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Abstract

Recent statistics show that almost 1/4 of a million people have died and four million people are affected either with mild or serious health problems caused by coronavirus (COVID-19). These numbers are rapidly increasing (World Health Organization, May 3, 2020c). There is much concern during this pandemic about the spread of misleading or inaccurate information. This article reports on a small study which attempted to identify the types and sources of COVID-19 misinformation. The authors identified and analysed 1225 pieces of COVID-19 fake news stories taken from fact-checkers, myth-busters and COVID-19 dash-boards. The study is significant given the concern raised by the WHO Director-General that 'we are not just fighting the pandemic, we are also fighting infodemic'. The study concludes that the COVID-19 infodemic is full of false claims, half backed conspiracy theories and pseudoscientific therapies, regarding the diagnosis, treatment, prevention, origin and spread of the virus. Fake news is pervasive in social media, putting public health at risk. The scale of the crisis and ubiquity of the misleading information require that scientists, health information professionals and journalists exercise their professional responsibility to help the general public identify fake news stories. They should ensure that accurate information is published and disseminated.

J.M.

Keywords: global health; information sources; public health; social media

An exploration of how fake news is taking over social media and putting public health at risk

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Introduction – the scale of the problem

The sudden onset of the coronavirus pandemic has been accompanied by an explosion of misinformation about the disease. As the COVID-19 pandemic spread, social media outlets emerged as an important means of socialising, as well as a way of seeking and sharing information about the disease. In the process, this enabled an explosion of unchecked information and the spread of misinformation. Social media use increased by 20–87% around the globe during the crisis. In Italy alone every day in March 2020, an average of 46 000 news posts on Twitter were inaccurate and linked to mis (dis) information about the crisis (Bruno Kessler Foundation, 2020). Examples of such stories include the view that of 5G technology has caused the pandemic; that mosquito bites can transmit the virus. Alleged cures included the ingestion of chloroquine, drinking cow urine or hot water. There has been a rumour spreading through social media accounts that neat alcohol can cure COVID-19 which has resulted in hundreds of Iranians dying from poisoning (Trew, 2020). The rumour was initially promoted citing a story published in a UK tabloid paper in February, which claimed that a school teacher and others in the UK were able to cure themselves with whiskey and honey. All these stories are fake. At the same time, countless 'so called' health experts and alternative medicine practitioners have pushed unproven pills, potions, stories, advice and therapies as ways to 'boost' the immune system (Caulfield, 2020). The misleading information about the disease is coming from diverse sources including politicians, world leaders, celebrities, prominent public figures,

conspiracy theorists and even the general public. As a result, the World Health Organization has declared an 'infodemic' of misleading information about the COVID-19, which poses a serious risk for public health (World Health Organization, 2020a).

The research study: design and methods

The research team comprised three qualified researchers, two of whom have PhDs in library and information science and several years of experience as faculty members in a public sector university. The third researcher has a post-graduate award in the field of pharmacology.

The main research method was content analysis. Using a variety of sources such as fact-checkers, myth-busters and COVID-19 dashboards, we identified 1225 pieces of fake news stories published in the English language between 1 January 2020 and 30 April 2020. We read through all these fake news stories to obtain a general sense of the material. With the help of VOSviewer software, we compiled a list of terms which frequently appeared in these stories. Then, we selected a list of terms based on a number of occurrences of each term and the relevance score. We selected only those terms that appeared in our data set at least seven times. This allowed us to identify patterns in the stories. A relational analysis of concepts in a text was carried out using the technique of proximity analysis. (This is an analytical technique used to determine the relationship between a selected point and its neighbours.) It is similar to co-citation analysis in bibliometrics. Using this technique, we created a 'concept matrix' and a group of interrelated co-occurring words that suggested an overall meaning. The data were analysed and visualised with the help of VOSviewer, a software tool that offers 'text mining functionality which can be used to construct and visualise a co-occurrence network of important terms extracted from a body of scientific literature'.

Research findings

The research revealed some interesting characteristics about the nature of false news: the main sources which disseminated the stories and the main types of stories. These are reported below.

Finding 1 – Sources of false news claims

Of the 1225 fake news stories analysed, social media accounted for spreading half (619, 50.5%) of the stories about COVID-19. The other 50% of sources include multiple sources: individuals, Donald Trump, websites and newspaper/website/tabloids. Figure 1 shows the sources of fake news stories by number of occurrences.

Finding 2 – The spread of fake news between January and April 2020

As we can see in Figure 2 which maps the relationship between the volume of fake news over a period of four months, the graph approximates to a bell shaped curve. It shows that the flow of fake news stories reached its peak in March. We counted 582 (47.5%) fake news stories that have been debunked by fact-checkers in just March as compared to 190 (15.5%) stories in February and 391 (31.9%) in April.

Finding 3 – Typology of misleading information during COVID-19

Examination of the 1225 fake news stories revealed three common types of misinformation relating to COVID-19 that are spreading around the world: false claims, conspiracy theories and pseudoscientific health therapies.

False claims. As the virus spread around the globe, there was a rise in false claims about its transmission, treatment and prevention. Here are some examples:

- Coronavirus can be transmitted through houseflies or mosquito bites.
- Drinking hot water, cow urine, methanol or alcohol has been recommended as a proven cure for COVID-19.
- Tunisian researchers discovered a cure for COVID-19.
- Israel has developed a vaccine for COVID-19.
- Communities of certain ethnicity or religion (such as Muslim communities in India) are to be blamed for spreading the virus in India.

Conspiracy theories. As global efforts to control COVID-19 continue, arguments about how the

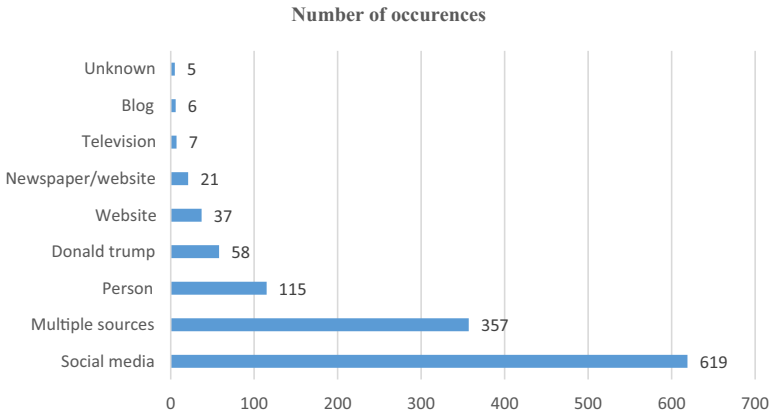

Figure 1 The sources of misinformation about COVID-19 [Colour figure can be viewed at wileyonlinelibrary.com]

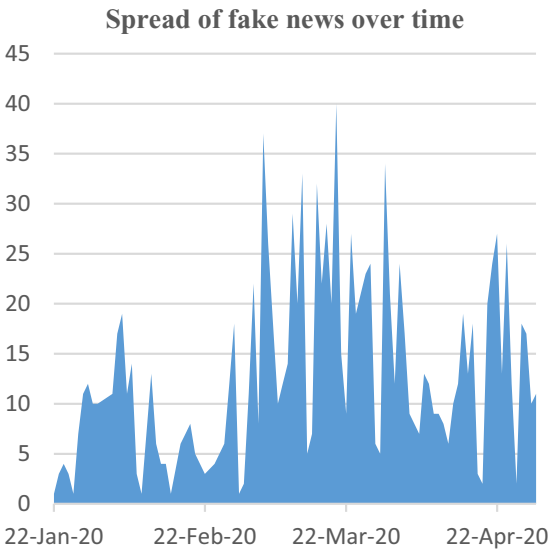

Figure 2 The spread of fake news stories between January and April 2020 [Colour figure can be viewed at wileyonlinelibrary.com]

virus spreads have intensified. Many conspiracy theories were fuelled by pronouncements made by world leaders, government officials, politicians and conspiracy theorists. The US President, Donald Trump, called COVID-19 a 'Chinese virus' and accused China of manufacturing it in a Wuhan Laboratory. The American President has continued to accuse China of underestimating the total number of cases and hiding the statistics about its mortality rate. Conspiracy theorists assert that the Chinese government sought to cover up the truth from the rest of the world. China, however, has rejected all these accusations. In his interview with BBC, The Chinese Ambassador to the UK, Xiaoming (2020, April 30) said: 'China is not the enemy of the United States, this virus is the enemy of the United States'. At the same time, the Chinese officials have backed another theory, claiming that the US Army brought the virus to Wuhan. China also suggests the United States is 'hiding something' about its COVID-19 response, and demands an answer from the United States.

It is not just governments which have endorsed conspiracy theories; there are also conspiracy theorists such as David Icke, who suggests that the virus is spread by 5G towers. This has led some of his followers to damage telecommunication towers across Europe. A widely read research paper from the Indian Institute of Technology (since withdrawn) claimed that proteins in the coronavirus shared an 'uncanny similarity' with those of HIV (Pradhan et al., 2020).

According to Joseph and Adam (2020), mainstream conspiracy theories come in two varieties: those which suggest that the virus is developed in a laboratory as a bioweapon and those that doubt the virus's severity. However, there is no scientific evidence that supports these theories. On 19 February, 27 public health scientists from the United States, Europe and Asia wrote in *The Lancet*: 'We stand together to strongly condemn conspiracy theories suggesting that Covid-19 does not have a natural origin' (Calisher et al., 2020).

Pseudoscientific health therapies. We have seen a flood of stories advocating pseudoscientific interventions and practices to help prevent coronavirus; often they promote fake tests and

cures. In our home country of Pakistan, as well as in the neighbouring countries such as India, Afghanistan, Iran and Bangladesh, practices such as homeopathy, alternative medicine, herbal medicine and old fashioned quackery are very common. 'So called' health experts have surfaced offering home remedies, diagnostics and natural medicines as a treatment, or as preventive measures against not contracting the virus. There are suggestions, for example that hot air blown up the nose kills the virus; that eating garlic can prevent viruses; and that pneumonia or malaria vaccination can protect against the virus. Some of these pseudoexperts claim that coronavirus is just the common cold. Therefore, vitamin C offers protection against coronavirus.

There are a range of other therapies promoted by those who subscribe to various pseudoscientific claims:

- The colloidal silver solution can help with coronavirus.
- The homeopathic drug 'Arsenicum album 30' can prevent coronavirus.
- Doctors in India have been successful in treating corona patients with combinations of the drugs lopinavir, ritonavir, oseltamivir, along with chlorphenamine, and they strongly recommend the world should use these drugs.

All of these claims are false. The response of the WHO has been to state that currently there are no drugs licensed for the treatment or prevention of coronavirus (World Health Organization, 2020b).

Caulfield (2020) rightly said:

> *'the fight against pseudoscience is weakened if trusted medical institutions condemn an evidence-free practice in one context and legitimize it in another. We need good science all the time, but particularly during disasters.'*

Finding 4 – Relational analysis of co-occurrence of interrelated terms

Using the VOSviewer, we conducted a relational analysis of the co-occurrence of interrelated terms; matrices and clusters of relationships were established which focus on the co-occurrences and the distance between terms. Weightings were applied and meanings assigned to the co-occurrences. The distances between clusters were also calculated. Each circle in Figure 3 represents a term from our data set on fake news stories. The terms are located in the diagram based on co-occurrences appearing in the data set at least seven times. In other words, these were the most reported terms in our data set of 1225 fake news stories. The size of each circle indicates the co-occurrences of a term in fake news stories. The bigger the size, the more occurrences of the term in the data set. For example, terms like Wuhan, president and water were the most frequently occurring terms. The distance between the terms in this map is also important – the smaller the distance between any two terms in the map, the higher the number of co-occurrences in fake news stories. Looking at the colours (which represents the group of related terms in fake news stories) – these are assigned automatically by the VOSviewer software. The software groups the main term which appeared in the fake news stories and indicates its branches in the same colour. In *brown*, we see terms like water, warm water, salt and garlic, which are the terms used by pseudoscientific practices. In *blue*, we see terms like India, prayer, woman, common cold and temperature, which are the terms that are found in false claims. The terms in other colours, such as coronavirus victims, suicide and Israel, are also terms used in false claims. We see that the terms US President Donald Trump, president, Wuhan and lab are not just located closer in the map, but the size of the circle of these terms is also large. This indicates the higher co-occurrences of these terms in fake news stories, and these are also the terms employed by conspiracy theories (see Figure 3).

Strategies to counter fake news stories

Caulfield (2020) and World Health Organization (2020c) issued a call for the scientific community to take up cudgels in the fight against the bunk. In our research, the identification of the most common types of COVID-19 misleading information and its main sources allowed us to devise an evidence based strategy to help prevent the spread of misleading information. We recommend the following three strategies for winning a war against the current infodemic of misleading information about COVID-19.

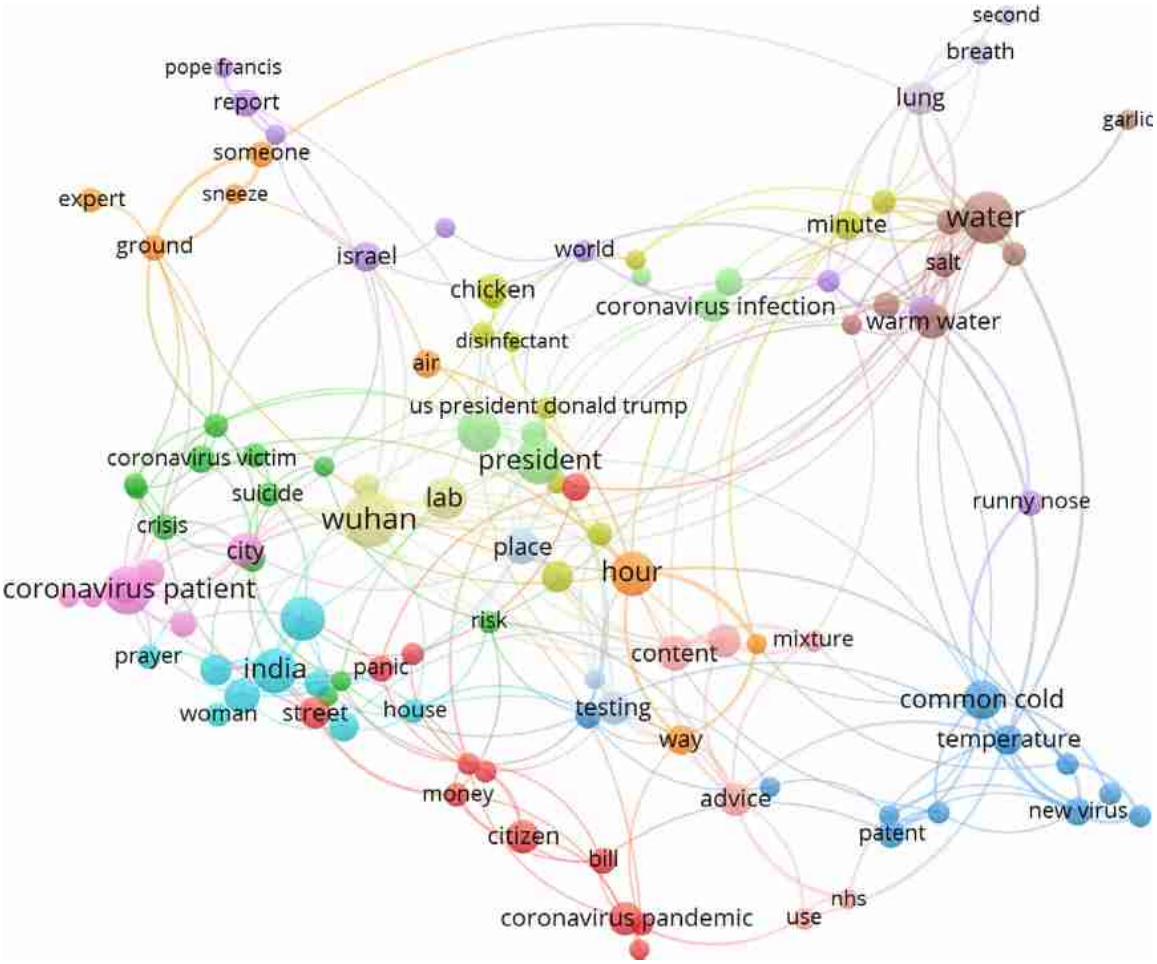

Figure 3 Visual map showing the relationship of co-occurring interrelated terms [Colour figure can be viewed at wileyonlinelibrary.com]

Train people how to identify and recognise fake news stories. The scale of the crisis and the abundance of misleading information demand that scientists, health information professionals and journalists take serious steps to help the general public to identify and recognise fake news stories. There is a need to train people, especially the young, about the nature of social media and how to use it effectively and safely if we are to win the war against fake news. Llewellyn (2020) said that we should be thinking about contact tracing; just like with coronavirus itself we need to query: who sent the information, what's the source, and how to know whether I trust it to be true? Mantas (2020, April 25) assembled tips from various fact checking organisations and journalists around the world and compiled a very useful six steps guide to help prevent people from misleading information during COVID-19. These steps include (1) stop breathe – before sharing (2) check the source, (3) trust scientists before politicians, (4) beware your emotions, (5) tools help verify images and videos, and (6) know what you don't know. The UNESCO hashtags campaign also advocates #ThinkBeforeClicking, #ThinkBeforeSharing and #ShareKnowledge (UN News, 2020). In summary, there is a need to inform the people about the sources, methods and guides that they can use to help identify fake news during the pandemic. There is also a need to teach the general public that we can prevent the spread of misinformation by not sharing it, or just by pausing before sharing any information.

Stop tolerating pseudoscience health practices. The damages that pseudoscience health practices have done for public health are far from negligible. In the current crises, pseudoscience health therapies

and advice are proliferating and pose a threat to public health. Caulfield (2020) said that we must stop tolerating and legitimising health pseudoscience, particularly during this pandemic. Instead, we must trust and rely on science. Llewellyn (2020), a social media consultant and trainer, said: 'At times of crisis we turn to experts —but news outlets and social media must be careful about the information they share, particularly informally'.

There is a need for governments to deliver awareness messages to the general public highlighting the risk of pseudoscience health therapies and the threat they pose to the world's collective efforts to curtail the virus.

Swamp the landscape with accurate information. Wardle (2020), a disinformation expert at Harvard University, said:

> *'The best way to fight misinformation is to swamp the landscape with accurate information that is easy to digest, engaging and easy to share on mobile devices. It should also answer people's questions and, ultimately, fears.'*

Caulfield (2020) responded by saying: let's get swamping the misinformation with accurate information. He told the scientific community that we must share accurate information that we feel is valuable for the public, empower the trainees to get involved in science communication, and on social media. Tworek (2020), assistant professor at the University of British Columbia in Canada, tweeted that 'communications in a public health crisis are as crucial as a medical intervention… in fact, communications policies ARE a medical intervention'.

Social media outlets have taken steps to monitor and debunk misleading information, for example YouTube has launched COVID-19 alerts and has also blocked several channels of conspiracy theorists including David Icke's channel. Facebook has also pulled down 'Interested in pseudoscience' ads. We must all discourage misleading information and be not part of sharing it. The flow of accurate information will not only prevent people from the negative effects of misleading information but also promote informed decision making.

Conclusion

The COVID-19 infodemic of misleading information has resulted in false claims, half backed conspiracy theories and a proliferation of pseudoscience health therapies, regarding the diagnosis, treatment, prevention, origin and spread of the virus. Fake news is taking over social media and putting public health at risk. The scale of the crisis and ubiquity of the misleading information demand that scientists, health information professionals and journalists see it as their professional responsibility to help the general public identify fake news stories. They must do their utmost to ensure that valid, evidence based information is disseminated, using both social media and traditional media – print, radio and television.

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Conflict of interest

There is no conflict of interest.

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