



Leveraging Social Media for Cardio-Oncology

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Opinion statement

As the world becomes more connected through online and offline social networking, there has been much discussion of how the rapid rise of social media could be used in ways that can be productive and instructive in various healthcare specialties, such as Cardiology and its subspecialty areas. In this review, the role

of social media in the field of Cardio-Oncology is discussed. With an estimated 17 million cancer survivors in the USA in 2019 and 22 million estimated by 2030, more education and awareness are needed. Networking and collaboration are also needed to meet the needs of our patients and healthcare professionals in this emerging field bridging two disciplines. Cardiovascular disease is second only to recurrence of the primary cancer or diagnosis with a secondary malignancy, as a leading cause of death in cancer survivors. A majority of these survivors are anticipated to be on social media seeking information, support, and ideas for optimizing health. Healthcare professionals in Cardio-Oncology are also online for networking, education, scholarship, career development, and advocacy in this field. Here, we describe the utilization and potential impact of social media in Cardio-Oncology, with inclusion of various hashtags frequently used in the Cardio-Oncology Twitter community.

Introduction

Scholarly works on social media in the broader fields of Adult and Pediatric Cardiology, as well as Oncology and Hematology, set a precedent for the role of social media in Cardio-Oncology [1–10]. These works describe both benefits and limitations of Cardiology and Oncology on social media. The described benefits include opportunities for networking among multidisciplinary healthcare professionals and patient advocates, education of colleagues and patients, raising public and societal awareness for various diseases and conditions affecting children, adolescents, and adults in Cardiology, as well as advocacy and professional branding [1–10]. In our quest to achieve these goals in Cardiology on social media, it is important for us to do so in a way that promotes equity, diversity, and inclusion, particularly for women and ethnic minorities. It is also important to ensure that healthcare professionals protect the privacy of patients, and that patients and the general public understand that medical advice cannot be given on these platforms, nor should patient-doctor relationships be formed on social media in their current forms.

While Cardio-Oncology is relatively young within the field of Cardiovascular Medicine. Yet, the cardiac sequelae of many anti-neoplastic regimens, such as mantle radiation, anthracyclines, and targeted therapies (e.g., trastuzumab), have been known for many years. The volume of new and clinically important

information continues to exponentially increase. Novel therapeutics with a multitude of side effects, toxicities, and important drug-drug interactions are being produced at a rapid pace. Social media can help busy clinicians and researchers keep up-to-date on current advances. Real-time educational debates and informed discourse often follow publication of key articles or trials on social media platforms such as Twitter, often led by trialists and content experts. Fast dissemination and discussion of recent literature usually ensues, with reporting and discussion of approaches to unusual adverse effects of cancer treatments. Social media is therefore changing the landscape of how we communicate, network, collaborate, and discuss current trends in cardiovascular medicine, and particularly Cardio-Oncology.

Here, we review current and proposed use of social media in Cardio-Oncology for networking, education, advocacy, branding, and academic career development. The presence and impact of Cardio-Oncology on social media at national scientific meetings, as well as the physician professionalism and patient perspectives, are also addressed. In addition, the roles of the Cardio-Oncology clinician or physician scientist on social media and of Cardio-Oncology social media editors and consultants are discussed. We primarily focus on Twitter as the main social media platform, as it has been heavily embraced by the global Cardio-Oncology community.

Organization and curation with hashtags

Popular and appropriate Cardio-Oncology hashtags have been introduced and should continue to be widely used (Fig. 1). These hashtags are metadata tags on Twitter that help us organize, curate, and find content relevant to the field [7, 11] (Tables 1 and 2). Such hashtags have been useful in various Cardiology subspecialties on Twitter. They connect active and engaged cardiologists, e.g., in prevention (#CvPrev), CV imaging (#EchoFirst for echocardiography, #WhyCMR for cardiac MRI, #YesCCT for cardiac CT, #CVNuc for nuclear cardiology), or structural heart disease (#TAVR, #MitraClip). Hashtags have also been used to establish overlapping interest areas in Cardiology and Diabetes (#CardioDiabetology) or Cardiology and Obstetrics (#CardioObstetrics; to highlight the relationship between the two specialties over the course of a woman’s lifetime), among others.

Oncology and hematology meet cardiology in social media

Cancer care has evolved in the last 20 years, once an isolated specialty, oncology is now composed of multidisciplinary teams and international collaborations. The survival of our patients with cancer has significantly improved with the introduction of targeted therapy and immunotherapy, and we continue to learn the long-term consequences of those treatments, particularly cardiovascular toxicity [12].

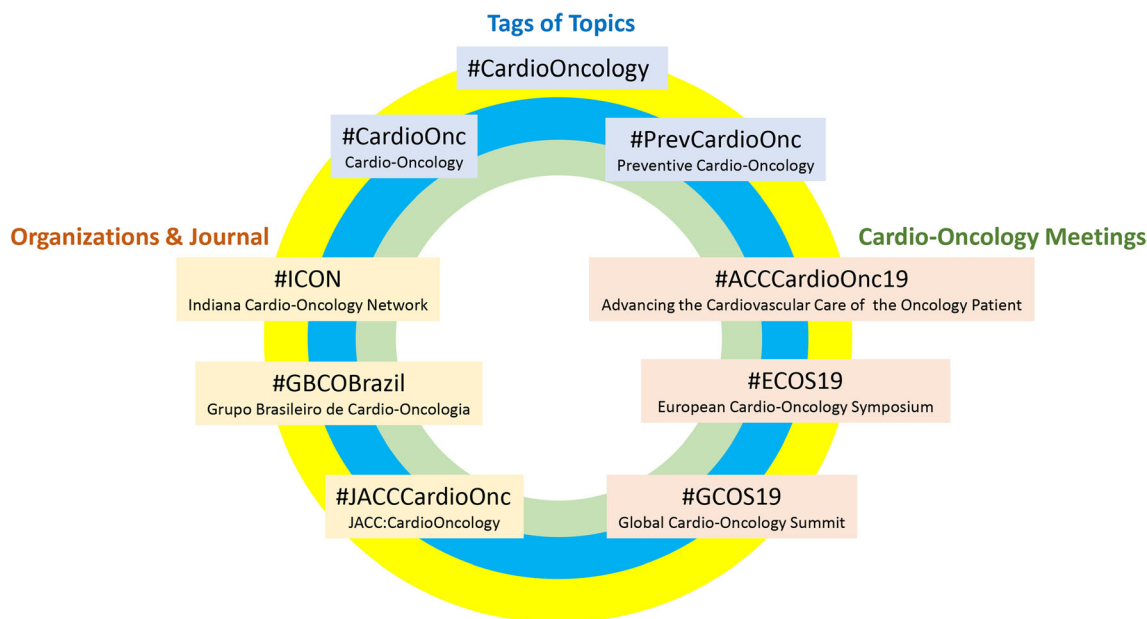


Fig. 1. Popular Cardio-Oncology twitter hashtags.

Table 1. Key Twitter terminology



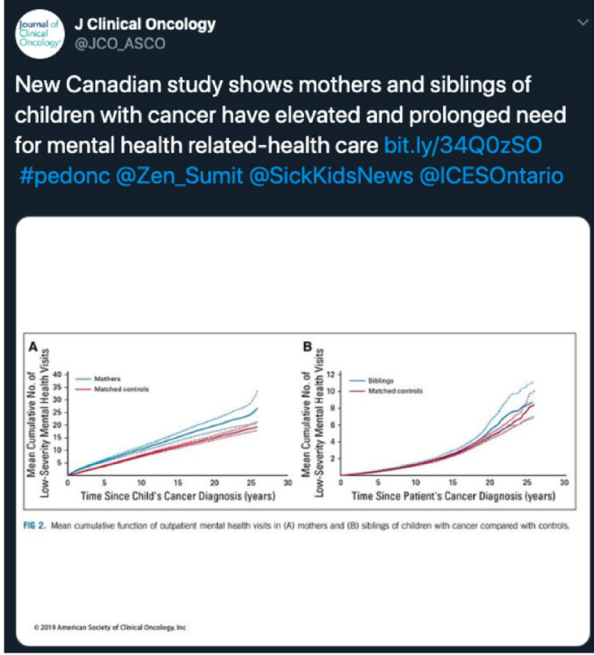
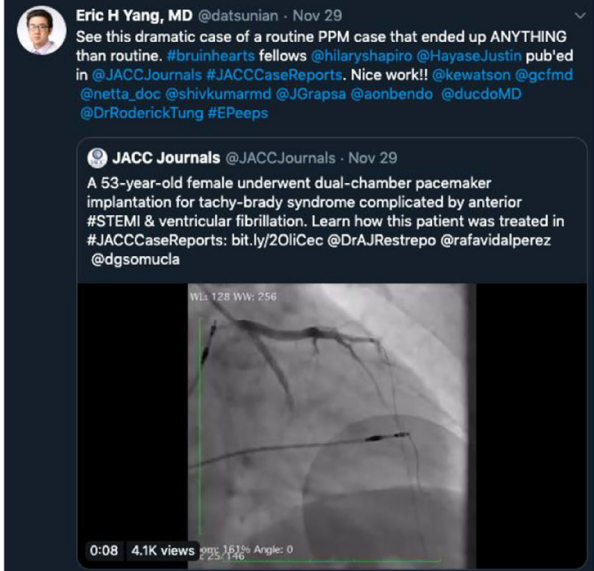
Term	Definition	Example
bio	Short (up to 160 characters) personal description that appears in the user's profile that serves to characterize their persona on Twitter.	 <p>https://twitter.com/JeffHsuMD</p>
@	Used to mention usernames in Tweets ("Hello @twitter!") Twitter users can have their @username mentioned in Tweets, communicate via direct messaging or have a link to their profile.	<p>@UCLAHealth @Twitter @CircAHA @JACCJournals @ASCO @JCO_ASCO</p>
# (hashtag)	A word or phrase immediately preceded by the # symbol. When hashtags are clicked on, users will see other Tweets containing the same keyword or topic	<p>#cardioonc #echofirst #melanoma #breastcancer #immunotherapy</p>
Follow/ Follower	<p>Follow: Subscribing to a Twitter account. Any post by that Twitter account will be posted on the Twitter user's feed.</p> <p>Follower: A Twitter account that is following the user to receive the user's Tweets in the Home timeline.</p>	 <p>https://twitter.com/onco_cardiology</p>

Table 1. (continued)

<p>Tweet</p> <p>(noun definition): A post of up to 280 characters that can contain photos, GIFs, videos, and text. (verb definition): Act of sending a Tweet. Tweets get shown in Twitter timelines, or are embedded in websites and blogs.</p>	 <p>https://twitter.com/JCO_ASCO/status/1194995931302834176?s=20</p>
<p>Retweet</p> <p>(noun definition): A Tweet that is forwarded to a user's followers. (verb definition): Act of sharing another account's Tweet to a user's followers.</p>	 <p>https://twitter.com/datsunian/status/1200475058390437888</p>

Examples of user profiles used with permission. Adapted from Twitter Glossary, <https://help.twitter.com/en/glossary>. Accessed November 28, 2019

Table 2. Sample of disease-specific hashtags frequently used by the Oncology and Hematology communities on Twitter

Hashtag	Disease
#AYACSM	Adolescent and young adult cancer
#BCSM	Breast cancer
#BMFSM	Bone marrow failure syndromes
#BMTSM	Bone marrow transplantation
#BPDCN	Blastic plasmacytoid dendritic cell neoplasm
#BreastCancer	Breast cancer
#ChildhoodCancer	Childhood cancer
#CRCSM	Colorectal cancer
#Globonc	Global Oncology
#GynCSM	Gynecologic cancer
#ImmunoOnc	Immuno-oncology
#Immunotherapy	Immunotherapy
#KCSM	Kidney cancer
#LCSM	Lung cancer
#Leukemia	Leukemia
#LeuSM	Leukemia
#LungCancer	Lung cancer
#LymSM	Lymphoma
#MDSSm	Myelodysplastic syndrome
#MMSM	Multiple myeloma
#MPNSM	Myeloproliferative neoplasms
#PallOnc	Palliative oncology
#PancSM	Pancreatic cancer
#PCSM	Prostate cancer
#PedCSM	Pediatric cancer
#SuppOnc	Supportive care in Oncology

The online oncology and hematology communities have been part of the early implementers of hashtags in order to decrease the signal-to-noise ratio that can be seen in the Twitter and Facebook communities. The first reported cancer-specific hashtag was #bcm (breast cancer social media), followed by #btsm (brain tumors social media) in 2011 and 2012, respectively [7]. Subsequently, more cancer-specific hashtags have been developed. The influx of a disease-specific hashtag is generally correlated with the clinical research advances in the field [8]. For example, in 2015, the hashtags #lungcancer and #immunotherapy were on the top five of the most commonly tweeted hashtags in the 2015 American Society of Clinical Oncology (ASCO) Annual Meeting [8]. This correlated with the presentation of clinical trials that would ultimately change the care of patients with lung cancer. The Collaboration for Outcomes on Social

Media in Oncology (COSMO) encourages all social media participants to use the designated disease specific hashtags to clean the message, help new users find accurate information, and allow better data collection when research in social media is conducted [9].

Social media also provide us with the opportunity to network among many specialties, with the discussion of cases among cardiologists, oncologists, pathologists, and radiation oncologists. This unprecedented exchange of information and ideas can be guided by the use of hashtag Twitter medical communities, pioneered in part by many colleagues in Hematology, Oncology, and Cardiology, with specific hashtags developed for common use; widespread collaboration has aided in providing a framework for ongoing discussions [7, 13, 14]. Ultimately, social media has therefore brought the Cardio-Oncology community together (including our colleagues in Hematology, Vascular Medicine, and others), and has helped increase awareness about many new entities and the subspecialty itself. Several resources exist for medical trainees and new social media users [1, 2, 7, 15], many of which are discussed in this review.

Cardio-oncologist on social media

Each cardio-oncologist on social media plays a role in the education of not only other cardio-oncologists, but also other physicians and advanced practice providers involved in the care of patients in Cardio-Oncology. Both radiotherapy and chemotherapy independently and synergistically appear to injure the pericardium, myocardium, valves, conduction system, and coronary vessels [16, 17]. Immunotherapy and targeted therapies can also injure the pericardium, myocardium, coronary vessels, or conduction system [18–21]. Therefore, it would be prudent to educate all physicians and other healthcare professionals in cardiology at all career stages about #CardioOnc. Other disciplines crucial to Cardio-Oncology, such as Medical Oncology, Radiation Oncology, Surgical Oncology, Hematology, and Internal Medicine, should also be engaged. This collaborative learning community would be best for patients, as we seek to prevent, manage, and limit the burden of existing cardiotoxicity. Both clinicians and physician scientists in Cardio-Oncology and Preventive Cardio-Oncology could take up the mantle of patient care, research, and education, along with community engagement and global collaborations. Different yet complementary perspectives from clinical practice, basic science, and translational medicine can coalesce to form a cohesive field and learning community on social media. The entire Cardio-Oncology social media community participates in a disruptive public crowdsourced peer review process in which educational items can be evaluated and advanced. In this way, robust discussions and debates among physicians and scientists at various stages of their careers, as well as patients, patient advocates, and other stakeholders rigorously and democratically sharpens and disseminates ideas internationally [1, 2]. Daily, “case reports” are posted for the purpose of educating our colleagues and patients in a manner that can be judicious and meaningful [1]. Cases should not include identifiable patient information, and should be accompanied by informed patient consent [22]. Often, prior publications are shared, as well as professional anecdotes, in collective wisdom or query, sprinkled with reflections on self-care and physician burnout and moral injury [22, 23].

Educational content: cardio-oncology initiatives

Professional societies and academic institutions use the hashtags #CardioOnc and #CardioOncology on Twitter to highlight scientific content in tutorials termed “tweetorials,” as well as case-studies, educational webcasts, and podcasts, many of which are free to access. Many journals have also created their own unique hashtags. For example, the new journal JACC: CardioOncology routinely tweets their content accompanied by a central illustration and link to the article with the hashtag #JACCCardioOnc. An online medical education platform MedPage (MedPage.Com) uses a unique hashtag #CardioOncoConnect to facilitate Cardio-Oncology twitter chats about various topical #CardioOnc, in collaboration with ACC and ASCO.

A few ACC chapters have also followed suit. The Texas-ACC chapter (Twitter handle: @TXChapterACC) sponsors the Texas CardioOncology Seminar #TCOS2020, as well as an educational blog on Cardio-Oncology topics. The Indiana-ACC chapter (Twitter handle: @InACC) and the Indiana CardioOncology Network (#ICON) together sponsor educational events that can be freely accessed through Twitter and YouTube.

Several individuals practicing in Cardio-Oncology have also established themselves as influencers in education on social media. Social media influencers are those who regularly post and garner a substantial following of engaged individuals focused on specific topics or themes, generating content using the hashtags #CardioOnc, #CardioOncology, and #PrevCardioOnc. Influencers set the trends and tone in discussions related to the relevant topics and themes. Followers grow to trust influencers, who establish themselves as thought leaders. As early career and midcareer clinicians (and some researchers) in Cardio-Oncology, all authors of this article frequently post trendsetting articles, polls, questions, tips, and other information that help engage and educate the community. It should be noted that influence can be carried by tweeting under one’s own name, the name of a specialty, the name of a program or institution, a journal or any of the above. In fact, many influencers oversee multiple social media accounts if the focus of each account is somewhat different from the other accounts, or if a particular field or program should be emphasized. A great case example is of @PrevCardioOnc and #PrevCardioOnc on Twitter (and the upcoming social education blog [PrevCardioOnc.Com](https://www.prevcardioonc.com)). This Twitter handle and hashtag were created to introduce and disseminate various new ideas for prevention in Cardio-Oncology, while building a specific community around these ideas.

There are other #CardioOnc influencers on social media who also help engage the community. Some community members post about recent scientific and medical journal publications from others (or themselves); others promote their podcast through Twitter. Other authors develop “tweetorials,” which are essentially tweets threaded together to form mini-lectures on focused topics. By actively participating in the vibrant social media community, several physicians and trainees have had the opportunity to forge successful international collaborations for data analysis and publication in #CardioOncology. From among such pools of active participants in academic #CardioOnc communities on social media often are drawn tweeters for specialty tracks at Cardiology conferences. The ACC has been an early adopter engaging cardiologists on Twitter.

Several national and international societies are also beginning to integrate social media coverage into their meetings and literature. The American Heart Association, European Society for Cardiology, Heart Failure Society of America, Association of Black Cardiologists, and several other societies are now designating societal “tweeters,” “influencers,” “catalysts,” “ambassadors,” and “commentators,” who often are assigned to specific subspecialty tracks for knowledge dissemination during the societies’ national or international annual scientific sessions. Such influencers are often regarded as the “go-to folks,” and may frequently receive direct messages for opinions or collaboration. These are also typically the individuals who serve as social media editors and consultants for journals for societies such as the ACC, American Society for Nuclear Cardiology, and other journal editorial boards on which the authors of this article serve, many of which have formal CardioOncology journal sections.

Cardio-oncology conferences on social media

Activities related to networking and education in the Cardiology social media community (commonly referred to as #CardioTwitter) often occur around the time of large national scientific sessions for major professional societies in Cardiology, such as those of the American College of Cardiology (ACC), American Heart Association (AHA), and European Society of Cardiology [1, 24, 25]. Indeed, there has been a tremendous increase in Twitter usage by cardiologists at around the time of these conferences [1]. Similar findings have been reported for major Oncology meetings, as cancer specialists are also leading the way on Twitter [8, 26–28]. The ASCO annual meeting, for example, has seen an 11-fold increase in the number of social media participants and content [8]. Most participants in the social chatter surrounding (especially the multidisciplinary) sessions at these conferences are actively tweeting pearls and insights from the conferences, while others are tweeting their responses to the scientific data and appreciation for being able to participate online. This allows physicians and other healthcare providers that are not attending the conferences to remain up to date regarding new research findings and changes in practice [10].

Such efforts by those at the conference and those remotely “listening” to the conference chatter on social media help to increase engagement of cardiologists, oncologists, and hematologists worldwide, even if unable to be physically present. This broadens access to educational material that would otherwise be limited to those attending in person. Sessions, courses, or conferences on Cardio-Oncology are catching up as well. Specifically tweeting from and about Cardio-Oncology sessions, posters, and gatherings at these conferences or at conferences dedicated to the field. There is great need to spread awareness and educate others currently in practice or those in training, to meet the needs of the growing cancer survivor population.

Conference speakers should [29]

- Consider the fact that your slides will likely be photographed and tweeted.
- Design your slides accordingly and include your Twitter handle and the conference hashtag.
- Speak slowly give the physical audience the opportunity to prepare and send off their tweets about your work.

- Finally, engage your worldwide virtual audience on social media (#SoMe) to promote your talk in advance and then continue the conversation online after the presentation and even the conference.

Such efforts help to broaden access to educational material and enhance the social media presence of your work and also the professional societies and sections hosting the conference or supporting your work.

Role of the social media editorial board

In addition to individuals and professional societies, scientific journals have also adopted the use of social media. Social media is being used to promote new articles and upcoming journal issues, enhanced by journal-initiated Twitter Journal Clubs and Twitter Chats [30]. Previous studies in Cardiology had shown that editorial board members at top journals were not appreciably present or active on Twitter. The findings suggested a chasm between academic Cardiology thought and science leadership and potential consumers of the vast knowledge being published in the journals. While consumers engaged with the actual journal Twitter handles, interaction from academic cardiology journal thought leaders was lacking.

Since then, many scientific journals have expanded their editorial boards to include members that are responsible for sharing journal content and highlighting select in-press manuscripts on social media, with inclusion of author twitter handles now being requested with each manuscript submission. Some journals also request draft tweets from authors of submitted or accepted manuscripts (e.g., <https://www.thepermanentejournal.org/authors/prepare.html>). Roles that have been assigned to social media editors consist of composing tweets about accepted journal articles, assigning composition of online contents (blogs), editing authors' composed tweets and associated media, creating, and either posting or delegating content [31]. In JACC:CardioOncology, for example, the social media editorial board consists of Social Media Directors (SMD) and Social Media Consultants (SMC) [32]. The role of SMDs and SMCs is to leverage the power of social media and the associated global audience to facilitate the dissemination of cardiovascular and Cardio-Oncology health information and education rapidly and efficiently [30]. The SMDs develop educational content in collaboration and upon approval of the editorial board. The content creation and dissemination are performed in collaboration with the SMCs. One example of educational content creation in social media is a series of tweets disseminated using the @JACCJournals Twitter account. The tweets highlighted seminal papers in Cardio-Oncology shared under the heading "How far we've come in #CardioOnc with #JACCCardioOnc" [33]. The intention behind these series of tweets was to educate the Twitter audience on some of the most important papers in the field of Cardio-Oncology, by summarizing findings and sharing the most relevant graphics and references. This campaign was developed to promote the release of JACC:CardioOncology. The social media editorial board in a Cardio-Oncology journal may create content by developing blogs related to the journal's articles, hosting live journal clubs

using social media platforms, developing or editing and sharing summarized visual abstracts, establishing or participating in podcasts, and tweeting articles in-press with the most appropriate accompanying illustrations.

One of the main goals of any organization that promotes or supports Cardio-Oncology should be education, as this has been reported previously as one of the most important barriers in establishing Cardio-Oncology programs in hospitals [34]. Multidisciplinary collaborations among cardiologists, oncologists, and other stakeholders (e.g., nurses, advanced practitioners, administration executives, patient advocacy groups) using social media can foster synergistic relationships and develop mutual interests, thereby strengthening the field. In this way, social media can be used to encourage engagement of more stakeholders. This ensures that education is not limited to those that subscribe to a particular journal or read a particular issue.

Strategic plans need to be developed by SMDs during Cardio-Oncology meetings and other Cardiology meetings with Cardio-Oncology sessions to share educational content from the journal relevant to discussions at the meetings. It is important to support the participation of other journal editorial board members, to increase the attention and engagement of the audience, for example, by sharing brief video clips of interviews and perspectives of the editorial board. Smart and considerate engagement is key, as is abiding by specific journal policies regarding social media activity. Best practices on the use of #CardioTwitter have been described [35]. In general, “strive for accuracy and quality, give credit, share perspectives, and be civil [35].

Opportunities for patient engagement in cardio-oncology on social media

We are connected globally. While on social media, cardio-oncologists are accessible to patients and providers worldwide. Globally it is estimated that 5 billion people have mobile devices, with half of these devices being smartphones. According to Pew research, smartphone ownership in the USA exceeds 65% of the population. Most Americans are online daily; Twitter has 126 million daily active users. The internet and social media have become major sources of information for all. Nearly 75% of all seniors use the internet daily, with more than half of these individuals doing so for health-related concerns. An overwhelming majority of patients (89%) in one survey of 1500 cancer patients, survivors, and caregivers reported using the internet to search for information about their diagnoses. More than 70% of adults in the USA use at least one social networking site. In addition, 90% of physicians use some form of social media for personal or private reasons, with 65% of physicians using social media for professional reasons [36].

Given these statistics for both patients and physicians, social media has the opportunity to dramatically extend the reach and amplify the voice of the cardio-oncologist. Instead of reaching 20–30 patients each day as many of us do in clinic, #SoMe offers the opportunity reach

hundreds, or perhaps thousands, of patients daily [37]. Benefits may include providing patients with trusted, timely, understandable, and targeted health information vetted by physicians and professional societies. Social media allows cardio-oncologists to curate and provide educational content for patients. Social media provides an opportunity to educate the misinformed and uninformed about health behavior change and best practices to improve outcomes. The instantaneous exchange of information is incredibly powerful. Use of social media may allow a physician to keep an ongoing relationship with the patient community, allowing for ongoing education and communication opportunities. Patients for the most part are reliant on physicians for insights, interpretations of medical literature and recent studies on medical advances, resolution of medical controversies, and importantly limitations to our current knowledge and understanding of their disease and its treatment [38]. Furthermore, some patients appreciate the transparency that comes with public debate about trial results and different treatment modalities [39]. Hard data remain lacking regarding the outcomes on social media content in terms of knowledge or behavioral change of followers, although anecdotes abound.

Notably, patients may benefit from interacting with or following healthcare professionals on social media. A salient illustration involves a survivor of breast cancer who was diagnosed with cardiomyopathy and wanted to learn more about her condition and the field of Cardio-Oncology and wished she could find a relevant hashtag. She was introduced to the Cardio-Oncology community, and it seemed she had found what she was looking for. Perhaps patients should be intentionally invited to enter into the #CardioOnc, #CardioOncology, and #PrevCardioOnc communities as patient advocates, to help us as healthcare professionals better understand their path and needs. Only by understanding them can we continue to optimally impact them.

Patients are quite active on Twitter by following hashtags such as #CardioOnc, #lscsm (lung cancer social media), and #bcsm (breast cancer social media) [7, 38, 40, 41] (Table 2). Indeed, patients already access social media to gain increased knowledge regarding their disease and its treatment and prognosis. Patients may also use social media to express their emotions, share their experience with others, get advice, or be in touch with healthcare professionals. Patients and their families create their own virtual online community centered on the disease they are battling in the setting of their own specific circumstances (e.g., late-stage disease, disease in the very young). Facebook and Twitter are currently homes for many of these disease-specific groups and hashtags [7, 38]. The cardio-oncologist may choose to interact with these communities to provide current and peer-reviewed content, which may both inform and empower patients and their caregivers, and also help them to seek and obtain appropriate care. Cardio-oncologists, oncologists, and patients may read disease-specific news about various advances regarding various cancers, by searching for frequently used hashtags (Table 2, Fig. 1).

While social media may be a useful tool, there are age and demographic disparities regarding internet access and frequency of use of social media. Younger people are more likely to have internet access and use social media than older people, although internet use has

increased in older persons [42]. From among those who have internet use, social media use appears to be higher among racial and ethnic minorities than among non-Hispanic whites [42]. Unfortunately, social media is not a panacea and access will remain a problem, especially in patient populations that suffer from language barriers, mental or cognitive difficulties, lower socioeconomic status, or literacy barriers [37].

Patient perspectives of physicians on social media

There is limited data on patient perceptions of physicians' social media use and their perceptions of physicians' professionalism. One study demonstrated that a physician's Facebook profile may influence a patient's perception of the provider's professionalism. Data are lacking regarding patients' perception of physician professionalism in the context of Twitter usage.

In this modern era, patients also use the internet to research their physicians before meeting them for the first time. Their first impression is therefore in part influenced by the information they encounter online. Social media may be a tool for physicians to optimize their online presence and present a positive image, to help shape that first impression [43].

Adolescents and young adults

In every medical field, it is important to reach out to all potential subgroups of patients. One critical group consists of adolescent and young adult cancer survivors (ages late teen to under age 40) [44]. This group is designated by the National Cancer Institute (NCI) as vulnerable and with unique needs [45]. Greater emphasis should be placed on information exchange for this group of patients, many of whom are experiencing relationships, body changes, transition of life from parents' house to their own, first jobs, fertility and parenting, higher education, financial and insurance barriers, and other life events for the first time [46, 47]. Multiple groups have shown that this group of patients may have the highest level of interaction on social media in their general lives, and this continues throughout their journey as cancer survivors many of whom develop cardiovascular diseases at young ages [6].

Pitfalls and solutions in social media

Important pitfalls of using social media for healthcare communication should be discussed. Anything shared is public, and a digital trail is left behind even after a post is deleted. All posts instantly become public knowledge accessible to patients, colleagues, and future prospective employers. All posts should be thoughtful and ideally useful additions to academic community discussions. The quality and lack of reliability of health information on social is also of concern. It may be challenging for patients and clinicians alike to discern the reliability of information found online. Physicians should make every effort to avoid posting errant information. Patients using social media may be unaware of the risks of disclosing personal information online or of using incorrect advice. Patients may also become overwhelmed and overloaded with

information, even if reliable and accurate. It is possible for the general public to be uncertain about how to correctly apply online information to their personal health situation, especially given the subtleties and complexities of care.

Concerns about privacy, confidentiality, and data security should also be considered. Specific patient details or details from which a patient can be identified should not be shared on social media. In addition, informed consent should be obtained from patients whose clinical information is shared on the internet. Patients should be educated about how such platforms operate, and how the online community may respond to information being posted. It is also important to not give patients specific medical advice through social media platforms, and instead to speak more generally about disease processes, treatment, and prevention. The American Medical Association (AMA), the American College of Physicians (ACP), and the Federation for State Medical Boards (FSMB) have created guidelines for healthcare professionals to help create and maintain a social media presence while ensuring standards of patient privacy and confidentiality [48].

Current ACP/FSMB recommendations are as follows [49]:

- Keep professional and personal accounts separate; do not individually “friend” or contact patients from your practice through social media.
- Text messaging with patients for a medical interaction even with an established patient and with consent is discouraged.
- Email only patients with patient consent and an established patient-physician relationship.
- Recognize that documentation about patient care is part of the medical record.
- If approached for clinical advice through electronic media outside of a patient-physician relationship, this should be handled with good judgment; consider scheduling the individual for an office visit, or if urgent patients should visit the nearest emergency department.
- Establishing a professional profile so it appears first during a search rather than a physician ranking site can help guide the accuracy and utility of information read by patients prior to their initial encounter.

The AMA cautions that physicians should monitor their own internet presence to ensure the accuracy and appropriateness of their personal and professional content. Physicians are cautioned to maintain appropriate boundaries of the patient-physician relationship congruous with standard professional ethic guidance. The AMA also holds a stance that physicians who see unprofessional content from their colleagues have a responsibility to bring the unprofessional content to the attention of the posting physician. It is vital that physicians recognize that online behavior and content may affect their reputations, have downstream consequences to their medical careers, and undermine public trust in the medical profession.

Career development

With the acute and chronic cardiovascular conditions of cancer survivors comes the need for specialized care by health professionals with sufficient exposure to Cardio-Oncology. This necessitates networking and recruitment for both training

and hiring of individuals dedicated to caring for these patients. Social media vastly expands the opportunity for such networking on Twitter, blogs, employment opportunities (e.g., [CardioOncTrain.Com/Fellowships-Jobs](https://www.cardioonctrain.com/fellowships-jobs)), and other platforms. The international multidisciplinary community on social media consists of cardiologists, oncologists, cardio-oncologists, and other related specialists, who can scour the terrain and identify appropriate candidates for training or hiring.

Networking and thought leadership on social media can also help facilitate faculty promotion at academic institutions. Social media portfolios can be developed to catalog important contributions to social media, e.g., dissemination of new publications, journal clubs, tweetorials, and so on. Many large academic institutions are incorporating social media contributions into their curriculum vitae templates [50–54]. Online methods of sharing and disseminating these papers may be effective in expanding their reach and readership, as well as citations [55–59]. One study noted a strong association between social media exposure on Twitter and rates of journal article citations [59]. In another study, articles that were tweeted by several individuals were 11 times more likely to be highly cited than those tweeted by only a few individuals [56].

In the world of alternative metrics (from which “Altmetrics” is derived), it has been suggested that “tweetations” be used to calculate a “twimpact factor” that may predict and estimate traditional citations [11, 58]. Thus, increased presence and engagement with these papers on social media can represent the breadth of impact of journal articles, and by extension, a faculty individual’s work. Although such a construct is still yet to be widely embraced, social media portfolios on digital scholarship are currently being used by early adopters to assist in decisions to determine academic promotion and tenure. Digital scholarship has been thought to be a gamechanger in the path to academic permanence and leadership. A real-life example by Jeard Gardner, MD is publicly available online and could be adopted and used.¹ Similarly, we should become leaders in our institutions’ efforts to incorporate digital scholarship into academic career development.

As we think about building social media portfolios and using analytics for academic promotion, as a community, we will need to determine metrics, regulation, adoption, and standardization. Who will determine appropriate metrics, and regulate how these portfolios and analytics are used? Will there be standardization across institutions nationally, and perhaps also internationally? Do we need to create a regulatory body for academic social media? Would this benefit from or be appropriate for a guidelines or scientific statement document? All of these considerations need to be addressed, as all of these will likely continue to become part of routine academic practice. Several groups have published recommendations for establishing portfolios and other means of curating digital scholarship for academic promotion and tenure [50–54]. Such recommendations could be endorsed by the #CardioOnc community to help advance the concept in academic medicine.

Conclusion

In our efforts to provide the best care for our patients in Cardio-Oncology, we need to be part of their healthcare conversations. The majority of patients are

¹ For ease of access, we have shortened the weblinks to [TinyUrl.Com/SoMeOverview](https://tinyurl.com/SoMeOverview) and [TinyUrl.Com/SoMeDropbox](https://tinyurl.com/SoMeDropbox).

outliving their malignancies and subsequently developing acute or chronic cardiovascular diseases. Many of these patients are turning to social media for support and information. It is prudent for their cardiovascular team to provide reliable information online, e.g., on Twitter. Social media can be used as a tool to augment our listening to patients' views, better understand their needs, and provide topical, accurate, and trusted healthcare information to inform the misinformed and uninformed. As digital methods become more common in the recruitment of patients for clinical trials, Cardio-Oncology should be at the helm of adopting digital transformation for patient-centered research.

Not only do we then have the opportunity to develop awareness among our patients, but we also benefit from interacting with other healthcare professionals, journals, societies, and conferences. In fact, social media gives us increased opportunity for national and international collaborations across disciplines related to care of our shared patients. The digital transformation in Cardio-Oncology can include new methods for education and study regarding differential mechanisms of various cardiovascular toxicities. This will likely improve our understanding of mortality risk and epidemiology, and help us further advance our efforts at both management and prevention.

Utilizing specific hashtags on social media, we have the ability to link instantaneously in real-time the entire world's Cardio-Oncology community to discuss, debate, educate, share, and support and learn from one another. Twitter, along with social media in general, presents a free global platform to disseminate education and Cardio-Oncology information. Creating online presence enhances visibility for both patients and the referring physician base. Consequently, we would encourage all Cardio-Oncology practitioners, administrators, and aficionados to grab their Twitter handle and swing into gear!

Let us use the social media platform to educate one another. Network with colleagues to identify gaps in knowledge, appraise current literature, identify important barriers to care (e.g., financial toxicity and burdens to patients, excessive prior authorization, administrative burdens), propose solutions, motivate patients, and provide healthcare information to the global Cardio-Oncology community. Engage the community frequently, schedule several posts and create others in real time, adhere to institutional social media or communications policies, and protect your authentic personal brand and professional reputation, with utmost professionalism and camaraderie [60]. This will help us all to establish our ground as early adopters of social media for online and offline community and career development. We hope that our perspectives in Cardio-Oncology will help to provide a roadmap for appropriate and fruitful use of social media for a myriad of benefits in this emerging Cardiology subspecialty.

Compliance with Ethical Standards

Conflict of Interest

Sherry-Ann Brown declares that she has no conflict of interest. Ryan P. Daly serves as a social media consultant for JACC: CardioOncology. Narjust Duma has received compensation from Inivata for service

as a consultant. Eric H. Yang declares that he has no conflict of interest. Naveen Pemmaraju has received research funding from AbbVie, Stemline Therapeutics, Novartis, Samus Therapeutics, Cellectis, Plexxikon, Daiichi Sankyo, Affymetrix; is supported by grants from the Sager Strong Foundation and Dan's House of Hope; has received compensation from AbbVie, Celgene, Stemline Therapeutics, Incyte, Novartis, Mustang Bio, Roche Diagnostics, and LFB for service as a consultant; and has served as a board member/volunteer for Dan's House of Hope and the HemOnc Times/Oncology Times. Purvi Parwani has received compensation for service as a consultant on the Journal of the American College of Cardiology. Andrew D. Choi declares that he has no conflict of interest. Juan Lopez-Mattei has received compensation from Arterys for service as a consultant.

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