Review Board and the Western Institutional Review Board and was deemed exempt.

## RESULTS

Number of tweets decreased significantly from 2016 to 2019, from 4500 to 2800, respectively ( $p < 0.05$ ). Number of retweets also declined significantly from 2016 to 2019, from 3600 to 1900, respectively ( $p < 0.05$ ). Though tweets and retweets declined, impressions increased significantly from 2016 to 2019, from 5.8 million to 10 million ( $p < 0.05$ ), potentially indicating contents from AAST conference presentations were still being widely viewed and disseminated. Twitter users dropped significantly from 2016 to 2019 as well, from 1600 to 743 ( $p < 0.05$ ) (figure 1). The account that used the conference hashtag the most, thus becoming the top influencer, was the AAST organization (@traumadoctors) Twitter account, from 2016 to 2019.



**Figure 1** Online engagement (measured by tweets and retweets combined), impressions (measured as views in millions) and attendance rate (in thousands) at the American Association for the Surgery of Trauma (AAST) meetings 2016–2019.



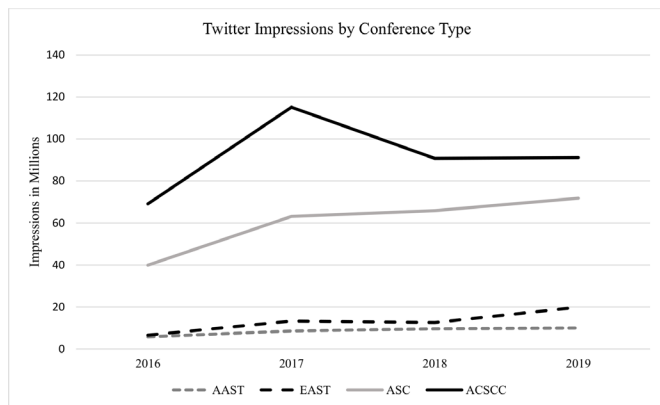
**Figure 2** International distribution of American Association for the Surgery of Trauma (AAST) membership: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Kenya, Republic of Korea, Latvia, Netherlands, New Zealand, Norway, Puerto Rico, Qatar, Russian Federation, South Africa, Sweden, Switzerland, Taiwan, Thailand, Turkey, UK.

Online engagement measured by tweets and retweets combined decreased significantly from 2016 to 2019, from 8100 to 4700 ( $p < 0.05$ ). Attendance remained relatively constant throughout the years 2016–2019 (figure 1). Figure 2 illustrates international distribution of members of the AAST by country of membership.

## DISCUSSION

Twitter data from the AAST conferences between the years of 2016 and 2019 yielded intriguing results. Tweets, retweets and users decreased over the years while impressions significantly increased, indicating increased reachability and dissemination of conference materials throughout the platform. Engagement did not increase at the same rate that impressions did. Despite the fact that engagement did not increase, conference attendance continued to grow over from 2016 to 2019.

The significant increase in impressions over time is likely due to a combination of the scope of influence of the AAST meeting, the content presented at the meeting and also the increasing use of Twitter by medical professionals. The AAST has over 1300 members in 130 countries and is well established as a leader in the field of trauma surgery. This influence likely plays a role in the increasing number of impressions during AAST conferences. The increasing use of Twitter by medical professionals is also likely to contribute to growing impressions. Twitter is the most popular form of social media used by healthcare professionals due to the ease and freedom of connection, information sharing and communication. The prevalence of healthcare professionals on Twitter is likely the cause for an increase in impressions across several surgical conferences, as seen in figure 3. AAST and Eastern Association for the Surgery of Trauma had consistent upward growth over the years while ASC and ACSCC peaked during 2017. The decreasing engagement at the AAST conference may be related to the concept of social media fatigue. Social media users are constantly bombarded with new content that they must read and respond to, while simultaneously creating their own unique posts. Initially, social media participation was easy to encourage because it was a new and exciting concept, but as its use has become more common, active participation has decreased. An increased amount of social media users are becoming ‘lurkers’ or viewing content without acting on it.



**Figure 3** Impression trends at the American Association for the Surgery of Trauma (AAST), Eastern Association for the Surgery of Trauma (EAST), Academic Surgical Congress (ASC) and American College of Surgeons Clinical Congress (ACSCC) meetings 2016–2019.

This phenomenon could contribute to the decreased amount of engagement.<sup>3</sup>

The usage of online platforms to improve the diffusion of research, particularly to students, residents and the public, has potential to revolutionize medical education. One orthopedic residency program put this theory to the test by starting a journal club using WhatsApp as the platform for discussion.<sup>4</sup> They found that the electronic platform allowed participants to still partake in discourse without the confines of scheduling problems, when given a 4-day window in which to respond. This method increases flexibility, which can contribute to resident satisfaction and willingness to participate. Another study found that up to 23% of a surgical resident's workday is spent on non-educational endeavors, such as waiting for operating rooms to be ready.<sup>5</sup> Using online forums such as WhatsApp or Twitter can help to bridge this downtime during the workday.

Previous studies have analyzed the use of Twitter at conferences, but very little was known about hashtag use at large trauma conferences. The majority of studies found that the use of hashtags increased meeting attendance, tweets and retweets throughout the years within fields such as critical care, cardiology and anesthesiology.<sup>6–14</sup> In 2016, the Spanish Association of Surgeons studied the users who had been using their meeting hashtag over the previous four meetings. Their research found that originally, physicians made up 65% of the conference influencers, but by 2016, they only represented 35% of influencers. These data suggest that physician influencers play a vital role in engaging the public to participate in online conversation and education.<sup>15</sup>

Twitter has the potential to entirely overturn academic communication, particularly during events such as the global COVID-19 pandemic. Many physicians are already using Twitter as an advocacy platform, to exchange the most current information on treatment, and improve education to the public, in addition to encouraging other physicians to join as well. Essential scientific information travels through the 'Twittersphere' much faster than it ever could through the rigid structure of online journals and databases. One recent article stated that research would be made public in 'days rather than months' but the reality of the current situation is that many of the patients do not have days to spare for their physicians to even obtain treatment information.<sup>16</sup>

Looking at the international distribution of AAST membership as illustrated in figure 2, nearly every continent is well represented by members, which is both extraordinary and essential for

an international trauma organization. Including trauma surgeons and scientists from across the globe in scientific evidence-based online conversations is beneficial to furthering trauma science and advancing patient care. The only continent that was relatively under-represented was Africa. The inclusion and expansion of AAST's membership and online reach in Africa could be facilitated and enhanced by magnifying efforts from the AAST communication committee and the AAST Twitter handle @traumadoctors. This will potentially result in forming more connections with physicians in Africa via Twitter and could be reflected in AAST meeting attendance and participation in the near future.

To improve the online presence of trauma surgery as a specialty, the AAST could implement a specialized social media team, similar to the *Journal of Neurosurgery*.<sup>17</sup> This team was composed of neurosurgery residents and medical students dedicated to the field, who were assigned to roles as designated editors. These editors created visual abstracts of current research topics, and were subsequently posted on various social media sites. After implementing this team approach to social media accounts (Twitter, Facebook), impressions and online viewing of scientific materials increased significantly. The use of social media creates increased connectivity between specialists and experts. Of note, the new generation of physicians will be proficient in the use of social media and it will likely play a more significant role in dissemination of research over time.

All medical conferences should take advantage of the increased participation that Twitter can provide when properly used. Including links, polls, photos and videos on postings can increase interactions between users. The use of the meeting hashtag should be encouraged as frequently as possible by displaying the hashtag on name tags, meeting handouts and materials, as well as at the beginning and end of presentations. For those who are attending and pursuing Continuing Medical Education Credit, hashtags could be added to those materials as well. Conferences could have a social media station alongside the registration station where participants could directly engage on social media with improved ease of access. Presentations could be set up where questions are asked via a specific Twitter hashtag, allowing a broader audience to participate, including those not in attendance.

Limitations of this study are primarily related to hashtag filters from Symplur software that were used to filter out information irrelevant to conference materials. Since hashtags are publicly available for use, anyone can tweet out information using the conference hashtag, even if it does not pertain to the meeting. Filters were placed to remove tweets that were not published in English or in the North American time zone from data. Twitter engagement relates to the previous year's attendance. Future studies should investigate the long-term effects of conference hashtag use on knowledge dissemination after the conclusion of the conference. In addition, future research should examine the influence conference material has on Twitter conversations during and after the AAST meeting.

Impressions do not directly indicate information translation. Absorption of information may not occur simply because the content of a tweet was viewed. However, there are indications that increased impressions and engagement may indicate overall scientific advancement. One study of at the conference of the American Urological Association found that the more likes and retweets a presentation received, the more likely it was to be published.<sup>18</sup> In addition, tweets can be formatted in a manner that fosters user engagement and thus the likelihood that they would absorb the information. A Twitter blog published in 2014 suggested that by including hashtags, photos and links a tweet was more likely to be interacted with by users.<sup>19</sup>

Medical conferences should continue to promote use of hashtags at their events in an effort to promote an online presence. The network of scientists created through use of hashtags at conferences

is beneficial to patients and students, and can be accessed in almost any circumstance.

## CONCLUSION

Twitter #AAST 2016–2019 online engagement and interactions have declined during the last 4 years while impressions have grown steadily indicating potential widespread dissemination of trauma-related knowledge and evidence-based practices, and increased online utilization of conference material to trauma surgeons, fellows, residents, trauma scientists, other physicians and the lay public. #AAST online engagement and impressions did not have influence on meeting attendance rates. Medical conferences and education alike should take advantage of online platforms, such as Twitter, to facilitate information sharing, stimulate online conversations, and advance trauma science.

**Contributors** Study conception and design: AE. Data collection, interpretation, and analysis: KS, DB, AE. Drafting of article: KS, AE. Critical revision of article: AE, MM, DB, KS. Approval of the final version: KS, AE, DB, MM.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Map disclaimer** The depiction of boundaries on this map does not imply the expression of any opinion whatsoever on the part of BMJ (or any member of its group) concerning the legal status of any country, territory, jurisdiction or area or of its authorities. This map is provided without any warranty of any kind, either express or implied.

**Competing interests** None declared.

**Patient consent for publication** Not required.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** Data are available in a public, open access repository. All data relevant to the study are included in the article or uploaded as supplementary information.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

## ORCID iD

Adel Elkbuli <http://orcid.org/0000-0001-7730-617X>

## REFERENCES

- 1 Daneshjou R, Adamson AS. Twitter Journal clubs: medical education in the era of social media. *JAMA Dermatol* 2020. [Epub ahead of print: 18 Mar 2020].

- 2 American Association for the Surgery of Trauma (AAST). Past meetings program book. <https://www.aast.org/past-meeting-program-books> (21 Jun 2020).
- 3 Lee C-C, Chou ST-H, Huang Y-R. A study on personality traits and social media Fatigue-Example of Facebook users. *LNIT* 2014;2.
- 4 Clesham K, Piggott RP, Sheehan E. A prospective review of a novel electronic Journal Club format in an orthopedic residency unit. *J Surg Educ* 2020;77:115–23.
- 5 Brasel KJ, Pierre AL, Weigelt JA. Resident work hours: what they are really doing. *Arch Surg* 2004;139:490–4.
- 6 Wong A, Capel I, Malbrain M. Social media in critical care: FAD or a new standard in medical education? an analysis of international critical care conferences between 2014 and 2017. *J Intensive Care Soc* 2019;20:341–6.
- 7 Cheung B, Wong CL, Gardhouse A, Frank C, Budd L. #CGS2015: An Evaluation of Twitter Use at the Canadian Geriatrics Society Annual Scientific Meeting. *Can Geriatr J* 2018;21:166–72.
- 8 Fuller MY, Roy-Chowdhuri S. Social media expands the reach of the 2017 ASC annual meeting. *J Am Soc Cytopathol* 2018;7:219–23.
- 9 Hudson S, Mackenzie G. 'Not your daughter's Facebook': Twitter use at the European Society of cardiology conference 2018. *Heart* 2019;105:169–70.
- 10 Schwenk ES, Jaremko KM, Park BH, Stiegler MA, Gamble JG, Chu LF, Utengen A, Mariano ER. I Tweet, therefore I learn: an analysis of Twitter use across anesthesiology conferences. *Anesth Analg* 2020;130:333–40.
- 11 Alvarez-Perea A, Ojeda P, Zubeldia JM. Trends in Twitter use during the annual meeting of the Spanish Society of Allergology and clinical immunology (2013-2016). *J Allergy Clin Immunol* 2018;6:310–2.
- 12 Nason GJ, O'Kelly F, Bouchier-Hayes D, Quinlan DM, Manecksha RP. Twitter expands the reach and engagement of a national scientific meeting: the Irish Society of urology. *Ir J Med Sci* 2015;184:685–9.
- 13 Wilkinson SE, Basto MY, Perovic G, Lawrentschuk N, Murphy DG. The social media revolution is changing the conference experience: analytics and trends from eight international meetings. *BJU Int* 2015;115:839–46.
- 14 Attai DJ, Radford DM, Cowher MS. Tweeting the meeting: Twitter use at the American Society of breast surgeons annual meeting 2013-2016. *Ann Surg Oncol* 2016;23:3418–22.
- 15 Segura Sampedro JJ, Morales Soriano R, Ramos Rodríguez JL, González-Argenté FJ, Mayol J. Twitter® use and its implications in Spanish Association of Surgeons meetings and congresses. *Cir Esp* 2018;96:352–6.
- 16 Eva KW. Strange days. *Med Educ* 2020;54:492–3.
- 17 Linzey J, Robertson F, Haider A, Graffeo C, Wang J, Shasby G, Alotaibi N, Cohen-Galdol A, Rutka J. Specialized social media team increases online impact and presence: the Journal of neurosurgery experience (Preprint). *J Med Internet Res* 2020;22.
- 18 Nolte AC, Nguyen KA, Perecman A, Katz MS, Kenney PA, Cooperberg MR, Gross CP, Leapman MS. Association between Twitter reception at a national urology conference and future publication status. *Eur Urol Focus* 2019.
- 19 Tomlinson S, Haas M, Skaugset LM, Cico SJ, Wolff M, Santen S, Lin M, Huang R. Using Twitter to increase content dissemination and control educational content with presenter initiated and generated live educational Tweets (piglets). *Med Teach* 2017;39:768–72.