

REVIEW ARTICLE

Use of Social Media at Cardiovascular Congresses: Opportunities for Education and Dissemination

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Abstract: Social Media includes different forms of online communication from Twitter, Facebook, Instagram, LinkedIn, podcasts, YouTube *etc.* and has advanced how information is exchanged. A notable use is engaging on Twitter at medical conferences, both for those attending the conference and the global audience who are not able to attend. It is also increasingly used as an educational tool similar to e-learning. The objective of this paper is to: 1) highlight the impact of using Twitter at cardiovascular congresses as an interactive platform for active learning as compared to passively listening to a presentation; 2) present perspectives from not only clinicians, researchers but also patients on how this information is interpreted; 3) provide recommendations for conference organizers for best practice live tweeting to share the information and knowledge beyond those in attendance; with potential for not only engagement but also educating our global community.

Keywords: Science communication, twitter, cardiotwitter, medical conference, mental health, medical education.

1. INTRODUCTION

Social media (*i.e.* Twitter [1], Facebook...) has transformed communication, both personally and for science and education [2- 4]. No longer is communication restricted only among peers in the similar subject or specialty but open across specialties and to a larger audience, such as our communities (Fig. 1). The flow of information and shared knowledge is fast, with estimated activity at 500 million tweets per day. There is a need to develop skills at science communication that have to be tuned to not only inform but also engage discussion. Traditional dissemination of information from congresses involved the individual writing a congress report of the key findings as well as presentation to department peers. Social media has now changed that to providing this information in real time on a changing platform to a diverse audience who were not able to attend, over different time zones [5]. This allows interaction with different health professionals that not only can enhance knowledge but also skills, depending on the congress, as well as opportunities for collaboration and mentoring.

While this can be exciting for many to engage with peers and leaders in the field, it can also be daunting for others, for

not being able to follow the conversation or worried about being criticized for expressing opinion or asking questions.

Communication is more effectively achieved by including some form of graphics/images as part of the scientific method we have to keep in mind to deliver engaging information [5]. The focus of this paper will be specific for the platform Twitter at cardiovascular congresses and to provide advice for those that are new to social media (#SoMe) communication, as well as highlight the advantages for sharing information and how this may promote collaboration as well as personal brand. We do not only focus on health professionals and academics but importantly, the perspective of patients or consumer representatives. Also included are the potential disadvantages and how these may be minimized. Finally, we provide recommendations for conference organizers who are wary of the use to increase engagement and as the new education platform. For beginners to the live tweeting at conferences, there have been many papers on the topic and we recommend "Ten simple rules of live tweeting at scientific conferences" [6].

2. LEARNING A NEW LANGUAGE TO ENGAGE IN #SOME

there are various levels of engagement for #SoMe, which require different layers of communication skills, especially at conferences where the information is a faster pace than regular interactions on Twitter. The act of crafting a message

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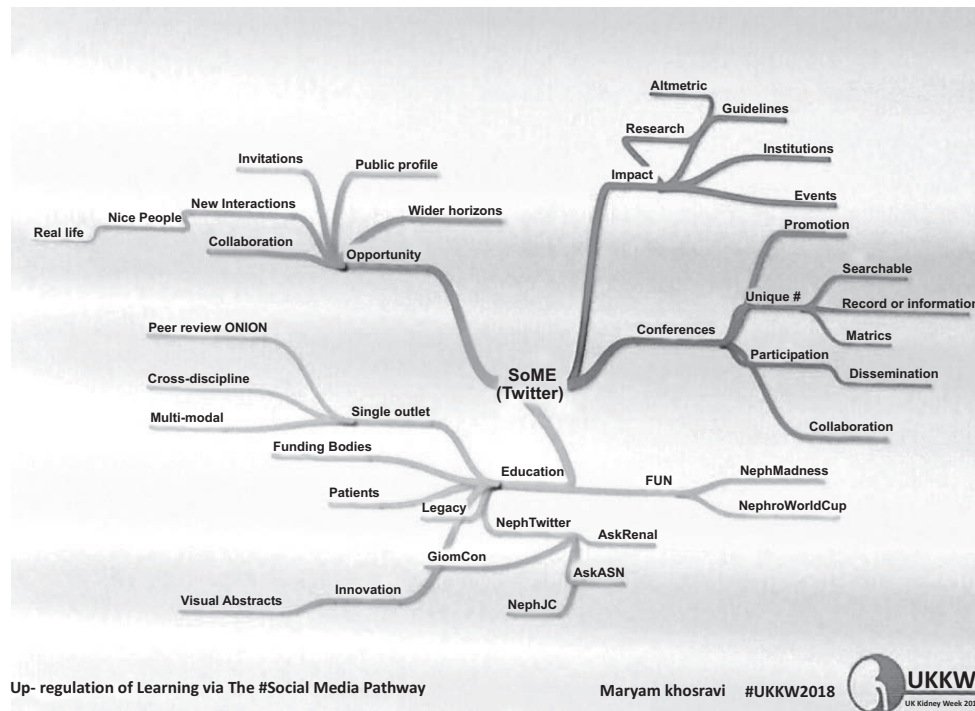


Fig. (1). The reach of #SoMe. Presentation on the impact of #SoMe at conference #UKKW2018. (A higher resolution / colour version of this figure is available in the electronic copy of the article).

which is referred to as “tweet” in Twitter involves listening to a speaker, actively processing that information, boiling that information down to 280 characters potentially including citation link and/or an image. Additionally, it could also be understood as a modern form of notetaking, which is easily archived, but also available freely to a wider audience. There is however specific terminology for Twitter that is confusing when one engages for the first time to see terms without context such as: followers, engagement, thread, impressions, influencer, moment, reach, retweets and hashtag. This is not restricted to patients but also fellow healthcare professionals and not directly interchangeable with metrics in academia. It is also important to remember that it differs from personal communication where the visual response of the audience is absent and instead is dependent on how the reader interprets the comment. This can potentially create confusion, anxiety or misunderstanding with text only communication and why visual abstracts/infographics have been introduced [7].

Conferences can vary from 200 to 30,000-35,000 attendees and while many may have been reluctant to use, they are now engaging in #SoMe since it allows many waves of conversations on the different topics being presented concurrently. Similar to the physical inability to attend each session, keeping up with the content is overwhelming and for some it can be discouraging. This is why Symplur (<https://www.symplur.com/>) introduced the Healthcare Hashtag Project to allow academia and the community to follow the conversations relevant to their interests. The Conference Organisers register a unique name with a hashtag which ensures the conversations are secured on a central location for viewing, metrics and a final transcript of all tweets using the registered hashtag.

3. ADVANTAGES OF #SOME USE AT MEDICAL CONFERENCES

Initially, there was reservation from many Associations and Congress organisers to allow the presentations to be photographed and distributed. This was due to misinformation that presentations fell under 'intellectual property' and were not to be shared. Since attendees do not sign a non-disclosure agreement and the presentation to an open audience should not be considered intellectual property. Societies are now recognising the advantages of #SoMe for facilitating the flow of science from the congress, albeit at a much more rapid pace and including real-time peer discussion to reach those audience who share this information. Some congresses identify individuals with content expertise and appoint them as Social Media (#SoMe) Ambassadors to communicate the science and encourage those following Twitter this year, to attend the conference the following year. Twitter has also contributed to an increasing number of publications providing guidance on using social media and conferences; with 280 published in the last 10 years (Fig. 2). Despite this guidance [2, 3, 8, 9], many in academia refuse to engage or if they do, are disappointed that they cannot follow the flow of conversations referred to as “threads”. Many well-designed applications (App) now allow a user to overcome this problem. Use of Tweetdeck (tweetdeck.twitter.com) allows one to follow all tweets with a specific hashtag. Specific for following a thread of tweets from a single individual is the Thread Reader App <https://threadreaderapp.com/> and one just needs to type “@threadreaderapp unroll” after the tweet to see the entire thread collated, making it easier to follow.

For those that do engage, advantages include “virtual attendance” to conference presentations and the ability to comment on the content, irrespective of location and time.

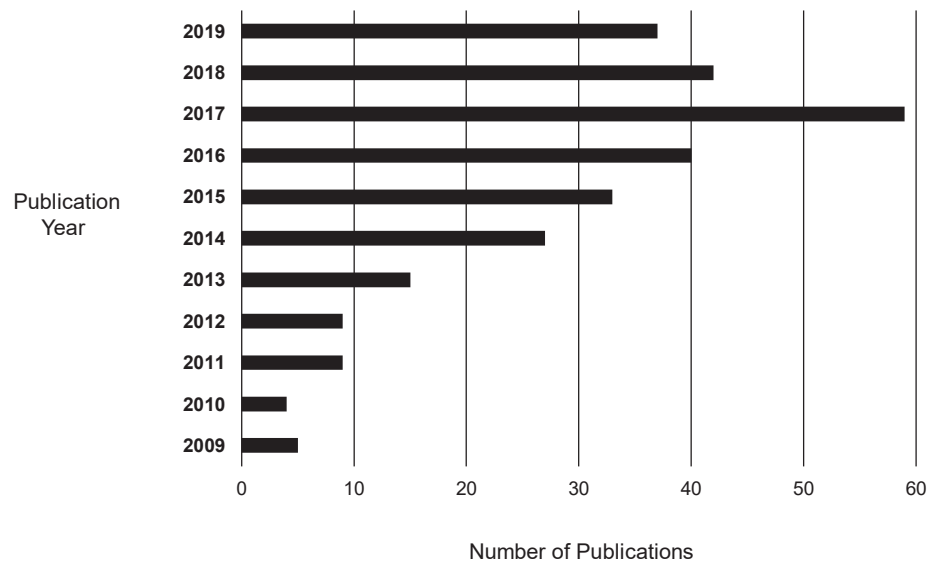


Fig. (2). Number of publications per year in PubMed on the topic of #SoMe and conference. (A higher resolution / colour version of this figure is available in the electronic copy of the article).

Twitter also removes the barriers which preclude patients to attend conferences. The information exchanged provides an opportunity for learning and audiovisual threads, making it easier to understand the content. The advantages for engaging in #SoMe at conferences are consistent across all scope of academia, healthcare, medical journals and the community – access to information which would have been missed due to difficulties attending in person. Live tweeting permits virtual attendees to track parallel sessions simultaneously and contribute to the discussion as well as post journal articles. When posting an article, Twitter courteous behavior is to find and cite the authors' twitter handle as well, which serves to acknowledge their work as well as allow them to reply and provide additional context. There is immediate feedback of the interest in a presentation by the extent of dissemination or in Twitter language, Retweets and conversations. Currently, this does not directly translate to academic recognition.

For Fellows in Training (FITs), social media provides an opportunity to reach leaders across the world to discuss real world management of complex cases and ask questions without concern of being judged. There is a critical discussion of current literature and opinions from scholars in the field, providing invaluable opportunities to learn. Similarly, for biomedical scientists and investigators who are early to mid-career researchers (EMCRs), attendance at conferences is difficult due to the time and financial costs. For them, #SoMe provides the opportunity to access the information presented and also to exchange ideas with potential for collaborations. For parents with young children or those who have Carer responsibilities and cannot attend conferences, the use of #SoMe also allows them to virtually attend. There is also the opportunity for learning new procedures with broadcasting live case studies or biomedical laboratory.

If conference attendees use the conference hashtag (for example #AHA19, #APCH2019) consistently in #SoMe, it allows remote tracking of the presentations and participate in discussions. The hashtag also allows access to smaller, more

focused cardiology conferences, such as #KCHRS2019 where the LAA (left atrial appendage) was the discussion topic. This is particularly relevant for professionals that could not attend the meeting. Twitter provides access to late breaking trials and highlights from conferences across the globe almost instantaneously. It is a great platform to share complex cases and discuss innovative techniques. Demonstration of new techniques/complex cases *via* videos is a common reason for interventional cardiologists to engage on social media. Some hashtags which serve to highlight, and aggregate these discussions are #RadialFirst, #MedShr, #UlnarSecond, #PercAx, #IdTR, #safefemoral, #EPeeps, as well as #Hypertension, #HeartFailure, #Afib and others. Overall, it lowers the bar for access to information, and improves inclusion and accessibility to the latest advances. The discussion can continue on #SoMe well after the conference has ended with online journal clubs, such as #ASEchoJC, #NephJC and #HYPHIP *etc.*

Other benefits of using #SoMe during conferences is to improve networking, which increases opportunities for new collaborations and mentoring for EMCRs and FITs and engage with the international cardiovascular community. It also provides an online introduction to senior researchers and leaders in the field, to ask questions and facilitate interaction. Even before conferences, EMCRs may find information about awards and travel grant opportunities on #SoMe that they might have otherwise missed. Being pro-active on Twitter at conferences might also provide an opportunity for writing commentaries on specific topics that were discussed briefly or being invited to present about an issue that was raised.

Using #SoMe at conferences is a great way to expand the number of followers, which may open new career opportunities. Finally, engaging in #SoMe can lead to forming new friendships. Maintaining these relationships is supported by the social environment [10] which includes meeting at conferences (#TweetUp) and promotes inclusion and feeling part of a community with common interests (#Cardiotwitter).

This online community provides motivation, sharing knowledge, potential collaboration and also support. The learning experience is not confined to the presentations but also extends to those not in attendance, and continues well after the conference.

A highlight of using #SoMe at conferences is engaging with the general community and translating the research findings into health messages. The connection between science and education is not obvious to patients and Carers. #SoMe provides an opportunity for communicating how new research impacts the health of our communities. Patients are increasingly invited speakers at medical conferences to share their expertise and insights. They take their experience as speakers and attendees back to their communities, although this involves curating and translating technical presentations into patient language. Whether this can lead to changes or improved health have not been well documented and an area for further research.

We have to be mindful that the information we communicate at a conference may be too rapid for patients to take notes. This is where the visuals assist these pioneer volunteers to curate, translate and share them with members of specific forum as needed. We need to consider the format of the presentations is often tailored for healthcare professionals but not to the wider community. Therefore hosting a Twitter tutorial (#Tweertorial) after the conference has ended, with the presentation accessible to download may be an opportunity to engage the community. As per patient representative advice (DM), citing the presenter's Twitter handle or name, presentation title, and conference hashtag allows tracking after the conference. For certain online communities, specific tweets may require translating from medical language before sharing as a transcript. It is important to recognize that only when the conference hashtag is registered with Symplur that transcripts can be archived, otherwise Twitter only saves the last 3500 tweets per account.

4. POTENTIAL DISADVANTAGES OF USING #SOME AT MEDICAL CONFERENCES

The power of disseminating information also includes certain responsibilities. While hashtags are useful to track a specific topic, extend the reach of the message or increase retweet success, they can often be used to excess, losing the message in the process. A recent analysis [11] identified the only consistent predictors for retweet success included other active users and used multimedia irrespective of the number of followers. It is also common that messages may be circulated or retweeted without verifying the content and this should also be discouraged.

Another issue is that non-attendees copy the slide presented and then distribute it to their network without acknowledging the speaker. It is a courteous etiquette to tag the speakers' Twitter handle, so that they are aware of the conversation, and could even subsequently respond. For social media applications like Twitter, maximal utility depends upon conversation and participation and hence being inclusive is more likely to foster participation. Twitter threads are sometimes hard to follow with replies forking the conversations in different directions. This issue is made worse by the use of 'quote tweeting', or 'retweet with comment' which is

an insidious way of breaking conversational threads and excluding the original person who posted the comment. Further, journals also publish Twitter data as it is "publicly available"[12]. On the rare occasions that a speaker requests it explicitly, one should refrain from taking photographs and tweeting. These requests will become uncommon with the passage of time, since most journals do not consider tweeting as a form of prior publication. The increasing use of pre-prints, which is also becoming more common, reduces the impact of embargos and 'scooping' [13].

4.1. The Patient Perspective

Live tweeting from congresses provides a great opportunity for patient engagement and education but we need to be aware of the patient's needs and how they interpret these interactions. Often it is hard to follow discussion or thread with medical terminology and abbreviations used without definition *e.g.* #TAVI *etc.* Posting of surgical or graphic videos should have a warning to prepare the non-medical observer. The volume of conversations on the same topic but with conflicting views is also confusing to track. While many academics post voting polls, there is no explanation provided and patients are confused about the need for a poll. Patients also find it unsatisfactory to see images of conference posted where the attendees seem to engage in their phones, paying no attention to the presenter.

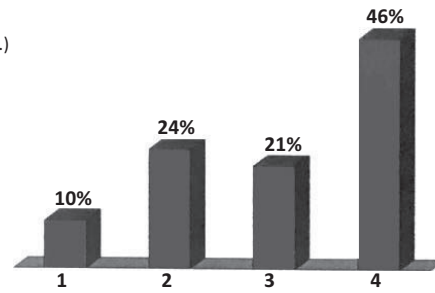
4.2. The Physician Perspective

Social media can also pose risk to physicians and hence physicians must be cognizant of the potential of HIPAA violations on #SoMe when posting educational cases and videos. The information posted could potentially damage relationships with colleagues, friendships as well as someone's personal brand. Unfortunately, there is also bullying behavior on #SoMe and at times it goes as far as targeting colleagues. Colleagues following each other should be careful to avoid expressing opinions on controversial topics, as this may spill over into the work place. For FIT, #SoMe may hinder sharing mistakes for fear of judgment. This can transform #SoMe into self-promotion and "look what I can do!" at times. Similarly, thought leaders may overpower conversations. There is also the added burden of keeping up with the #SoMe posts, while busy with work and home life. One should be cautious before implementing the information provided on #SoMe into their practice without validating since anyone can offer opinion and false information can be rapidly circulated by retweeting.

Tweeting at a medical conference can also expose selection bias in the opinions of the attendees, compared to the wider population interested in a topic. As an example, during a recent conference, a poll of the live audience revealed higher preference for renal denervation compared to a similar poll carried out simultaneously in the Twittersphere (Fig. 3). There are still some negative opinions about tweeting during a medical conference. Some organizers are still reluctant to allow live tweeting, potentially being afraid of decreasing the value of attending the conference in person, or of inadvertent dissemination of research findings that are still under an embargo [14]. Another minority opinion is of the poor value of such tweets, which sometimes include fuzzy

Q 2: WOULD YOU CONSIDER RDN FOR A PATIENT WITH UNCONTROLLED HYPERTENSION AFTER BEING PRESCRIBED 1-2 DRUGS?

- 1. Always
- 2. Only if non-adherence was suspected or verified
- 3. Only for other reasons (patient preference, CV risk, etc.)
- 4. Never. I'd add a drug



Swapnil Hiremath, MD, MPH @hswapnil · Jun 23

Let me ask the twittersphere
 Will you consider renal denervation in a patient whose BP is not controlled on Valsartan/HCTZ
 46M sedentary smoker with dyslipidemia & Creat 1.33? # ESH2019

- Let's burn those nerves 5%
- are you kidding? 66%
- Switch to CTD/Indapamide 9%
- I forgot amlodipine 21%

82 votes · Final results

Fig. (3). Top panel shows the live poll from the European Society of Hypertension session, with about 55% of respondents supporting renal denervation; bottom panel shows results of a twitter poll on the same topic, where only 5% supported renal denervation. (A higher resolution / colour version of this figure is available in the electronic copy of the article).

images of doubtful provenance with inadequate context. Indeed, it is important to tweet, while providing the clinical context. The use of citations and illustrative images increase the value, and so does adding an editorial comment rather than a mere transcription of the speaker.

4.3. #SoMe Impact on Mental Health

Engaging in #SoMe facilitates new connections not only in the same field but also across specialties and with diverse interests which can provide opportunities and have a positive influence on the individual feeling socially connected [15] with “Influencer” status. This interaction also draws unwanted and sometimes judgmental comments. Emerging data shows a negative impact of engaging on #SoMe on sleep, attention span and mental health [16]. Attendees at conferences who do not receive a “like” or “retweet” may perceive disappointment. A recent study [15] found that people having negative experiences on #SoMe had higher perceived social isolation, higher levels of anxiety and depression [17], which are associated with adverse cardiovascular health outcomes [18].

There is also the “Iceberg Effect for Success” where the highlights of great publications, promotions, awards and grants are shared but the hard work, struggles, frustration, late night, tears that have gone into the work to get those results is hidden. This can have an adverse impact on mental health for those having difficulties, as well as young trainees or investigators, who may be already stressed by the impending deadlines and competitive environment, when other colleagues are enjoying their experience on Twitter. While Twitter can be a great resource for sharing publications, research findings *etc.*, and this maybe a timely reminder to have a real, face-to-face, check in with one’s colleagues. Similarly, when someone has a paper published or wins an award or promotion, one only sees the final success. The earlier rejections, revisions and setbacks are not seen and one might assume that the process was streamlined.

4.4. Metrics of #SoMe at Cardiology Congresses

The impact and reach of a medical conference are now measured by the activity of social interactions or tweets, as well as impressions, tracked by #SoMe tools, such as SympLur and NodeXL (<https://nodexlgraphgallery.org/>)

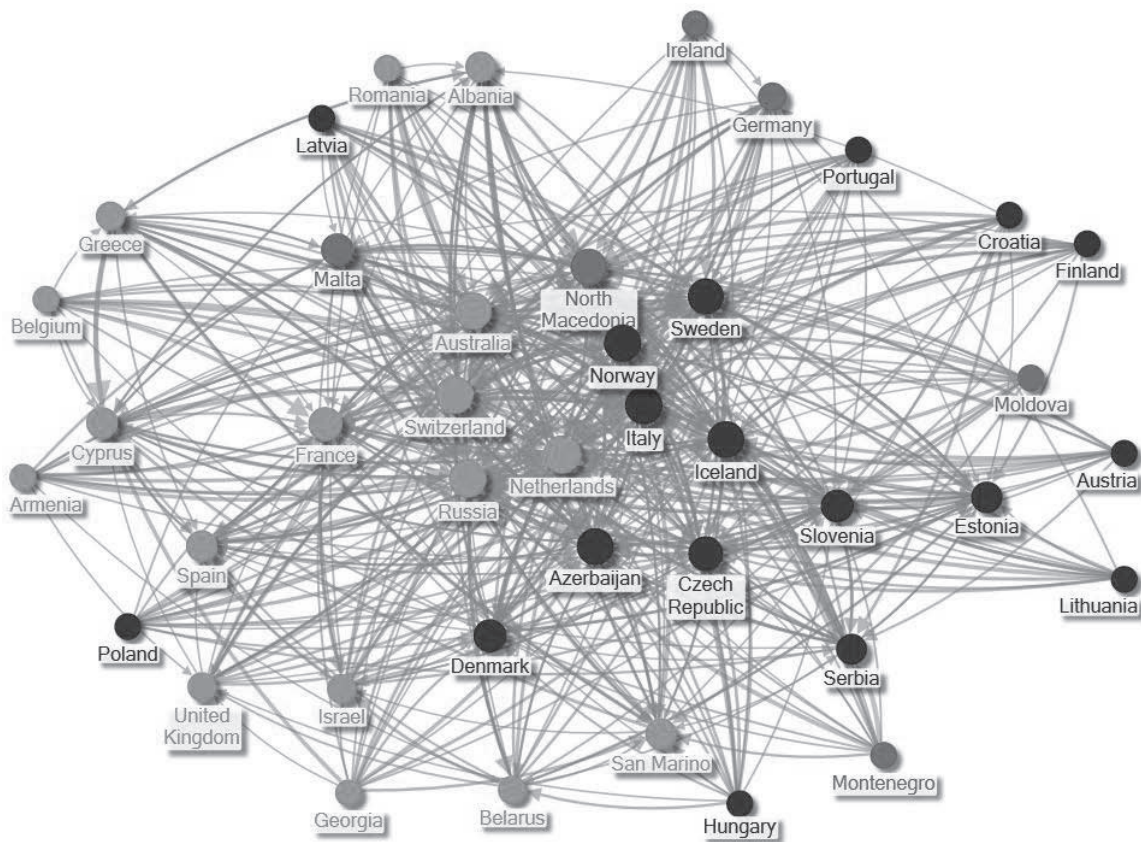


Fig. (4). Using the NodeXL platform shows the reach of the European Society of Cardiology 2019 Conference. (A higher resolution / colour version of this figure is available in the electronic copy of the article).

Pages/Graph.aspx?graphID=197566) and example shown in Fig. (4).

These tools then produce lists of the people who have generated the greatest number of posts that have been redistributed. These people are referred to as “Influencers“ (Fig. 5). There have been several studies reporting the number of tweets and impressions, as surrogate outcomes [4, 9] <https://paperpile.com/c/tUxuD/hK1p+5pLB>. Impressions do not translate directly to a number of people having viewed the tweet. The number is calculated by taking the number of times an account has tweeted multiplied by the individual user’s followers repeated for all accounts, then summed up. If the healthcare hashtag is not used consistently then the calculations will be compromised. Identifying the social media influencers at a conference can help conference organisers understand ways to support the dissemination of information. However, it is difficult to measure the true educational impact of a medical conference from the perspective of an individual following the tweets virtually in the Twitter-sphere [19, 20]. One can, however with confidence say that live-tweeting from a conference does increase the visibility beyond the actual attendees [8, 21]. This may be especially noted in the followers who read these tweets are from a different specialty and would otherwise not have attended the specific medical conference. It is also a great opportunity for increasing visibility and recognition of the individual’s research output and encourages collaborations.

5. ROLE OF #SOME AT CONGRESSES AS PART OF E-LEARNING STRATEGY

There is an increasing move towards web-based education tools to provide continuing education that is independent of location and barriers to support engaged enquiry and allow interactivity. This technology has been integrated into teaching courses and curriculum, whereas content from congresses integrated into tutorials *via* Twitter referred to as #Tweertutorials and other medical education (#MedEd) or science communication (#scicomm) have yet to be integrated into curriculum. Although some independent databases used “educational” as part of the branding, they have not been validated nor meet the criteria and highlight one of the hurdles that need to be addressed.

Currently, there is a lack of comparative strong evidence that integrating the content of #SoMe in medical education and well-designed assessment of these tools enhance engagement and active learning. There are also important institutional social media guidelines that the information posted needs to meet and this may vary across institutions. However, there is a great opportunity for research to compare social media use with other methods of education and assess skill- or behaviour-based outcomes, to unmask the potential of #SoMe to provide more collaborative, engaging and generated by those learning, both health professionals and patients.

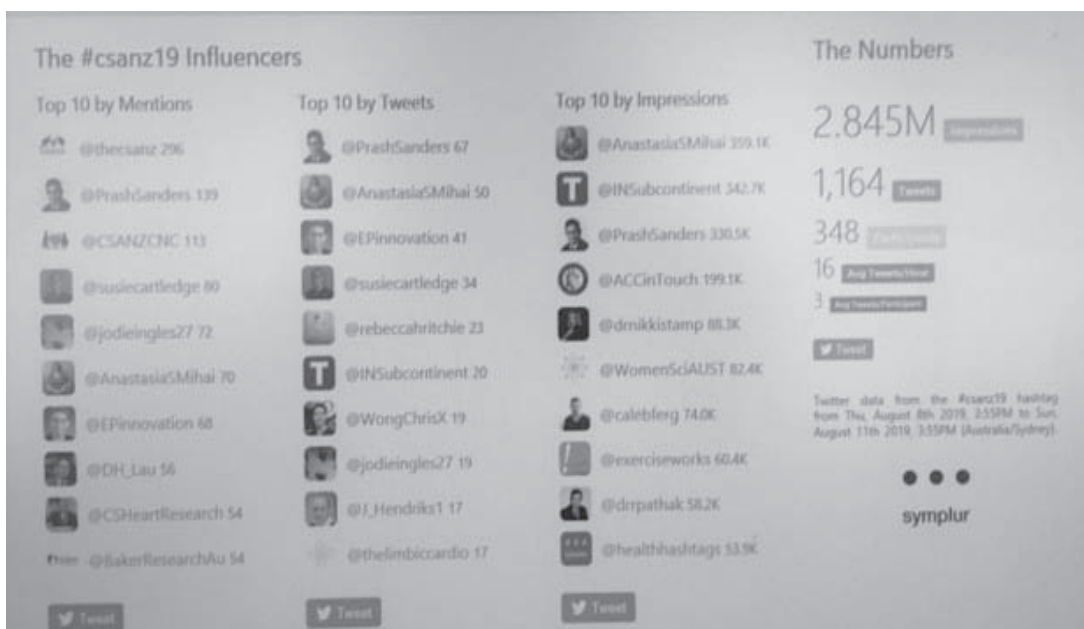


Fig. (5). Symplur summary of tweeting activity at the Cardiac Society of Australia & New Zealand (#csanz19). (A higher resolution / colour version of this figure is available in the electronic copy of the article).

Although this is an evolving field, it is encouraging that there are two systematic reviews of the use of social media tools in medical education [22, 23]. While studies in the first [22] were generally low to moderate quality due to lack of a comparison group and only one randomized controlled trial, they confirm undergraduate medical students satisfaction with the #SoMe tools, engagement and improved skills in most of the studies. Privacy breaches were flagged as a concern, although none of the studies reported adverse events. The other systematic review examined the use of social media platforms in Graduate Medical Education and confirmed that there is a need for well-designed research to identify measuring effectiveness with validated instruments. There was confirmation from the various studies that #SoMe provides a platform to learn, enquire and allow interaction.

CONCLUSION

The benefits of using #SoMe at cardiovascular congresses are dissemination of the science presented and engaging not only those in attendance but also those attending virtually. It is an exciting time for education to be transformed by using standardised procedures for assessment of the content delivered by #SoMe from cardiovascular congresses and impact on clinical practice. To optimise effective tweeting of information, while minimising risk we provide the following recommendations to both the societies organising the conferences and attendees:

Presenter to hold a Tweakorial of highlights once the Congress has finished and to post presentation on the website for people to follow but not download for a short period of 1-month post-meeting.

Physicians & healthcare professionals must be accountable for maintaining professionalism and ensure posts related to patient care are evidence based. If not, that should be clearly stated.

Standardised assessment tools need to be developed and compared to other teaching platforms to provide the much-needed evidence of the educational potential, both for the health professionals and the patients.

Conference Organisers ensure that presenters have their Twitter handle or email posted on each slide of their presentation as well as the Congress hashtag and confirm there are no restrictions to share the content.

To encourage participation from virtual attendees, it is important for all to remember the respectful and considerate conversation.

CONSENT FOR PUBLICATION

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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