



Use of “Social Media”—an Option for Spreading Awareness in Infection Prevention

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Abstract

Purpose of review There is a need for enhanced adoption of infection prevention and control (IPC) practices in both healthcare settings and the entire community, more so during pandemics. The exponential increase in the use of social media (SM) has made it a powerful tool for creating awareness, education, training and community engagement on IPC. Here, we review how social media can be used effectively to implement strategies to combat public health issues especially vis-à-vis infection prevention and control.

Recent findings According to the World Health Organization, 10% of patients get an infection whilst receiving care in healthcare institutions. Effective infection prevention and control measures can reduce healthcare-associated infections by at least 30%. Education and awareness play a vital role in implementation of infection prevention and control (IPC) strategies. Various studies show how social media has been used successfully in education and training activities, for awareness campaigns, community engagement, risk communications during outbreaks, disease surveillance and pharmacovigilance.

Summary Infection prevention and control (IPC) is the need of the hour to mitigate transmission of disease in healthcare settings as well as in the community. SM is the

fastest and most efficient way of communicating with the general population as well as health professionals. SM can help people take the right decisions and enable change in their behaviour patterns to introduce infection control practices.

Introduction

Social media (SM) is a powerful tool and can be used to spread awareness regarding diverse subjects including social and public health issues. It has become an easily accessible and open platform to express opinions and discussions on any global topic or matter of concern. The average time spent per day on social media has increased over the last few years. In fact, each year, people are spending more and more time on SM and content-sharing forums like Facebook, YouTube, Twitter and TikTok.

Within 7 years, the time spent on social media per day went up from 90 min to 153 min. The maximum usage was reported in Africa and South America, where people were spending more than 3 h on SM every day (<https://review42.com/how-much-time-do-people-spend-on-social-media/>). The ease of use, speed and low or no cost lead to increased usage across the globe. Many healthcare providers have already started piloting social media-based interventions to improve patient care and population health. Public, patients and health professionals use SM for multiple purposes like behavioural change, prevention and management of disease, disease surveillance, health education and communication, on-line learning, online reporting and symptom reporting, outbreak management, pharmacy practice and education and professional development (<https://www.emarketer.com/content/us-time-spent-with-media-2019>). In light of the current pandemic, many countries have launched mobile applications to train

people on isolation of infected individuals, restricted movements, hand hygiene and cough etiquette, sanitation and hygiene in public places and waste and garbage disposal.

Infection prevention and control (IPC) is integral to health action plans on infectious diseases, patient safety and antimicrobial resistance (AMR) to name a few. In fact, AMR was identified by the World Health Organization (WHO) as one of the ten threats to global health in 2019. The problem of AMR is exacerbated by the overuse of antibiotics which typically happens as a result of compensation for poor hygiene and infection control practices, in community, in hospitals and in livestock settings. Mass scale education campaigns on improving infection control are seen as a potential solution, which can reduce the incidence of episodes warranting antimicrobial use. Many tools and manuals for education on infection control have been developed by various agencies; however, such programmes have not been able to achieve scale because of inadequate resources, limited availability of trainers and skills and costs related to organising training sessions and mass media campaigns.

SM can be effectively leveraged for the purposes of creating awareness of infection prevention. With the emergence of the COVID-19 pandemic, claimed to be the greatest catastrophe and worst crisis since World War II, here, we discuss the role of SM in creating awareness about IPC measures to helping interrupt the chain of transmission of the infection and further outbreaks.

Importance of infection control

Infection prevention and control (IPC) occupies a unique position in the field of patient safety and quality universal health coverage since it is relevant to health workers and patients at every single healthcare encounter (WHO) (<https://www.who.int/infection-prevention/about/ipc/en/>). In the community setting, inadequate access to safe water, sanitation and hygiene (WASH) has a significant impact on illness and death, as lack of sanitation led to 2.73 times

higher rate of diarrheal diseases among children under the age of 5 years [1]. In 2010, the United Nations General Assembly declared water and sanitation as human rights that are “essential for the full enjoyment of life and all human rights” [2]. Lack of or inadequate WASH conditions is responsible for faecally transmitted infections (FTIs) like cholera and diarrhoeal disease, the second major cause of morbidity and mortality among children less than 5 years [3]. The emergence of multi-drug-resistant tuberculosis (MDR-TB) is a major challenge since *Mycobacterium tuberculosis* is transmitted through airborne droplet nuclei and adopting adequate IPC practices can help prevent the spread of the disease (<https://www.dhs.wisconsin.gov/ic/tb.htm>, <https://www.cdc.gov/tb/education/corecurr/pdf/chapter2.pdf>).

Infection control in HAIs and antimicrobial resistance

IPC measures have also been found to be effective in reducing the spread of pathogens including resistant ones within healthcare facilities and to the wider community. Implementation of infection control practices in low middle-income countries (LMICs) is poor due to lack of infrastructure and poor awareness among the general population [4]. Healthcare-associated infections (HAIs) contribute significantly to mortality during their hospitalisation and the emergence of drug-resistant bacteria [4]. The implementation of a multidimensional infection control approach is necessary to combat Nosocomial infections and outbreaks [5]. Implementation of antibiotic stewardship (ABS) programmes and infection control practices with increased hand hygiene compliance, antiseptic body washes, continuing education and the use of new tools (e.g. electronic wearables and Wi-Fi-equipped dispensers) reduced transmission of MDROs causing the majority of nosocomial infections than screening and isolation measures [6]. Effective implementation of IPC interventions can prevent further infections and AMR spread [7]. In view of the increasing number of outbreaks in different parts of the world, the World Health Organization (WHO) established a Global Unit for IPC in 2016. The WHO Global Unit for IPC works in conjunction with WHO Water, Sanitation and Hygiene (WASH) programme and with outbreak control [8].

Infection control in outbreaks

The emergence of outbreaks like SARS (severe acute respiratory syndrome) in 2002–2003, Middle East Respiratory Syndrome-Coronavirus (MERS-CoV) since 2012, Ebola virus in 2013–2014 and COVID-19 in 2019–2020 underscores the importance of infection control. All these outbreaks were of viral origin for which no treatment or vaccine was available. In absence of an effective vaccine, advanced infection control measures were used in conjunction with basic infection control measures to control the transmission of Middle East Respiratory Syndrome-Coronavirus (MERS-CoV) in Saudi Arabia [9]. The MERS-CoV epidemic plan included education and communication of patient, family and visitors; staff education; and transparency in communication of accurate information. Proactive infection control measures including timely education of healthcare workers and hospitalised patients reduced the rate of outbreaks significantly [10].

In 2014–2016, West Africa faced the most deadly Ebola virus disease (EVD) outbreak in history. A key strategy to overcome this outbreak was continual staff

training in infection prevention and control (IPC), with a focus on Ebola. IPC measures were used during the EVD outbreak to (i) interrupt Ebola virus transmission and (ii) protect the health workforce who were affected by the EVD outbreak [11].

Tools for infection control

There are many useful online tools, technical guides and training modules available to hospitals and other healthcare settings on infection prevention and control from authentic sources like the WHO and Centers for Disease Control and Prevention (CDC) (Table 1). WHO global unit has developed evidence-based recommendations, strategies and tools for IPC in healthcare settings [12••], (<https://www.who.int/infection-prevention/tools/en/>). WHO "Infection control standard precautions in health care" is a useful quick guide

Table 1. Globally available resources for IPC

Document name	Agency	Web link	Reference
Minimum requirements for infection prevention and control programmes, 2019	World Health Organization	https://www.who.int/infection-prevention/publications/MinReq-Manual_2019.pdf?ua=1 .	[12••]
Basic Infection Prevention and Control Guidelines, 2008	Centers for Disease Control and Prevention	https://www.cdc.gov/infectioncontrol/guidelines/index.html	(https://www.cdc.gov/infectioncontrol/guidelines/index.html)
Infection Control in Healthcare Personnel: Infrastructure and Routine Practices for Occupational Infection Prevention and Control Services, 2019		https://www.cdc.gov/infectioncontrol/pdf/guidelines/infection-control-HCP-H.pdf	[13••]
Hospital infection control guidelines, 2017	Indian Council of Medical Research (ICMR)	https://www.icmr.nic.in/sites/default/files/guidelines/Hospital_Infection_control_guidelines.pdf	[14••]
Core competencies for infection control and hospital hygiene professionals in the European Union, 2013	European Centre for Disease Prevention and Control (ECDC)	https://www.ecdc.europa.eu/sites/default/files/media/en/publications/Publications/infection-control-core-competencies.pdf	[15]
Healthcare-associated infections: prevention and control in primary and community care, 2012	National Institute for Health and Care Excellence, UK	https://www.nice.org.uk/guidance/cg139/resources/healthcareassociated-infections-prevention-and-control-in-primary-and-community-care-pdf-35109518767045	[16]
Australian Guidelines for the Prevention and Control of Infection in Healthcare, 2019	Australian Commission on Safety and Quality in Healthcare	https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019#block-views-block-file-attachments-content-block-1	[17]

for hospitals and healthcare settings (https://www.who.int/csr/resources/publications/4EPR_AM2.pdf). CDC gives tools to implement Standard and Transmission-Based Precautions to prevent infections (<https://www.cdc.gov/infectioncontrol/tools/index.html>), infection control guidelines (<https://www.cdc.gov/infectioncontrol/guidelines/index.html>), [13••] and a training programme on infection control (<https://learningce.shea-online.org/content/sheacdc-outbreak-response-training-program-ortp#group-tabs-node-course-default1/>). Preventing healthcare-associated infections is a huge challenge in LMICs like India. The Indian Council of Medical Research (ICMR) has developed a comprehensive “Hospital Infection Control Guidelines”, which assists healthcare workers on best practices to prevent healthcare-associated infections (HAIs) in Indian hospital settings [14••]. Other available tools are developed by the European Centre for Disease Prevention and Control (ECDC), National Institute for Health and Care Excellence (NICE), UK, and Australian Commission on Safety and Quality in Health Care (ACSQHC) [15–17].

Role of social media in public health

Social media can be broadly classified into the following five types [18]:

1. Social networking media such as Facebook, Twitter, Instagram and LinkedIn that bring groups of people together,
 2. Content-sharing media such as YouTube and TikTok that can be used to upload content such as videos, documents or pictures to a community of users
 3. Knowledge-sharing media such as Wikis and podcasts that enable others to interact, ask queries and respond
 4. Blogging social media are used to share articles, write-ups, facts and values
- Volunteer technology communities (VTC), such as Ushahidi and Sahana, are social media platforms or modules created especially for risk and crisis communication. SM has been used for different purposes by different groups of people like health professionals, administrators, public health experts, patients and the general public. Health professionals and administrators use for disease prevention and management, disease surveillance, health education and communication, virtual learning, online reporting, outbreak management and pharmacy practice [19•]. Prior to the advent of SM, traditional public health campaigns and communications typically included mass media campaigns such as television, radio and health fairs as well as small media efforts such as posters and fliers. These campaigns had high costs and were a low return on investment due to the number and percentage of people reached. SM data can provide complementary data that can be integrated with traditional data [20•].

In a systematic review, Moorhead et al. [21] identified seven key ways that SM is being used in healthcare:

- (i) To provide information on a range of issues;
- (ii) To provide answers to medical questions;
- (iii) To facilitate dialogue between patients and health professionals;
- (iv) To collect data on patient experiences and opinions;

- (v) To use SM as a health intervention, for health promotion and health education;
- (vi) To reduce illness stigma; and
- (vii) To provide a mechanism for online consultations.

Social media as a tool for information, education and communication

SM platforms like Facebook, YouTube, Instagram, Twitter, WhatsApp, FB Messenger, WeChat and Telegram have the advantage of connecting millions of users at the touch of a button. These platforms can be effectively utilised to share education and training materials including videos and pictorial presentations to sensitise and create awareness among communities and healthcare professionals (HCP) on important themes such as IPC practices, outbreak response, hospital-acquired infections and AMR. Some modes of dissemination being used widely are downloadable infographics, interactive blogs by experts, small video clips to promote knowledge and awareness, case studies, posts with thought-provoking questions, etc. [22].

SM has been increasingly used in educating patients and high-risk population. Giustini et al. [19•] showed that studies during 2014–2016 reported promising changes in mental health problems through increased interactions in SM. Adoption of healthier lifestyle in patients was associated with iterative information-sharing through SM [19•].

Healthcare workers, namely, physicians, nurses, pharmacists and other paramedical staff, can engage in online communities to read research articles, listen to experts, find new innovations and consult experts regarding diagnosis and treatment, sharing ideas and cases, discuss challenges, make referrals, disseminate their research, or promote health advocacy [23].

Outreach

Twitter is an American [microblogging](#) and social networking service with approximately 321 million active users as of February 2019 [24]. Twitter is used to send instant short and frequent messages, posts, articles, videos, pictures, etc. and to directly engage with world leaders and experts. Twitter is used widely as a learning tool in education and research for knowledge sharing [25]. LinkedIn is an American [business](#) and employment-oriented service used mainly for professional relationships with 630 million registered members in 150 countries in 2019 [26].

ResearchGate is a European social networking site for scientists/researchers to share research articles and discuss research related queries with approximately 15 million users as of April 2018. Most of the research gate users are involved in biological or medical research [27].

Specific social networking sites cater to the needs of the professionals like the physician-only sites Sermo, Doximity, Medical Directors Forum, QuantiaMD (www.quantiamd.com), Doctors' Hangout (www.doctorshangout.com) and Doc2Doc (doc2doc.bmj.com). The “physician-only” social networking community verifies the credentials of members during registration [23]. Similarly, there are networking sites for the pharmacists (ASHP Connect (www.connect.ashp.org), PharmQD

(www.pharmqd.com), The Pharmacist Society (www.pharmacistsociety.com) and nurses (American Nurses Association's ANANurseSpace (www.ananursespace.org), NursingLink (www.nursinglink.com) and SocialRN (www.twitter.com/socialRN)) [23].

Communication strategies for SM

Education, training and altering deeply entrenched habits and practices related to IPC can be a long drawn-out process, which require consistent effort and active participation of key stakeholders on a sustained basis. However, an enabling environment at the healthcare setting and community level combined with a well chalked out communication blueprint will help deliver the goods. An effective communication strategy to inform, educate and drive desired behaviour change among target groups (TGs) or audiences, be it the healthcare workforce or members of the community, will need to be informed by analysing existing knowledge, attitude, behaviour and practices. The most effective strategies keep the TG at the front and centre to ensure barriers to communications are effectively countered through combining a good media mix (new and traditional media channels) and sensitive messaging, which when played out in a diverse socio-economic and political contexts is able to overcome cultural and language barriers and deal with the requirements of a heterogeneous audience effectively. SM provides tremendous flexibility in how one can share relevant advice and information using text, infographics and audio-visuals, to ensure outreach to people who are literate as well as those who are not.

Messaging is the crux of SM campaigns

With the current pressures on people's time, it is also important to keep in mind that communicating everything to everyone runs the risk of low relevance, engagement and ultimately unacceptable levels of response and hence developing specific messages for specific target groups will be important. Some of the messaging will be general and applicable across audience groups. However, a lot of the messaging will be specific and only relevant to the specific audience being targeted. Each audience segment or stakeholders will also differ in terms of their triggers and barriers to adapting IPC best practices. These will also have to be considered whilst crafting campaigns and messages, educate various stakeholder groups about IPC practices, its impact, reducing the spread of infections and saving lives. For example, when sharing information on IPC practices, whilst the information on donning and doffing of PPE may be relevant only to healthcare workers, messages on masks, hand or injection safety will need to be presented from different perspectives to a healthcare worker and a member of the community, taking into account the variance from one setting to another.

Viral messages

Linking crucial messages to creative thought that can overcome socio-cultural barriers can harvest excellent rewards in terms of virality, when the message becomes popular and is shared by people across their social

networks. A unique feature of SM is its "virality" factor and that is geography agnostic, enabling outreach well beyond political boundaries. Messages can go viral swiftly well beyond the intended TGs to their extended personal and professional networks and even beyond. A recent example is a catchy animated video, a collaboration between musicians and Vietnam's health ministry, on preventing COVID-19, listing IPC practices like hand hygiene, wearing masks and cleaning of personal spaces. (<https://www.youtube.com/watch?v=Btull3oArQw>). The Ministry's official page on YouTube has 1.43 million subscribers, and the message posted on 24 February had over 50 million views as of 14 June 2020 (<https://economictimes.indiatimes.com/magazines/panache/take-a-break-from-coronavirus-panic-vietnams-handwash-dance-challenge-goes-viral/articleshow/74457876.cms?from=mdr>). It was shared further by people on their personal social pages, by news websites and TV channels across the world including in India garnering more attention. Adding English subtitles to the content made it more widely understood.

Media mix

Communication strategies often combine traditional and new media tools (TV, radio, online/social media, print, street plays, interpersonal interactions). However, social media offers some unique and clear advantages vis-à-vis other platforms. Content is delivered to the fingertips at high speed and comparatively low costs offering an extremely high level of customisation. It provides a high level of engagement to spark and accelerate discussions, dialogue and action in the intended audience and community groups completing the feedback loop over a relatively short time period. Uniquely, it offers real-time assessment of sentiments or public response to a message which can guide swift changes in the communication response in case there are any problems in messaging or if there are new developments that need to be incorporated into the messaging. It is a relatively low-cost intervention and offers the opportunity to reinforce messages using text and audio-visual and it can be well understood by even people who cannot read or write.

Instant feedback

There is a very high level of engagement with the content and it can provide very real, insightful feedback on the quality of information shared. Both hits and misses can be assessed quickly and often when messages miss the mark, the feedback can be quite brutal. Feedback tools and analytics on social media do not just measure outreach these can also help assess learning levels and even closing the feedback loop on the quality of information provided. These also help assess public sentiment based on social media posts. Information on SM is being mined to develop health applications which can potentially guide public health campaigns. The Commonwealth Scientific and Industrial Research Organisation (CSIRO), an Australian federal government agency responsible for scientific research, has developed a tool called WeFeel (<http://wefeel.csiro.au>) to measure the emotional pulse of countries using data from Twitter [28, 29].

Social media allows considerable scope for innovation in how content can be adapted to catch attention in terms of the variety of content it can host—long- and short-format audio-visuals (AVs), infographics, gifs, jpegs, photographs and the list goes on. Chatbots have also become popular, and health authorities are frequently using them to share information as seen during the current COVID-19 outbreak. The community can also join the information campaign efforts to widen outreach and reinforce a better understanding of messages in their social networks and their physical environments by further sharing the health message or even generating their own content to supplement the health promotion campaign.

IPC is hard to introduce and even harder to sustain

The core components of IPC are enumerated in Table 2. The existence of an IPC programme with a dedicated IPC lead/focal person and team with a clear mandate, dedicated budget and supported by an IPC committee is a critical first step that will support the implementation of all core components. This will enable the prioritisation and implementation of other core components according to the local context, as well as baseline and regular assessments. This IPC team facilitates development of IPC guideline, which would need to be disseminated and implemented through a range of communications and targeted improvement plans. Many hospitals make a mobile application of the IPC guideline, which can be made available through App stores like Google Play Store which can be downloaded free of cost by the hospital staff on their smart phones.

The next most crucial step is to organise periodic trainings based on your local evidence-based guidelines for all new employees, as well as continuous

Table 2. Core components of IPC (WHO, 2019)

S. No.	Core component	Recommendation
1	IPC programme	Develop programmes on both the national level and in healthcare facilities to prevent HAIs and manage antibiotic resistance with dedicated and trained teams in all acute healthcare facilities. On a national level, the IPC programmes should be linked with other relevant programmes and professional organisations
2	Guidelines	Evidence-based guidelines should be developed, disseminated and implemented. Adherence to the given guidelines should be monitored and evaluated.
3	Training	Continuous training on the implementation of the guidelines should be provided for all healthcare workers. Different training strategies should be tailored for the specialists and supporting staff.
4	Surveillance	Facility level surveillance programmes on HAIs and antimicrobial resistance linked to national programmes should be established to detect outbreaks and guide interventions
5	Integrated approach	An IPC programme should be implemented using an integrated approach inclusive of all components like system change, education and training, monitoring and feedback, reminders and culture change.
6	Monitoring	Undertake the monitoring of the IPC practices and share feedback with relevant staff and stakeholders in a blame-free, non-punitive manner, to facilitate action based on the evaluations as well as the audited persons.

education with updates at least annually. Training and education sometimes need to be linked to job profiles and competencies and basic IPC training should be made available to all healthcare workers involved in service delivery and patient care, as well as for other personnel (for example, administrative and managerial staff, auxiliary service staff, cleaners). This is the most crucial part and is also the hardest to sustain as it is very resource-intensive. One needs trained manpower who can create a pool of master trainers who organise frequent training sessions to train others to cascade learnings right to the grassroots level amid all relevant stakeholder groups. As one conceptualises trainings, it is important to be mindful of (1) how the training will be monitored and evaluated and (2) how will the knowledge and behaviours be improved and assessed.

Most of the time, trainings suffer owing to lack of resources to support the trainings as frequently as desired. SM can play an important role in making this happen. Development of online education modules or mobile apps allows the training resources to be available and accessible for ready reference and dissemination at all times. Having a mobile application or an online module will also address the challenge of lack of time for training, which has been identified as a key barrier to IPC-related training programmes. Trainers who have limited time to spare can choose a time convenient to them rather than be available as per training schedules, which can often be challenging for large-scale training programmes.

In LMICs, it is necessary to reiterate the importance of hand hygiene practices and cough etiquette through multiple channels to achieve infection control. In these settings, having an HAI surveillance system will be useful in detecting outbreaks, thus identifying breaches in the system and opportunities to address the same. SM can provide real-time communication opportunities at a relatively low cost. The information about such outbreaks can be readily disseminated through the hospital-based system or through any of the SM like hospital WhatsApp groups. This is the fastest method of communicating and forewarning the hospital staff about potential threats.

Social media in disease surveillance and pharmacovigilance

A systematic literature review by Charles-Smith et al. [30] showed the impact of social media on public health surveillance and suggested that social media analytics should be integrated into disease surveillance and outbreak management practice.

SM-facilitated disease surveillance has been reported earlier during outbreaks of influenza H5N1 in 1997 and SARS in 2002 [31]. Analysis of trends in Internet search engines was used for syndromic surveillance that involves collection of health-related data preceding diagnosis which may indicate a probable disease outbreak [32]. A high correlation was reported between the number of clicks on a keyword-triggered link in Google with epidemiological data from the flu season 2004/2005 in Canada [32].

Large-scale effort to use Google search queries to track influenza was successfully used to estimate influenza activity in each region of the USA [33]. In another study, Signorini et al. [34] reported that estimates of influenza-like illness from tweets could accurately track reported disease levels and also 1–2 weeks faster. Twitter data was shown to improve predictions of estimates of suspected Zika cases 2–3 weeks ahead [35].

Also, Sarker et al. [36] discuss the use of social media for pharmacovigilance for reporting adverse drug events to alert authorities of these events. Reporting adverse effects often faces challenges as it depends upon the clinician and pharmaceutical companies. However, SM platforms like Twitter have been shown to be effective in creating real-time access to first-hand reports of adverse drug events.

Surveillance

Interestingly, with more and more people sharing news and views on their social media pages, analysing social media posts, search behaviour and terms/queries (“fever”, “flu”, “infection”, “symptoms” etc.) on search engines can serve as informal source of early warning signals of potential outbreaks or health issues in specific geographies and serve as an important surveillance tool to health authorities together with established protocols for surveillance. Online search behaviour and specific information being sought on social media platforms can guide targeted health messaging to specific communities and groups of health professionals. HealthMap (<http://healthmap.org/>) mines news websites, government alerts, eyewitness accounts and other data sources for outbreaks of various illnesses reported around the world, whilst <http://www.google.org/flutrends/> is a website that allows people to compare volumes of flu-related search activity against reported incidence rates for the illness displayed graphically on a map.

Community engagement

Effective implementation of IPC requires sustained engagements with the communities and subsequent assessment of behaviour change. SM provides the potential to increase the number of interactions that hospital staff or communities can have with the online resources and thus the information is more easily accessible. SM acts as an amplifier to generate more available health information when users share medical information online. Blog sites create a space for individuals to access tailored IPC resources. SM can also widen access to certain sections of society such as younger people, ethnic minorities and lower socio-economic groups, who may not otherwise access this information. Using SM for health communication also provides opportunity for valuable peer, social and emotional support for the general communities and patients. In public health surveillance, SM can provide communication in real time and at relatively low cost. SM can monitor public response to health issues, track and monitor disease outbreak, identify misinformation of health information, identify target areas for intervention efforts and disseminate health information to targeted communities. Health professionals can aggregate data about patient experiences from blogs and monitor public reaction to health issues. There is a good likelihood that the information on SM may contribute to healthcare policy-making, as medical blogs are frequently viewed by mainstream media.

Role of social media in managing pandemics

Pandemics are public health emergencies that have the potential to spread at a great speed. SM platforms can be used as a potential tool to spread awareness, mitigate anxiety and disseminate useful information like guidelines, advisories

and helplines. Ye et al. [37••] emphasise the role of SM in emergency response through faster communication during crises for creating awareness, reporting on-ground information, dissemination of information, early warnings and faster interventions in affected areas. In the current scenario of the COVID-19 pandemic, the need for creating awareness in the community cannot be overemphasised. Equally important is understanding the response of people in SM that can be tracked and used in policy issues and decisions by policy-makers.

In a systematic review, Al-Garadi et al. [20•] show how social networking data contain significant information that can be efficiently utilised to track a pandemic since the data can be obtained in real time at a lesser cost. Additionally, the authors suggest that the geographical and temporal information offered by SM data can provide spatiotemporal dynamics of infectious disease spread [20•].

SM are used for faster communication of information during crises like conveying warnings, inquiries, complaints, feedback response, introducing appropriate interventions, initiating action in the community and coordinating volunteer services. One successful example is the United States Federal Emergency Administration (FEMA) which has taken a proactive approach to communicating with the public via SM [18].

The networking speed of SM helps in coordinating emergency planning, mobilising activities and raising funds. Zadeh et al. [38••] used Big Data technologies to analyse the behavioural patterns from a location-based social network and to monitor flu outbreaks (and their locations) in the USA and found that clinical flu encounters lag behind online posts. This will help in creating awareness much before the spread of disease and helps in more effective interventions to reduce the spread. Ebola outbreak was highlighted by media in 2014 frequently (more than 10 million tweets in 20 days from 170 countries) and CDC predicted that 1.4 million people in Sierra Leone and Liberia would succumb to the epidemic [39, 40].

Based on the cultural and behavioural differences, the crisis communication plan needs to be specific to the local audience. International cooperation and public-private partnerships are facilitated by SM during crisis.

Epidemic outbreaks need extensive networking within hospital, between other hospitals, testing laboratories, community centres and NGOs and with patients. SM platforms can be effectively used to reach out to patients and healthcare information seekers in the local community by hospital staff. It is critical for medical professionals to engage patients for follow-up, monitoring and tracing in highly infectious diseases. Locating and monitoring suspects or contacts could be done using location tracking technologies linked with accounts. CDC used SM to locate and monitor sources and suspected cases of Legionnaire's disease [23].

Advantages and disadvantages of social media

The digital divide

According to a report by the GSM Association (GSMA), an industry organisation of mobile network operators, mobile phone is the primary means of Internet access in LMICs and connects over 3.5 billion people to the

Internet, which is nearly 47% of the world's population (<https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/07/GSMA-State-of-Mobile-Internet-Connectivity-Report-2019.pdf>). However, mobile Internet connectivity is not equitable and only about 40% population in LMICs are connected as opposed to almost nearly 75% of the population in high-income nations. In terms of content consumption, in both LMICs and high-income countries, messaging and social media dominate mobile Internet use; in LMICs, other popular activities include online calls, news, free videos and games (<https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2019/07/GSMA-State-of-Mobile-Internet-Connectivity-Report-2019.pdf>).

Often criticism of social media campaigns is focused on the digital divide, particularly in LMICs. The fact remains that no single communication tool can reach everyone. The digital divide is a harsh reality. The fundamental to any communication strategy is a media mix that delivers the message based on the target group it intends to connect with. Social media campaigns are consequently needed to be focused on those who have access to mobile technology and Internet services.

Communication

Communication between people, individuals or groups, is supplemented by many unique aspects which can be verbal or non-verbal in nature. Despite the emoticons and the wide variety in which information can be showcased on SM, the complexities of human interactions played out between people or groups in a physical environment and the absence of nuances of communication—expressions, tones of voice, sentiments of empathy which are seen, felt and understood during one-on-one interactions in a physical social environment have not yet been replicated on social media, despite the complex algorithms that are adding to the list of human addictions in many societies.

Context is often lost in social media

Health education campaigns operate within the framework of a context, time and geography. Given the nature of the social media certain pieces of information continue to be in circulation long after its time has run out and new development and research have made it outdated and irrelevant. Old messages keep popping up on people's timelines long after they were first posted and well after they have lost their relevance.

Providing an enabling environment

Like any health promotion campaign, SM health campaigns need to be operationalised in an enabling environment that supports the call to action or the intended behaviour change. If the call to action is to wash hands, it is also important to ensure that clean water, soap or sanitiser is available to people. Similarly, health settings

awareness initiatives on handling and disposal of biomedical waste should be guided by local policy and supported by the availability of essential resources like disinfection tools and incinerators. In its absence, awareness alone will not drive change.

- Moorhead et al. [21] lists several limitations of using SM of which lack of reliability is the major one which is attributed to the fact that most often the authors are unidentifiable.
- Another major concern is about security, privacy and confidentiality as users are unaware of the disclosure of information.
- SM also has the risk of sharing harmful or incorrect advice by unprofessional users.
- Due to the increasing number of users there is a possibility of information overload
- Online consultations may reduce direct interaction of patients and doctors as there may be reduced hospital visits.
- In developing countries, low Internet connectivity due to lack of infrastructure and technology and high costs of Internet services can lead to limited use of SM.

Combating misinformation

One of the major limitation of using SM is the reliability or genuineness of the content shared. Since SM is an open channel of communication involving all citizens including non-professionals, there are numerous misconceptions and rumours being spread. Rumours add noise to the information in SM and may form a barrier in the evaluation of data [40]. Spreading rumours in the community creates panic, fear, anxiety and confusion and may even lead to wrong practices among the population. It was reported that inaccurate Facebook posts about Zika virus are more popular than relevant and genuine information [37••].

Problem of infodemic

This is the Achilles heel of SM. According to the WHO, an infodemic is an over-abundance of information, some accurate and some not that makes it hard for people to find trustworthy sources and reliable guidance when they need it. It poses a serious problem for public health since people need this guidance to know what actions to take to protect themselves and others and help mitigate the impact of a disease. In the context of the COVID-19 pandemic, the infodemic is exacerbated by the global scale of the emergency and propagated by the interconnected way that information is disseminated and consumed through social media platforms and other channels. In response, a team of WHO "mythbusters" is working with search and media companies like Facebook, Google, Pinterest, Tencent, Twitter, TikTok and YouTube to counter the spread of rumours, which include misinformation that the virus cannot survive in the hot weather and that consuming large quantities of ginger and garlic can prevent the virus (<https://www.un.org/en/un-coronavirus-communications-team/un-tackling-%E2%80%9998infodemic%E2%80%9999-misinformation-and-cybercrime-covid->

19). Reliability includes preventing rumours/misinformation and propagating only authentic information. Since there is no regulation on what content is shared and who shares, it is important to screen and validate the content through useful tools.

- One way of reducing this is having official government accounts or accounts of reliable international and national health agencies with specific icons.
- Constant education of the community about the right use of SM and about rumours is essential to tackle this problem.
- Another way of ensuring authenticity is to use artificial intelligence integrated into the mobile phones to integrate sensor technology, GPS and SM information. Filtering tools have been developed to reduce time spent reading irrelevant messages and untrustworthy sources.
- Laws prohibiting spreading of rumours has been found to be useful in controlling misinformation in some countries.
- Development of fact check resources/applications and awareness of common public to do fact check before spreading the information in SM.

Conclusion

SM has ushered in a new avenue in healthcare by offering a platform that can be utilised by public, patients and health professionals to communicate about health issues. Infection prevention and control is an underutilised intervention, which holds a promise for reducing the burden of many infectious diseases both in communities and hospitals. To implement IPC, a multimodule approach is recommended which requires disseminating the IPC resource materials, organise trainings and capture IPC-related breaches in real time. IPC is therefore seen by health administrators as resource-intensive intervention. SM can be used as a potential tool to widen the reach of knowledge and information on IPC in community settings and hospitals. Many hospitals are already using mobile apps for training their staff and for gathering the HAI surveillance data. Application of SM for health communication purposes, including IPC, is an expanding area and more research is required to establish whether SM improves IPC practices in both short and long terms. Better geographical identification system, enhanced computational linguistics and advanced algorithms are required to overcome the existing challenges in using SM.

As it evolves, greater accountability is being demanded from not just SM companies, but also its users. Positive steps are being taken for example fact-checkers and user account verification; for example, the blue verified badge on Twitter lets people know that an account of public interest is authentic. The potential of social media is tremendous and its use as a health promotion tool for IPC for various target groups including healthcare professionals and members of the community can reap rich dividends.

Data Availability

Not applicable.

Compliance with Ethical Standards

Conflict of Interest

Jayaprakasam Madhumathi declares that she has no conflict of interest. Rina Sinha declares that she has no conflict of interest. Balaji Veeraraghavan declares that he has no conflict of interest. Kamini Walia declares that she has no conflict of interest.

Ethics Approval

Not applicable.

Consent to Participate

Not applicable.

Consent for publication

All authors give their consent for publication.

Code Availability

Not applicable.

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