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STEM CELL TRANSPLANTATION (R MAZIARZ, SECTION EDITOR)

# Twitter Use in the Hematopoietic Cell Transplantation Community

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**Abstract**

**Purpose of Review** Social media has revolutionized the access and exchange of information in healthcare. The microblogging platform Twitter has been used by blood and marrow transplant physicians over the last several years with increasing enthusiasm. We review the adoption of Twitter in the transplant community and its implications on clinical care, education, and research.

**Recent Findings** Twitter allows instantaneous access to the latest research publications, developments at national and international meetings, networking with colleagues, participation in advocacy, and promoting available clinical trials. Additionally, Twitter serves as a gateway for resources dedicated to education and support for patients undergoing transplantation.

**Summary** We demonstrate the utilization and various applications in using Twitter among hematopoietic cell transplant healthcare professionals, patients, and other affiliated stakeholders. Professionalism concerns with clinician use of such social media platforms, however, also exist. Overall, Twitter has enhanced and increased the opportunities for engagement in the transplant community.

**Keywords** Social media · Twitter · Hematopoietic cell transplantation

## Introduction

The advent of social media has changed not only the physician and patient relationship, but also the collaborations within the medical community. Social media includes social networks that facilitate communication and interaction. Compared to traditional forms of media, social media is immediate, archived, interactive, and searchable and allows the original message to be amplified [1]. Its application in the blood and marrow transplantation (BMT) community has been most notable utilizing the Twitter platform. We describe a variety of uses of Twitter for the BMT providers, but also challenges and pitfalls as well. The role of such platforms in regard to governance, ethics, professionalism, privacy, confidentiality, and information quality are ongoing areas of discussion [1, 2].

## What Is Twitter?

Twitter is a microblogging site that is defined by 140-character messages (and currently testing a 280-character limit) known as "tweets." The limited number of characters serves as a critical element in synthesizing complex transplant literature, for example, down to single tweet. Due to the limited space allowed, users can employ acronyms, emoticons, and/or hashtags to convey a message. Hashtags identify keywords and facilitate the organization and search of particular information. The tweet itself can contain photographs, video clips, and website thumbnails. In addition, links can be included and shortened and metrics can be tracked on the number of clicks received. Followers of an individual or organization composing the tweet can view, "retweet," or "favorite" the message. Akin to compounding interest, retweeting allows a follower's followers to see the message and so on. This results in rapid dissemination of information via a large number of impressions. For example, Fig. 1 shows the number of impressions generated by tweets, mentions, and retweets of the #bmtsm hashtag amongst the top 20 users. Finally, users can include abbreviations to signify the source of

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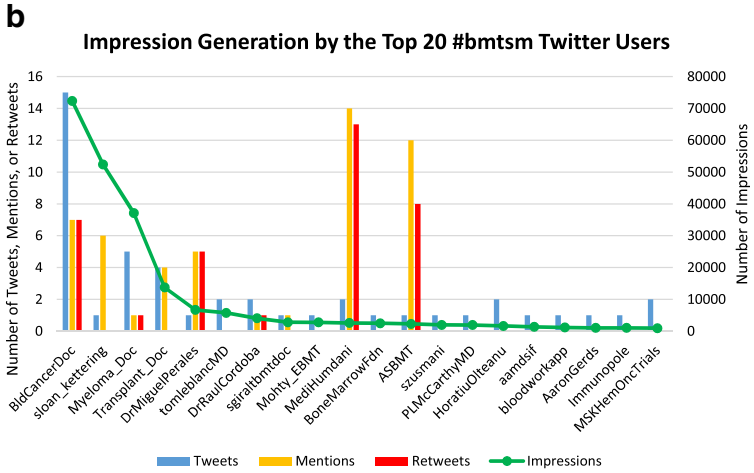
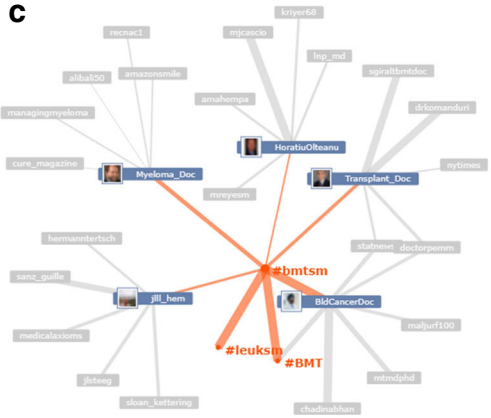
**a**

| | | |
|---|---|---|
|  | @mtmdphd | 985,000 |
|  | @bldcancerdoc | 700,300 |
|  | @drmiguelperales | 304,700 |
|  | @sciencebeta | 226,522 |
|  | @drkomanduri | 154,555 |
|  | @lizszabo | 123,922 |
|  | @doctorpemm | 116,211 |
|  | @sloan_kettering | 103,000 |
|  | @myeloma_doc | 87,388 |
|  | @drraulcordoba | 65,566 |

**b**




**c**




**d**

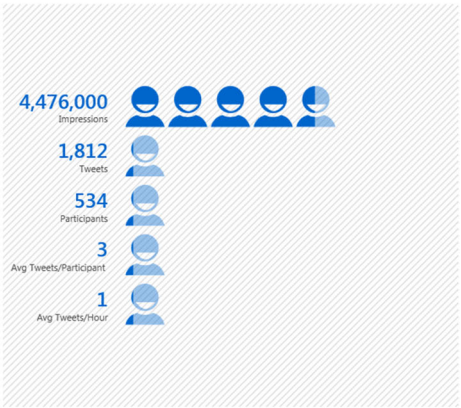



**Fig. 1** Example of #bmtsm hashtag activity. **a** Top 10 #bmtsm Twitter users by impressions; Twitter data from the #bmtsm hashtag from 6/9/2017 to 10/7/2017 via tweetreach.com data. **b** Impression generation by tweets, mentions, and retweets; Twitter data from the #bmtsm hashtag from 9/28/2017 to 10/6/2017 via tweetreach.com data. **c** Mention map of #bmtsm hashtag; top five profiles mentioning #bmtsm via mentionmap.com data. **d** Engagement of #bmtsm hashtag; Twitter data from the #bmtsm hashtag from 6/9/2017 to 10/7/2017 via symplur.com data

a tweet. "RT" indicates a retweet, when a follower re-posts a tweet on their own profile. "MT" refers to when one modifies a retweet before posting it on their own profile. Finally, "HT" refers to hat tip or heard through, indicating acknowledgement of the original source or composer of a tweet [3••].

Given the sheer volume of tweets on Twitter and rapidity with which new content is generated, it is critical for the transplant physician to follow several standards when posting. This includes "tagging" a particular person or organization using the "@" symbol to ensure they are then connected to the tweet in question. In addition, there have been several movements to standardize hashtags (#) to allow the appropriate curation of content in the hematology and oncology space [4]. This organization into topics of interest can help the transplant clinician quickly sift through filtered content. Continued adoption of disease-specific hashtags will lead to discussions that can be easily later retrieved and referenced [5••]. Such hashtags are particularly useful for rare diseases as it allows providers and patients to raise awareness and connect. Table 1 shows several relevant disease-specific hashtags and a real-time list can be found at http://www.symplur.com/healthcare-hashtags/ontology.

## Uses of Twitter in BMT

The rapid adoption of Twitter by health care providers and especially BMT clinicians highlights its advantages for professional use. It represents a natural evolution from listservs and emails to long-format blogs. The interface

**Table 1** Relevant Twitter handles and hashtags in BMT

| | Twitter handle/ hashtag |
|---|---|
| Journals and periodicals | |
| American Society of Clinical Oncology Post | @ASCOPOST |
| American Society of Hematology Clinical News | @ASHClinicalNews |
| Biology of Blood and Marrow Transplantation | #BBMT |
| Blood Advances | @BloodAdvances |
| Blood | @BloodJournal |
| Current Reports | @SpringerCurRpts |
| Haematologica | @haematologica |
| HemOnc Today | @HemOncToday |
| Journal of Clinical Oncology | @JCO_ASCO |
| Journals of the American Medical Association Oncology | @JAMAOnc |
| Lancet Haematology | @TheLancetHaem |
| Leukemia | @LeukemiaJnl |
| Nature | @nature |
| New England Journal of Medicine | @NEJM |
| The Lancet | @TheLancet |
| Professional and Related Organizations | |
| American Society for Blood and Marrow Transplantation | @ASBMT |
| American Society of Hematology | @ASH_hematology |
| American Society of Clinical Oncology | @ASCO |
| Be The Match | @BeTheMatch |
| European Hematology Association | @EHA_ Hematology |
| European School of Haematology | @ESHaematology |
| European Society for Blood and Marrow Transplantation | @TheEBMT |
| Foundation for the Accreditation of Cellular Therapy | @FACTunmc |
| International Society for Cellular Therapy | @ISCTglobal |
| World Marrow Donor Association | @WMDA_office |
| Patient Advocacy Organizations | |
| BMT InfoNet | @BMTInfoNet |
| International Myeloma Foundation | @IMFmyeloma |
| Leukemia and Lymphoma Society | @LLSusa |
| Multiple Myeloma Research Foundation | @theMMRF |
| National Bone Marrow Transplant Link | @nbmtlink |
| Research Organizations | |
| Blood and Marrow Transplant Clinical Trials Network | @BMTCTN |
| Center for International Blood and Marrow Transplant Research | @CIBMTR |
| National Cancer Institute | @theNCI |
| National Heart Lung and Blood Institute | @NIH_NHLBI |
| Disease Hashtags | |
| Bone marrow failure | #bmfsm |
| Blastic plasmacytoid dendritic cell neoplasm | #BPDCN |
| Blood and marrow transplantation | #bmtsm |
| Graft-versus-host-disease | #GvHD |
| Leukemia | #leusm |
| Lymphoma | #lymsm |
| Myelodysplastic syndromes | #mdssm |
| Multiple myeloma | #mmsm |
| Myeloproliferative neoplasms | #mpnsm |
| T cell therapy | #tcellrx |
| Waldenström macroglobulinemia | #wmsm |

is intuitive and straightforward to use allowing a minimal barrier to entry for new users. The platform is flexible and allows providers to create and control content as desired. Given the character limit, information is presented in small pieces allowing it to be rapidly processed. Furthermore, Twitter allows varying levels of participation as providers can, for example, passively read the latest research developments in transplant to actively promoting enrollment for a center's new clinical trial. Some examples of using Twitter as an instrument for professional use include:

## Research Updates

The Twitter platform allows transplant providers to obtain information on the latest research developments. A variety of relevant journals have an existing social media presence that updates followers to new issues, pre-published articles, and guideline updates. In addition, non-peer reviewed journals and medical news periodicals provide feeds of the latest impactful articles. Table 1 highlights selected relevant journals of interest. Indeed, Twitter allows a physician to share his or her own research and publications. This also allows one to identify and establish research collaborations as well. As BMT is a small but geographically spread out community, it lends itself well to such online interactions. Highly tweeted publications generally represent research that would become highly cited independently of such promotion [6–8]. Indeed, regular use of Twitter by not only an individual physician, but the entire department or entity may boost reputation scores by spreading such global benefit [9]. In addition, Twitter engagement by transplant clinicians in resource limited areas globally can substantially benefit from the knowledge and experience of high-volume centers.

## Meeting Engagement

An ever-growing trend at the American Society of Hematology (ASH) Annual Meeting and the BMT Tandem Meetings is the continuous stream of learning opportunities and engagement available at such national conferences. Potentially practice changing, controversial, or highly anticipated trial results can be rapidly disseminated. Twitter allows participants to reflect, document, and comment on trending research in real time [10••]. Twitter engagement notably swells around the time of major medical conferences, connecting those physically attending and providers virtually tuning in. As such this allows a broader audience to immediately react and respond to plenary sessions and oral and poster abstract presentations. Snapshots of slides can allow others to virtually see the critical results data for themselves. Beyond the conference, Twitter allows transplant providers of all background and training levels to follow key opinion leaders and experts. For clinicians who feel they do not have enough time to actively keep up with the latest research results that may change patient care, following the tweets of active leaders in

the field can quickly make educational use of sporadic minutes of downtime during the day. Twitter represents a rapidly utilized tool to allow information exchange amongst transplant physicians, trainees, researchers, and patients. Figure 1 highlights a recent snapshot of the recent top 10 users utilizing the #bmtsm (BMT social media) hashtag along with the hashtag's connections to users and impression generation, respectively.

### Advocacy and Professional Updates

By following professional organizations such as the American Society for Blood and Marrow Transplantation (ASBMT), transplant physicians can stay up to date on practice, policy, and professional news updates. Quickly reviewing such updates can help reduce inbox overload from the usual set of society-related emails. Notably for transplant physicians, ASBMT and ASH have very active advocacy efforts on social media. Engaging the Twitter community to spread awareness of healthcare reform, changes in payment structure, and support key legislation are a few critical efforts of such advocacy. Moreover, transplant providers can directly follow and message their local representatives and senators to share their opinion on relevant issues. In light of legislative efforts to dismantle the Affordable Care Act and reduce research funding for the National Institutes of Health, Twitter provides an accessible and direct channel for transplant physicians to participate in the health care debate.

### Professional Networking

Though the BMT community is relatively small, it is geographically dispersed and lends itself well to networking via an online platform such as Twitter. Such interactions allow BMT clinicians to connect with each to share interesting research articles, highlight new clinical trials, and discuss the management of a complex case. Twitter also allows BMT clinicians to find collaborators for a planned project. Moreover, networking via Twitter allows BMT clinicians to post open faculty or fellowship positions and directly reach a target audience. Indeed, Twitter allows junior colleagues to interact with established thought leaders, even if they have not physically been introduced. Such opportunities allow one to build a collection of virtual mentors that can provide ongoing career guidance. Finally, Twitter also allows colleagues to share notices regarding career advancement updates and professional society leadership participation.

### Transplant Community Engagement

The adoption of Twitter by transplant physicians primarily will be the first step towards expanding its use to other stakeholders. BMT requires a multidisciplinary effort from not only physicians, but advanced practice providers, nurses, pharmacists, and social workers as well. In addition, organizations such as the National Marrow Donor Program and the Center for International Blood and Marrow Transplant Research are integral partners in establishing the clinical and research framework needed to create a solid transplant infrastructure. With greater participation in social media, these entities can connect with each other and create a public dialogue towards a common goal of improving outcomes in our transplant patient population.

### Learning Opportunities

Twitter provides a multitude of learning opportunities for the BMT clinician. For example, the BMT online journal club (@bmtojc) is a dedicated space to share and discuss research and practice updates in the field. Twitter also makes it easy for a user to curate a personal library of BMT-related content via shared journal and news articles, academic meeting proceedings, and other online resources. Furthermore, Twitter can provide educational benefits for each type of role; for example, the BMT Tandem Meetings includes a separate BMT Pharmacists Meeting (#asbmtpharm).

### Patient Support and Engagement

Finally, social media has also empowered patients to actively participate in researching available clinical trials and the latest treatment options for their disease. With widespread Internet use, patients and their caregivers without formal medical training can access online educational and support resources [11]. Patients can participate in a variety of educational experiences through articles linked on Twitter [12]. Patients and patient advocacy organizations are active on Twitter and can provide transplant physicians a valuable and different perspective. Notable resources for patients include Be The Match, BMT InfoNet, and National Bone Marrow Transplant Link. Given the complexity with selecting the appropriate type of transplantation type, donor, and conditioning regimen, Twitter also allows transplant physicians to post challenging de-identified cases to solicit treatment opinions—a virtual tumor board.

## Challenges and Pitfalls of Twitter in BMT

The interplay of social media and medicine has introduced new potential challenges and pitfalls relevant to the transplant provider. Twitter, like other forms of media, should be used with caution by medical professionals as tweets can be archived even when deleted and remain publicly accessible [13•]. Hence, it is critical that clinicians maintain the highest standards of professionalism when engaging in Twitter or any form of social media. Of highest priority is protecting patient

confidentiality in accordance with the Health Insurance Portability and Accountability Act of 1996 [14]. Additionally, adhering to this will ensure the protection of the reputation of the transplant center and individual physician. While formal guidelines specifically regulating physician use of Twitter do not exist, general professionalism guidelines still apply [15]. It behooves the transplant community engaging in Twitter use to adhere to several informal rules, such as self-regulating for spam posts, monitoring of posts with inaccurate information, and maintaining a common sense approach to the appropriateness of posts [16].

Clinicians using Twitter must also read with caution posts about specific agents as there can be an underlying undisclosed commercial interest in the products being discussed. Taken a step further, transplant physicians should always confirm tweets regarding research results with the original article themselves to ensure authenticity. Finally, any professional treatment recommendations solicited from Twitter should be verified as patient care liability ultimately rests upon the treating physician.

The basic principles for acknowledging and attributing sources of content and information apply to Twitter as well. This is especially relevant when sharing content at scientific meetings—one should include the name of the presenter (or preferably their Twitter handle), and provide a link to the source material, if available. Users also need to be aware of any copyright issues that may apply to specific content they intend to share. Finally, and as with any other forum where a clinician publically provides an opinion, one should be aware of conflicts of interest. They should ideally be shared on the users Twitter profile, or disclosed when a relevant drug, test, or procedure is being discussed using this social media platform.

## Conclusions

The advent of the microblogging platform Twitter has been adopted by the medical community in recent years with increasing enthusiasm. Twitter serves as a valuable tool to allow transplant physicians in particular to reap several benefits. These include staying up to date on the latest research publications, contributing to discussions at meetings, networking with colleagues, participating in advocacy, and promoting awareness of clinical trials. For patients, Twitter provides an additional resource for disease and transplant related information. Transplant physician use of Twitter at the BMT Tandem Meetings and ASH has been extensive and likely will continue to increase. This has allowed those not physically present to vicariously attend the meeting and stay up to date on research results as they are delivered. Finally, transplant physicians should practice “safe tweeting” by committing to protect confidential heath information, ensuring the accuracy of their posts, and adhering to general standards of professionalism.

## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflicts of interest.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

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- •• Of major importance


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