REVIEW

Social media in cardiovascular medicine: a contemporary review
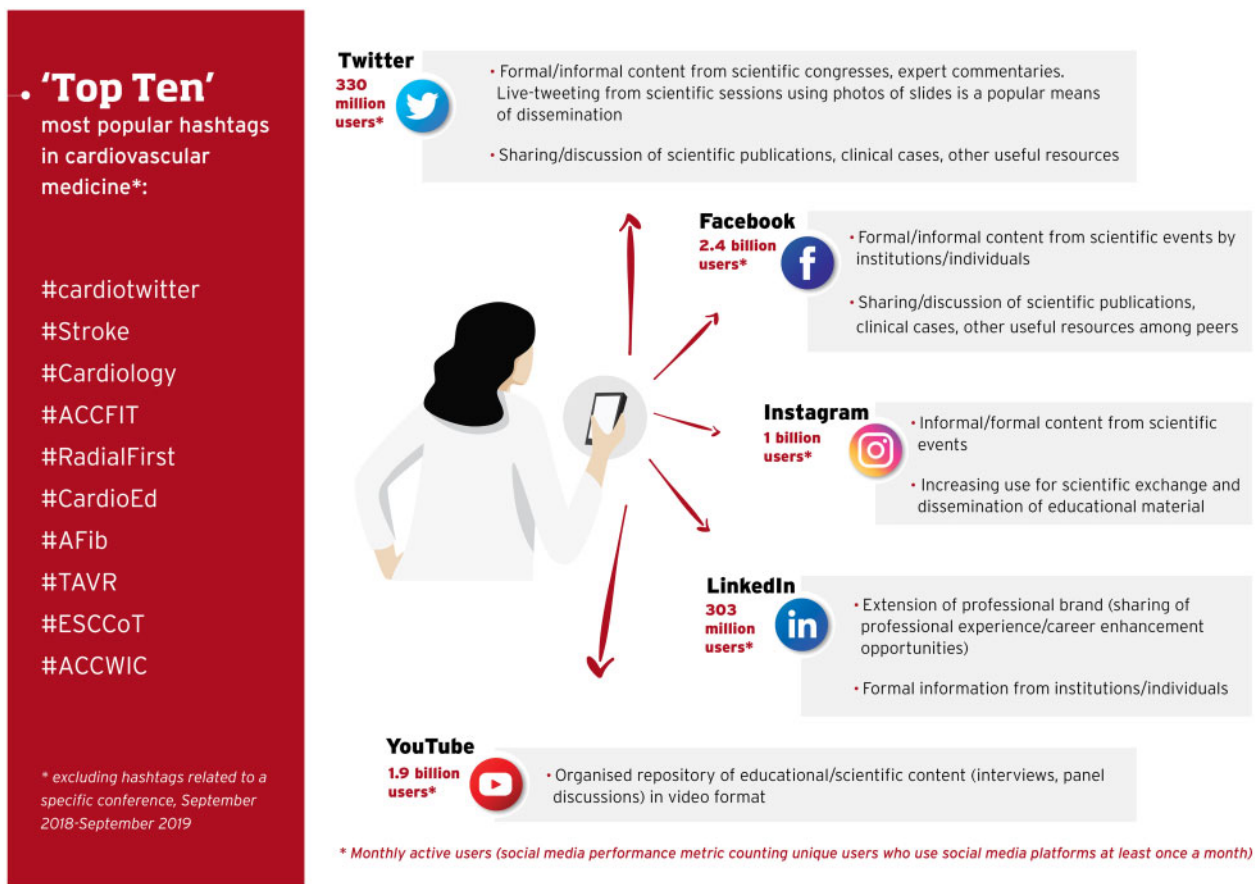
Ricardo Ladeiras-Lopes[1,2]*, **Lavinia Baciu**[3], **Julia Grapsa**[4], **Afzal Sohaib**[4,5], **Rafael Vidal-Perez**[6], **Allan Bohm**[7,8], **Harri Silvola**[9], **Maria Rubini Gimenez**[10,11], **Saverio Muscoli**[12], **Markus Wallner**[13,14], **Amina Rakisheva**[15], **Vivien Klaudia Nagy**[16], **Martin R. Cowie**[17], **Sarah C. Clarke**[18], **and Stephan Achenbach**[19] **On Behalf of the 'Cardiologists of Tomorrow', Digital Health and Media Committees of the European Society of Cardiology**

[1]Cardiology Department, Gaia Hospital Centre, Vila Nova de Gaia, Portugal; [2]Cardiovascular Research Centre, Faculty of Medicine, University of Porto, Porto, Portugal; [3]European Society of Cardiology; [4]Barts Heart Centre, London, UK; [5]Barking, Havering and Redbridge University Hospitals, London, UK; [6]Department of Cardiology, Hospital Universitario Lucus Augusti, Lugo, Spain; [7]Department of Acute Cardiology, National Institute of Cardiovascular Diseases, Bratislava, Slovakia; [8]Academy - Research Organization, Bratislava, Slovakia; [9]Department of Cardiology, Oulu University Hospital, Oulu, Finland; [10]Heart Centre Leipzig, Leipzig, Germany; [11]University Hospital of Basel, Basel, Switzerland; [12]Department of Cardiology, Policlinico Universitario "Tor Vergata", Rome, Italy; [13]Lewis Katz School of Medicine, Temple University, Cardiovascular Research Center, Philadelphia, PA, USA; [14]Division of Cardiology, Medical University of Graz, Graz, Austria; [15]Cardiology Department, Scientific and Research Institute of Cardiology and Internal Diseases, Almaty, Kazakhstan; [16]Semmelweiss University Heart and Vascular Centre, Budapest, Hungary; [17]Digital Health Committee of the European Society of Cardiology, Imperial College London (Royal Brompton Hospital), London, UK; [18]Media Committee of the European Society of Cardiology, Royal Papworth Hospital, Cambridge, UK; and [19]Department of Cardiology, Friedrich-Alexander-University Erlangen-Nürnberg, Erlangen, Germany

Social media increasingly impact both the private and professional lives of the majority of the population, including individuals engaged in cardiovascular healthcare and research. Healthcare providers across the world use social media platforms such as Twitter or Facebook to find medical and scientific information, to follow scientific meetings, to discuss individual clinical cases with colleagues, and to engage with patients. While social media provide a means for fast, interactive and accessible communication without geographic boundaries, their use to obtain and disseminate information has limitations and the potential threats are not always clearly understood. Governance concerns include a lack of rigorous quality control, bias due to the pre-selection of presented content by filter algorithms, and the risk of inadvertent breach of patient confidentiality. This article provides information and guidance regarding the role and use of social media platforms in cardiovascular medicine, with an emphasis on the new opportunities for the dissemination of scientific information and continuing education that arise from their responsible use.

* Corresponding author. Tel: +351 22 786 51 00, Email:ricardoladeiraslopes@gmail.com

Graphical Abstract

'Top Ten' most popular hashtags in cardiovascular medicine*:

#cardiotwitter
#Stroke
#Cardiology
#ACCFIT
#RadialFirst
#CardioEd
#AFib
#TAVR
#ESCCoT
#ACCWIC

* excluding hashtags related to a specific conference, September 2018-September 2019

Twitter 330 million users*
- Formal/informal content from scientific congresses, expert commentaries. Live-tweeting from scientific sessions using photos of slides is a popular means of dissemination
- Sharing/discussion of scientific publications, clinical cases, other useful resources

Facebook 2.4 billion users*
- Formal/informal content from scientific events by institutions/individuals
- Sharing/discussion of scientific publications, clinical cases, other useful resources among peers

Instagram 1 billion users*
- Informal/formal content from scientific events
- Increasing use for scientific exchange and dissemination of educational material

LinkedIn 303 million users*
- Extension of professional brand (sharing of professional experience/career enhancement opportunities)
- Formal information from institutions/individuals

YouTube 1.9 billion users*
- Organised repository of educational/scientific content (interviews, panel discussions) in video format

* Monthly active users (social media performance metric counting unique users who use social media platforms at least once a month)

Keywords   Social media • Cardiovascular medicine • Cardiovascular science • e-Cardiology • Digital health

Social media—use and impact

Social media have become an integral component of modern life for many—a real-time extension of our personality, expertise or 'brand', albeit to a greater degree in some countries than others, and with higher usage among younger individuals. Worldwide, 4 billion individuals use the internet (53% of the population), and ∼3.2 billion individuals (42% of the population) are active social media users (see *Table 1*), with an average annual growth rate of 13%.[1] The majority of healthcare providers are users and in several surveys more than 80% of healthcare professionals reported active engagement in social media.[2]

Social media postings related to cardiovascular health and disease cover a wide spectrum. For example, an analysis of English-language 'tweets' (microblogs on the social media platform Twitter™) originating from the USA between 2009 and 2015 revealed that 550 338 tweets were associated with cardiovascular disease, most frequently relating to risk factors (42%), awareness (23%), and management (22%). Automated language analysis suggested that 53% of users were female and that the average age was 29 years—older than the average Twitter user. In a small percentage of the analysed tweets (3%) the persons who tweeted appeared to have cardiovascular disease themselves.[3]

The impact and reach of social media discussions can be measured in various ways. For example, the 'potential impressions' metric is a way to quantify social media traffic around a particular topic, or a hashtag on Twitter (such as #heartdisease). It is a limited metric in that it does not show actual impressions, i.e. how many times content with that hashtag was actively viewed, but how many times the hashtag could have been seen on Twitter by all followers of those tweeting (or retweeting) on the topic.

This metric is a widely used tool among healthcare professionals and organizations, and potential impressions around particular events can reach very high numbers. As an example, *Figure 1* provides Twitter activity in the context of five global cardiology conferences, measured through potential impressions of the relevant conference hashtag in the time period extending from 3 days before to 3 days after the event (when most social media comments are posted about an event).

The value of social media postings was recently boosted by the COVID-19 pandemic. In China, social media (e.g. Sina Microblog-

Table 1   **Most frequently used social media platforms**

Social media platform	Short description	Number of monthly users worldwide	Examples of typical use
Facebook	World's most popular social media platform. Users create a personal profile, add other users as friends and exchange messages	2375 million	• Finding and communicating with friends and peers • Sharing and following informal content from scientific congresses (such as pictures, videos) • Obtaining formal and informal information from institutions and individuals
Twitter	Micro-blogging platform that allows users to communicate by short messages (280 character limit) Considered more professional and formal than other social media platforms	330 million	• Receiving information from medical and scientific journals (e.g. recently published articles, table of content) • Following formal content coming from scientific congresses (such as presentation slides, take-home messages), but also expert interpretation of presented and recently published data • Sharing and discussion of interesting clinical cases supported by media content (pictures, videos)
WhatsApp	Messaging platform that allows users to communicate by text, audio, or video. Users can create groups	1600 million	• Creating private groups for discussion of and exchange of information on specific topics
YouTube	Video hosting website. Allows to upload and watch videos	1900 million	• Finding and watching educational videos
LinkedIn	Platform focused on personal/group branding, professional communication, and job searching	303 million	• Sharing curriculum vitae and information about professional experience • Job postings
Instagram	Photo and video sharing platform	1000 million	• Posting and watching media content (pictures and videos), both professional and personal

Source: https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users/ (21 October 2019).

Weibo Chat; the Twitter of China) has been used to measure public attention towards public health emergencies, during the epidemic of the novel coronavirus. A large amount of information about the COVID-19 epidemic was disseminated on that platform and received widespread public attention[4] and the Twitter material generated about the COVID-19 has been collected for further analysis.[5] In Italy, a cross-sectional survey of 645 physicians showed that 70% increased their use of social media to seek medical information, and almost half reported that information shared on social media had a consistent impact on their daily practice.[6]

Social media platforms

While there are some particular characteristics to each social media platform, they share common terminology and characteristics (see *Table 2*).
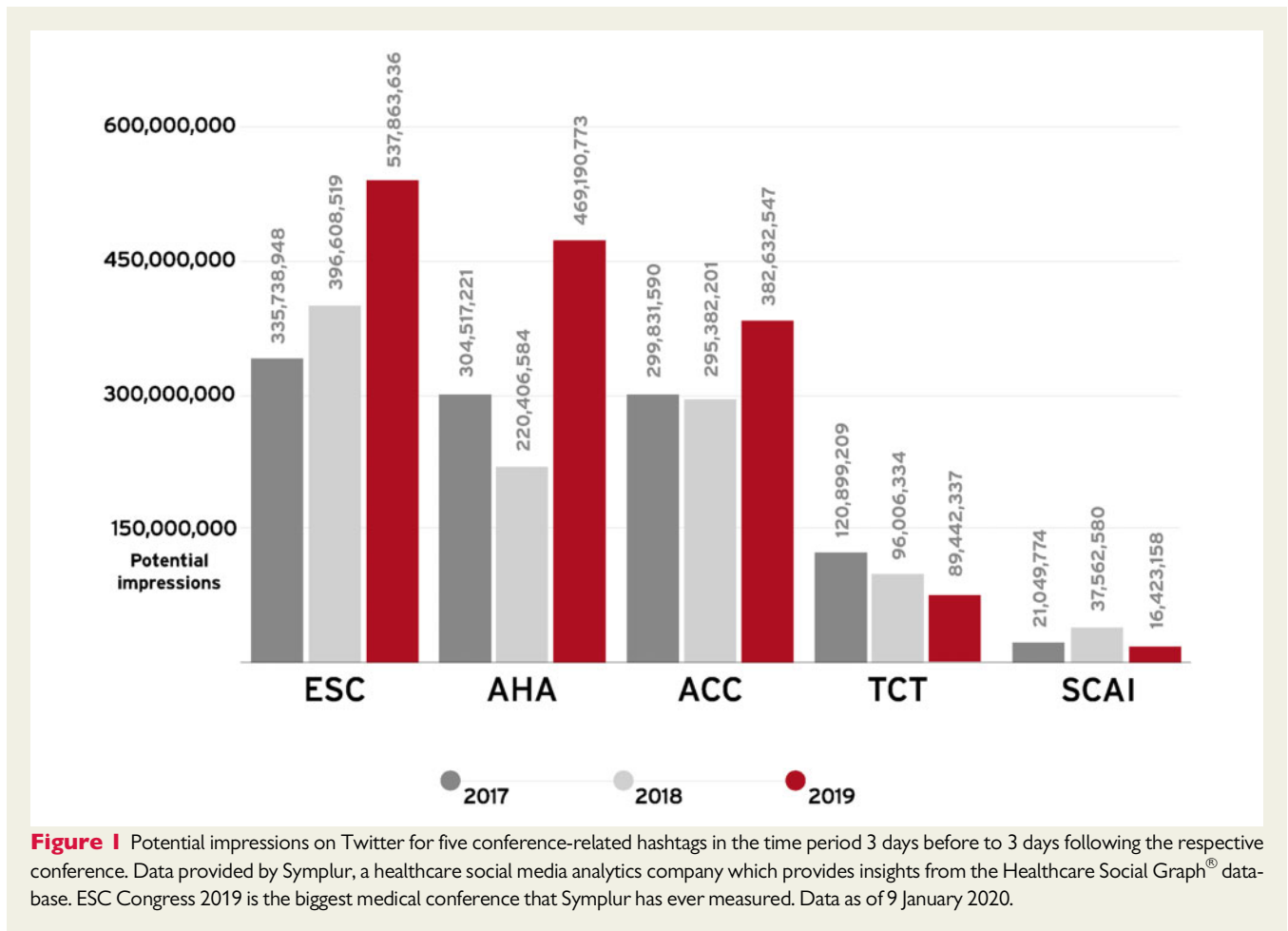
Cost, accessibility, speed

Most social media platforms are free to use, and this provides an opportunity for resource-poor societies and individuals to readily access information. While some 'traditional' internet educational resources require payment (with access restriction through a paywall or requirement for membership subscription), access to information on social media is typically free of charge.

Two other notable features of social media are mobility and interactivity. Social media platforms are optimized for usability on smartphones and tablets and currently more than half of US social media users access the platforms exclusively on a mobile device.[7] Through ongoing algorithm updates, social media platforms are continuously competing for the highest possible share of users' time. For healthcare professionals, such algorithms translate into more streamlined content 'served' to their newsfeed. Furthermore, the social media 'product' is enhanced by the unique ability to exchange opinions with virtually anyone, in real-time (or close to). One initial post followed by several comments can develop into a growing exchange both for active participants engaged in the discussion or those reading passively in the background.

Use of different platforms for medical education and research dissemination

Facebook and Twitter are the most frequently used social media platforms for the exchange of scientific information[8] (see *Table 1*). In order to identify available material on a specific topic or area, an individual can typically follow three strategies:

(1) To 'like' (on Facebook) or 'follow' (on Twitter) another user—this can be an actual person, but also an institution or journal. Subsequently, all information sent out by this user will be received and prominently displayed in the individual's newsfeed.

Figure 1 Potential impressions on Twitter for five conference-related hashtags in the time period 3 days before to 3 days following the respective conference. Data provided by Symplur, a healthcare social media analytics company which provides insights from the Healthcare Social Graph® database. ESC Congress 2019 is the biggest medical conference that Symplur has ever measured. Data as of 9 January 2020.

(2) To enter suitable 'terms' in the search window to actively identify information regarding a specific topic. The most effective approach is to search the hashtag of the desired topic and this works particularly on Twitter (e.g. #HeartFailure, #diabetes, #echocardiography—see *Figure 2* for the most frequently used hashtags in cardiology in the past year).

(3) To move from one 'post' or tweet to another, usually via links embedded in a message or via replies other users have sent to the original message, conversations commonly referred to as 'threads'.

Specific to medical education, many scientific journals send alerts on relevant publications or post their tables of content on social media, promoting discussion among the medical community and attracting new audiences. In some cases, full articles may be available free of charge. For example, the *European Heart Journal* and all other ESC (European Society of Cardiology) Journals are represented on Twitter through the @ESC_Journals account. The unique feature here is that each tweeted publication is made available through free access for at least 24 h from the time of the tweet. Interestingly, an ongoing trial randomized a group of articles published by ESC Journals family to promotion via social media (@ESC_journals account) vs. not and the citations rate of those articles was subsequently analysed. A recently published preliminary analysis suggested that a social media strategy of Twitter promotion for cardiovascular

medicine papers seems to be associated with increased online visibility and higher number of citations.[9]

In addition, social media play an increasingly important role in expanding the reach of scientific congresses and meetings. They provide a means to disseminate the presented content globally, with little or no delay. Typically, hashtags are used to identify information relative to a specific scientific gathering, some examples are listed in *Table 3*.

Alongside informal social media activity by congress attendees and reaction to such activity by other users, official messages are usually posted by the congress organization itself. The social media 'footprint' of medical congresses can be enormous. The ESC vision on conference hashtags is that they should become an archive of the new science presented at the respective congress and the discussions around it by professionals on-site or those 'watching the news' from home. The ESC actively encourages the live sharing of cardiovascular science at its congresses and the most convenient social sharing is via Twitter, particularly for the ability to segment discussions through hashtags and have them open for all to contribute.

For example, Twitter activity around the ESC Congress 2019 included 65 900 total tweets (all unique tweets, retweets, retweets with comments, and comments that contained the #ESCCongress hashtag) from a total of 13 100 unique Twitter profiles, jointly generating more than 540 million *potential* impressions (data provided by

Table 2 Terms frequently used in social media platforms

Term	Definition
Bitly	A free website to shorten web addresses so users can save characters/make them tidy
Cloud	Data exclusively stored and accessed online
Direct message	Private conversation on Twitter (possible only among individuals who are following each other)
Fake news	False information spread on the internet (especially through social media channels) on purpose so that people believe is true
Feed/newsfeed	The display of posts from followed accounts; their sorting is decided by each network's unique algorithm for choosing to display what is most interesting/relevant to users, based on their behaviour
Follow	To start receiving information from a specific social media account (especially on Twitter)
Followers	Individuals who subscribe to an individual's account (usually on Twitter or Instagram) in order to receive all information sent from that account
Handle	A person's or organization's account name on Twitter (preceded by the symbol @, e.g. @escardio for the official ESC account)
Hashtag	A single word or contracted phrase added to social media posts in order to facilitate finding and tracking that information (preceded by the symbol #, e.g. #ESCongress for content related to ESC Congress)
Like	Approval of another user's social media post on Facebook, Twitter, and Instagram (by clicking the 'Like' button)
Mention/tag	To include someone else's social media user name in a post. Used to attribute content to a specific person, to engage the mentioned person in discussion and to categorize information (format on Twitter: @username)
Post	Content published online on a social media platform. Can comprise text, image, video, audio information, and internet links
Retweet	To forward a message posted by another user on Twitter. The respective button on Twitter allows to retweet received messages along with the original sharer's name
Tag Cloud	Visual depiction of common expressions found in posts or messages relative to a specific topic/hashtag. The size in which a certain expression is visualized reflects the frequency with which it is mentioned
Thread	A series of connected tweets from the same user, usually tweeted at the same time. Phrase equally used for a series of tweets from multiple users as well (all replying to initial tweet/other replies within the discussion)
Trolling	To make a deliberately offensive or provocative post on social media
Tweet	Message with a maximum of 280 characters posted on Twitter. May include images (up to 4) or 1 video or 1 gif
Verified account	Officially validated handle/profile in a social media platform that distinguishes a person/organization's real handle/profile from any false ones that might be created
Viral	Online content posted on social media that circulates rapidly and achieves widespread awareness

ESC, European Society of Cardiology.

Symplur, an organization that analyses hashtag impact by a proprietary algorithm, a method very similar to Google's ranking for websites based on search results. Symplur provides an image of the most influential Twitter profiles during a congress based on who in that field mentioned them and their overall Twitter activities). *Figure 3* is an example of Symplur's analysis of the active cardiology community at ESC Congress 2019, from 31 August to 4 September 2019 (#ESCongress).

Conference delegates have come to expect a free exchange of information from scientific meetings on social media. In 2017, the American Diabetes Association (ADA) concerned that sharing information would lead to copyright infringements of material yet to be published, banned any social media posts from its international meeting. This provoked heavy criticism among the medical community on social media.[10] Importantly, there has since been clarification, e.g. from the *New England Journal of Medicine* that content shared from conference presentations on social media does not preclude publication of the material in the journal.[11]

Networking and peer discussion

The ability to engage in conversations with a wider community is the hallmark of social media. Accordingly, cardiovascular professionals can initiate and participate in discussions about specific topics of interest. By nature, this engagement often leads to the creation of a personal network of individuals with similar interests, unrestricted by geographic boundaries and typically growing over time.

Next to discussions around congresses and publications, an important aspect of peer-to-peer communication in the healthcare sector is the sharing of educational cases or rare findings. The format constraints of social media platforms often force those who post a case to do so in a very succinct format and to create contributions that are particularly valuable through their condensed nature. 'Crowd' reaction to the case may provide additional knowledge and insight and can enhance the educational experience. Such posts and threads are typically found on Twitter and Facebook. In difficult, rare or unclear cases, social media postings can potentially lead to a 'crowd solution' with suggestions for diagnosis or management and with links to further resources. In both cases, broad communication of the case or material and the ability of a large community of healthcare professionals and scientists to comment on it, may serve as a de facto means of validation, albeit not likely as formal or stringent as the traditional peer-review process. It should also be noted that there is evidence for a bias towards reporting cases with a positive outcome (see below), which may distort the perception of those following the
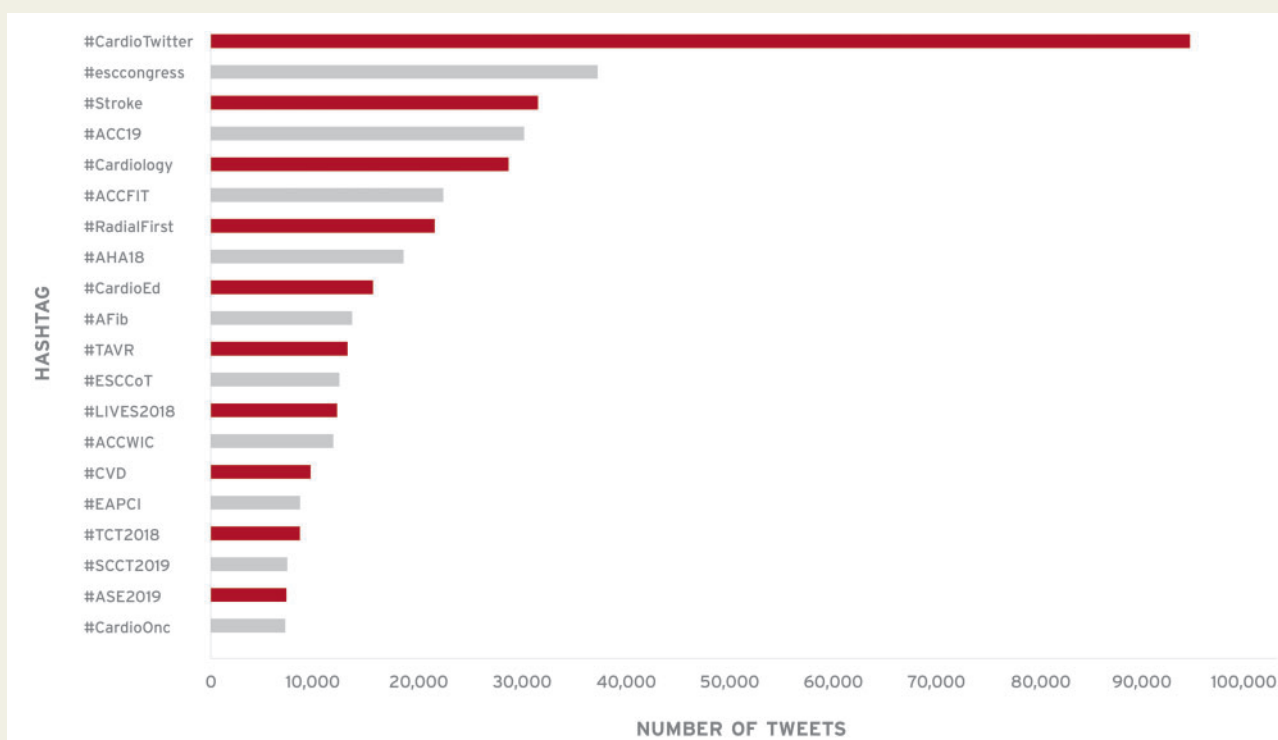
Figure 2 Top 20 most frequently used hashtags in cardiology, by cardiology professionals. Data provided by Symplur, for 15 September 2018–15 September 2019.

Table 3 Social media presence of congresses and events in cardiovascular medicine

Event	Official Twitter handle	Official Facebook account	Hashtag
ESC Congress	@escardio	@europeansocietyofcardiology	#ESCCongress
ESC Digital Summit			#ESCDigitalSummit
Heart Failure Congress			#HeartFailure2019[a]
Acute Cardiovascular Care Congress			#AcuteCVD19[a]
EHRA Congress			#EHRA2019[a]
EuroPrevent Congress			#EuroPrevent
EuroHeartCare Congress			#EuroHeartCare
EuroCMR Congress			#EuroCMR
EuroEcho Congress			#EuroEcho
International Congress on Cardiac CT and Nuclear Cardiology (ICNC)			#ICNC2019[a]
EuroPCR Course	@PCROnline	@PCROnlineCommunity	#EuroPCR
American College of Cardiology Annual Scientific Meeting	@ACCinTouch	@AmericanCollegeofCardiology	#ACC20[a]
American Heart Association Annual Scientific Sessions	@American_Heart	@AHAMeetings	#AHA19[a]
Cardiovascular Research Foundation's Transcatheter Cardiovascular Therapeutics	@crfheart	@CRFHeart	#TCT2019[a]
Society for Cardiovascular Angiography and Interventions Scientific Sessions	@SCAI	@SCAINews	#SCAI2019[a]

ESC, European Society of Cardiology.
[a]In these meetings, the official hashtag changes every year.

Figure 3 Twitter handles listed as the top 10 influencers during European Society of Cardiology Congress 2019, from 31 August to 4 September 2019 (#ESCCongress). Data provided by Symplur.

thread around a particular topic. Further research on how social media messages and content might actually change and influence healthcare practice is needed.

Public and patient engagement

While social media can contribute towards the effective dissemination of the latest science among healthcare professionals, they may also be a useful tool to convey important health messages to the public. However, experience shows that only a small percentage of such posts are authored by cardiovascular professionals.[12] Social media enable patients with a specific disease or disorder to share their experiences with fellow patients.[13] Content in video format, for example, on YouTube, is often perceived as particularly useful[14–16] and has been shown to help affected individuals address common cardiovascular risk factors, such as diabetes[17] and obesity.[18] Such patient groups have developed a ubiquitous presence on social networking sites. Next to sharing individual experiences and potentially reducing a sense of isolation which can accompany a diagnosis, such activities provide a different perspective from traditional patient education which may be biomedically focused, difficult to understand and potentially perceived as patronizing. A meta-analysis of 42 studies published in 2016 revealed that 48% of publications suggested a benefit of patients using social media for chronic diseases, while 45% reported neutral results and 7% of publications indicated harm to patients.[19] Considering the multi-faceted aspects of social media use in acute and chronic illness, further systematic research is required to fully understand the potential role of these various platforms in disease education and management.[20,21]

Social media also provide opportunities to recruit individuals for health research. Compared to traditional recruitment methods (such as from clinics, or using flyers, advertisements in newspapers, on radio, television, or websites), recruitment through social media platforms potentially reduces costs, shortens recruitment periods and may allow better representation and improved participant selection in young or hard-to-reach population groups.[22–24] Therefore, including social media tools in the design of clinical trials may increase the cost-effectiveness of clinical cardiovascular research. In addition, social media may also help in disease prediction and tracking, providing significant and complementary information beyond traditional surveillance data.[25]

Potential downsides of social media

Some problematic issues of social media are particularly relevant in a scientific and healthcare context.

Inaccurate or biased information

On social media, anyone may express his or her opinion without evidence to substantiate statements and purported facts. Such opinions may gain widespread recognition; 'statin denialism'—with media of all

sorts exaggerating unproven risks of statins—being a recent example.[26,27] Healthcare professionals should be aware that one out of three patients go online in order to determine what medical condition they or someone else might have, and a third of them do not visit a clinician afterwards to get a professional opinion.[28]

While the term 'fake news' is used to describe active disinformation, any social media post could contain incorrect, biased, or out-of-context information. It is ultimately the reader's responsibility to investigate sources and make sure the information is 'verified', although this may be difficult for most people to do. As an example, most social media platforms provide the option of applying for a 'verified account'. Those are officially validated handles/profiles that distinguish a person/organization's real handle/profile from any false ones that might be created.

A systematic analysis of 625 health-related tweets between 1 April and 5 April 2015 revealed that 51.2% contained incorrect information.[29] It is impossible to determine the accuracy of information on a social media platform where the vast majority of posts are neither peer-reviewed nor endorsed by a respected authority. Social media users from the healthcare professions should be actively encouraged to adopt the AACODS (accuracy, authority, coverage, objectivity, date, and significance) checklist that was originally created to evaluate the trustworthiness of content not published in peer-reviewed books or journal articles.[30] Some authors or organizations, including the General Medical Council (UK), the American Medical Association, or the Canadian Medical Association, have made suggestions on how to use social media appropriately.[31–35] These documents place a strong emphasis on the maintenance of professionalism and respect for colleagues, as well as on patient confidentiality and privacy. Indeed, the standards expected of healthcare professionals do not change when they are communicating using social media platforms rather than face-to-face or other traditional media. Healthcare professionals should avoid the risk of blurring the boundaries between private and professional life and always maintain a professional boundary between them and their patients (see below).

Even if information posted on social media is not necessarily incorrect, the entirety of posts may provide an incorrect impression. For example, a recent publication compared the outcome of tweeted cases reporting mechanical thrombectomy in ischaemic stroke to the randomized HERMES trial (Highly Effective Reperfusion Evaluated in Multiple Endovascular Stroke).[36] Mortality was significantly lower in tweeted cases than in the randomized trial (0% vs. 15%, $P < 0.0001$) as were other complications (e.g. symptomatic intracerebral haemorrhage, 0% vs. 4.4%, $P < 0.0001$), while success rates in reported cases were higher (94% vs. 71%, $P < 0.0001$). This suggests a very strong publication bias towards positive outcomes on social media platforms. To some extent, such publication bias is, of course, also present in more traditional media such as scientific journals.

More generally, for physicians (and other healthcare professionals) and professional organizations, the problem of un-reviewed, non-verified, and potentially biased information on social media presents an opportunity—indeed, a responsibility—to disseminate accurate, factual information to colleagues and patients by creating and constantly updating a well-curated social media presence.

Specifically regarding Twitter, since tweets are typically short messages one can think about the problem of excessive enthusiasm that

may overhype results and information. However, a tweet is usually they are the start of 'endless' conversations. If some user were to overhype results, there often will tend to be a reply from individuals calling this out.

Privacy concerns and the 'filter bubble'

While social media use typically requires no payment, there nevertheless is a cost. Users pay with exposure to advertising and data collection. While the former is recognizable, the latter usually goes unnoticed. For example, every time an individual engages with Twitter on a smartphone, this is accompanied by a systematic transfer of information from the individual's contact list, unless this option is specifically deactivated. Importantly, most social media platforms such as Facebook and Twitter have several privacy settings options that might be defined as more or less restrictive (e.g. selecting who can view content, who can post messages, and who can join a discussion forum). A proper understanding and individual adjustment of those settings are pivotal whenever the user has important privacy concerns.

Social media also collect substantial amounts of information on the individual user in order to filter subsequent content displayed to them. The 'filter bubble' concept, described by Pariser[37] in 2010, describes how algorithms dictate what internet users find online. Based on past searches, click behaviour, and location, users are preferentially offered articles and posts that support their current opinions and perspectives. While this bias is also present in search engines such as Google, social media have the additional aspect of forming networks of like-minded individuals, amplifying the 'filter bubble' problem. According to Microsoft founder Bill Gates:

> (technology such as social media) '. . . lets you go off with like-minded people, so you're not mixing and sharing and understanding other points of view . . . It's super important. It's turned out to be more of a problem than I, or many others, would have expected. . .'[38]

Obtaining medial or scientific information from social media is therefore not comparable to a thorough, systematic review on a given topic. Careful interpretation of the offered content and awareness of the likely biases are of crucial importance.

Breach of confidentiality

Breach of patient privacy can occur easily on social media. Once information is made public, it is impossible to correct or withdraw. For healthcare professionals sharing clinical cases online, extreme caution must therefore be taken to remove all identifiable data to prevent tracing back to a specific patient. Even unique descriptors of a specific patient such as a rare profession in combination with age and location may allow the identification of a particular individual. Photographs or videos that depict patients, including images taken inside a healthcare facility with another person in the background, must not be published without all of the individuals' informed consent.

The General Medical Council furthermore advises that healthcare professionals should be cautious about using social media to answer

questions from patients—for confidentiality reasons and because the available information may be incomplete.[33]

Patient–physician relationship

Cardiovascular professionals who post on social media should be aware that their audience may include patients. Social media content will influence patient opinions and can lead to a blurring of professional and social boundaries. In an experimental design, it was shown that health professionals whose personal Facebook profiles contained comments suggesting frustration were perceived as significantly less credible than those whose profiles did not. It was also associated with a reduced willingness of individuals to become a patient of that healthcare provider.[39]

A small study involving patients in an obstetrics and gynaecology clinic showed that healthcare providers with Twitter profiles that contained exclusively educational tweets were perceived as more professional than providers whose profiles contained both educational and personal or only personal tweets.[40]

Non-professionalism and problematic social media use

The use of social media can cause problems to individuals (both personally and professionally) with long-term consequences.

As an example, a study of 195 Facebook accounts attributed to practicing surgeons in US teaching hospitals identified no unprofessional content in 85% of accounts, but 'potentially unprofessional content' in 10% and 'clearly unprofessional content' was present in 5% of accounts.[41] 'Clearly unprofessional content' was only identified in accounts attributable to male surgeons, and it was more common in those who were in practice for <5 years. Furthermore, in a systematic US survey, directors of surgery programs reported high rates of social media usage (Facebook 68%, Twitter 40%). These directors frequently reported reviewing the social media profiles of residency applicants, and 11% reported that they lowered the rank or removed an application because of questionable online behaviour.[42] In addition, 10% reported taking formal disciplinary action against a surgery resident because of behaviour displayed online (response rate in the survey was 42.5%, which likely introduces some bias).

Social media use can also have negative impact on the personal life of healthcare providers. Harassment or 'trolling' can affect users, and social media have been identified as a source of new psychological syndromes such as anxiety disorders related to the 'fear of missing out'.[43] 'Problematic' social media use has been associated with depressive and addictive traits.[44] Limiting the daily time of exposure to social media to 30 min (no more than 10 min each on Facebook, Instagram, and Snapchat) has been demonstrated to be associated with improved well-being as well as reduction in perceived loneliness and depression.[45]

The European Society of Cardiology presence on social media

In recent years, the ESC has initiated a systematic presence on all social media channels.
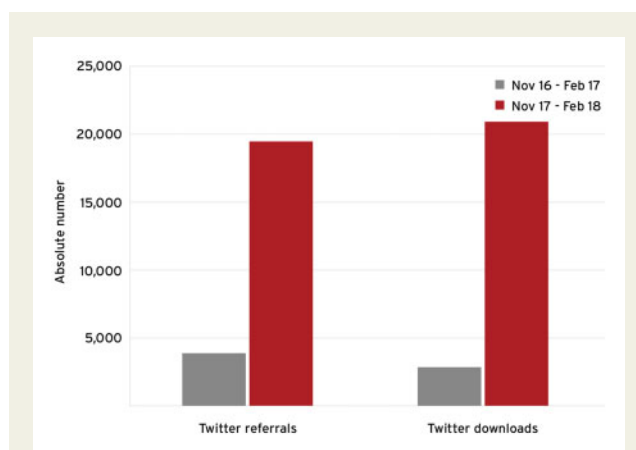

Figure 4 Number of referrals (visits) and papers' downloads coming from Twitter to the websites of 7 out of the 13 European Society of Cardiology journals, comparing the initial 4 months (November 2017 to February 2018) of @ESC_Journals Twitter presence with the corresponding 4 months 1 year previously (November 2016 to February 2017). Data provided by Oxford University Press.

The ESC strives to be as relevant, useful and timely as possible, with the aim to bring the latest and most useful resources to the cardiovascular community, in an engaging way. The ESC believes in a personal tone and approach and intends to have a unique, recognizable voice as well as a focus to connect people with one another. For example, some popular posts are 'Know your Guidelines?', ESC Journals Club, or Clinical Case/ECG challenges.

The ESC prioritizes Twitter. Its main handle is '@escardio' with over 80 000 followers, complemented by the ESC journal family's Twitter handle '@ESC_Journals' with over 23 000 followers. Interestingly, preliminary results exploring the number of referrals (journal visits online) and paper downloads coming via Twitter showed a five-fold increase in visits and seven-fold increase in downloads of published papers for 7 out of the 15 ESC journal family titles. *Figure 4* shows the comparison between the 4 months (November 2017 to February 2018) of @ESC_Journals activity with the corresponding 4 months 1 year before (November 2016 to February 2017). The rapid rise in activity emphasises the growing use of social media platforms (especially Twitter) in cardiovascular science and their role in increasing the immediate visibility of scientific papers.

Although Twitter is the main focus of ESC social media activities, the society is also active and encourages career, educational and academic exchange on Facebook, LinkedIn and Instagram. Equally, the ESC enables specialty or specific interest groups to connect and share unique content through its LinkedIn groups, of which the latest addition is the ESC Digital Health LinkedIn group. The goal is that the #ESCDigital hashtag will become the 'go-to' resource on Twitter for news and discussions covering digital cardiology, a key topic for the ESC.

Conclusion

Over recent years, social media have gained powerful influence globally and throughout society. Although initially cautious, healthcare professionals and organizations are increasingly present on social

media platforms, with young professionals in particular viewing social media as an integral component of communicating, networking, and keeping up to date with the latest science. While potential problems need to be considered, responsible social media use is likely a beneficial addition to traditional means of obtaining and disseminating medical and scientific education. Healthcare professionals and organizations should consider actively engaging in social media in order to counterbalance un-reviewed and biased information. The ESC is increasingly active on social media and is supportive of using these new methods of communication in support of its mission, to reduce the burden of cardiovascular disease.

Conflict of interest: none declared.

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