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Social Media in Medical Education Before and After The COVID-19 Pandemic: Scoping Review

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Abstract

Background: The COVID-19 pandemic has catapulted virtual online learning to the forefront of medical education as training programs adapt to physical distancing challenges while maintaining the rigorous standards of medical training. SoMe offers a unique and partially untapped potential to supplement formal medical education.

Objective: We detail a summary of the incentives, applications, challenges, and pitfalls of SoMe based medical education for both trainees and educators

Methods: We performed a literature review via PubMed on medical research involving social media platforms including Facebook, Twitter, Instagram, and WhatsApp. Papers were reviewed for inclusion based on the integrity and power of the study.

Results: The unique characteristics of social media platforms like Facebook, Twitter, Instagram, and WhatsApp endow them with unique communication capabilities that serve different educational purposes in both the formal and informal education setting. However contemporary medical education curricula lack widespread guidance on meaningful use, application and deployment of social media in medical education.

Conclusions: Clinicians and institutions must evolve to embrace the use of SoMe platforms for medical education. Healthcare professionals can approach SoMe engagement in the same ethical manner that they would with patients in real life but healthcare institutions ultimately must enable their healthcare professionals to do so by enacting realistic social media policies. Institutions should appoint clinicians with strong social media experience to leadership roles in order to spearhead these generational and cultural changes. Further studies are needed to better understand how healthcare professionals can best utilize social media as educational tools most effectively. Ultimately social media is here to stay influencing lay public knowledge and trainee knowledge. Clinicians and institutions must embrace this complementary modality of trainee education and champion social media as a novel distribution platform that can also help propagate truth in a time of misinformation.

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Social Media in Medical Education Before and After The COVID-19 Pandemic: Scoping Review

INTRODUCTION

Social media has become an integral vehicle for the delivery and dissemination of health care education. As ubiquitous as social media (SoMe) has become amongst patients, healthcare practitioners on the other hand have had variable enthusiasm with regards to its adoption and engagement within the SoMe realm. The COVID-19 pandemic has catapulted virtual online learning to the forefront of medical education as training programs adapt to physical distancing challenges while maintaining the rigorous standards of medical training. SoMe offers a unique and partially untapped potential to supplement formal medical education. Indeed, SoMe has also offered clinicians who must social distance for public safety an opportunity and virtual space for educational discourse, community, camaraderie and support. Notably, contemporary curricula on social media's application, deployment, and professional etiquette is quite lacking. Herewithin, we detail a summary of the incentives and applications of SoMe based medical education for both trainees and educators. Likewise, we highlight the challenges and pitfalls of SoMe based medical education.

METHODS

We performed a literature review via PubMed on medical research involving social media platforms including Facebook, Twitter, Instagram, and WhatsApp. Papers were reviewed for inclusion based on the integrity and power of the study.

RESULTS

SOCIAL MEDIA: HISTORY, EVOLUTION & USE PREVALENCE

Social media is characterized as a web-based application that facilitates interactive creation and sharing of information and ideas through virtual communities. Facebook, Twitter, Instagram, YouTube, WhatsApp, and various podcasts hosting applications are amongst the most popular and well established electronic communication tools and SoMe platforms. Each platform has its own individual smartphone mobile application with unique user interfaces. These individual platforms have variable degrees of flexibility or limitation on how content is posted. Twitter permits a total of 280 characters in a single tweet whereas other platforms may be far more generous, such as Facebook, permits up to 63,206 characters in a single post. Images and videos are permitted on all platforms but the number of images and the permitted video length may differ between each of these platforms. Instagram is intentionally built to share images and short videos. YouTube is strictly built for videos and does not restrict video length. WhatsApp provides secure, encrypted messaging and sharing of audiovisual material capabilities within closed groups but is restricted to mobile devices, without a traditional desktop, web-based user interface. These platform specific parameters lend each of them to be utilized uniquely for different types of educational learning.

Critical to the global adoption of SoMe platforms was the parallel and complementary development of high speed internet and smart devices that laid the groundwork for their creation and global adoption. Our ability to capture and share high quality audiovisual media evolved from basic email and text messaging to dissemination of such media via social networks with social network access transitioning from a computer interface to a smartphone interface. The prevalence of smartphone technology is undoubtedly widespread in the United States with an estimated number of Americans who owned a smartphone rising from 56% in 2013 to 77% in 2017 [1]. Similarly, smart tablet use in America rose from 3% in 2010 to 51% in 2016 [2]. Social media platforms have similarly experienced widespread multigenerational adoption. In 2014 the percentage of Americans who reported using smartphones to access social media was 55% in those greater than 50 years of age, 77% in Americans aged 30-49, and 91% in Americans aged 18-29 [3]. The percentage of American adults on at least one social media platform has risen from 5% in 2005 to 72% in 2019. Additionally, in 2019 an estimated 75% of Facebook users, 63% of Instagram users, and 42% of Twitter users report accessing each SoMe platform, respectively, on a daily basis [3].

Hence, the critical focus on the word ‘media’ in social media bears much weight and recognition in considering the ramifications of how SoMe has changed society over the last 15 years as social media applications have come to find themselves a part of daily life.

PHYSICIAN ENGAGEMENT ON SOCIAL MEDIA BEFORE AND DURING THE PANDEMIC

Prior generations of doctors were apprehensive about engaging on social media out of concern about patient privacy, liability, lack of time, compensation, and familiarity with the technology but times are changing [4,5]. A 2011 survey of 4,033 clinicians found that 90% of clinicians use at least one social media site for personal use and 65% of clinicians already use at least one social media platform for professional purposes [6]. Many physicians use SoMe to find and share health information, communicate with colleagues and trainees, advertise their clinical practice, engage in health advocacy, impact health policy decisions, exchange developments in their fields, and publicize their research [7-12]. Over 140 reported uses for Twitter alone exist in healthcare [8]. Beyond social networking, clinicians have historically also used SoMe platforms to directly engage and educate professional peers, house staff trainees, and patients.

The advent of COVID-19 further catalyzed the adoption of SoMe platforms such as Twitter to more rapidly disseminate and spread information about an unknown & contagious disease directly to frontline reporters as new information unfolded. This was critical in many instances such as providing guidance on helping healthcare workers to maintain safety during aerosolizing procedures like endotracheal intubation [13, 14]. Infected physicians even chronicled their disease course on Twitter to educate followers in a novel way that would otherwise not have even been possible 15 years ago [14]. Similar to the global response to the Zika virus, physicians and public health organizations like the Center for Disease Control (CDC) and the World Health Organization (WHO) also utilized Instagram to spread information to healthcare professionals and the general public from verifiable sources [15-17]. This rapid and efficient dissemination of information illustrates the significant influence SoMe can have on the spread of medical literature and knowledge amongst healthcare professionals.

The COVID-19 pandemic also disrupted medical education. It forced medical schools and residency and fellowship training programs to adapt to how they educate their trainees. Aided by virtual platforms like Zoom and Microsoft Teams, formal educational lectures, noon-conferences, grand rounds, and even medical conferences have migrated online to adapt to a new normal [18]. With widespread cancellation of elective procedures, more procedural based specialty training programs faced unique challenges to ensure adequate procedure skill acquisition by their trainees. Gastroenterology fellowship programs adopted innovative virtual training webinars to strengthen their theoretical background in endoscopy, video sessions to review common technical aspects of endoscopy, and reinvigorated the use of simulation-based training which has shown that skills learned in virtual reality simulation-based training are transferable to real life [18-21]. Although Zoom and Microsoft Teams are the newest widely adopted virtual platforms to be used for formal medical education, informal medical education has been present on multiple SoMe platforms for years. Moreover with social distancing measures in actively in place, SoMe platforms help provide HCP’s an opportunity for community and camaraderie that would otherwise not exist. Specific use case examples of educational opportunities on each SoMe platform are illustrated below.

FACEBOOK

Facebook has been well studied in analyzing how patients use the platform to access and share medical information for chronic disease management and may provide insight into how closed Facebook groups can be harnessed for medical education [7,22-29]. Studies have looked at relatively small and homogenous groups of individuals who participate in well-moderated, closed Facebook groups to enhance

weight loss in African-American women, improve physical activity in patients with type 2 diabetes, and improve exercise motivation in patients with stable coronary artery disease undergoing cardiac rehabilitation [29-31]. These studies may provide important context on how Facebook groups can potentially enhance the learning experience of medical students. Although Facebook groups for medical education may pose privacy and logistical concerns, medical students are already using them to share learning tips, study strategies, material, and discuss course content [32]. Faculty who engage in and moderate discussions with medical trainees in closed Facebook groups may help them better understand common problems and challenges that students encounter and in doing so enhance the student experience [33].

TWITTER

Twitter's historically robust engagement among physicians has led to several educational opportunities for medical trainees and attending physicians alike. Opportunities like virtual case conferences, Twitter-based journal clubs, and Tweetorials provide physicians the ability to communicate and learn from experts in their field that they otherwise wouldn't be able to. For example, #MondayNightIBD is a weekly SoMe version of a multidisciplinary case conference. The weekly hashtag is used to identify discussion threads about the treatment or management of inflammatory bowel disease. It brings together clinicians from around the world to share their knowledge and research as it relates to a complex or controversial topic or situation [34]. These weekly discussions foster sharing scientific data or guidelines when available, highlight areas where there is disagreement in data interpretation, and identify areas where more research is needed. These de facto case conferences also empower patients with IBD to help educate clinicians to better understand the patient experience and ultimately help improve patient care [34].

Twitter-based journal clubs are similar to contemporary journal clubs. They exist across medical specialties including but not limited to internal medicine, radiology, nephrology, urology, and echocardiography [35-39]. Typically a chat is organized around a specific article publication [37]. Participants use hashtags to follow subjects of interest and contribute to discussions [37]. Many journal clubs, like #NephJC, have live discussions over a specific time period that fosters a conversational tone and instant communication. Other journal clubs, like #UroJC, have focused chats over a period of a few days to foster global discussion that foster participation whenever convenient for each individual [36]. Twitter-based journal clubs promote global participation from individuals in different fields and institutions and allow participants equal opportunity to participate in a timely and efficient manner [35]. Participants can engage with research authors directly who may be able to provide nuanced insight that otherwise may not have been revealed and simultaneously provide post-publication peer-review [36-38]. Chan et al. outlined the steps to establish an online journal club and although it is challenging to establish, promote, and maintain a Twitter-based journal club in comparison it is quite easy to participate [40].

Tweetorials are a collection of threaded tweets with the goal of educating those who read them [41]. Tweetorials' impact is restricted only by the author's audience. Users on Twitter can follow any number of individuals who can use Tweetorials as a teaching tool. Authors can use embedded pictures, videos, polls, or GIFs in tweets within the tweetorial thread, provide links to further reading or primary sources, and foster self-directed learning and teaching for healthcare professionals. Similar to Twitter-based journal clubs or case conferences, tweetorials allow individuals of varying hierarchical levels to directly interact who otherwise may not have the opportunity to [41]. Tweetorials can be used in formal medical education lectures and

are a novel tool to summarize, education & disseminate complex topics in bite sized teaching points.

WHATSAPP GROUP CHAT

As the field of medicine grows, so do new ways for healthcare professionals and those in training to digest educational material. In formal medical education classrooms didactic lectures still predominate. Residency and fellowship training programs as well as continuing education for attending physicians are often, at least partly, driven by case-based learning through direct patient care. These important teaching points that physicians experience daily are often difficult to translate into formal lectures but widely available smartphones and software applications like WhatsApp are disrupting and enhancing modern medical education.

WhatsApp is a secure, encrypted messaging software application restricted to mobile devices [42]. It allows physicians to securely share messages, links, documents, files, photos, and videos in a timely manner and is an ideal smartphone application for modern medical education. It has been used to enhance and stimulate medical student education as an adjunct to formal classroom and problem based learning [43-46]. The Duke University cardiovascular disease fellowship program successfully implemented a WhatsApp group chat to enhance the education of its fellows and continuing education of attending physician faculty [42].

Coleman and O'Connor's scoping review detailed a practical and learning framework for those interested in establishing successful WhatsApp educational group chats [43]. Many successful educational group chats implemented a faculty 'champion' or leader to focus discussions and facilitate learning objectives. Some implemented a pre-specified curriculum while others used a continuous learning environment seeded by real life clinical cases [42-47]. This may be ideal for smaller groups like residency or fellowship housestaff. However it can also be limited by the relatively small size of the group as it is reliant on individual member engagement. Ultimately, these studies have shown WhatsApp educational group chats, if structured well, create a safe online space for peer discussion and is applicable in multiple fields and educational levels.

INSTAGRAM

Instagram's intuitive and interactive design and widespread use creates multiple teaching avenues for physician educators and learning opportunities for medical trainees. Sharing images to educate other healthcare professionals is not a new concept but the means and ease of doing so have changed. In 1992 the New England Journal of Medicine (NEJM) introduced *Images in Clinical Medicine* [48]. Today NEJM continues to expose readers and Instagram followers to classic medical images and diagnoses to remind us of their clinical importance [49]. While most users access Instagram for entertainment, there exist a large number of physicians who run medical Instagram accounts enabling users to learn in a unique and informal manner across multiple specialties including, but not limited to, cardiothoracic anesthesiologist Dr. Rishi Kumar (@RishiMD), interventional cardiologist Dr. Ali Haider (@YourHeartDoc), cardiac electrophysiologist Dr. Hafiza Khan (@Heart.Beat.Doctor), interventional gastroenterologist Dr. Austin Chiang (@AustinChiangMD), and pulmonary and critical care intensivist Dr. Cedric Rutland (@DrJRutland). Medical images and videos shared on Instagram give users access to virtual mini-case presentations that allow users to learn bite-sized information that they otherwise would not have had access to and otherwise would not have the ability to stumble upon.

Instagram is an ideal medium to share visually appealing teaching points and has been described in several specialties including dermatology, plastic surgery, radiology, infectious disease, and cardiology [50-55]. Specialists like interventional cardiologists can easily share a descriptive case, serial electrocardiograms, and non-invasive and invasive (catheterization) imaging studies in order to illustrate pearls of wisdom about the art of medicine that may not be found in formal curriculums [55]. An account's static page allows healthcare professionals to curate a feed of teaching points with accompanying photos, videos, and written descriptions. Instagram stories complement static posts by enabling followers to directly interact with posted text, photos, or videos in real time. This also instigates further in-depth discussion beyond a single post.

For prospective pre-med students, Instagram stories may show them a glimpse into the medical field to supplement formal shadowing opportunities. For medical students and resident physicians Instagram can similarly supplement formal rotations to gain insight into various fields or niche specialties that they would otherwise not have exposure to in their current rotations. Also, learners can transcend geography, time zones and schedules to engage and learn from educators whom they otherwise may not have had the opportunity to interact with. Important, this informal setting may also allow trainees to voice questions they may not otherwise have felt comfortable asking. For educators, Instagram's platform can be used in parallel to complement formal didactic lectures, share unique and interesting cases, and provide teaching points even longer after the formal lecture is complete.

YOUTUBE

Videos are an excellent medium to illustrate highly complex medical concepts. Signaling this potential, in 2006 The New England Journal of Medicine (NEJM) established *Videos in Clinical Medicine* to offer peer-reviewed educational videos. These videos are created for medical trainees to better understand complex procedures and advanced physical examination maneuvers to ultimately improve patient care [56]. In fact, supplemental patient education videos published on YouTube have been shown to improve patient understanding of dual antiplatelet therapy after drug eluting stent placement [77].

YouTube is the single largest video-sharing platform on the internet and is the leading free online source of videos used by students and healthcare workers in the world [58]. A study of 91 second year medical students found that 98% used YouTube as an online information resource. When a YouTube channel was created for these same medical students to compound their understanding of gross anatomy 86% of students accessed the channel and 92% of those individuals agreed or strongly agreed that the channel helped them learn anatomy [59]. YouTube is clearly an effective medical education tool to improve trainee understanding and integration of information across a molecular and clinical level [60].

There are numerous medical YouTube channels present already. Some individual physicians use their channels to teach the general public about various health issues. For example Dr. Danielle Jones, an OB/GYN who produces content on her channel at *MommaDoctorJones,* and Dr. Mikhail Varshavski, a family medicine physician better known on his channel as *Doctor Mike*. Organization and medical societies also have high quality medical educational videos but also focus on medical knowledge for the general public. These include the *Center for Disease Control and Prevention (CDC)*, the *American Heart Association* and healthcare systems like the *Cleveland Clinic* and *Mayo Clinic* . Other hospital networks however feature videos specific for graduate medical education. The *Houston Methodist DeBakey CV Education* channel

features free didactic courses and hands-on learning and procedures for cardiologists, cardiovascular surgeons, and vascular surgeons. There are also several companies that provide high quality medical education content specifically for students at various levels of training. Companies like *Osmosis*, *OnlineMedEd,* and *Dr. Najeeb Lectures* are amongst the most popular channels that provide free videos with expanded levels of content with paid subscriptions.

PODCASTS

Podcasts are ideal mediums for the delivery of medical education due to their relatively low cost, ease of access, and rapidity of distribution. Podcasts offer medical trainees the ability to learn at their own pace and can reinforce contemporary in-person lectures and even foster more meaningful and engaging lectures. Podcasts are increasingly popular among medical trainees with an increasingly more favorable perception over traditional books and journals [61]. The popularity of podcasts in medicine has grown alongside its success in the general public. In 2019, 139 active medical education podcasts existed across 19 different specialties with emergency medicine, internal medicine, and pediatrics having the most active podcasts among specialties [62].

Podcasts can have varying structure and focus. Popular podcasts like *The Curbsiders* have over 271 individual episodes and cover a wide array of individual topics across specialties and subspecialties. By interviewing and discussing topics with experts from an array of medical disciplines *The Curbsiders* podcast is able to deep dive into the diagnosis, management, and treatment of various medical conditions. In doing so listeners are able to gleam valuable insight into the minds of experts they otherwise would not have access to [63]. Other formats include a review of recent literature publications or as a companion to formal journal publications. For example, *This Week in Cardiology* is a weekly podcast that delivers a summary of noteworthy publications in the field of cardiology while *JACC Podcast* is another free podcast recorded by Dr. Valentin Fuster, the editor-in-chief of the Journal of the American College of Cardiology, highlighting the journal findings and a short summary of each manuscript [64,65].

It remains difficult to objectively assess the clinical utility of podcasts in medical education [66]. Although few studies have rigorously studied the efficacy of podcasts as teaching tools in medical education their widespread use and adoption is evident [66, 67] In 2017 a survey of 356 emergency medicine residents found that 88.8% listened to a medical podcast at least once a month and that 72.2% reported that podcasts change their clinical practice either ‘somewhat’ or ‘very much’ [67].

DISCUSSION

CHALLENGES AND PITFALLS OF SOCIAL MEDIA USE AS HEALTHCARE PROFESSIONAL

First, we must acknowledge the prevalence and spread of misinformation on SoMe. This was present prior to and exacerbated by the COVID-19 pandemic. Gaining credibility in the medical community is often difficult to replicate online and accounts with a large following may not have verifiable credentials in order to provide medical education. For instance, an analysis of dermatological hashtag use on Instagram showed that only 5% of top dermatology-related posts were created by board-certified dermatologists [50]. This indicates that although many physicians and healthcare professionals may in fact be on Instagram and using it appropriately, the majority of the most popular posts are created by individuals giving advice who are not qualified to do so. Without widely effective medical therapies to treat COVID-19, clear communication with the general public is our most effective medical

treatment to date and underpins the importance of combating misinformation on SoMe [68]. Although medical journals may provide open access to healthcare professionals, this is not accessible to the general public who receive most information through SoMe channels [69]. This topic warrants further discussion and research but is outside the scope of this review.

There are several limitations in our review. Formal medical education programs adapted to physical distancing requirements during the ongoing pandemic enthusiastically but the effectiveness of these virtual learning modalities have not been extensively studied. It remains unclear if social media or virtual learning modalities may be applicable as a true substitute when in-person learning is limited. Similarly it remains difficult to study the effectiveness of individual components of social media in medical education due to the multifactorial nature of medical education and individual user variation of social media. Nonetheless, the utility of various aspects of social media including Instagram stories, Tweetorials, YouTube videos, and podcasts is evident. Future studies should focus on guiding clinical educators on how to best use these platforms effectively and appropriately for their respective specialty. Even prior to the pandemic an increasing number of healthcare professionals began engaging across social media platforms to provide informal medical education. The degree to which these online social media platforms will continue to be wielded for meaningful medical education following the eventual recovery from the pandemic however is yet to be seen. Additionally, the trend toward medical education permeating across social media is also apparent on platforms such as Reddit and TikTok but due to limited availability of studies assessing educational content on these platforms they were not included in our review.

For healthcare professionals, uniform training in proper use of SoMe is often insufficient. Many medical and educational institutions forbid active SoMe engagement by its trainees or provide vague guidelines on its use. As a result unprofessional or perceived unprofessional behavior by healthcare professionals remains an ongoing issue. Organizations like the Association of Healthcare Social Media and social media campaigns like #VerifyHealthcare are concrete steps by healthcare organizations and individual professionals to combat this chronic issue [70,71]. However larger institutional culture shifts and further formal studies are needed to evaluate how best to leverage SoMe to positively impact medical education.

Although these challenges are not new, they do complicate an already difficult task of using SoMe as an educational tool. As previously detailed, WhatsApp has successfully been integrated into formal medical school classes and informal cardiovascular disease fellow training [42-47]. YouTube channels and podcasts series may be some of the most effective methods for educators to supplement trainee education. However, there may be challenges to formally incorporate them and platforms like Instagram, Twitter, or Facebook into formal medical education curriculums. Therefore these platforms remain as supplemental resources for trainees, professionals, and patients alike. Future studies should examine how to best supplement contemporary medical education with each respective SoMe platform.

Studies should isolate differences between educating healthcare professionals in various stages of training. We surmise that there will be specialty specific variations in regards to ideal platforms as well.

Future SoMe studies should implement process-evaluation strategies to ascertain which specific aspects of SoMe make the biggest impact. A conceptual framework was developed to aid future researchers in establishing studies on SoMe. This framework, known as the Therapeutic Affordances of Social Media (TASoMe), is grounded by the biopsychosocial model, or the interconnection between biology, psychology, and socio-environmental factors [72]. TASoMe has been used to study SoMe use in brain cancer, endometriosis, and mental health [72,73]. It can aid researchers in systematically generating evidence-based research

in a stepwise fashion and can be particularly useful for future studies on Facebook groups to educate trainees on chronic disease management [72].

It also remains difficult to quantify the academic impact of physician engagement on SoMe. As healthcare professionals engage on SoMe they will gradually redirect their time from other responsibilities. Unfortunately, contemporary criteria used by academic institutions to evaluate individuals for academic promotions and tenure may not fully encompass the impact of SoMe posts or publications [74,75]. Expanded altmetrics for each SoMe platform can supplement contemporary metrics that aid in academic promotion or financial reimbursement in contract negotiations.

Lastly, contemporary studies on Facebook in medical education focus on perceived digital professionalism and likely reflect generational attitudes towards SoMe [76,77]. For better or worse, some residency program directors routinely survey public SoMe profiles of potential candidates that directly influenced residency match rank lists [76]. Teaching institutions must adapt to the changing online landscape and integrate realistic SoMe best practice guidelines into formal medical school, residency, and fellowship training program curriculums to ensure that current and future generations of physicians are well equipped to use SoMe platforms meaningfully, responsibly, and professionally.

CONCLUSION

Social media platforms may come and go and engagement patterns may fluctuate but their impact on modern society is incalculable. The seeds of social media were enriched by separate yet intertwined technological advances that bore the building blocks of a communication revolution and spawned these integrative and seemingly inescapable social media platforms. In a time period that requires novel communication and teaching methods social media can put the ‘social’ back into physical distancing and medical education. The characteristics of each social media platform endow them with unique communication capabilities never before seen in telecommunication history. Their use as educational tools must be approached with accelerated caution and monitored as they are implemented. Further studies are needed to better understand how healthcare professionals can utilize social media as educational tools most effectively. Healthcare professionals can approach SoMe engagement in the same ethical manner that they would with patients in real life but healthcare institutions ultimately must enable their healthcare professionals to do so by enacting realistic social media policies. Institutions should appoint clinicians with strong social media experience to leadership roles in order to spearhead these generational and cultural changes. Ultimately social media is here to stay influencing lay public knowledge and trainee knowledge. Clinicians and institutions must evolve to embrace and champion these platforms to preserve the educational integrity and preserve public trust.

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