Be in the Digital Room Where it Happens, Part I: Tweeting & Technology for Career Development

Jaclyn M. Martindale, DO1, Jessica Goldstein, MD2, Kathryn Xixis, MD3, Arpita Lakhotia, MD4, Adam Rodman, MD, MPH5, Lauren D. Strauss, DO1, Roy E. Strowd, MD, MS, MEd1 and Nancy Bass, MD6

Abstract
Social media has become a part of everyday life. It has changed the way we obtain and distribute information, connect, and interact with others. As the number of platforms and users grow, medical professionals have learned the value social media can have in education, research, advocacy, and clinical care initiatives. Platforms provide opportunities to network, build collaborations, and develop a reputation. This is part one of a two-part series. This article provides an overview on how social media can benefit professional career development for clinicians and researchers, as well as for advocacy to raise awareness against biases, disparities, and for patient benefit. We review challenges, limitations, and best practices for social media use by medical professionals with neurology-specific examples.

Keywords
social media, curriculum, medical education, pandemics, neurology education, COVID-19, twitter, instagram, child neurology, information dissemination

Received May 5, 2022. Accepted for publication May 26, 2022.

Introduction
Social Media (SoMe) is an umbrella term for interactive platforms and tools that facilitate creation and sharing of information (content) through virtual communities (networks). Over half of the world’s population uses SoMe; which drastically increased during the COVID-19 pandemic.1 On average, users spend 2.5 hours on SoMe per day across multiple platforms.1 The most popular platforms used by the general public include Facebook (2.9 billion active users), YouTube (2.3 billion), WhatsApp (2 billion), Instagram (1.4 billion), TikTok (1 billion), and Twitter (436 million).1–4

The use of SoMe in healthcare has expanded over time. Hospital systems use SoMe to promote brand presence, patient education, and reputation scores.7 An estimated 25–65% of medical professionals are using SoMe6–10 for clinical outreach,11–13 career development,8,14–21 research,15,22–33 education,34–44 and advocacy efforts.45–59 However, there are misconceptions, anecdotal stories, and fears surrounding a medical professional’s use of SoMe use, which can foster inappropriate use, skepticism, and criticism. The pandemic accelerated previous trends towards digital spaces as many real-world communities were shuttered in the face of social distancing. SoMe has become integral for many medical professionals and created an opportunity to shape the

1Department of Neurology, Atrium Health Wake Forest Baptist, Wake Forest University School of Medicine, Winston-Salem, North Carolina, USA
2Department of Neurology, University of Minnesota School of Medicine, Minneapolis, Minnesota, USA
3Department of Neurology, University of Virginia, Charlottesville, Virginia, USA
4Department of Neurology, University of Louisville, Louisville, Kentucky, USA
5Department of General Medicine, Beth Israel Deaconess Medical Center, Boston, Massachusetts, USA
6Department of Neurology, Case Western Reserve University, Cleveland, Ohio, USA

Corresponding Author:
Jaclyn M. Martindale, Atrium Health Wake Forest Baptist, Department of Neurology, Medical Center Boulevard, Winston-Salem, North Carolina, 27157, USA.
Email: jmartind@wakehealth.edu

Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 License (https://creativecommons.org/licenses/by-nc/4.0/) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE and Open Access page (https://us.sagepub.com/en-us/nam/open-access-at-sage).
next generation of educators, researchers, and leaders. Developing fluency in various platforms, uses, and tools has become essential. We provide an introductory primer to the main SoMe platforms used by medical professionals. Additionally, we discuss the benefits and limitations of using SoMe for clinical outreach, advocacy, research, and continuing medical education and how each of these can foster career development.

The Terminology

Understanding terminology forms the building blocks for success. A tweet (Twitter) or post (Instagram) is the content you are creating and sharing. Handle refers to an individual’s username typically symbolized by an @ sign followed by numbers and/or letters. This may be different from the display name, which is typically the full name of the individual, program, or organization. Hashtags are symbolized by a # sign followed by letters and/or numbers. Hashtags are clickable and searchable across multiple platforms. Hashtags can be registered through organizations such as Symplur© in order to track impact, activity, and top influencers.65

On Twitter (Figure 1), there is a 280-character limit per tweet, which can be overcome by linking a series of tweets together, into a thread. Threads are often denoted by numbering each individual tweet at the top 1/9, 2/9 or 1/1, 2/ and so forth. Twitter allows inclusion of up to 4 photos as well as external website links, polls, graphic interchange format (GIF), or short videos in the tweet. Mentions are when another user’s handle is included in the main text. Users can be tagged, attaching a user’s handle to the post or photograph, a feature also found on Instagram and Facebook. Users can interact with a tweet by commenting (through the chat-bubble icon), retweeting (sharing the content) or quoting (sharing the content with added commentary). These interactions bring the tweet to the top of the users’ feeds, which is a stream of continually updated content.

On Instagram (Figure 2), there is a 2200-character limit and content is visually driven. Text falls below the visual content, which can include up to 10 photographs or short videos per post. Instagram TV allows the inclusion of longer videos (> 1 min), but interactive elements such as links, polls, or GIFs are harder to include. Website links can be included in an individual’s bio but not within the post itself. Both Instagram and Twitter allow comments and likes. Unlike Twitter, commenting and liking do not alter the position of the post on the feed. Posts appear in chronological order of newest to oldest regardless of the number of comments or likes.

Career Development:

Medical professionals have learned the value SoMe can have in education, research, advocacy, and clinical care initiatives. Each of these provides opportunities to network, build collaborations, and develop a reputation (Figure 3).

SoMe can facilitate professional networking within a specific network that may not be readily accessible in your own institution or more broadly. Networking can occur on public or private platforms designed solely for medical professionals, such as Doximity©, Sermo©, and Medscape Physician ConnectSM. Traditionally mentors and sponsors can facilitate professional networking opportunities; however, this may be challenging for early career faculty who may lack access to strong mentorship or sponsorship. Leveraging SoMe for professional networking can help level the playing field against time, geography, and traditional hierarchical status of medicine.16–19 SoMe creates accessibility to bring your voice, name, or reputation to bigger circles.

Individuals can build their personal brand, reputation, and expertise visibility.14,15 This can result in speaking opportunities, educational engagements, research collaborations, mentor-mentee relationships, or media outreach.8,20,21 Faculty promotion and tenure committees evaluate clinicians based on educational portfolio, academic scholarship, and reputation. SoMe can facilitate professional growth through each of these avenues and support career advancement.

Research and Academic Scholarship:

Dissemination

SoMe aids in the promotion of research and academic scholarship. Through SoMe scientists gain accessibility to a larger research community. Through these networks, scientists can share ideas, enable rapid large-scale collaborations, and even facilitate new funding opportunities.15,22–28

SoMe can also play a pivotal role in the dissemination of publications. Journals actively broadcast new articles through SoMe platforms or integrate their own articles into Twitter-based journal clubs to facilitate visibility, downloads, views, metrics, and even journal impact factor.31–33 Visual abstracts distributed on SoMe lead to increased impressions for journal articles and have become standard in many fields of academic publishing.61,62 Inclusion of author handles enables more impressions and full-article downloads, leading many journals to request authors’ twitter handles with manuscript submission.

Acquisition of New Studies and Articles

As SoMe is utilized for dissemination and promotion of academic scholarship, it can be a great place to find the latest research and publications. Over 3 million articles are published per year.63 The annual growth of articles published has been steadily rising at 4–5% per year with even higher rates in 2021 due to COVID-19 related papers.64 Publications in traditional paper journals can be both time-consuming and costly. Pre-prints, open access, and SoMe are being used to reduce the time to integrate new evidence into clinical practices although can be associated with costly publication fees.65,66
Many child neurology and neurology journals have SoMe accounts (Table 1).

**Study Recruitment**

Web-based recruitment is both cost-effective and more efficient than traditional recruitment methods. SoMe can facilitate study participant recruitment by reaching target populations. Although online support groups for rare diseases are discussed later in this article, their use in study recruitment is relevant to the current topic. The majority of members in online support groups for pediatric rare diseases supported being contacted through the group for study recruitment inquiries. Use of these support groups for recruitment has been both successful and practical in rare diseases.

SoMe advertising can also accelerate clinical trial enrollment, which can be challenging in rare diseases. The ExTINGUISH Trial, a prospective randomized clinical trial for Anti-NMDA Receptor Encephalitis, is a prime example of SoMe-based recruitment to study a rare disease through a national cooperative group. Investigators use SoMe to access patient advocacy and support groups, or to create targeted ads to reach a specific population. Investigators can also enlist involvement of patients or families through SoMe in decision making processes.

Although SoMe-based recruitment can facilitate both accessibility and geographic diversity, additional recruitment methods should be used to insure phenotypic, racial, and ethnic diversity in a study population. Investigators should also be mindful of the challenges SoMe may pose in protecting study participant’s identities, maintaining blinding, and retention of participants.

**Alternative Metrics**

While SoMe article dissemination facilitates citation building, traditional citation-based metrics can take years to accumulate. In the age of electronic distribution, alternative metrics aim to capture the broader influence of publications across all scholarly outlets beyond citations alone. This type of data captures a quicker, more diverse assessment of impact and engagement across both traditional and non-traditional outlets (i.e. SoMe, blogs, news outlets, governments, or nonprofits). Sites such as PlumX or Altmetrics are ways to track these alternative metrics (Figure 4).

Altmetric Attention Scores are visualized through a multi-colored donut display, where each color represents a different source and changes depending on the volume of each source. Total scores are created from automatic algorithms based on a weighted combination of mention volume, author reach, and type of source. The score considers the potential source value and bias. For example, sharing of an article by a news agency, patents, or blog are weighted more heavily than SoMe shares or mentions. Multiple shares by the same source or within a short time are weighted less in the total score. Scores are readily accessible through a bookmarklet, a free web browser plug-in, for any publication with a digital object identifier (DOI). Generally, there is no ‘good’ Altmetric score; scores can increase with both negative and positive attention. Traditional journal citations are excluded from the Altmetric Attention Score. With these limitations, Altmetrics should be used in conjunction with traditional citation-based metrics for the best assessment of total scholarly influence.

![Figure 1. Anatomy of a Twitter post.](image-url)
Figure 2. Anatomy of an Instagram post.

Figure 3. Facilitation of career development through social media.
PlumX is an alternative metric through Plum Analytics© that measures impact through citations, usage, captures, and mentions on SoMe. The score is provided through a visual Plum Print, which features 5 “lobes” corresponding to each of the five main categories of impact. The size of the lobe will grow with volume in each category. Hovering over the widget will provide details of each category. Plum X is only available through request to non-commercial open access journals, data providers, and platforms. It is available on certain Elsevier products such as Mendeley, Science Direct, and Scopus.80

Education

Continuing Medical Education

SoMe is a powerful tool to disseminate and translate knowledge in a way that users, educators, learners, and others can be of up-to-date educational content. The American Academy of Neurology publishes short, high-yield YouTube educational videos called NeuroBytes as part of their online learning catalog offering CME. These videos are advertised on a variety of platforms in addition to SoMe. Additionally, private SoMe groups such as the Women Neurology Group (WNG) and BlackInNeuro offer regular CME series exclusively through SoMe. These groups are discussed in more detail later.

Professional medical societies also use hashtags that are often conference, specialty, or disease-specific, to share educational content to and beyond their members.81–84 As hashtags are searchable, it also creates a living collection of curated content. Live posts of conference sessions can aid in metrics, impact, and engagement. This is especially relevant in today’s era where conferences have adopted virtual or hybrid models of attendance due to the COVID-19 pandemic. Using meeting-specific hashtags provides a real-time opportunity for virtual-attendees and non-attendees to engage with each other, live attendees, and presenters. Linking supplemental educational material to the posts can drive scientific engagement.85,86

In addition, using specialty-related hashtags can influence health-related discussions beyond conferences. Hashtags are used in Twitter journal clubs (i.e. #NeuroJC) and medical education chats (#MedEdChat). These digital formats of traditional teaching activities can facilitate deeper critical appraisal, broader accessibility, diversity of participants, and engagement of key stakeholders.31 Hashtags can also be used to curate best practices and pearls, for example in general medical education (#MedEd) and neurology medical education (#EndNeurophobia). This is discussed more in part two of this article series.

Advocacy

Community Access

SoMe can facilitate access to specific networks that may not be readily available within your institution such as women in medicine, sexual and gender minorities (SGM), or underrepresented minorities (URM). The complexity of disparities, stereotypes, and challenges faced by these groups is beyond the scope of this article; however, SoMe can be a helpful tool for advocacy by facilitating networking, amplifying voices, and propagating awareness efforts. Professional societies can be integral to magnify these efforts.87

Women now represent 37.5% of practicing child neurologists compared to 30.4% in 2005;88,89 however, they occupy the minority of leadership and senior faculty positions.90–92 Although there has been change in gender and racial diversity in academic neurology, white males continue to hold the majority of leadership and higher academic positions.93 Initiatives such as Women Neurologists Group (WNG), Physician Mom Group (PMG), or #EWIMS (Early Career Women in Medicine and Science) work to empower women in academic medicine.90

The WNG is a closed Facebook group for women neurologists created in 2015. WNG aims to foster networking, support, and collaboration of women neurologists. Since its creation, WNG has grown to over 3500 members and expanded to other SoMe platforms such as Twitter, YouTube, and Instagram. The group holds regular networking dinners at national conferences, webinar series, and an annual CME-accredited conference.94,95 WNG also collaborated with the American Academy of Neurology (AAN) Women’s Issues in Neurology section to develop WoMEN (Women Mentoring Excellence in Neurology), a women-specific mentorship program working towards gender equity in neurology. Recognizing the critical role mentorship plays in academic satisfaction and retention, over 127 mentor-mentee pairs were matched during its pilot year.91,90 Several neurological societies and communities have organized similar efforts.

Amplifying Advocacy Initiatives

SoMe not only creates accessibility to specific networks, but also can amplify advocacy efforts quickly and broadly. Leveraging SoMe for this purpose can strengthen the impact and reach of advocacy initiatives. A medical student-run organization, White Coats For Black Lives (WC4BL), originated

| Table 1. Selected Child Neurology and Neurology Journals. |
| Journal | Twitter handle |
|---------|---------------|
| Annals of Neurology | @ANA_journals |
| Clinical Neurology | @ELSNeurology |
| Frontiers in Neurology | @FrontNeurol |
| Green Journal | @GreenJournal |
| JAMA Neurology | @JAMANeuro |
| Journal of Child Neurology & Child Neurology Open | @ChildNeurol |
| Neurology Today | @NeurologyToday |
| Pediatric Neurology | @pedneurojournal |
| Pediatric Neurology Briefs | @PedNeurBriefs |
| The Lancet Neurology | @TheLancetNeuro |
through a SoMe organized national demonstration. Over 3000 medical students from 80 schools participated in a National White Coat Die-In to show solidarity against police brutality in support of Black Lives Matter. The demonstration called for health professionals to address structural and institutional racism as a public health crisis. The hashtag #WhiteCoatsForBlackLives gained national media attention. In the subsequent years, WC4BL has 70 active medical school chapters working to promote racial justice.

Two trainee led hashtag turned movements amplified gender disparities, sexism, and unconscious bias in the operating room. The hashtag #ILookLikeASurgeon, created by a surgical resident, reinvigorated after the New Yorker’s Health, Medicine & the Body Issue featured a cover illustration of an all-female surgical team gazing down in 2017. A global movement of female surgeons recreated their own version of the cover leading to over 1 billion impressions and more than 350,000 hashtag uses. What started from a tweet in the midst of a global crisis of anti-Black racism, created two movements working to sustain significant and meaningful change to the centuries of suppression and systemic racism in the neuroscience community and beyond.

Raising Awareness:

SoMe can raise awareness against bias and disparities. Anti-black movements, such as @BlackInTheIvory and @BlackInNeuro, drew attention across SoMe to anti-Black racism in academia. The first #BlackInNeuroWeek took place only 3 weeks after its creation and received over 3.4 million twitter engagements. These communities gained sponsors and a growing network of scholars and allies. What started from a tweet in the midst of a global crisis of anti-Black racism, created two movements working to sustain significant and meaningful change to the centuries of suppression and systemic racism in the neuroscience community and beyond.

Similar movements have risen in other SGM and URM communities, such as @LatinxInNeuro and @QueerInNeuro. SGM and URM face their own unique inequities and systemic injustices. Identification with multiple layers of minorities increases the complexity of disparities, from which neurology is not exempt. According to a 2015 child neurology clinical workforce survey 79.9% of practicing child neurologists were White, 14.8% Asian, 1.6% Black, 0.7% American Indian or Alaska Native, and 4.7% reported other race. There was a mild increase in racial and ethnic diversity from the prior workforce survey in 2005. While SoMe can facilitate these discussions, some argue it may amplify preexisting disparities. One study found that women physicians had less visibility, lecture invitations, and collaborative opportunities on SoMe compared to their male colleagues. While outside of SoMe women have fewer publications and citations than men even with co-authorship or team collaborations, having women co-authors did not decrease Twitter dissemination of articles.
amplifying or mitigating these disparities needs to be further explored.

**Patient Advocacy**

Organizations are crucial influencers to patient advocacy and disease-specific discussions. This aspect of advocacy becomes even more important for child neurologists as many of the conditions encountered in child neurology frequently fall under the rare disease umbrella. Organizations such as Child Neurology Foundation (@Child_Neurology), International Alliance for Pediatric Stroke (@StrokePediatric), and Epilepsy Foundation (@EpilepsyFdn) are a few examples where SoMe has been successfully used to increase outreach, promote advocacy, and raise awareness, as well as to disseminate helpful information and tool-kits for professionals and the general public (Table 2).

AAN events such as Neurology on the Hill (#NoH, #AANAdvocacy) leverage the power of SoMe to bring issues pertaining to neurology into a larger conversation. Tagging state representatives by sharing content about these issues can engage them and the public in key topics, complementing discussions from advocacy days.

The role of SoMe in patient advocacy could not be discussed without mentioning the #icebucketchallenge. The Ice Bucket Challenge began as a challenge for nominees to videotape themselves dumping ice water over their head within 24 hours or donate to a charity of their choosing. In July 2014, Chris Kennedy whose relative has Amyotrophic Lateral Sclerosis (ALS), dedicated his challenge to ALS. The challenge reached a former baseball player Pete Frates causing it to spread rapidly on SoMe.106 The campaign not only rapidly raised over $115 million for the ALS Association but also increased public interest, awareness, publications, funding, and advancement of research for the ALS community. The Ice Bucket Challenge had direct impact on the discovery of five new genes connected to ALS as well as acceleration of the largest ALS genomic study in the United States.107 Similar campaigns have been created by a variety of patient organizations.

**Clinical**

**Communities of Practice**

At the beginning of the pandemic, healthcare providers turned to SoMe for crowdsourcing of advice, information, and best practices against the novel severe acute respiratory syndrome due to coronavirus-2 (SARS-CoV-2). Crowdsourcing generally refers to a large group of people collectively contributing knowledge, value, or problem solving usually via the internet. COVID-19 information was scarce and rapidly evolving. Within 3 weeks of the World Health Organization (WHO) declaring COVID-19 a global pandemic, there were over 26 Facebook groups for medical professionals with a mean number of 21,000 members. One of the largest US COVID-19 physician and advanced practice provider (APP) groups has 146.8K members. The majority of these groups were private with a variety of security measures before admittance. Facebook groups emerged to rapidly crowdsourcing collective knowledge on patient management, resources, and personal protective equipment.108,109

Information sharing also occurred across other platforms such as WhatsApp and Twitter.110,111 In neurology, early uncertainty regarding the risk of COVID-19 to patients with multiple sclerosis on disease modifying therapy raised the need for urgent clinical decisions. The hashtag #MSCOVID19 was created during the early phase of the pandemic as a way for the international medical community to rapidly share case information.112 As information evolved, disease-specific journals and organizations readily shared protocols and guidelines to create communities of practice.113

**Patient Referrals and Expertise Visibility**

We previously discussed the importance of SoMe in professional networking, reputation building, and expertise visibility. In clinical practice, this can translate to larger referral networks and lead to new patient referrals. Patients research their physicians online. Google rankings, word-of-mouth, and group recommendations influence a patient’s decision-making when seeking specialty care. One study showed that a medical professional’s SoMe visibility was more influential on front-page placement on Google Rankings than medical school ranking or years in practice.114 This is an important consideration when trying to build a niche, brand, and reputation.

**Patient Care and Support**

In the era of genetic testing, rare and new diseases are increasingly encountered in child neurology. The European Union defines rare disease as one that affects fewer than 1 in 2000 people.115 With over 7000 rare diseases in the US, there is a

---

**Table 2. Selected Patient Advocacy Organizations.**

| Organization                                      | Twitter handle                  |
|---------------------------------------------------|---------------------------------|
| Batten Disease International Alliance             | @BattenDisease                  |
| Child Neurology Foundation                        | @Child_Neurology               |
| Children’s Tumor Foundation                       | @ChildrensTumor                |
| Cure Duchenne                                     | @CureDuchenne                  |
| Cure Spinal Muscular Atrophy                      | @CureSMA                       |
| Danny Did Foundation                              | @DannyDidOrg                   |
| Epilepsy Foundation                               | @EpilepsyFdn                   |
| Friedreich’s Ataxia Research Alliance             | @CureFA.org                    |
| Functional Neurological Disorder Hope International| @FNDHope                       |
| International Alliance for Pediatric Stroke       | @StrokePediatric               |
| Lennox-Gastaut Syndrome Foundation                | @LGS_Foundation                |
| Tourette Association of America                    | @TouretteAssn                  |
| Tuberous Sclerosis Complex Alliance                | @tscalliance                   |
good chance families would never encounter another child with the same disorder without the help of the internet.

Online support groups, particularly on Facebook, allow families to locate, receive emotional support, exchange information and knowledge, and connect with others going through the same thing. These are widely used with over 6000 support groups for pediatric diseases on Facebook. In a survey of pediatric rare disease support groups, almost 80% reported they would like to have health professionals as members.\(^{116}\)

SoMe can also be used to quickly crowdsourced resources for patient care. One author’s general tweet for insurance denial of epilepsy medications led to multiple messages regarding patient support programs, resource contacts, societal committee assistance, and appeal templates within several hours (Figure 5).\(^{117}\) In addition to supporting patient care, raising awareness to barriers of clinical care may help influence broader change. It is important to note that SoMe also poses ethical and privacy considerations, whether it be the patient or clinician sharing case information for collective advice.\(^{118}\)

### Documentation of Social Media Scholarship

Faculty promotion and tenure committees evaluate clinicians based on educational portfolios, academic scholarship, and local, regional, or national reputations. Customary documentation of achievements fails to capture the broader impact and influence of non-traditional activities. A growing body of literature provides guidance on how to include these digital achievements and alternative metrics in the promotion and tenure process.\(^{14,23,75,119–124}\)

SoMe portfolios, mission-based content, and scholarship are meaningful contributions to academic portfolios.\(^{23}\) High-impact original content should be included in both the curriculum vitae as well as the appropriate portfolio. Contributions chosen should demonstrate both influence and quality while facilitating career development. Including detailed analytics of digital content such as impressions, downloads, subscribers, or more platform-specific metrics can demonstrate overall impact and reach. Although objective metrics can provide some insight, overall impact can be more subject to interpretation. Individuals should briefly highlight why these contributions were included and how it supports their academic mission.

#### Challenges

While SoMe is a powerful tool, it is not without pitfalls. One of the most common barriers to SoMe use by medical professionals is skepticism. This often arises from a misunderstanding of how using SoMe for professional purposes differs from personal or non-clinical use. As such, it is recommended to separate professional and personal content.

As a medical professional, activity on SoMe platforms should be treated as a digital extension of your professional identity and thus held to the same degree of accountability and professional standards. Users should consider how content reflects their professional goals, area of expertise, on themselves, and their employers. Content is public and viewable by patients, colleagues, employers, or media. Content can also invite users known as *trolls*. Trolls are usually anonymous users, who purposely try to instigate conflict or provoke anger. They can be persistent, intrusive, rude, or even offensive. As tone and context may be misinterpreted in SoMe exchanges, it is best to disengage, block, or report these users. It is also important to keep this in mind when sharing content and responding to others. Both the American Medical Association (AMA) and the AAN have developed codes of conduct for medical professionals using SoMe.\(^{125,126}\) Similar guidelines have been created by different specialties and organizations. It is best to review your institution’s SoMe policy before engaging in professional or personal SoMe use.

Medical professionals should also be mindful of Health Insurance Portability and Accountability Act (HIPAA) compliance. Appropriate steps need to be taken to eliminate potential breach of patient confidentiality or identification. This is especially important in a specialty such as child neurology, where rare diseases are frequently encountered. As a result, it may be easy for patients or patient families to identify themselves in content shared on SoMe platforms. Written consent must be obtained prior to sharing of any personal health information. Most institutions have a standard consent form for pictures or other media that can be modified to share digitally. Altering details of the patient and clinical presentation can preserve privacy while sharing clinical cases for collective advice or educational purposes.

Although SoMe can facilitate knowledge translation, content shared on SoMe is often criticized for lack of a formal peer review process. Medical professionals should take extra steps to ensure accuracy of information and

---

**Figure 5.** Example of tweet crowdsourcing patient care resources.
avoid plagiarism. Attaching references, original articles, or reputable resources can reduce the risk of misinformation. It is also important to read content and supporting references fully before sharing with others to diminish risk of misinformation propagation.

Some of the benefits of SoMe may also provide challenges. Character limits allow concise delivery of content but may hinder more complex views or discussions. You can circumvent character limits through threads, Tweetorials, including external website links, or transitioning to a different platform. Additionally, while SoMe can facilitate building a personal brand, too much self-promotion can disengage followers. A healthy mixture of sharing personal accomplishments with sponsoring others’ work is important.

Lastly, SoMe use has the potential to develop into a significant time commitment and distract from other professional duties. Scheduling small amounts of time in your workweek for SoMe can minimize distraction and fatigue. Consider keeping a list of content ideas to create during your dedicated SoMe time. Additionally, scheduling content and working in teams are effective strategies that facilitate SoMe presence without constantly being "plugged in".

Conclusion and Future Directions

SoMe has grown over the last decade and is part of our daily routines. The use of SoMe has changed the way we obtain and disseminate information, educate, network, and collaborate. Medical professionals have leveraged this to broaden the impact and reach of clinical, educational, research, and advocacy initiatives. Through understanding effective and appropriate uses of SoMe in each of these capacities, SoMe has become a powerful tool for career development strategy. Becoming familiar with benefits and challenges of SoMe use by medical professionals is important to navigate the evolving trends of academia. The next leaders of child neurology and neurology will be plugged in various platforms, tools, and SoMe uses to support their academic mission. Current practicing medical professionals should develop familiarity with these practices to engage with the next generation of learners. Part two of this article series will review the role of SoMe and digital tools in medical education. Future research exploring how medical professionals engage with SoMe will aid in ongoing work to incorporate these metrics in academic promotion processes. Additionally, exploration of the role of SoMe in mitigating and/or propagating existing disparities within healthcare is critical.

Acknowledgments

The authors would like to express gratitude to the University of Louisville Child Neurology Residency Program (@louisvillechildneuro on Instagram) for allowing the authors to use their post as an example.

All authors have read the final manuscript and approved it for submission.

The authors would like to thank the Neurology journal for permission to use an image of the article in Figure 4 as an example.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Ethical Approval

Not applicable, because this article does not contain any studies with human or animal subjects.

Informed Consent

Not applicable, because this article does not contain any studies with human or animal subjects.

ORCID iD

Jaclyn M. Martindale https://orcid.org/0000-0002-4919-8850

Trial Registration

Not applicable, because this article does not contain any clinical trials.

References

1. Global Social Media Stats. Updated 10/17/2021. Accessed 10/27/2021, https://datareportal.com/social-media-users.
2. Bursztynsky J. TikTok says 1 billion people use the app each month. CNBC. Updated 9/27/2021. Accessed 10/27/2021, https://www.cnbc.com/2021/09/27/tiktok-reaches-1-billion-monthly-users.html.
3. Sherman A. TikTok reveals detailed user numbers for the first time. CNBC. Updated 8/24/2020. Accessed 10/27/2021, https://www.cnbc.com/2020/08/24/tiktok-reveals-us-global-user-growth-numbers-for-first-time.html.
4. Thanks a billion!. TikTok. Accessed 10/27/2021, https://newsroom.tiktok.com/en-us/1-billion-people-on-tiktok.
5. Triemstra JD, Poepelman RS, Arora VM. Correlations between Hospitals’ social Media presence and reputation score and ranking: cross-sectional analysis. J Med Internet Res. 2018;20(11). doi: 10.2196/jmir.9713.
6. Van Noorden R. Online collaboration: scientists and the social network. Nature. Aug 14 2014;512(7513):126-129. doi:10.1038/512126a.
7. Loeb S, Bayne CE, Frey C, et al. Use of social media in urology: data from the American Urological Association (AUA). BJU Int. Jun 2014;113(6):993-998. doi:10.1111/bju.12586.
8. Househ M. The use of social media in healthcare: organizational, clinical, and patient perspectives. Stud Health Technol Inform. 2013;183:244-248.
9. Economides JM, Choi YK, Fan KL, Kanuri AP, Song DH. Are we witnessing a paradigm shift?: a systematic review of social Media in residency. Plast Reconstr Surg Glob Open. Aug 2019;7(8):e2288. doi:10.1097/GOX.0000000000002288.
10. Farsi D. Social Media and health care, part I: literature review of social Media use by health care providers. *J Med Internet Res*. Apr 5 2021;23(4):e23205. doi:10.2196/23205.

11. Niemann MH, Alvarado MC, Camayd-Muñoz C, Jonas RR, Wenger JK, Douglass LM. A multimodal telehealth strategy to improve pediatric epilepsy care. *Pediatr Clin North Am*. Aug 2020;67(4):629-634. doi:10.1016/j.pcl.2020.04.004.

12. Pearl PL. Child neurology, COVID-19, and crisis in society. *Dev Med Child Neurol*. 2020;62(10):1113-1113. doi:10.1111/dmcn.14624.

13. Bain JM, Dyer CA, Galvin M, et al. How providers in child neurology transitioned to telehealth during COVID-19 pandemic. *Child Neurol Open*. 2021;8:2329048X211022976. Published 2021 Jul 19. doi:10.1177/2329048X211022976.

14. Sotto-Santiago S, Sharp S, Mac J. The power of social Media in the promotion and tenure of clinician educators. *MedEdPORTAL: the Journal of Teaching and Learning Resources*. 2020;16 (10943). doi:10.15766/mep.2374-8265.10943.

15. Choo EK, Ranney ML, Chan TM, et al. Twitter as a tool for communication and knowledge exchange in academic medicine: a guide for skeptics and novices. *Med Teach*. May 2015;37(5):411-416. doi:10.3109/0142159x.2014.993371.

16. Ruan B, Yilmaz Y, Lu D, Lee M, Chan TM. Defining the digital self: a qualitative study to explore the digital component of professional identity in the health professions. *J Med Internet Res*. Sep 29 2020;22(9):e21416. doi:10.2196/21416.

17. Antheunis ML, Tates K, Nieboer TE. Patients’ and health professionals’ use of social media in health care: motives, barriers and expectations. *Patient Educ Couns*. Sep 2013;92(3):426-431. doi:10.1016/j.pec.2013.06.020.

18. Lu D, Ruan B, Lee M, Yilmaz Y, Chan TM. Good practices in harnessing social media for scholarly discourse, knowledge translation, and education. *Perspect Med Educ*. Jan 2021;10(1):23-32. doi:10.1007/s40037-020-00613-0.

19. Wong K, Swamy L, Jardine LDA. #Tipsfornewdocs: mentoring from miles away. *J Grad Med Educ*. Oct 2017;9(5):674-675. doi:10.4300/JGME-D-17-00723.

20. Ernst M, Badkhshan S. #Urostream101: social media as a medium for mentorship in urology. *Urology*. Aug 16 2021; 158:39-44. doi:10.1016/j.urology.2021.08.001.

21. Diller D, Yarris L.M. A descriptive analysis of the use of twitter by emergency medicine residency programs. *J Grad Med Educ*. 2018;10(1):51-55. doi:10.4300/JGME-D-16-00716.1.

22. Acquaviva KD. Establishing and facilitating large-scale manuscript collaborations via social media: novel method and tools for replication. *J Med Internet Res*. May 17 2021;23(5):e25077. doi:10.2196/25077.

23. Acquaviva KD, Mugele J, Abadilla N, et al. Documenting social Media engagement as scholarship: a new model for assessing academic accomplishment for the health professions. *J Med Internet Res*. Dec 2 2020;22(12):e25070. doi:10.2196/25070.

24. Christensen T, Riis AH, Hatch EE, et al. Costs and efficiency of online and offline recruitment methods: a web-based cohort study. *J Med Internet Res*. Mar 1 2017;19(3):e58. doi:10.2196/jmir.6716.

25. Child RJ, Mentes JC, Pavlish C, Phillips LR. Using Facebook and participant information clips to recruit emergency nurses for research. *Nurse Res*. Jul 2014;21(6):16-21. doi:10.7748/nr.21.6.16.e1246.

26. Lafferty NT, Manca A. Perspectives on social media in and as research: a synthetic review. *Int Rev Psychiatry*. Apr 2015;27(2):85-96. doi:10.3109/09540261.2015.1009419.

27. Gorska A, Korzynski P, Mazurek G, Pucciarelli F. The role of social Media in scholarly collaboration: an enabler of international research team’s activation? *J Glob Inf Tech Manu*. Oct 1 2020;23(4):273-291. doi:10.1007/1097198x.2020.1817684.

28. Hunter P. The growth of social media in science: social media has evolved from a mere communication channel to an integral tool for discussion and research collaboration. *EMBO Rep.*. May 6 2020;21(5):e50550. doi:10.15252/embr.202050550.

29. Topolovec-Vranic J, Nataljkan K. The use of social Media in recruitment for medical research studies: a scoping review. *J Med Internet Res*. Nov 7 2016;18(11):e286. doi:10.2196/jmir.5698.

30. Carlock G, Manning K, Leslie EJ. Feasibility of social Media recruitment for orofacial cleft genetic research. *Cleft Palate Craniofac J*. Jun 5 2020;59(6):701-707. doi:10.1177/10566656211024484.

31. Stoneman S, Hiremath S. Twitter-Based journal clubs: bringing critical appraisal to the social table. *Semin Nephrol*. May 2020;40(3):264-272. doi:10.1016/j.semnephrol.2020.04.004.

32. Wray CM, Auerbach AD, Arora VM. The adoption of an online journal club to improve research dissemination and social media engagement among hospitalists. *J Hosp Med*. Nov 2018;13(11):764-769. doi:10.12788/jhm.2987.

33. Kelly BS, Redmond CE, Nason GJ, Healy GM, Horgan NA, Hefferman EJ. The use of twitter by radiology journals: an analysis of twitter activity and impact factor. *J Am Coll Radiol*. Nov 2016;13(11):1391-1396. doi:10.1016/j.jacr.2016.06.041.

34. Nickson CP, Cadogan MD. Free open access medical education (FOAM) for the emergency physician. *Emerg Med Australas*. Feb 14 2021;26(1):76-83. doi:10.1111/1742-6723.12191.

35. Galiatsatos P, Porto-Carreiro F, Hayashi J, Zakaria S, Christians C. The use of social media to supplement resident medical education - the SMART-ME initiative. *Med Educ Online*. 2016;21:29332. doi:10.3402/moe.v21.29332.

36. Trivedi S, Saunders S, Rodman A. Strategies for designing a health professions digital education curriculum. *Clin Teach*. Aug 2021;18(4):336-340. doi:10.1111/ctc.13382.

37. Weber DJ, Albert DVF, Aravamuthan BR, Bernson-Leung ME, Bhatti D, Milligan TA. Training in neurology: rapid implementation of cross-institutional neurology resident education in the time of COVID-19. *Neurology*. Sep 2020;95(19):883-886. doi:10.1212/wnl.00000000000010753.

38. Sandrone S, Berthaud JV, Carlson C, et al. Strategic considerations for applying the flipped classroom to neurology education. *Ann Neurol*. 2020;87(1):4-9. doi:https://doi.org/10.1002/ana.25609.

39. Fick L, Potini Y, Palmsano K. Twelve tips for creating your program’s social Media footprint. *MedEdPublish* [version 1]. MedEdPublish 2019; 8:169. doi:10.15694/medep.2019.000169.1

40. Daneshjou R, Adamson AS. Twitter journal clubs: medical education in the era of social Media. *JAMA Dermatol*. Jul 1 2020;156(7):729-730. doi:10.1001/jamadermatol.2020.0315.

41. Albin C, Berkowitz AL. #Neurotwitter 101: a tweetorial on creating tweetorials. *Pract Neurol*. Dec 21(6):539-540. doi:10.1136/practneurol-2021-003116.

42. Breu AC. From tweetstorm to tweetorials: threaded tweets as a tool for medical education and knowledge dissemination. *Semin Nephrol*. 2020;40(3):273-278. 2020/05/01/ https://doi.org/10.1016/j.semnephrol.2020.04.005.

43. Cadieux M, Campos-Zamora M, Zagury-Orly I, Dzara K. Journal club using virtual breakout rooms: interactive continuing education with No learner preparation during COVID-19. *J Contin...
Almetirc. How is the Almetric Attention Score calculated? Updated 9/21/2021. Accessed 2/10/2022. https://help.altmetric.com/support/solutions/articles/6000233111-how-is-the-almetric-attention-score-calculated-

Analytics P. Featured Integrations. Accessed 2/10/2022, https://plumanalytics.com/featured-integrations/

Callister MN, Robbins MS, Callister NR, Vargas BB. Tweeting analytics. P. Featured Integrations. Accessed 2/10/2022, https://plumanalytics.com/featured-integrations/

Callister MN, Robbins MS, Callister NR, Vargas BB. Tweeting analytics. P. Featured Integrations. Accessed 2/10/2022, https://plumanalytics.com/featured-integrations/

Hillman T, Sherbino J. Social media in medical education: a new pedagogical paradigm? Postgrad Med J. Oct 2015;91(1080): 544-545. doi:10.1136/postgradmedj-2015-133686.

Robbins MS, Schwedt TJ, Ward TN, Roberts J. Headache (@HeadacheJournal) and twitter. Headache. Oct 2014;54(9): 1437-1438. doi:10.1111/head.12451.

Schwenk ES, Jaremko KM, Park BH, et al. I tweet, therefore I learn: an analysis of twitter use across anesthesiology conferences. Anesth Analg. Feb 2020;130(2):333-340. doi:10.1213/ANE.0000000000004036.

Robbins MS, Shokrian N, Schwedt TJ, Houle TT, Roberts J. Headachejournal tweets on. Headache. Jun 2019;59(6):828-833. doi:10.1111/head.13539.

Elkbuli A, Santarone K, Boneva D, Hai S, McKeon M. Analysis of the American college of surgeons conference twitter hashtags and its impact on online engagement and attendance rates: the era of health care social media. Am Surg. Feb 2021;87(2):235-241. doi: 10.1177/0003134820950289.

Mishori R, Singh L, Lin KW, Wei Y. #Diversity: conversations on twitter about women and black men in medicine. J Am Board Fam Med. Jan 2019;32(1):28-36. doi:10.3122/jabfm.2019.01.180175.

Kang PB, Bale JFJr, Mintz M, et al. The child neurology clinical workforce in 2015: report of the AAP/CNS joint taskforce. Neurology. Sep 27 2016;87(13):1384-1392. doi:10.1212/wnl.0000000000031437.

Polsky D, Weiner J, Bale JFJr, Ashwal S, Painter MJ. Specialty care by child neurologists: a workforce analysis. Neurology. Mar. 22 2005;64(6):942-948. doi:10.1212/01.WNL.0000154462.34536.Cb.

Lewis JD, Fane KE, Ingraham AM, et al. Expanding opportunities for professional development: utilization of twitter by early career women in academic medicine and science. JMIR Med Educ. Jul 23 2018;4(2):e11140. doi:10.2196/11140.

Farheen AS, George IC, Singhal D, et al. Current Status and future strategies for mentoring women in neurology. Neurology. Jul 6 2021;97(1):30-37. doi:12.1212/WNL.0000000000012242.

Miyasaki JM, Mapletonere E, Yuan Y, Keran C, Gross RA. Leadership, recognition awards, and publication by men and women in the American Academy of Neurology. Neurology. 2020;95(24):e3313-e3320. doi:10.1212/wnl.000000000010810.

Saleem N, Naveed S, Mohyud Din Chaudhary A, et al. Racial and gender disparities in neurology. Postgrad Med J. Nov 2021;97(1153):716-722. doi:10.1136/postgradmedj-2020-138584.

Avitzur O. Neurologists on social Media the women neurologists group. American Academy of Neurology. 2018;18(24), doi: 10.1097/01.NT.0000552581.57562.ca https://journals.lww.com/neurotodayonline/Fulltext/2018/12200/Neurologists_on_Social_Media_The_Women.9.aspx.

Avitzur O. Neurologists on social Media the women neurologists group. NeurologyToday Online. 2018;18(14), doi:10.1097/01.NT.0000544112.87550.42 https://journals.lww.com/neurotodayonline/Fulltext/2018/07190/Neurologists_on_Social_Media_The_Women.13.aspx.

Gender Disparity Task Force Report. 2017. Accessed 1/3/22. https://www.aan.com/membership/gender-disparity-task-force-report-

Charles D, Himmelstein K, Keenan W, Barcelo N, for the White Coats for Black Lives National Working G. White coats for black lives: medical students responding to racism and police brutality. J Urban Health. 2015;92(6):1007-1010. 2015/12/01. doi:10.1007/s11524-015-9993-9.

Logghe H, Jones C, McCoubrey A, Fitzgerald E. #ILookLikeASurgeon: embracing diversity to improve patient outcomes. BMJ. 2017;359:j4653. Published 2017 Oct 10. doi:10.1136/bmj.j4653.

#ILookLikeASurgeon Dataset. Symplur. Accessed 1/3/2022, https://signals.symplur.com/account/datasets.

Dukes A. 7/3/2020. Accessed 2/16/2022. https://twitter.com/futuremdstatus/duates/1279181446108770305.

Subbaraman N. How #BlackInTheHvory put a spotlight on racism in academia. Nature. 2020;Jun;582(7812):327. doi: 10.1038/d41586-020-01741-7.

Neuro BI. Black In Neuro at a Glance: 2020-2021. Accessed 2/16/22, https://www.blackinneuro.com/.

Garcia L. The inspiration behind Black In Neuro. 2/1/2021. Accessed 1/3/22. https://news.uci.edu/2021/02/01/the-inspiration-behind-black-in-neuro/.

London ZN, Khan J, Cahill C, Schuyler E, Wold J, Southerdner AM. 2017 Program director survey: feedback from your adult neurology residency leadership. Neurology. Oct 9 2018;91(15): e1448-e1454. doi:10.1212/WNL.000000000006315.

Woitovich NC, Arora VM, Pendergrast T, Gottlieb M, Trueger NS, Jain S. Gender differences in physician use of social Media for professional advancement. Jama New Open. May. 3 2021;4(5):e219834. doi:10.1001/jamanetworkopen.2021.9834.

Sifferlin A. Here’s how the ALS ice bucket challenge actually started. TIME. 2014.8/18/2014. Accessed 2/23/2022. https://time.com/3136507/als-ice-bucket-challenge-started/.

Ice Bucket Challenge dramatically accelerated the fight against ALS. ALS Association; 6/4/2019, 2019. Accessed 2/25/2022. https://www.myals.org/stories-news/ice-bucket-challenge-dramatically-accelerated-fight-against-als.

Helen Ouyang M. At the front lines of coronavirus, turning to social Media. New York Times. 3/18/2020. Accessed 2/23/ 2022. https://www.nytimes.com/2020/03/18/well/live/coronavirus-doctors-facebook-social-media-covid.html.

Xun H, He W, Chen J, Sylvester S, Lerman SF, Caffrey J. Characterization and comparison of the utilization of Facebook groups between public medical professionals and technical communities to facilitate idea sharing and crowdsourcing during the COVID-19 pandemic: cross-sectional observational study. JIMIR Form Res. 2021/4/30 2021;5(4): e22983. doi:10.2196/22983.

Abdel-Razig S, Anglade P, Ibrahim H. Impact of the COVID-19 pandemic on a physician group’s WhatsApp chat: qualitative content analysis. JIMIR Form Res. 2021/12/7 2021;5(12): e31791. doi:10.2196/31791.
Author Biographies

Jaclyn Martindale, DO, is a movement disorder specialist with interest in Tourette syndrome, an Assistant Professor of Pediatric Neurology, and the Associate Program Director of the Child Neurology Residency at Wake Forest University School of Medicine. She is passionate about leveraging social media for career development and advancing digital education initiatives. Martindale leads the social media strategy for the Child Neurology Society as a member of the Electronic Communications Committee and is the Chair of the Digital Committee for the Professors and Educators of Child Neurology.

Jessica Goldstein, MD, is an Associate Professor of Neurology at the University of Minnesota School of Medicine and a medical educator. Her research is focused on exploring the innovative use of technology in medical education as well as professional development and identity formation. She is currently working collaboratively to explore the effectiveness of creating a community of practice on faculty engagement with digital technology and social media.

Roy Strowd, MD, MS, Med, is a neurologist, neuro-oncologist, educator, associate professor of neurology, and vice chair for health system integration in the Department of Neurology. His research is advancing the field of neuro-oncology by discovering new treatments for glioma and neurofibromatosis. He is also a passionate education researcher and serves as an assistant dean for education and scholarship at the Wake Forest University School of Medicine.

Adam Rodman, MD, MPH, is a general internist at Beth Israel Deaconess Medical Center in Boston, MA, a medical historian focusing on the history of diagnosis and medical epistemology, and a medical education researcher. He is the co-director of the Innovations in Media and Education Delivery (IMED) Initiative at BIDMC, which is dedicated to the study and promotion of digital medical education. He also co-leads the Digital Education Track of the internal medicine residency.

Arpita Lakhota, MD, is an assistant professor in neurology at University of Louisville/ Norton Children’s Medical Group. She has a special clinical interest in pediatric stroke and neuromuscular conditions. She serves as the Chair for American Academy of Neurology Section on Neurogenetics, and is part @ChildNeuroSoc twitter admin team.

Nancy Bass, MD, is currently a professor of pediatrics at University Hospitals of Cleveland/Rainbow Babies and Children’s Hospital and has a faculty appointment at Case Western Reserve University in Cleveland, Ohio. She is the program director for the Child Neurology Residency program at this institution and currently serves as President of the Professors and Educators of Child Neurology, a national organization comprised of the leaders in Child Neurology Education. Bass has received numerous teaching awards in her career as a medical educator. She also specializes in the field of pediatric neurogenetics and neuromuscular disorders and runs the multidisciplinary clinics at her current institution in these two areas.

Lauren Doyle Strauss, DO, FAHS, is a pediatric and adult headache specialist at the Comprehensive Headache Program at Atrium Health Wake Forest Baptist who focuses on improving the lives of children with headache disorders through educating patients, parents, and other healthcare professionals. Strauss became interested in the use of social media early in her career and its influence on medical care, patient advocacy, and education. As the cochair of the American Headache Society’s Electronic Media Committee, she plans social media campaigns for the organization including new social media posts and website content. Strauss teaches Twitter 101 sessions to support Neurology faculty and residents joining twitter to advance the academic mission. In 2020, Atrium Health Wake Forest Health Baptist recognized her as one of the top 25 influencers at the medical center.
Kathryn Idol Xixis, MD, is an assistant professor of neurology and pediatrics at the University of Virginia. Xixis has an interest in medical education and currently serves as the Child Neurology Residency Program Director at UVA. She also has an interest in how digital tools can be incorporated into medicine and especially medical education. As such, she is the Project Lead for the Child Neurology Society Podcast Project, Brainstorm – High Yield Topics for Physicians Short on Time. Xixis is also actively involved in patient care and has a clinical interest in neurofibromatosis.