



Researchers in cardiology – Why and how to get on Twitter?

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ARTICLE INFO

Keywords:

Social media
Twitter
Tweertorial
Twitter-based Journal Club
Dissemination
Cardiology

ABSTRACT

Social media (SoMe) for professional use has gained importance for scientific impact. In cardiology, Twitter is among the preferred SoMe platforms for scientific dissemination. We are in the middle of a paradigm shift within scientific dissemination as more scientific content is presented on Twitter, and it is crucial to embrace it. Therefore, this paper includes a description and discussion of the existing literature reporting the impact of Twitter on research dissemination, as well as a guide on how to get started. In addition, we describe a case of the Danish Cardiovascular Academy Summer Meeting 2021 as an example of a scientific event that was promoted on Twitter before, during and after the event and present a survey showing that participants were inspired to increase the use of SoMe professionally. Finally, the paper addresses limitations of Twitter and SoMe for scientific use and discuss a need for an increased evidence base.

1. Introduction

Social media (SoMe) is increasingly used for professional purposes and has gained importance for scientific impact, including education, training, and diffusion of new techniques [1]. It has become ubiquitous in everyday communication, especially for the younger generation, and is accessible worldwide for everyone with an internet access. Twitter is among the preferred SoMe platforms for scientific dissemination in cardiology [1]. The platform may be a new important “hub” for scientific discussions, dissemination of results, collaborations and creation of new research questions [2], and there has even been a discussion about translating the educational content of Twitter into formal CME credits

[2]. Twitter activity is increasing as virtual and hybrid cardiology congresses are emerging, facilitated by key opinion leaders in the field and supported by an increasing use of Twitter ambassadors [3,4]. Furthermore, Twitter promotion of research papers may have a positive impact on future citation rates [5,6]. The current paper will focus on why and how researchers should embrace SoMe dissemination and in addition present a case from the Danish Cardiovascular Academy (DCAcademy) summer meeting 2021.

2. Why use Twitter for scientific dissemination as a researcher?

Networking is important in becoming a successful researcher. In the

Abbreviations: CME, Continuing Medical Education; DCAcademy, Danish Cardiovascular Academy; EST, Eastern Standard Time; SoMe, Social media.

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<https://doi.org/10.1016/j.ijcha.2022.101010>

Received 19 January 2022; Received in revised form 11 March 2022; Accepted 16 March 2022

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beginning of a research career, it may, however, be challenging to interact with established senior researchers. Twitter may constitute a helpful tool in connecting and interacting with researchers around the world. Furthermore, Twitter can be used as a free tool to promote publications with the opportunity to discuss the content with peers and experts. However, the most efficient reason to use Twitter remains uninvestigated. Thirty years ago, *Phillips et al.* showed in *The New England Journal of Medicine* that there was a positive correlation between mainstream media coverage of scientific publications and journal citations [7]. Therefore, it has been hypothesized that there was a relationship between articles promoted on Twitter and journal citations. This has indeed been confirmed by randomized controlled trials showing that articles promoted on Twitter are more likely to be cited [6,8]. Multiple studies have investigated the impact of Twitter on research dissemination. Two crossover studies compared visual abstracts with plain text abstracts and demonstrated higher rates of impression (total number of times a tweet has been seen) and engagement (total number of times a user interacted with a tweet) in the visual abstract arm [9,10]. However, randomized controlled trials using article views and downloads as outcome measures failed to show any differences [8,11,12]. The more recent randomized controlled trial “Three facts and a Story” demonstrated that connected tweets featuring personal motivations leading to the research questions and a summary of the main findings with an attached visual abstract increased the engagement significantly as compared to visual abstracts alone [13]. Thus, tweets containing visual abstract featuring the reason behind the research may be one way of optimizing the use of twitter for research dissemination.

Journals are increasingly incorporating SoMe editors into their editorial boards to manage their SoMe engagement and content [14]. SoMe editors are using new initiatives as hosting Twitter-based Journal Clubs [15], and “post-publication” feedback [16,17]. However, very little is known about the ideal Twitter Journal Club, but some approaches as @NephJC [18] and #ACEchoJC [19] have been suggested. Randomized controlled trials, however, have not been conducted yet. Hence studies are warranted to optimize the use of Twitter-based Journal Clubs.

Tweetorials is an emerging Twitter strategy found under the hashtag #Tweetorial [20]. The term “tweetorial” is a neologism combining “tweet” and “tutorial”, which perfectly describes what it is – a thread of multiple tweets linked together for a progressive, didactic delivery of information, like a tutorial. The length of a tweetorial is usually 10–15 tweets, however, to the best of our knowledge, no studies has ever tested the optimal length of a thread. Tweetorials are usually made for teaching purpose or to give an elaborated take on a study. In a survey from 2019 of 743 Twitter users, 95.5% of respondents who had read at least one tweetorial answered that they read the tweetorial because they wanted to learn something new, while 94.4% responded that it was to feed their curiosity [20]. In addition, they reported the three most valuable components of a tweetorial as inclusion of media (e.g. video, images), links to literature, and use of polls [20]. Whether these links to literature/publications are cited or downloaded more often has, to the best of our knowledge, not been tested in a randomized controlled setting.

3. How to get started as a researcher in cardiology

3.1. How to create a Twitter account

Twitter is open source, and anyone can create an individual account using a personal e-mail. The username of the account is called a “Twitter handle” and begins with an “@” (e.g. @DCAcademyDK). A professional photo, a description of the user’s professional field of interest/work/expertise and institution should be added to the profile description. A precise description of the user makes it easier to connect with peers with similar interests.

3.2. How to tweet

A tweet is a short message limited to 280 characters. However, it is strongly advisable to create shorter tweets between 71 and 100 characters as they usually gain most re-tweets (other users sharing your tweet) [21,22]. If needed, several tweets may be combined into one thread. Up to four images and one video of maximum 2.20 min in .MP4 or .MOV format can be added per tweet.

3.3. Promoting your publications through tweets

Research articles shared on Twitter are more likely to be cited than articles not shared on Twitter [6,8]. The direct URL link to an article can be added to enhance the reach of the tweet. To save characters, Twitter automatically shortens the URL, while URL shorteners (e.g. bitly.com) has become less important. However, the usage of bitly remains if you use a bitly account and can track the activity of your URL dissemination. Several approaches exist to spread the tweet widely. One is hashtags “#”, used to index keywords or topics allowing users to easily access these. For example, a search for “#summerDCAcademy” returns all tweets that have been tagged with that hashtag, and thereby serves as an archive regarding the topic of the hashtag Note, that hashtags are not case-sensitive, and the use of both upper- and lower-cases within a hashtag usually just serve as a help to read it more easily. Hashtags are usually included directly in the text. However, do not overuse them. For hashtag inspiration it is advisable to visit the symplur cardiology hashtag ontology [23]. Additionally, Twitter handle of co-authors and Journal Twitter handles (e.g. @IJC_Heart_Vasc) can be tagged. Twitter handles of peers can also be added to the tweet inviting them to discuss the tweet. If you need to tag several persons and you have limited characters of your tweet left, you can consider uploading an image (not possible for a video), as up to 10 Twitter handles can be tagged in each image without using additional characters.

3.4. Creating a tweetorial

Beside promoting publications, you may also consider creating a tweetorial. In *Fig. 1A*, an example of a tweetorial made for teaching purposes is given, while *Fig. 1B* depicts an example of a tweetorial created to provide an elaborated take on a study. The setup of the tweetorial may vary depending on the purpose. However, we have several recommendations worth considering before posting a tweetorial (*Table 1*). Initially, you may tempt the audience with a strong and clear statement defining the topic of the tweetorial. To enhance the reach and boost interactions with the tweet, it is advisable to tag peers and use relevant hashtags (e.g. @MedTweetorials to have it catalogued at <https://www.medtweetorials.com>). As noted earlier, the most important components of a tweetorial are inclusion of visual media, links and polls. Using polls in a teaching tweetorial may also be useful for you, as you can evaluate whether users understand the point. A summary tweet stating the most important take-away message at the end of the tweetorial is very important as only the first, last, and second-to-last tweets in a thread are seen by your followers [24]. The tweets in-between are only viewed if the thread is fully expanded. Generally, it is the summary tweet that generates likes and re-tweets, which increases the overall impressions of the tweetorial.

3.5. Creating a Twitter-based Journal Club

A Twitter-based Journal Club can be held in different ways. One way is to organize it like a “Twitter chat”, which is a recurring, scheduled chat with a planned start and end time (e.g. every first Monday of the month from 1 PM to 2 PM). There are a few recommendations that are worth considering before creating a Twitter-based Journal Club as a “Twitter chat” (*Table 2*). The first step is to create a relevant hashtag for the Journal Club (e.g. #CardioJournalClub). This allows participants to

A

Daniel Fyenbo @DFyenbo · 5h

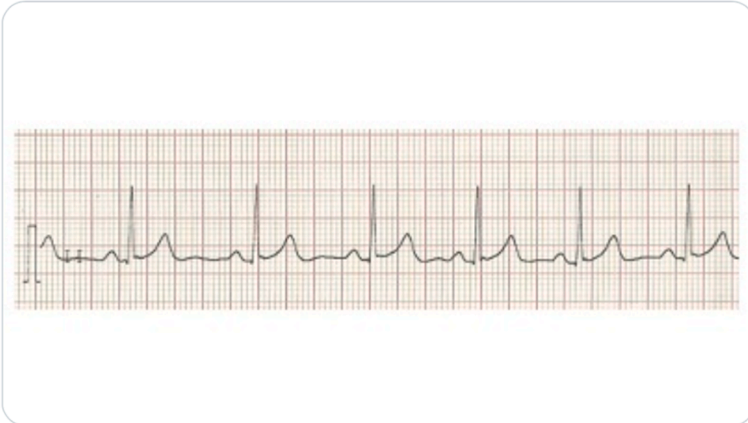
1/ 📖

Time for a [#tweetorial](#) on simple [#ECG](#) interpretation

When I learned to read ECGs, my biggest fear was to miss an important finding!
To avoid that: Be systematic !

My simple approach to ECGs with 8 steps 📋👉

[#medicalstudent](#) [#education](#) [#cardiotwitter](#) [#medtwitter](#) [#EPeeps](#)



1 10 19

Show this thread

B

Emil Nielsen Holck @EmilHolckMD · Sep 14

1/

[#Tweetorial](#) on IAMI trial

💔📌 Does influenza vaccination improve prognosis in patients who have had an acute myocardial infarction?

[@FrobertOle](#) et al. Investigated this in a well executed trial!

bit.ly/2YHycZe

[@CircAHA](#) [@MedTweeterials](#) [#medtwitter](#) [#cardiotwitter](#)

Yes	96.2%
No	3.8%

26 votes · Final results

1 9 8

Show this thread

Fig. 1. An example of a tweetorial with a teaching purpose (A) and elaborated take on a study (B). By clicking on “show this thread” the full thread will expand, and the thread can easily be read.

Table 1
Recommendations on how to post a tweetorial.

- Open with a strong clear state defining the topic
- Tag peers
- Use relevant hashtags
- Use media (videos, images etc.)
- Use links to further reading / publications / other relevant information
- Use polls
- Use summary tweet at the end
- Be mindful of the length
- Be careful with patient information

Table 2
Recommendations on how to conduct a Twitter-based Journal Club.

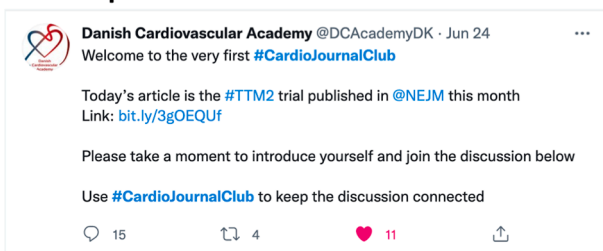
- Create a relevant short hashtag and ask participants to use it during the event
- Find a relevant article to be discussed and request, if necessary, to be made freely available
- Invite authors and experts in the field of the featured article
- Invite peers
- Promote the Journal Club with link to the article
- Prepare questions to be discussed during the event
- Use a moderator to facilitate the discussion
- End the session by thanking all participants

follow tweets in relation to the event. To avoid hashtag cluttering, it is advisable to make it as concise and precise as possible. This hashtag may be re-used for following Journal Clubs. Thereafter you may choose a relevant article to be discussed in the Journal Club and invite the authors to participate. Promotion is important and invite both experts in the field and peers with relevant hashtags. If available, use a visual abstract of the publication as images attract readers. Before launching the event, prepare questions that may be posted as text an image (Fig. 2). If you want to be active in the discussion yourself, you may consider using a

Preparation

What is hot?	Generate an audience
When to publish?	Find a moderator
What to ask?	Generate attention
What timespan?	Hashtags and handles

Twitter post



Timeline

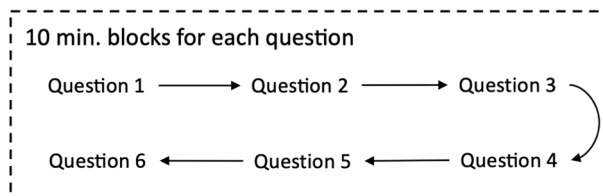


Fig. 2. Organizing a Twitter-based Journal Club. In the preparation of a Twitter-based Journal Club the author should consider the content and execution of the journal club. The moderator of the event should stick to the timeline, which could be 10-minute blocks for each question.

moderator to facilitate the discussion. Also, remember to acknowledge participants for their participation at the end of the Journal Club. Information on how to keep the audience engaged after the Journal Club is described by Topf and colleagues [18]. Another way to settle a Twitter-based Journal Club is to use the recently launched feature named “Spaces”. This is a way of having live audio conversations as up to 13 speakers can be invited to discuss a topic or an article. Everyone on Twitter can listen directly to the discussion. Like “Twitter chat”, a “Space” can be scheduled so the Twitter-based Journal Club via “Spaces” can be promoted. Despite the feature has just been launched very recently and the experience with this is very little, this may be an appropriate way of having a more deeper ongoing scientific discussion.

3.6. Creating other content on Twitter

It is important to stay active on Twitter to keep your followers. Twitter is a very fast moving SoMe platform and an individual tweet has a medium lifespan of approximately 18 min meaning that the post is visible on most people’s timeline during the first 18 min [21]. Hence, to stay at peoples Twitter-feed you may tweet multiple times a day. However, tweeting a few times per month may be sufficient to keep most followers. Relevant content to tweet about may include posts about daily research practice, an interesting patient case and re-tweeting (share) other persons’ tweets.

Finally, be aware of spelling/broken links/other mistakes of the content before posting, as you are not allowed to edit the tweet after it has been posted. Furthermore, only post fully anonymized patient cases that comply with data protections rules and has an informed consent. Even though you can delete your own tweets after posting them, some may potentially have screenshotted the tweet and considerable harm and controversy can continue. Additionally, lack of ethical research can hinder trustworthiness if a patient recognizes him/her in a patient case without informed consent. Therefore, it is of utter importance for the researcher to keep a high moral and ethical standard when navigating SoMe.

3.7. When to tweet

A randomized controlled trial found no significant difference in impressions or total engagements with tweets at various times of the day (9 AM, 1 PM, 5 PM, and 9 PM) across four Eastern Standard Time (EST) periods [25]. Tweeting at 1 PM EST appeared to generate the highest and 9 PM EST the lowest reach to both physicians and members of the public. However, the sample size for each group was very small (N = 14), and the results should be interpreted with that in mind. Hence, the optimal time of a tweet remain unanswered and larger studies are warranted.

4. Danish Cardiovascular Academy summer meeting

There is a rapid growth in the use of SoMe at cardiovascular scientific sessions [4]. This may be due to SoMe’s ability to promote an event and rapidly disseminate information during the event. Both small and large event can use SoMe for this purpose. In the following, we would like to describe the DCAcademy summer meeting 2021, where SoMe was an essential part of the meeting. The DCAcademy was set up in 2021 as a nationwide academy (supported by the Danish Heart Foundation and the Novo Nordisk Foundation) in Denmark with the mission to facilitate talent development and to improve diagnosis, treatment and prevention for patients with cardiovascular disease [26]. In June 2021, DCAcademy held the first annual summer meeting over three days with Twitter for scientific dissemination as one of the key topics during the meeting. Before the meeting, the hashtag “#summerDCAcademy” was created and participants were encouraged to use the hashtag in all tweets in relation to the summer meeting. DCAcademy also posted tweets about the event using the hashtag. During the event, monitors were live

streaming the hashtag #summerDCAcademy. Furthermore, an invited speaker (Dominik Linz) held a talk about Twitter and its advantages to motivate participants to use Twitter. After the meeting, DCAdemy posted highlights from the event and thanked the participants for their engagement. Participants had the opportunity to follow peers from the meeting and potentially establish a collaboration. A systematic approach on how to set up a new event using Twitter is presented in Fig. 3.

Every Twitter account can use “Twitter Analytics”, which is an overview of your Tweet data. Several metrics (e.g., impressions, engagements etc.) for every single tweet is shown. If you need more data on the interactions, <https://www.symplur.com> may be helpful.

From the first to the last tweet made in connection to the DCAdemy summer meeting, the tweets earned 19.900 impressions. The total number of impressions peaked on the last day of the meeting, possibly affected by the talk on the use of SoMe that was given during the meeting. To investigate this, we send all 62 participants a survey regarding their use of SoMe, including Twitter, after the event (all survey data can be assessed here <https://da.surveymonkey.com/results/SM-ZJ7LLNFY9/>). In total, 48% (N = 30) participants responded, including both PhD students, post docs and senior researchers. Of these, 47% (N = 14) already used SoMe to share and discuss scientific data, publications, achievements, research stays and opinions primarily on Twitter and/or LinkedIn (Fig. 4A) either on a weekly or monthly basis. The participants reported the pros of using SoMe to be that it is a fast way of communicating, it permits a two-way real-time discussion and can be expanded to more than two people (Fig. 4B). The cons of using SoMe were primarily reported to be that the non-verbal communication is lost and that it takes too much time (Fig. 4C).

Forty percent (N = 10) used SoMe during DCAdemy summer

meeting to share and discuss data with their colleagues. Of these, 60% (N = 6) reported that the talk on SoMe inspired them to start using SoMe more or differently such as for instance how to compromise the content that is Tweeted and start using Twitter as a tool to communication. The remaining 60% (N = 15) of participants did not use SoMe during DCAdemy either because they did not use SoMe in general or because they did not find it relevant. One participant had no experience, and one was new in the field and therefore preferred using Twitter more as a tool to observe and learn. However, out of the participants that did not use SoMe at the meeting 50% (N = 7) were inspired to start using SoMe after the meeting. The participants reported that the talk on the use of SoMe gave them insight into the impact SoMe, how fast research can be disseminated and that it is a good way of getting noticed in the research field. Based on this survey we can conclude that adding awareness about the use of SoMe both can inspire already user and non-users to use SoMe, as well as it may have a positive influence on the total number of Tweet impressions during the event. However, the data is cross-sectional and therefore, we are not certain if responders intend to use Twitter after the meeting.

5. Limitations using Twitter for scientific dissemination

A fundamental principle in scientific dissemination is peer-review. This principle is compromised on Twitter, which leaves a great responsibility on the reader and the one who create the tweet. Therefore, it is advisable to be aware of the source of the tweet. In context of this lack of peer-review there is also a potential problem when a key opinion leader in the field tweets, as followers may have a reduced level of criticism and therefore not challenge the statements provided. Nevertheless, another fundamental principle of science is “freedom of speech” which is exceptionally provided through open platforms like SoMe. One could argue that the conservative, peer-review-based publication system of scientific journals is sometimes not open-minded enough and there are several examples of scientific innovations having failed in their first attempts of publication peer reviewed journals. The lack of peer-review in the open platforms could be viewed as problematic since it requires the readers to be very critical and some may not have the expertise to critically review content on SoMe. On the other hand, one could argue that by giving access to scientific content to several readers and potential experts, the swarm intelligence brings about a stronger peer-review than the traditional one provided by journals. Furthermore, laymen do also have access to all scientific tweets, and may potentially interpret the scientific tweets wrongly, which could be harmful and possibly impair the doctor-patient relationship if the patients insist to trust what they read on Twitter more than their own doctor. However, it may also have the opposite effect and help to break down the barriers between the doctor and patient. Thereby the doctors and researchers give a great opportunity to interact with their patients and probably lower the dispersion of misinformation. A challenge is also the concept of the K-index which is the correlation between a researcher’s number of Twitter followers and research citations [27,28]. A researcher with K-index > 5 means that the researcher has built their public Twitter profile on a non-scientific foundation, while a very low K-index suggests that a scientist is being undervalued on Twitter [21]. This may not be the truth for young researchers, who are active with science-related content online. Another potential concern is that visual content has great impact on impressions on Twitter and therefore one might fear that researchers and journals will have a higher focus on the visual expression of the paper than the actual science. Therefore, it is of great importance that researchers do not compromise their scientific integrity. Lastly, it is important to acknowledge that other SoMe platforms besides Twitter are useful for promoting scientific content and staying in touch with professional peers.

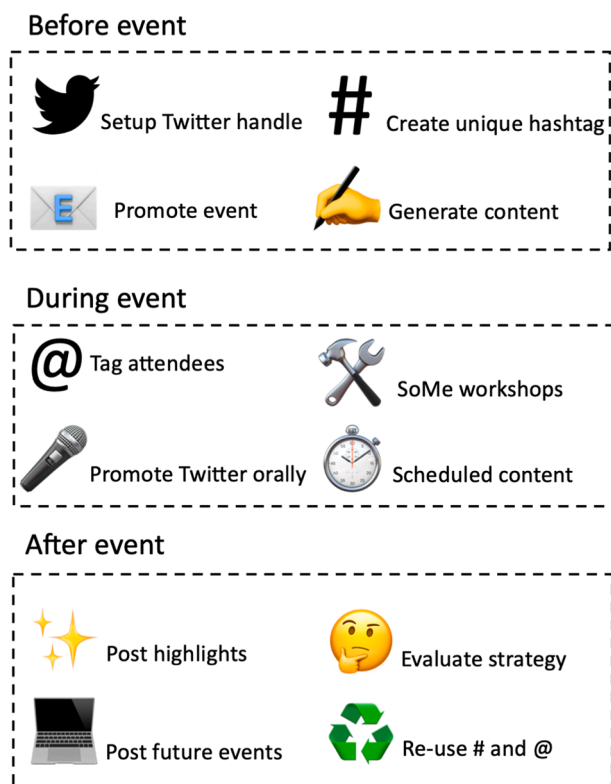


Fig. 3. Organizing an event/meeting on social media. Using these recommendations may help increase the aware of the event both before, during and after the event. This may both be beneficial for the event committee and participants as they can follow each or comment on Twitter posts from the event, even after it has ended if the event committee post highlights.

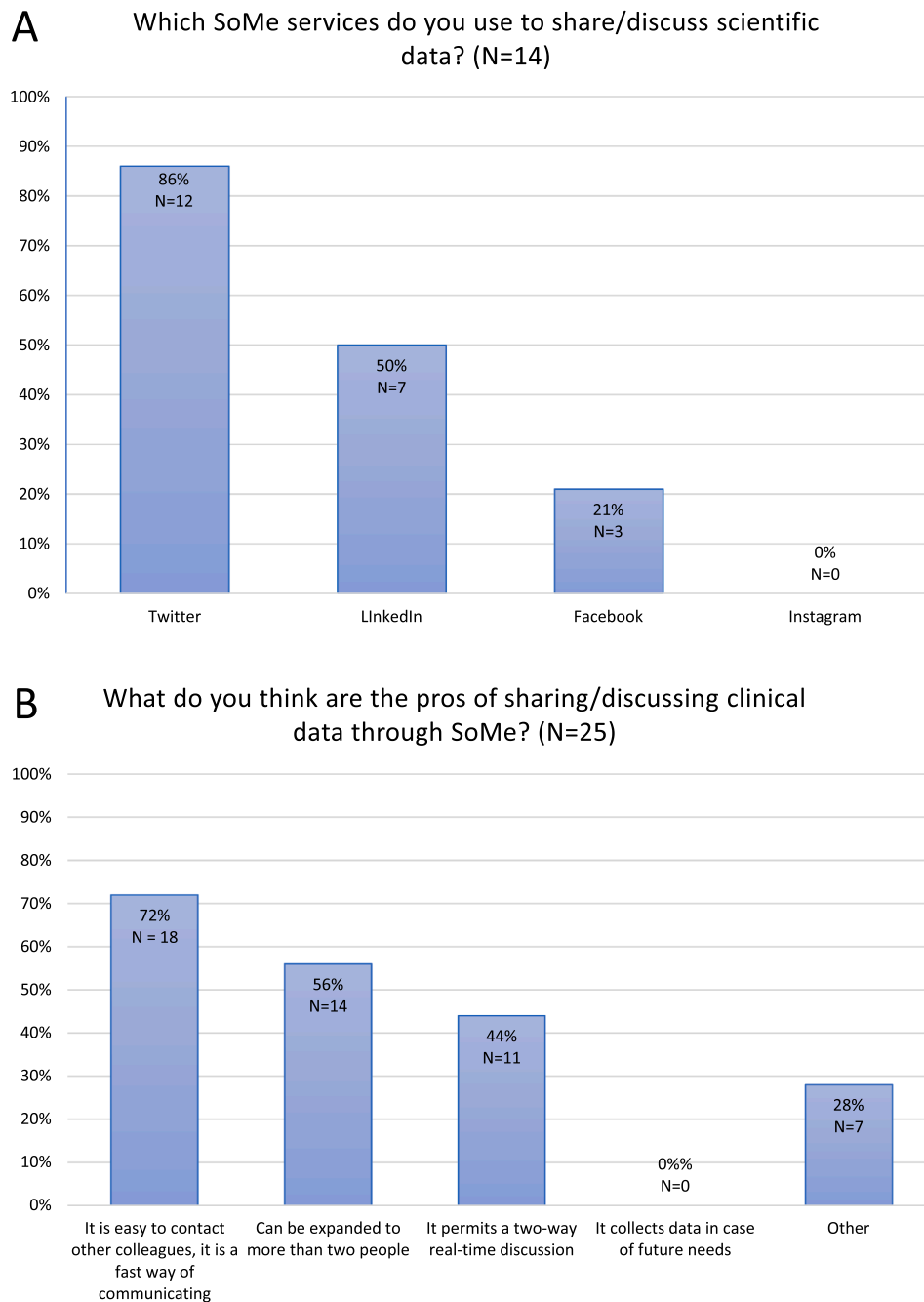


Fig. 4. Survey data from participants attending the Danish Cardiovascular Academy Summer Meeting about their use of social media (SoMe) services (A), and pros and cons of sharing/discussing clinical data through SoMe (B and C). All survey data can be assessed here <https://da.surveymonkey.com/results/SM-ZJ7LLNFY9/>.

6. Future perspectives

One may speculate on the sustainability of SoMe, in particular Twitter, for professional use, as such types of technological advances may have a “euphoria” period. This platform is suitable for keeping the reader up-to-date very quickly as one tweet is limited to maximum 260 characters and therefore only include the absolute key messages. We believe the use of SoMe for professional use is sustainable and evolving, as it provides easy and fast access to topics of interest and opportunities for networking with colleagues outside of your network. Furthermore, most high impact journals have an active tweeting policy and are conducting trials on how to improve Twitter dissemination [6], which underlines the well-established position of SoMe within the established

scientific world of peer-reviewed journals. On the other hand, SoMe platforms as Instagram, Reddit etc. may also be justified for scientific dissemination and education. Instagram may be a platform that is more suitable for sharing cases and Reddit may provide a better discussion forum for sub-specialties. However, these lack the power of speed that is an inherent feature of Twitter but we will probably look into a future where different kind of dissemination is tailored for different SoMe platforms. Hence, for the researcher it is important to embrace a future where citations, H-index and Pubmed hits may have lesser impact than today. It is reasonable to believe that high Altmetric (alternative metrics) attention score, re-tweets and possibly number of individual paper downloads will be incorporated in the assessment of scientific impact. Due to the very short window of opportunity to catch the reader,

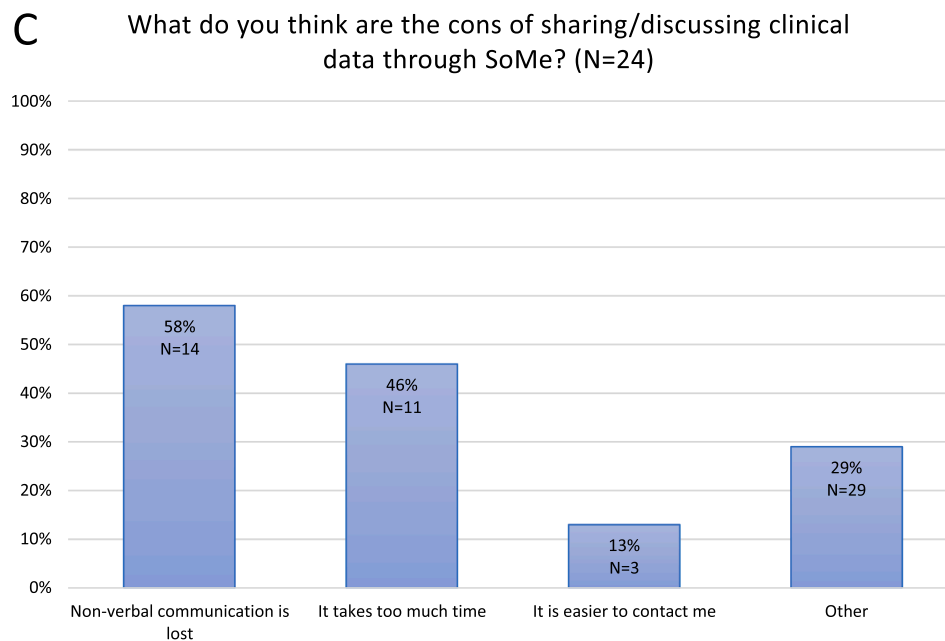


Fig. 4. (continued).

journals will have high demands regarding graphical content (e.g., visual abstract) and precise and concise tweets of equal importance as the written abstract. Also, when applying for research funding and future jobs it could be wise to incorporate an active SoMe strategy. Teaching using Twitter has recently gained increased attention and we might even see an increased use in awarding continuing medical education (CME) credits for participating in Twitter based education as with #ASEchoJC (Twitter-based Journal Club created by the American Society of Echocardiography). Young researchers are digital natives and therefore have a responsibility to expand SoMe in their scientific community, including branding their organization and involving more senior peers to this unique opportunity to scientific dissemination and discussion. An organizational Twitter account could be driven by young researchers and managed by an editorial board consisting of both senior and junior researchers.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

The authors would like to thank the DCAcademy for arranging a summer meeting with focus on Twitter, which inspired us to write this manuscript. We would also like to thank Professor Christian Aalkjær for reading and commenting on the article.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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