The Thoracic Surgery Social Media Network: Early experience and lessons learned

Jessica G. Y. Luc, MD, Maral Ouzounian, MD, PhD, Edward M. Bender, MD, Arie Blitz, MD, MBA, Nikki L. Stamp, MBBS(Hons), FRACS, Thomas K. Varghese, Jr, MD, MS, David T. Cooke, MD, and Mara B. Antonoff, MD

ABSTRACT

Background: The Thoracic Surgery Social Media Network (TSSMN) is a social media collaborative formed in 2015 by The Annals of Thoracic Surgery and The Journal of Thoracic and Cardiovascular Surgery to bring social media attention to key publications from both journals and to highlight major accomplishments in the specialty. Our aim is to describe TSSMN’s preliminary experience and lessons learned.

Methods: Twitter analytics was used to obtain information regarding the @TSSMN Twitter handle and #TSSMN hashtag. TweetChat and general hashtag #TSSMN analytics were measured using Symplur (Symplur LLC, Los Angeles, Calif). A TSSMN Tweeter App was created, and its use and downloads were analyzed.

Results: Hashtag #TSSMN has a total of 17,181 tweets, 2100 users, and 32,226,280 impressions, with peaks in tweeting activity corresponding to TweetChats. Thirteen 1-hour TweetChats drew a total of 489 participants, 5195 total tweets, and 17,297,708 total impressions. The top demographic category of TweetChat participants included Doctors (47%), Advocates/Supports (11%), and Unknown (10%), with 3% characterized as patients. The TSSMN Tweeter iTunes App (Apple, Cupertino, Calif) was downloaded 3319 times with global representation. A total of 859 articles were viewed through the App, with 450 articles from The Annals of Thoracic Surgery and 409 from The Journal of Thoracic and Cardiovascular Surgery.

Conclusions: We demonstrate that TSSMN further enhances the ability for the journals to connect with their readership and the cardiothoracic community. Ongoing studies to correlate social media attention with article reads, article-level metrics, citations, and journal impact factor are eagerly awaited. (J Thorac Cardiovasc Surg 2019;158:1127-36)
Trainee members were invited to join in 2017 and provide a unique perspective on issues related to training, mentorship, and transitioning to independent practice.

Each month, TSSMN delegates disseminate new, original research published in cardiothoracic surgery across Twitter. Delegates provide commentary contextualizing the recently published papers within our respective areas and highlight the potential impact a study may have on our surgical community. Tweets are accompanied with the hashtag #TSSMN, have links to the selected article, and are re-tweeted by other delegates and the @TSSMN account for broad dissemination.

Articles are chosen that are provocative, feature innovative techniques, or simply because they are of interest to the delegate. Often, featured articles that are open access (ie, full-text is available to the public) are chosen for dissemination. The TSSMN tweets serve to stimulate a discussion around the main findings of the article, applications to clinical practice, limitations, and unanswered questions through broad engagement of the social media community. The target audience for TSSMN activities includes other scientists and clinicians (surgeons, cardiologists, pulmonologists, oncologists, etc), as well as the lay public and patients.

In addition to direct tweeting of articles, members of TSSMN regularly engage in live tweeting from our national scientific sessions. By using hashtags, such as #AATS2019 (the American Association for Thoracic Surgery Annual Meeting) and #STS2019 (The Society of Thoracic Surgeons Annual Meeting), delegates provide minute-to-minute updates regarding conference events, keynote speakers, and the latest research in our field.2

Furthermore, several times a year, members of TSSMN host 1-hour live TweetChats addressing interesting topics with relevant papers from both journals.3 The moderator of the TweetChat prepares questions for discussion, and the session serves as a journal club for cardiothoracic trainees and surgeons with global participation. Authors of the selected papers are invited to participate in the chat, providing a forum for high-level interaction with interested readers and an in-depth exploration of the papers’ content.

The present report describes the preliminary experience of the TSSMN group along with lessons learned.

**MATERIAL AND METHODS**

**The Thoracic Surgery Social Media Network**

The TSSMN was formed by creation of a Twitter handle @TSSMN and hashtag #TSSMN to link conversations of cardiothoracic surgical literature to the handle. An information page regarding TSSMN as well as the handles of TSSMN delegates were promoted on The Annals of Thoracic Surgery and The Journal of Thoracic and Cardiovascular Surgery journal websites (Table 1). Twitter analytics was used to obtain information about the performance of the @TSSMN Twitter handle and #TSSMN hashtag.

**Definitions**

Definitions of Twitter nomenclature have been reviewed by Luc and colleagues.2,3 In brief, a handle is a Twitter account with a corresponding username. Hashtags identify specific topics and allow one to connect with other people tweeting or interested in similar subjects and are the primary modality by which tweets in a given campaign or TweetChat are connected. Hashtags are “clickable” as well, meaning that when a hashtag is tapped, it will populate a list of all tweets containing that hashtag and thus related to that topic. Impressions are the number of times article tweets were viewed by unique individuals. Followers are the people following an account, which means that they allow your tweets to be automatically populated in their Twitter feed, which is a live stream of all content being posted by the individuals they are following.

**TweetChats**

TSSMN was created in May 2015. Thirteen TweetChats were held between September 17, 2015, and February 19, 2019, and were analyzed as part of this study. TweetChats were 1-hour in length and were scheduled occurrences with broad advertisement by TSSMN, TSSMN delegates, and the journals through social media. All coauthors of manuscripts to be discussed received an invitation to join the TweetChat and support to use Twitter, if required. A searchable hashtag #TSSMN was created to tag the conversation and was registered with the social media analytics platform, Symplr (Symplr LLC, Los Angeles, Calif). Our group previously published a step-by-step guide on how to join a TSSMN TweetChat and provide an example of one of our prior TweetChats in the guide.3

TweetChat and general hashtag #TSSMN analytics were measured using Symplr. Data variables include the number of participants in the...
TweetChat, total tweets, and impressions. Demographics of participants were provided by Symplur, and individuals were defined based on their Twitter profile and associated web links. Demographic categories are Doctor, Health Care Provider (HCP), Patient, Caregiver/Advocate, Researcher/Academic, Journalist/Media, Individual Other Healthcare, Individual Other Non-healthcare, Organization (Org.) Provider, Org. Research/Academic, Org. Government, Org. Advocate/Support, Org. Pharma, Org. Media, Org. Other Healthcare, Org. Other Non-healthcare, Spam, Unknown. Participants may be characterized more than once (e.g., a participant may be both a Doctor and a Researcher/Academic).

TSSMN Tweeter iTunes App
To streamline the process for using Twitter as a platform to expose interesting scholarly articles to followers, we developed a free mobile software application (App), the TSSMN Tweeter, available on the iTunes (Apple, Cupertino, Calif) App Store (https://itunes.apple.com/us/app/thoracic-surgery-social-media-network-tweeter/id1015160497?ls=1&mt=8; Figure 1). The App takes advantage of the journals’ RSS feeds to download the most current articles and present them to the user in a table. Tapping on a table cell will reveal the article abstract to the reader with an option to produce a tweet about it. Built in to the tweet are the #TSSMN hashtag and the URL link that directs to the full-text article on the journal’s website. The articles that are viewed on the App are tracked using a free cloud-based data store using open source software called Parse Server (http://www.back4app.com).

RESULTS
TSSMN Demographics
The Twitter handle @TSSMN has a total of 10,900 tweets, with an average of 243 tweets per month. The combined followership of all TSSMN delegates (Table 1) was 52,983, with representation from across the world (Figure 2, A). TSSMN has 2024 followers, with a follower accumulation of 45 new followers per month, and activity at all hours of the day (Figure 2, B).

Overall, most TSSMN followers are male (64%) and speak English (91%), followed by Spanish (12%), Arabic (6%), Portuguese (3%), and Turkish (2%). Compared with all Twitter users, followers of TSSMN are more interested in politics (87% vs 31%), government (84% vs 32%), science news (98% vs 69%), tech news (86% vs 62%), and technology (84% vs 63%; Figure 3).

The TSSMN social media community, with communication among participants, by the #TSSMN hashtag is shown in Figure 4 with a node-edge diagram. Biography word clouds of followers of TSSMN are shown in Figure 5, A, with the top related hashtags with #TSSMN and topics shown in Figure 5, B and C, respectively.

TSSMN TweetChats
Hashtag #TSSMN has a total of 17,181 total tweets, 2100 users, and 32,226,280 impressions (Figure 6), with peaks in tweeting activity of #TSSMN corresponding to TweetChats (Table 2). Thirteen one-hour TweetChats drew a total of 489 participants, 5195 total tweets, and 17,297,708 total impressions. Figure 7 demonstrates the professional demographics of participants for the combined TweetChats. The top demographic category of TweetChat participants included individuals identified as Doctors (47%), Org. Advocate/Support (11%), and Unknown (10%) with 3% of participants characterized as patients.

The top TweetChat (Table 2) by number of tweets was “Natural History of the Aortic Root After Replacement of the Ascending Aorta” (December 13, 2017), with 670 tweets. The top TweetChat by number of impressions and participants was “Leadership of Surgical Teams in the

FIGURE 1. The Thoracic Surgery Social Media Network (TSSMN) Tweeter iTunes (Apple, Cupertino, Calif) App created to streamline the process for using Twitter as a platform to expose interesting scholarly articles to followers.
Operating Room” (October 20, 2018), drawing 6,371,570 impressions and 72 participants. TweetChats with the lowest impressions were those held at 5 pm EST as compared with later times in the day (Table 2).

TSSMN Tweeter iTunes App
From July 2015 to February 2019, the TSSMN Tweeter iTunes App was installed 3319 times, with the majority from China (n = 2643), followed by United States (n = 390), Japan (n = 28), Turkey (n = 17), United Kingdom (n = 16), India (n = 14), Italy (n = 13), Thailand (n = 11), Brazil (n = 10), Egypt (n = 10), Germany (n = 10), Russia (n = 10), and Saudi Arabia (n = 10). Pakistan, Mexico, Israel, Spain, Australia, Canada, Ukraine, and Greece each accounted for fewer than 10 of the App’s downloads. A total of 859 articles were viewed through the App, with 450 articles from The Annals of Thoracic Surgery and 409 from The Journal of Thoracic and Cardiovascular Surgery.

COMMENT
Social media is leading a major shift in the paradigm of how healthcare professionals connect with one another, with professional societies, journals, trainees, and of course, with patients. Social media is unique in that it has the ability to uphold the traditional goals of medical journals by disseminating peer reviewed articles to an interested audience or stakeholder. With an ever-increasing presence
of physicians and academics, social media is a strong driver of contemporary education, information dissemination, and collaboration.

TSSMN is a network created through the partnering of the 2 major cardiothoracic surgery journals with a group of diverse clinicians. We demonstrate in our preliminary evaluation of TSSMN that this online community further enhances the ability for the journals to connect with their readership and to foster a relationship that guides journal and information growth with leaders of the cardiothoracic community. Hashtag #TSSMN had a total of 17,181 total tweets, 2100 users, and 32,226,280 impressions. Thirteen 1-hour TweetChats drew a total of 489 participants, 5195 tweets, and 17,297,708 impressions. As such, TSSMN provides a focused and readily available forum for cardiothoracic specialists.

Education is an important goal of journals, and through TSSMN, our journals have been able to facilitate educational activity. From online TweetChats to linking TSSMN with major conferences, social media not only propagates the information but also allows for a democratization of access. The use of articles that are freely available online also promotes access to those who would normally not have access. Currently, there is a global push for free online medical education as a way of allowing access to information to those who would not normally be able to by virtue of financial or geographic concerns. The partnering of TSSMN with the journals and creation of the free TSSMN Tweeter App is a way to identify and promote articles of importance that are freely available online.

Social media has been criticized for its inability to provide the robust peer reviewed information that we rely on from journals. By partnering with respected peer reviewed journals and engaging manuscript authors, readers, and the virtual community in scholarly discussion, TSSMN propagates high-quality information to the medical and lay social media community. Furthermore, by providing a channel of open, transparent, and crowd-sourced, free, open-access critical appraisal from end users, social media can arguably be the best form of postpublication peer review and may yield new thought on research, expand perspectives, and lead to collaborations. This is an important strength of TSSMN through its collaboration with clinicians and journals.

Along the lines of picking articles rather than whole issues, TSSMN members tweet about topics within their

FIGURE 3. Interests of followers of the Thoracic Surgery Social Media Network compared with all other Twitter users.
area of expertise. This allows for readers to be able to categorize their reading to their area, author, or expert of choice. To streamline information discovery, TSSMN delegates can work to logically categorize articles and topics leading to increased volume of readers. TSSMN can work to both share these specialized topics and guide publishing, educational, and technological advancement to improve readership.

Further, social media attention and discussion of cardiothoracic surgery scholarship brings attention and recognition to the work of authors published in the journals.9 With social media attention being correlated with citation rates, 10 we are optimistic that tweets will augment subsequent citations in the future — for the benefit of the authors, the journals, and for our specialty as a whole. A randomized prospective trial is currently underway11 with planned long-term follow-up by our group to examine whether prospective tweeting of articles through TSSMN improves article-level metrics and citations.

Given social media’s permanence and widespread reach, social media is a very powerful tool that must be used responsibly. Tips on effective social media use in a surgical practice3,12 and best practice guidelines for surgeons’ social media use 13 have been published by the American College of Surgeons.

Lessons Learned

Education and collaboration. In 2017, recognizing the importance of education, TSSMN added delegates representing trainees, residents, and medical students. They are uniquely placed to guide clinicians, TSSMN members, and the journals to important facets in their education. It is in this group where providing the guidance of senior clinicians and free online information where we
can see great benefits. Evidence of the feasibility of a trainee TSSMN committee has been shown through its use in the creation of a platform for cardiothoracic surgical networking and mentorship\textsuperscript{4-6} and to generate critical discussion of peer reviewed publications on trainee education to develop and implement practice-changing solutions.\textsuperscript{14}

Uniting the group in their diverse interests, trainees held joint TweetChats with TSSMN faculty, of which, one of the joint TweetChats generated the second highest impressions ‘’Multi-arterial as compared to single-arterial grafting for coronary artery bypass grafting (CABG)’’ (1,377,000 impressions). Furthermore, trainees highlighted not only issues of relevance to those in cardiothoracic surgical training but also those of interest to the broader surgical community, as demonstrated by the trainee group successfully hosting the TweetChat with the most impressions and participants, “Leadership of Surgical Teams in the Operating Room” (6,371,570 impressions and 72 participants).

**TweetChat timing.** With such a diverse team of TSSMN delegates (Table 1) spread across 6 time zones with a maximum of 20 hours time difference and 4 countries and 12 provinces/states, finding a mutually agreeable time was challenging. TweetChats with the lowest impressions were conducted earlier in the day, at 5 PM EST (Table 2), suggesting that it is possible that many of the regular TweetChat participants were unable to join due to clinical duties.

**Broadcasting TweetChats.** To ensure TweetChats are appropriately broadcast to the community, we not only have had members of TSSMN tweet out an invitation but...
also the journals and their respective societies disseminate the TweetChat ad. The TweetChat ad lists the moderator(s), TSSMN teams, discussion topic, and articles from *The Annals of Thoracic Surgery* and *The Journal of Thoracic and Cardiovascular Surgery* to be discussed. To allow for these coordinated efforts, we tend to aim for at least a 2-week notice period for people to have a chance to save the date and ensure they are available for the TweetChat.

**Improving engagement.** To ensure engagement and representation of authors’ own voice in the discussion of their work published in the journals, we formally invited authors of articles to be discussed to the TweetChat. This not only

![Figure 6: Tweets per day that contain the hashtag #TSSMN.](image)

<table>
<thead>
<tr>
<th>TweetChat title</th>
<th>Date of chat (Time)</th>
<th>Tweets</th>
<th>Impressions</th>
<th>Participants (No.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBRT in Early Stage Lung Cancer</td>
<td>Sep 17, 2015 (8 PM EST)</td>
<td>211</td>
<td>381,519</td>
<td>22</td>
</tr>
<tr>
<td>TAVR</td>
<td>Oct 13, 2015 (8 PM EST)</td>
<td>163</td>
<td>106,234</td>
<td>8</td>
</tr>
<tr>
<td>AATS Annual Meeting Highlights 2016</td>
<td>May 25, 2016 (9 PM EST)</td>
<td>290</td>
<td>1,061,418</td>
<td>18</td>
</tr>
<tr>
<td>Highlighting Key Papers From STS Annual Meeting 2017</td>
<td>Feb 8, 2017 (8 PM EST)</td>
<td>461</td>
<td>1,843,863</td>
<td>44</td>
</tr>
<tr>
<td>Enhanced Recovery after Thoracic Surgery</td>
<td>Nov 8, 2017 (8 PM EST)</td>
<td>328</td>
<td>1,319,000</td>
<td>38</td>
</tr>
<tr>
<td>Role of Simulation in Cardiothoracic Surgery Education</td>
<td>Dec 2, 2017 (6 PM EST)</td>
<td>526</td>
<td>1,140,000</td>
<td>45</td>
</tr>
<tr>
<td>Natural History of the Aortic Root After Replacement of the Ascending Aorta</td>
<td>Dec 13, 2017 (9 PM EST)</td>
<td>670</td>
<td>876,747</td>
<td>60</td>
</tr>
<tr>
<td>Resident Assessment and Autonomy in Cardiothoracic Surgery</td>
<td>Mar 20, 2018 (5 PM EST)</td>
<td>451</td>
<td>592,000</td>
<td>41</td>
</tr>
<tr>
<td>Lean Principles in Thoracic Surgery</td>
<td>Apr 16, 2018 (8 PM EST)</td>
<td>526</td>
<td>1,009,000</td>
<td>45</td>
</tr>
<tr>
<td>Non-Operative Technical Skills in Cardiothoracic Surgery</td>
<td>May 16, 2018 (5 PM EST)</td>
<td>515</td>
<td>697,426</td>
<td>37</td>
</tr>
<tr>
<td>Multi-Arterial As Compared to Single-Arterial Grafting for CABG</td>
<td>Sep 20, 2018 (9 PM EST)</td>
<td>482</td>
<td>1,377,000</td>
<td>39</td>
</tr>
<tr>
<td>Leadership of Surgical Teams in the Operating Room</td>
<td>Oct 20, 2018 (9 PM EST)</td>
<td>362</td>
<td>6,371,570</td>
<td>72</td>
</tr>
<tr>
<td>Sublobar Resections</td>
<td>Oct 30, 2018 (8 PM EST)</td>
<td>210</td>
<td>521,932</td>
<td>20</td>
</tr>
</tbody>
</table>

No., Number; SBRT, stereotactic body radiotherapy; TAVR, transcatheter aortic valve replacement; AATS, American Association for Thoracic Surgery; STS, The Society of Thoracic Surgeons; CABG, coronary artery bypass grafting.

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encourages more members of the cardiothoracic surgery community to join Twitter, if they have not already, but also provides a unique and valuable perspective to the work discussed with questions from colleagues and the public that can be answered by the authorship. In addition, we also made an effort to extend the invitation to colleagues outside of the realm of cardiothoracic surgery in the hopes of greater representation of a diversity of perspectives. Ultimately TweetChats are a great equalizer, allowing propagation of scientific articles to a broad audience through social networks as well as welcoming robust, constructive, real-time feedback, which is, ultimately, the optimal form of postpublication peer review, conducted in a novel fashion. It is interesting that most of the tweeters of articles were English speaking, whereas most of the downloads of the TSSMN Tweeter App were from China. Reasons for this may be related to unique preferences in usage of social media across the world or that users from China tweeted in English.

**Data Driven**

We live in an age of data and documentation. Social media efforts and outcomes are best analyzed with analytic tools, including Symplur, for TweetChat metrics including reach, impressions, and engagements. Furthermore, documentation of TweetChat content can be done with tools such as Wakelet (https://wakelet.com/) to construct a crowd-sourced collection of tweets to allow others to re-read or catch up on the TweetChat.

**Limitations**

Our study is subject to a number of limitations that must be considered in the interpretation of the data. Our study represents pilot data from a limited time period. Furthermore, the study is exploratory in nature and is meant to describe the preliminary experience of a joint collaborative effort of The Annals of Thoracic Surgery and The Journal of Thoracic and Cardiovascular Surgery journals to produce a network of social media readership through TSSMN. Selection and tweeting of articles were unscheduled and left to the discretion of the individual TSSMN delegates. Although every effort was made to invite all coauthors of manuscripts scheduled for discussions at TweetChats to participate, this was not always possible given the nature of scheduling and clinical responsibilities.

In regard to the TSSMN Tweeter App, the App is currently limited to iTunes users, and expansion of the App to include Android (Google, Mountain View, Calif) users can improve user accessibility. A confounding factor in the App’s utility has been the tendency for journals to display the articles’ abstracts on the journal website in a nontext format, most commonly an image rendered from the journal abstract. This defeats the App’s ability to parse the abstract text. Since the App user cannot read the abstract in this situation, the software becomes less efficient in tweeting about articles. A remedy would be for journals to include links to the text version of abstracts within the RSS feed.

Lastly, impressions, followers, and other social media metrics are able to demonstrate social media attention but are unable to differentiate between positive and negative attention. Ongoing studies to correlate social media attention with article reads, article-level metrics, citations, and journal impact factor are eagerly awaited. Furthermore, we look forward to expanding the reach of TSSMN to social media platforms beyond Twitter in the future.
Conclusion

In these changing times, TSSMN is uniquely placed to take the Journals’ readership into the future. Along with growth of actual numbers of readers and other metrics of article access, TSSMN and the Journals can shape and change our information, education, and collaboration paradigms to benefit us all. The use of TSSMN to form closer ties between the journals and clinicians puts The Annals of Thoracic Surgery and The Journal of Thoracic and Cardiovascular Surgery in prime position to create modern, technologically savvy, and thoughtful journals that is both impactful and sustainable. Ultimately, the sharing of high-quality, relevant, and easily accessible information will globalize our overarching mission to provide high-quality, up-to-date care for our patients through sound education of our clinicians. It is an exciting time to be a part of the revolution in journal-based and social media-led medical information, and TSSMN is in a unique and strong position to not only facilitate reading but also change and improve the way we communicate and understand literature.

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References


Key Words: Social media, health care community, communication, collaboration, education