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One Health in social networks and social media

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Summary

In the rapidly evolving world of social media, social networks, mobile applications and citizen science, online communities can develop organically and separately from larger or more established organisations. The One Health online community is experiencing expansion from both the bottom up and the top down. In this paper, the authors review social media's strengths and weaknesses, earlier work examining Internet resources for One Health, the current state of One Health in social media (e.g. Facebook, Twitter, YouTube) and online social networking sites (e.g. LinkedIn and ResearchGate), as well as social media in One Health-related citizen science projects. While One Health has a fairly strong presence on websites, its social media presence is more limited and has an uneven geographic distribution. In work following the Stone Mountain Meeting, the One Health Global Network Task Force Report recommended the creation of an online community of practice. Professional social networks as well as the strategic use of social media should be employed in this effort. Finally, One Health-related research projects using volunteers (citizen science) often use social media to enhance their recruitment. Including these researchers in a community of practitioners would take full advantage of their existing social media presence. In conclusion, the interactive nature of social media, combined with increasing global Internet access, provides the One Health community with opportunities to meaningfully expand their community and promote their message.

Keywords

Collaboration; Digital disease detection; Environmental health; Interdisciplinary; One Health; Social media; Social networks; Veterinary medicine; Web 2.0

Background

In the rapidly evolving world of social media, social networks, mobile applications ('apps'), and citizen science, online communities can develop organically and separately from larger or more established organisations. The One Health online community is experiencing expansion from both the bottom up and the top down. The Stone Mountain Meeting – a One Health meeting hosted by the Centers for Disease Control (CDC) in May 2010 – offered a

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comprehensive approach to unifying One Health efforts. While that meeting and its working groups promoted coordination rather than institutionalisation, their efforts still represented a more directed approach. In this paper, the authors review social media's strengths and weaknesses, earlier work examining Internet resources for One Health, the current state of One Health in social media (e.g. Facebook, Twitter, YouTube) and online social networking sites (e.g. Linkedin and ResearchGate), as well as social media in One Health-related citizen science projects.

The Stone Mountain Meeting sought to build on earlier One Health visionary meetings by bringing together the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO), the World Organisation for Animal Health (OIE), the World Bank, CDC, the national Ministries of Health and Agriculture, academics, physicians, and veterinarians to identify both opportunities for implementing One Health strategies and barriers to those opportunities. The meeting created numerous working groups to address specific issues. The One Health Global Network and the Information Clearing House working groups later merged and in October 2012 released the One Health Global Network Task Force Report (1), providing a detailed examination of the state of the One Health web presence, including descriptions of all major One Health websites. This report reviewed 13 web-based networks (including both health- and non-health-related networks) and identified best practices in these networks that should be incorporated into a new One Health network. It also separately reviewed 13 One Health-related websites and assessed their performance on those best practices. The limited inclusion of social media in the best practices, as well as the almost complete absence of social media from the assessed websites, reflects a disconnect between traditional websites and more recent Internet technologies.

What is social media?

When the Internet began its rapid growth in the 1990s, static WebPages were the norm. As technology improved to allow greater interaction between Internet users, the environment became more dynamic and collaborative. Social media refers to the many applications supporting the creation of content generated by users, including short messages and updates (e.g. Twitter or Facebook), blogs, videos, wikis (e.g. Wikipedia), and interactions with applications on mobile devices or WebPages. Although these platforms are only a decade old, they have already become important communication or education tools, and are valuable in researching Internet content and user behaviour in the areas of public health (2, 3, 4), health communication (5), plant sciences (6), human medicine (7, 8), veterinary medicine (9, 10), and the wildlife trade (11).

Strengths and weaknesses of social media

There is growing recognition that an enormous amount of valuable information about infectious diseases is found from web-accessible information sources, such as discussion sites, disease-reporting networks and news outlets. This information can assist situational awareness and even early disease detection, aiding both health professionals and researchers. Such data have encouraged One Health practitioners to join social networks where this information is available. While social media represent a huge opportunity to engage and

expand the One Health Community, online involvement still does not represent the complete picture of what is needed. The usefulness of these data can be clouded by a number of potential hazards, such as intentional false reports and errors in reporting. Furthermore, there are critical gaps in media reporting in tropical and lower-latitude areas, the very areas where interest in One Health should be the greatest. The expectation is that, as web-based mobile phone adoption expands globally, allowing for low bandwidth access to these sites to become the norm, we will see a closing of the gaps in access to technology. Looking beyond the access issue, there are a multitude of social networking sites where the success of one site is regionally dependent. The use of different sites risks fragmenting the One Health community. While issues of access, fragmentation and bias still remain, the potential benefits of real-time unification of the One Health community still fuel the overwhelming interest in these technologies.

One Health in social media

Despite the large number of websites reviewed by the One Health Global Network Task Force, few had a strong Twitter or Facebook presence at the time of the report. For example, One Health Talk had only five Facebook ‘likes’ and 20 tweets after seven and five months, respectively. As of September 2013, the One Health Talk Twitter account had sent 55 tweets and had 78 followers (https://twitter.com/onehealthtalk). One Health Talk has replaced its Facebook page with a One Health Approaches open group on Facebook (www.facebook.comgroups/112491482110940/), which, as of September 2013, had 523 members. This switch to an open group reflects the need for flexibility as options in informal data streams evolve rapidly. Twitter, for example, was created in 2006 and then experienced rapid growth. While a Twitter account would have been of limited use in its early years, it is now a vital tool for communication and community-building.

Facebook and Twitter are two of the largest social media networks in the world, with one billion (12) and 218 million (13) monthly active users, respectively. Facebook began as a social network for Harvard in 2004 but soon expanded to other universities. In 2005, access expanded to high-school students and corporations and then everyone (14). In addition to its expanding membership, the site features evolved over time, particularly the pages for organisations and groups. Currently, One Health organisations can create their own brand page, e.g. One Health Central and Eastern Africa (www.facebook.com/OHCEA), to publish promotional material, link to online articles, or encourage visitors to take an action, such as visiting a conference website. Facebook also supports open and closed groups which allow users to join and discuss One Health- related topics, e.g. One Health Initiative Nepal (www.facebook.com/groups/271373762976477) and One Health Approaches (www.facebook.com/groups/112491482110940/). The group format allows Facebook users to discuss One Health topics and often appears more dynamic and interactive than the organisation pages. A recent search for ‘One Health’ in Facebook found 21 groups, 14 open and 7 closed. Most of the groups had an academic affiliation, with ten associated with universities and two with university courses. Three groups were based on an individual country (Bangladesh, Indonesia and Nepal). The remaining pages were based on shared interest or organisation, or were unclear. Of the open groups, half (seven) had a post within the past month, while two each had posts two, three, and six months ago. One evidently

defunct group had not seen a post in over three years. Despite the frequent activity in many groups and Facebook's much larger user base, Twitter may have more vibrant One Health activity.

Twitter is a real-time social information network that allows users to post messages no longer than 140 characters. It has a feature similar to Facebook's 'friends' feature, in that users may follow the accounts of people or organisations they find interesting. Twitter users are also able to search for terms of interest and view tweets from people they follow or from everyone using the term. While Facebook is expanding its search capabilities, Twitter has emphasised from early on its ability to search for public tweets from all users. In addition, the short length of the messages encourages frequent brief updates. This attribute has led to Twitter's reputation as being more of a real-time information network than Facebook.

To evaluate the strength of One Health's presence on Twitter, the authors used a commercial online tool that aggregates and indexes tweets. They searched the archive of tweets (Twitter messages) since the Stone Mountain Meeting for One Health-related terms, including hashtags. Hashtags are topics or phrases with '#' in front of them (e.g. #ebola or #VaccinesSaveLives). In 2007, an early Twitter user asked 'how do you feel about using # (pound) for groups. As in #barcamp (msg)?' (15). The idea spread rapidly through the Twitter community and by 2009 hashtags were formally adopted by Twitter. Now, any topic with '#' in front of it is hyperlinked to a page showing other tweets with the same hashtag.

Using a commercially available Twitter index service (Topsy), the authors examined One Health terms in several languages, including English (One Health, #OneHealth); Spanish (#UnaSalud,); French (versions of Une Seule Santé); Polish (Jedno Zdrowie); Chinese (唯一健康); Japanese (ワンヘルス); and Arabic (صحة واحدة). Owing to the ubiquity of the words 'one' and 'health', searching for a hashtag like #OneHealth increases the likelihood that a tweet concerns One Health-related material and not simply 'one's health'. In fact, the presence of a One Health hashtag in a particular language may become a 'chicken or egg' problem, where the increasing use of a hashtag will also encourage more users to refer to One Health topics in their tweets. As a result of the rapid growth of Twitter's user base, as well as that growth's uneven geographic distribution, standardising the use of a hashtag to a date- and language-specific population size is not possible. The daily incidence of a hashtag, however, is still a useful measurement of the presence of One Health matters on Twitter.

Only the English terms had a strong presence on Twitter. Over 10,000 tweets have included the #OneHealth hashtag since the date of the Stone Mountain Meeting. Further examination of the geographic distribution of the #OneHealth tag shows a heavy concentration in the United States (Fig. 1). The only other language with noteworthy One Health activity on Twitter was Spanish, with 35 tweets using #UnaSalud. The tweets are more evenly distributed than the English tweets (Fig. 2), but the small numbers do not allow for a strong interpretation of that distribution.

As the use of #OneHealth expands, more sophisticated analyses may be performed to characterise the online community using it. For example, Gruzd and Haythornthwaite traced one month of tweets using #hcsmca (Health Care Social Media Canada) to identify the most

influential group members and to describe the online community as a whole (8). These network analysis techniques may prove useful in directing efforts to build the online and social media presence of One Health.

Finally, YouTube is a social media platform for sharing videos. The company reports over one billion unique users every month across 56 countries and 61 languages on its statistics WebPage (16). While researchers and academic journals have been creating videos to supplement articles for many years, the popularity of TED (Technology, Entertainment, Design) videos has greatly expanded the awareness of scientific and academic videos on YouTube (17). A search for 'One Health' on the YouTube website returns over 11,000 videos but, as is the case when searching for 'One Health' in tweets, many of these videos simply have those words adjacent to each other in their title. Users may browse for 'channels' of interest to them. These channels are similar to television channels and are often topic-specific. YouTube has several One Health-related channels, including Thai OneHealth and One Health Institute. In addition, users may subscribe to specific YouTube accounts to see their videos easily. One Health-related videos are frequently posted by many organisations through their YouTube accounts, including the Animal Health Institute through its Healthy Animals account and the American Veterinary Medical Association through its AVMAvets account. Academic programmes with One Health research components also post videos (e.g. the University of London International Programmes). Despite the numerous videos, it can be challenging for users to find them by searching YouTube. Therefore, those promoting these materials should use other platforms to enable users to directly access the videos.

Using social media to build a community of practitioners through social networks

The One Health Global Network Task Force Report has recommended the creation of an online community of practice (CoP), 'a group of people who share a concern, a set of problems, or a passion about a topic and who deepen their knowledge and expertise in this area by interacting on an ongoing basis'. The task force created One Health Talk (onehealthtalk.org) to facilitate One Health discussions, and link to the site from the One Health Global Network website (www.onehealthglobal.net), which provides a portal to numerous One Health resources online. While this is a valuable resource for people who find the website, social networks and social media provide further opportunities to introduce professionals to One Health activities and bring them into a CoP. This growth is happening organically on social networks, while established organisations are guiding its use in social media like Twitter.

For example, LinkedIn is an online professional network available in 20 languages with over 238 million members (18). Members can join discussion groups based on affiliation or interests. The One Health Initiative group has over 2,000 members and frequent posts on diverse topics, including conference announcements, new research articles, new government programmes, and job opportunities. Since LinkedIn actively encourages users to connect with other users, groups on LinkedIn benefit from an atmosphere that promotes exploration.

Founded in 2008, ResearchGate is a professional social network for academics. Members can link to published papers, ask questions of colleagues (e.g. where to find a particular reagent, a collaborator for a project, or more information on a method), and connect with researchers working in similar fields. ResearchGate reports that it has three million members in 193 countries. A US$35 million investment in June 2013 from Bill Gates (19) is encouraging evidence that this network may have a stable niche in the volatile world of social networks. While the One Health Initiative topic in ResearchGate has no questions, it does have over 50 members. Both the Environmental Health and the Veterinary Public Health groups have over 2,000 members, suggesting the ResearchGate user base may present an opportunity for expanding the One Health idea to a broader CoP, as recommended by the One Health Global Network Task Force.

In addition to professional social networks, social media such as Twitter provide another way to expand the One Health CoP. As discussed above, Twitter hashtags allow users to search for tweets about a particular topic. Increasingly, conference participants are 'live tweeting' (i.e. providing running, real-time descriptions of presentations at conferences) and including a conference-specific hashtag, which allows fellow conference-goers in concurrent sessions, or colleagues who were unable to attend, to follow developments. For example, during the 2013 American Veterinary Medical Association (AVMA) annual convention, participants used #avmaconv to tweet about conference activities. Twitter users following that hashtag would have seen this tweet from the AVMA meetings account: 'One Health has greater visibility now than ever before, but continued advocacy is needed. #avmaconv #OneHealth.' Inclusion of #OneHealth encourages users to explore that hashtag to find other tweets of interest. By including the hashtag, while live tweeting conferences, advocates of One Health introduce the concept to an even larger audience and contribute to the perception that it is an established concept that is relevant to a broad audience. Unfortunately, this broader audience may not draw from human health experts as much as veterinary and ecology/environmental health experts. While the American Medical Association (AMA) House of Delegates approved a resolution calling for increased collaboration between the human and veterinary medical communities in 2007, and sent a representative to the 2009 One Health Commission meeting, no #OneHealth tweets were identified that also used the AMA's meeting hashtags (e.g. #AMAmtg).

Another way to recruit potential community members into the One Health mindset is through the use of social media in digital disease surveillance. This capacity has been illustrated most recently in China, where a hospital employee uploaded an image of an H7N9 patient's medical record to Sina Weibo – a popular Chinese social network similar to Twitter. The post was promptly deleted, but appears to have accelerated government acknowledgement of four new cases. The emergence of H7N9 represented an opportunity to promote the One Health narrative. Engagement of the Twitter community through the use of the #OneHealth hashtag during the most intense period of the outbreak would have been a highly visible way to raise awareness.

Social media in One Health-related citizen science projects

Finally, many small or local research projects have employed social media and the 'citizen science' concept to build communities around One Health-related research. Silvertown defined a citizen scientist as a volunteer who collects and/or processes data as part of a scientific enquiry (20). The term has gained popularity in the last decade, as illustrated by numerous journal articles (21, 22, 23, 24, 25) and science-oriented blog posts (26, 27). The practice itself, however, has a lengthy history, especially in ecological studies. The National Audubon Society claims its annual Christmas Bird Count, started in 1900, as the longest running citizen science survey in the world and the resulting data have been used extensively by the academic community (28, 29, 30, 31). More recent examples of citizen science projects with One Health themes include:

- the Seabird Ecological Assessment Network (SEANET): a long-term collaborative effort to identify and mitigate threats to North American Atlantic marine birds (32, 33). It uses a blog to update its community (http://seanetters.wordpress.com/);
- Evolution Megalab: a European project to survey shell polymorphism in banded snails, whose shell changes may be associated with climate change (34). Numerous YouTube videos are available on this project, including one with over 16,000 views (www.youtube.com/watch?v=c8qghHQ7-n0);
- the Wildlife Health Event Reporter (WHER): a United States Geological Survey-sponsored website for reporting wild animal disease or deaths (35, 36), which accepts reports through a mobile application for smart phones and is promoted by the Wildlife Data Integration Network's Twitter account (@WDIN_News);
- PlantWatch: a joint venture between Nature Canada and Environment Canada to help identify ecological changes that may be affecting the environment (37, 38, 39), which has specific Facebook pages for each province (e.g. www.facebook.com/pages/PlantWatch-Nova-Scotia/263160873759914).

The growth of citizen science has led to the creation of the Citizen Science Alliance in 2007, the Citizen Scientists' League in 2010, the Citizen Science Association in 2012, and the European Citizen Science Association in 2013. Given the need of these projects to recruit volunteers, many have strong social media presences. Additionally, several organisations now provide websites which serve as clearing houses to recruit micro-volunteers to perform small tasks, allowing researchers to capitalise on those organisations' social media recruitment efforts. Many citizen science projects blend human, animal, and environmental health and would make strong partners in raising awareness of the One Health perspective. The approach of these projects contrasts with top-down formal initiatives, such as resolutions from veterinary and medical associations, calling for greater collaboration. For decades, scientists and clinicians with transdisciplinary vision have advocated cooperation between fields, but speeches and resolutions have had limited impact. The future of One Health may instead depend on its promoters showing rather than telling.

Conclusion

The interactive nature of social media, combined with increasing global Internet access, provides the One Health community with many opportunities to expand their community and promote their message. Social media platforms will continue to evolve. Some of the platforms discussed here may not exist a few years into the future, but they will be representative of the kinds of interactions and opportunities that social media offer. The One Health community must use these tools to the fullest and stake out an identity during this period of dynamic growth in Internet and social media use.

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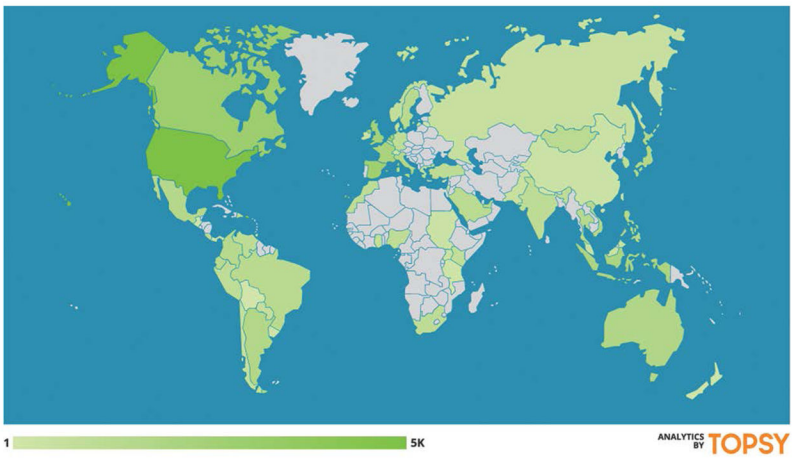

Fig. 1.
Geographic distribution of tweets using #OneHealth from May 2010 to October 2013

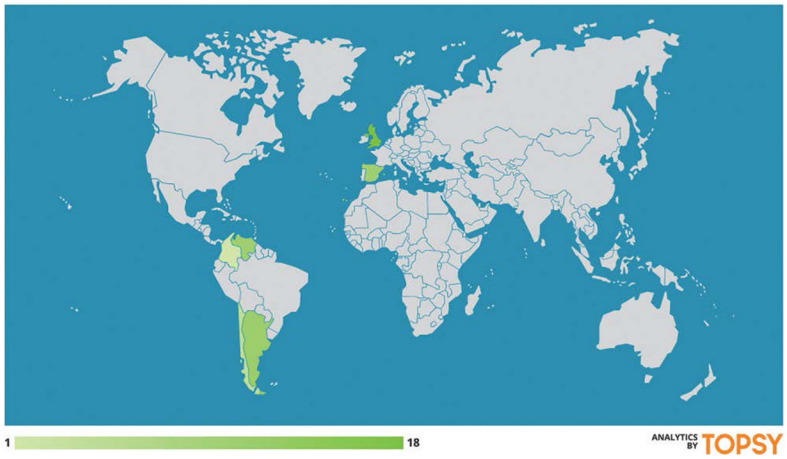

Fig. 2.
Geographic distribution of tweets using #UnaSalud from May 2010 to October 2013