Social Media and Medicine – Applications, Limitations and New Developments

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ABSTRACT
Social media provide wonderful new tools for dissemination of health information, and there has been an explosion in the use of various types of social media in health care. My paper looks at the different applications of social media in medicine, the innovations that are being trialled, exciting new experimental applications and also the limitations and potential difficulties. There is also a brief discussion of an innovative project being trialled locally, with which I had the opportunity of being involved. Overall, I found that the benefits of social media outweigh the risks, and it has the potential for further development.

INTRODUCTION
The Oxford Dictionary defines social media as ‘websites and applications that enable users to create and share content or to participate in social networking.’ This is a broad definition, which includes a variety of resources such as social networking sites, media-sharing sites, blogs, microblogs and wikis.

Social media can form a common platform leading to interactions between patients, physicians and the public as shown in Figure 1. The use of social media in healthcare can be better understood if looked at under a number of different headings based on use:

1) Professional Education/Continuous professional development
2) Public health messaging, education or surveillance
3) Recruitment of patients to online studies or clinical trials
4) Patient to patient or peer to peer communication
5) Direct engagement with specific patients for purposes of clinical care

Figure 1.
Key social media interactions among patients, physicians, and the public. Solid line circles denote secure interactions. Dotted line circles denote personal networking interactions. [10]
Use in Professional Education:
A survey by McGowan et al (2012) \(^{[3]}\) of 485 physicians in the United States showed that 61% used social media to explore medical information weekly, and 46% contributed new information. The study concluded that social media was an efficient method for physicians to keep up to date and to share newly acquired medical knowledge with other physicians and to improve the quality of patient care.

Another survey by Kovic et al (2008) \(^{[4]}\) of medical bloggers found that medical bloggers are highly educated writers (with masters or doctoral level degrees), and that medical blogs are an important vehicle to influence medical and health policy.

Muhlen and Machado (2010) \(^{[5]}\) did a review of all available literature looking at use of social media by physicians and found a study reporting that 70% of 35 junior physicians used Wikipedia to find medical information and another reporting that 35% of 1050 pharmacists used this. The review concluded that social media use by clinicians is widespread, especially by younger clinicians for personal and reference purposes.

Public Health Information and Surveillance:
Social networks are influential in affecting people’s ideas and this can be harnessed to try and generate a positive influence on behaviours. There has been research showing that ‘social networks contribute to public health issues such as obesity, smoking cessation, eating behaviours, sexual risk behaviours and almost infinite other phenomena.’ \(^{[6]}\)

Hospitals and GP practices have started using various forms of social media to spread public health messages and information about services, and to interact directly with users. Cancer Research UK has a dedicated team managing its Facebook page, Twitter account and a specialised forum called Cancer Chat.\(^{[7]}\)

The Centre for Disease Control (CDC) tracks Tweets for information about flu outbreaks and also posts regular updates and public health information. Similarly, the Mayo Clinic has used YouTube to post information about the importance of knowing one’s profile for blood pressure, lipids and body mass index to prevent heart disease.\(^{[6]}\) These are inexpensive ways to spread information to large numbers of people and can prove very effective.

Recruitment to Trials:
Social media such as Facebook are now being used for recruitment of patients to clinical trials and for research purposes. They are easy forums to reach large numbers of people at a relatively low cost and are not confined to local areas geographically. Pharmaceutical companies have been making good use of various types of social media for this purpose. One company Acurian \(^{[8]}\) reported that in one Phase III trial, 46% of patients were recruited in this way. Another Pharmaceutical company Lilly has set up international pilots in diabetes and head and neck cancer and used social media such as Facebook, Click-it-Forward and YouTube to recruit patients. Big institutions like the Mayo Clinic have also been using social media to recruit patients directly via advertisements. Their view is that this is very effective at recruiting patients with rare diseases and also that it is easier to reach large and demographically diverse patient groups more quickly. \(^{[6]}\) Penn State College of Medicine have used Facebook Groups to
develop a stress reduction intervention for first year medical students and are also using a similar model for third year medical students during their clinical rotations.\textsuperscript{[9]}

**Patient-to-Patient Interaction:**

Use of the Internet and social media is increasing significantly over time. In 2012, Facebook was reported to have 1 billion users worldwide. In a 2011 survey, 23\% of US adult Internet users with chronic medical conditions such as hypertension, diabetes or cancer, had gone online to find others with a similar condition.\textsuperscript{[10]} This has led to the formation of many support groups set up by patients who have a specific condition. This sort of peer-to-peer interaction acts as a valuable source of information and support and also allows users to talk about symptoms and treatments available. One such site is PatientsLikeMe, which was launched online in 2006. It is now reported to have over 250,000 members and covers 2000 health conditions. Users can ‘anonymously share treatment, symptom, progression and outcome data with the entire community, facilitating knowledge management and transfer for all to benefit.’\textsuperscript{[11]}

Individual patients have also been setting up blogs (or Web-logs) to talk about their experience with certain conditions, and these act as useful sources of information for other patients with the same condition. One example of this is SixUntilMe - a blog about living with type 1 diabetes.

Another type of ‘patient thematic networking’ is patient-driven research. This is started by a patient who actively links in with other patients with the same condition and collects data which can be used for research. An example of this is CureTogether, which collects information from patients about their conditions and what treatments appear to be effective for them. This form of data collection is known as crowdsourcing and can be a very valuable source of information for patients and researchers.

**Direct Engagement with Patients/ Telemedicine:**

This use of social media in health is so far the least used and is still beginning to be explored. This includes telemedicine, in which the patient and the physician are not at the same geographical location. One use of this is where patients live in remote areas, with no access to specialist health care services, and telemedicine has been used successfully in such cases.

This form of use of social media for healthcare is described as ‘virtual health care interaction’ and there has been one documented example of a ‘virtual health care practice.’ Two physicians have been using Twitter \texttt{@tweetspreekuur} for primary care consultations.\textsuperscript{[2]} This was started in 2009 and is run on a voluntary basis and so far, reports are positive.
DISCUSSION

The Reach of Social Media:
The use of social media in healthcare has really taken off and as more people use social media, this will only increase. Young people across the world are growing up in an environment where the use of social media is the norm. A YouGov 2012 survey found that in the UK, 95% of 16-20 year olds and 74% of 20-25 year olds had used Facebook in the previous month. Doctors in training and younger doctors form a large proportion of this and as they go through medical school and to the careers as a doctor, they are comfortable with the use of social media and increasingly use it in their practice. A 2011 survey in the Severn deanery found that 100% of medical students and Foundation Year doctors had Facebook accounts compared with 30% of senior specialist grade doctors.

Health professionals have been keen to take up the potential of social media and have begun using it effectively for a variety of purposes. Twitter has been used at conferences to interact directly with speakers, blogs have been used to exchange clinical information, such as ‘virtual rounds’, doctors have set up communities (Doctors.net) where they can communicate with each other and discuss professional and personal issues and health libraries with medical textbooks and reference libraries such as Medscape Drug Reference have been set up.

Risks:
It is important to remember that, as with all new ideas, there are some issues that we need to be careful of. The strength of social media is that it is not confined by geographical boundaries and that anyone can access and add to it. However, these are the very reasons that it also be a dangerous tool if sufficient care is not taken in its use.

There has been concern about the quality of health information sometimes posted on social media. It is not always possible to check the validity of information and anyone with Internet access can possibly claim to be a doctor and post their ideas. The difficulty with this is that a layperson accessing the information could possibly follow the misinformation. Site such as Wikipedia have been trying to enforce stricter guidelines by setting up medical editorial teams, but it continues to be difficult to check the expertise or credentials of all contributors. Some sites such as Medpedia have been tightly regulating the content by verifying authors’ credentials before allowing them to post information, but this then restricts the amount of information available on the site.

It is also important to be aware of the possibility of the use of social media to promote harmful lifestyles, and to realise that these can be accessed by young people, who can be influenced by this information. Some closed sites have been set up by individuals with anorexia and bulimia and they encourage other people to join them, which can prevent individuals from getting appropriate support from medical professionals.

Another concern is that e-pharmacies, and people selling useless or in some cases harmful versions of medication, can also directly target consumers by advertising on social media. It is also possible for people who are against a particular medical or health intervention to present their views very forcefully or with wrong claims and this can, in turn, influence large numbers of people against that intervention. Keelan and colleagues (2007) did research looking at the available immunisation information on YouTube. They found that the most commonly discussed vaccine topic was general childhood vaccines and that approximately half of videos
were not supportive of immunization. They also found that negative videos were most likely to be viewed and have a rating. Another finding was that a quarter of the negative videos conveyed messages that contradicted reference standards. They concluded that clinicians need to be aware of the presence of negative and false information and should be prepared to respond to patients who get their health information from these sources.

There is a huge role here for educating the public on the possible dangers of social media and the importance of following health recommendations only from genuine, validated health representatives.

There is also another concern particularly for the medical profession. Traditionally, higher standards of behaviour are expected from doctors. Social media use can sometimes pose a problem in this regard. In 2011, the Guardian reported details of 72 actions against NHS staff for ‘inappropriately’ using social media.\[15\] Although this technology and its use is increasing rapidly, there had not been enough training and support of healthcare professionals about safe, and ethical, use of social media. This has been recognised as a learning need, and in 2012, the British Medical Association produced guidance for doctors and medical students.\[16\] Medical organisations around the world have produced similar guidance, and the advice in all of these is similar. It is important to maintain professional standards at all times. It is important to make adequate use of privacy settings on sites like Facebook to maintain confidentiality. Doctors are also advised that if a patient makes a ‘friend request’, they are to be politely informed that this would be inappropriate, and the request is to be refused. Any doctor who posts medical information openly, should make sure that the information is legitimate and they should only put up information that they are qualified to. Another important aspect is patient confidentiality and doctors are to remember never to put any details, which could lead to patients being identified. Doctors and other medical professionals should also make it clear on any sites if they are being paid to put up any information, such as about specific medication. However, once these precautions are taken, social media remain a very valuable source for education and spread of healthcare.

**Limitations of Social Media:**

While it is true that large numbers of people have access to social media, it is important to remember that this is only the case in more economically developed countries. There are parts of the world in which Internet access is not always available or affordable, and in other parts of the world, Internet access may be rigidly controlled, not allowing for international communication. In such cases, the benefits of social media will not be attainable until the situation changes.

**Exciting new developments:**

One area where there is a lot of research is in the field of using social media to gain more information and for teaching purposes. As mentioned earlier, young people today are growing up in a world where the Internet and computers are part of everyday life. The majority of young people and many adults enjoy computer gaming and the virtual world. Researchers nowadays are using this interest to try and help with increasing knowledge of the structure of the brain and its function. Sebastian Seung is a neuroscientist at MIT (Massachusetts Institute of Technology) who is studying the neural circuits of the retina. Normally, it can take up to 50 hours to reconstruct one neuron, and there are around 850 billion neurons in the human brain.
The researchers have, therefore, developed a videogame called EyeWire, which gets players to map the connections between the retinal neurons by colouring in 3-D slices of the brain.\textsuperscript{[17]} There is a similar game called Foldit, developed by the Centre for Game Science at Washington University, which helps look at protein folding.

Here in the UK, the Great Brain Experiment\textsuperscript{[18]} was launched in March 2013. It is a ‘gamified’ neuroscience experiment investigating memory, impulsivity, risk-taking and happiness, and is available as a free App for Android and Apple. These games make good use of the amount of time spent by gamers and turn it to a practical purpose such as mapping the brain and learning about human behaviours.

Another field where there is a lot of work being done is in simulated training using MUVEs or Multi-User Virtual Environments. These are 3- dimensional simulated worlds or ecosystems where users can create an ‘avatar’ of themselves and interact with other users. It has been used for training purposes. Second Life is a virtual online world which was launched in 2003 and SciLands\textsuperscript{[19]} is an area within this world devoted to science and technology. Various institutions including Imperial College, London, hold ‘islands’ within SciLands. Within this environment, there are polyclinics with simulated patients where nursing and medical students can practise clinical scenarios. The initial pilots have proved very popular.

\textbf{Figure 2.}

An Avatar in a MUVE.\textsuperscript{[2]}

Another application of MUVEs has been in helping patients with learning disabilities understand about procedures so that they are able to give informed consent. It can have similar uses in helping children understand about procedures in a non-threatening environment. The advantage with MUVEs is that it has low costs and again can be used in different places at the same time. MUVEs are also being used to test the function of medical robots before an actual model is made and this can again help with new research by keeping down costs.\textsuperscript{[20]}

\textbf{The E-patient:}

E-patients are defined as individuals who are equipped, empowered and engaged in their health and health care decision.\textsuperscript{[21]} Healthcare is ideally an equal partnership between e-patients and health professionals and systems that support them.
**Personal Experience:**

With this goal in mind, a lot of health organisations are trying to involve patients more in decision-making. For this to happen, patients should first have a better understanding of their condition and be able to monitor changes and make doctors aware of these. Patients should be consulted at every stage, whether it is about new investigations, procedures or treatments.

This is particularly important for teenage patients as they move from paediatric to adult services. With this in mind, the Spina Bifida Association in Scotland is developing an exciting new service for children and young people with spina bifida (a condition in which there is a problem with the development of the spine and spinal cord, leaving a gap in the spine), called Bring I.T On. This is a patient-centred record, accessed through various forms of social media, holding key information about diagnostic tests and appointments. Young people will be able to record their own information and the whole document is presented in a way as to make it appealing and fun for them. I have had the opportunity to be involved in this project in helping to develop the functionality of the website. If the project is successful, it can be used as a prototype to set up similar services for young people with other medical conditions.

**Potential Developments:**

With the wide reach of social media and the development of the e-patient concept, the next step should be towards individualised patient information gathering and diagnosis. Smart phones are easily available and many of them have applications that can monitor heart rate and other such parameters. It is only a short step to developing apps to measure blood pressure, heart function and eventually, other markers. This could then be monitored centrally at GP practices or hospitals without the need for the patient to actually be on site. Telemedicine, which is already being used to a limited degree, can be extended more widely. With the current increased waiting times at A&E and pressures on GPs, the ability to see the information virtually, can be extremely useful, particularly in case of older people, who can have difficulty getting to the hospital or GP practice. Patients with diabetes could send in readings of blood glucose levels to a central station and this could be the case for other conditions too. Heart tracings to monitor cardiac patients, well-being monitors for elderly patients and mood level indicators for patients with depression could be the next step. This form of monitoring would need to go through secure channels but once it was set up, it could free up medical time for patients who needed to be seen urgently and could help prioritise these.

"The standards expected of doctors do not change because they are communicating through social media rather than face to face or through other traditional media. However, using social media creates new circumstances in which the established principles apply”

Doctors’ use of social media (General Medical Council 2013)

**CONCLUSION**

Social media are here to stay. They have taken over traditional forms of communication and have made the world a smaller place, allowing people at distances to communicate with each other easily.
The field of health care has taken on this new technology and is making good use of it for increasing medical knowledge and training and to interact with patients. As with any new technology or advance, there are risks associated with its use and it is important to be aware of these and take steps to minimise them. However, overall, social media have proven to be a force for good. With further advances, even more uses of social media in healthcare are being explored with the eventual aim of enhancing patient care. Perhaps, in future, we will see the use of social media for individual health monitoring, where medical care can be tailored for each person based on their health statistics. We are truly heading into the ‘brave new world’ where simulated technology and virtual patients can be used for training and every individual may ultimately carry a personal sensor keeping track of their health.
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