

Global pandemics, conflict and networks – the dynamics of international instability, infodemics and health care in the 21st century

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John SG Wells 

Fellow, School of Health Sciences, Waterford Institute of Technology, Waterford, Ireland

Florian Scheibein

Research Assistant, School of Health Sciences, Waterford Institute of Technology, Waterford, Ireland

Abstract

Background: The COVID-19 global pandemic is a harbinger of a future destabilised world driven by climate change, rapid mass migration, food insecurity, state failures and epidemics. A significant feature fuelling this destabilised world is networked misinformation and disinformation (referred to as an infodemic), particularly in the area of health.

Aims: To describe the interactive dynamic of climate change; mass population movement; famine; state failure and epidemic disease, analyse developments over the year 2020–2021 and discuss their relationship to an infodemic about disease and public health responses and how this should be addressed in the future.

Methods: Using the concept of ‘the Five Horsemen’ of epochal change and network theory to guide a narrative review.

Results: Concepts of epidemiology are reflected in how misinformation is spread around the world. Health care services and personnel face threats as a result that make it more difficult to manage pan global health risks effectively.

Conclusions: Health care professionals at an individual and organisational level need to counter infodemic networks. Health care professionals who consistently spread misinformation should have their licence to practice withdrawn.

Keywords

climate change, conflict, future of healthcare, global, networks, pandemic, public health

Corresponding author:

John SG Wells, School of Health Sciences, O’Connell Bianconi Building, Waterford Institute of Technology, Cork Road Campus, Waterford, Ireland.

Email: jswells@wit.ie

Introduction

This paper explores and proposes that online misinformation distributed through networks of likeminded individuals, should be seen as a significant driver of conflict and mistrust in health care advice and professionals within the wider context of a world changing global crisis linked to climate change ([UN Intergovernmental Panel on Climate Change, 2021](#)). It is argued that networked dissemination and impact of online misinformation is a significant driver of change – an ‘infodemic’ – which should be viewed in much the same way as we view the spread of population based viral disease. Consequently, this networked infodemic should be addressed and contained by the health care professions in much the same way as we control and contain disease.

Method

The approach taken within this paper is a narrative review of major developments over the course of the last 2 years which indicate the coming global crisis in the next 40 years will have significant health impacts. As an organising frame of reference, [Diamond’s \(2019: pp. 423–463\)](#) hypothesises as to why states collapse and [Turchin’s](#) work on social and economic discord between elites who have power and elites who aspire to power in an environment of widening social disparities ([Turchin, 2016a, 2016b](#)) were considered. Each have significant explanatory power for modern times however neither fully satisfies the need for a comprehensive explanation of the diverse scale of change which the world is experiencing and neither comprehend what many consider an extinction event that is manmade – the Holocene Extinction ([Wallace-Wells, 2019: pp. 220–310](#)). Therefore, as an organising concept for this analysis it was decided to focus on the work of [Morris \(2010, 2015\)](#) and his ‘Five Horsemen’ which explains epochal change and civilisational collapse.

One might argue that [Morris’s](#) work lacks explanatory power in terms of the digital space as a driver of global transformation. To address this, we reference network theory to examine current thinking about how misinformation is exchanged and how this exchange needs to be understood from an epidemiological perspective in much the same way as we understand viral disease spread ([Kucharski, 2020](#)).

Current trends for the next 40 years through the prism of Five Horsemen

The years 2020 and 2021 may well be remembered as ‘the plague years’ in which the world became, in the words of Jack London, ‘topsy turvy’ ([Webb, 2019: pp. 45](#)). A recent review of the seminal 1972 bestseller *The Limits to Growth* ([Herrington, 2021](#)) concluded that averting predictions of 21st century global collapse in food production, industrial output, and population was increasingly unlikely based on international trends in relation to climate change and industrial pollution. The historian [Ian Morris \(2010\)](#) argues that transformative change in human civilisation occurs every 500–1000 years through epochal disruptive crises involving what he terms ‘the Five Horsemen’: (1) climate change; (2) food scarcity/famine; (3) rapid and large-scale population movements between regions; (4) governance/state failure; and (5) epidemics. It should be emphasised that within this model it’s not the action of any one ‘horseman’ that leads to epochal change but rather an iterative dynamic when all five appear within a close time frame.

The appearance of the Five Horsemen during 2020–2021

The last 2 years have seen all five of Morris's horsemen come to the fore on the global stage. The recent report of the [UN Intergovernmental Panel on Climate Change \(2021\)](#) highlights that global warming of 1.5°C and 2°C will be exceeded over the course of this century, with every region of the world projected to experience numerous climate impacts. Consequently, a range of worst-case scenario eco-systems changes ([Kolbert, 2015](#); [Wallace-Wells, 2019](#)) accompanied by global health impacts – heat related illness, allergies, food, water and zoonotic diseases, mental illness and physical injuries arising from environmental disasters – ([Kreslake et al., 2016](#)) over the next 30 years ([Rocque et al., 2021](#)) will ensure that health care and the role of health care professionals will be at the centre of social, political and military conflict ([Van Hout and Wells, 2021](#)).

The Joint Report by the Global Network Against Food Crises and the Food Security Information Network ([GNAFC, 2021](#)) reported a record-breaking rise in the number of people in 2021 (161 million) facing famine in 42 countries, surpassing an already record-breaking figure in 2020 ([Global Network Against Food Crises, 2020](#)). Food insecurity for poorer citizens is now a major issue not only in the poorer regions of the world but also in Europe and North America ([Holland, 2020](#)). Meanwhile, the [UN High Commissioner for Refugees \(2021\)](#) reports that despite restrictions on movement related to COVID-19, forced displacement of people is at record levels with one in 95 of the world's population forcibly displaced compared to one in 159 in 2010. Most recently, we have witnessed the desperation of refugees seeking security being weaponised for criminal purposes or to effect policy changes by one state over another ([Van Hout et al., 2016](#); [Marder, 2018](#); [Galeotti, 2021](#)).

In 2021, the Fragile States Index (FSI) published by the [Fund For Peace \(2021\)](#), which catalogues the sustainability of nations (sustainability is defined as ability to meet vital needs and provide basic services; strength of governance; level and persistence of extreme poverty; level of territorial control and propensity for conflict/civil war), identified only six states as sustainable (all, except for New Zealand, in Europe) and 41 at 'elevated warning' or 'very high alert' for unsustainability. Most notably the USA saw the worst year-on-year deterioration in its sustainability score of any country in the world, with it ranked midpoint in the fourth of nine categories. The report noted a rise in misinformation, particularly related to COVID-19, and mistrust in the political system, as significant destabilising factors in the USA's sustainability deterioration.

The last horseman – epidemics – has, of course, dominated the thoughts and actions of both individuals and governments across the world. COVID-19 has affected every nation ([Harris, 2020](#); [Gewirtz, 2020](#); [Gaens and Sinkkonen, 2020](#)) and in one way or another impacted the other 'four horsemen'. COVID-19, it has been argued, is a harbinger of a future landscape dominated by zoonotic disease, health care conflicts between regions and nations and the deliberate targeting of health care professionals in civil and military conflict ([Van Hout and Wells, 2021](#)).

In addition to the above five, one may argue that there is a new 'Sixth Horseman' for the 21st Century – 'networked infodemics' – that is, misinformation and disinformation exchanged, amplified and distributed by groups and individuals through a range of digital platforms spreading similarly to the way a virus spreads in a population. Utilising narrative review referenced to concepts of network theory, this paper discusses the implications of 'networked infodemics' for the future of health care and its impact on health care professionals.

'Networked infodemics' – a new sixth horsemen?

Daniel Defoe, writing in 1720, of the origins of the 1665 Great Plague of London, noted, 'We had no such thing as printed newspapers in those days to spread rumours and reports of things, and to improve them by the invention of men, as I have lived to see practised since' (Defoe, 1960: p. 11). The COVID-19 pandemic has accelerated a process that was already underway before it arrived – namely, the ubiquity of digital communities exchanging misinformation in daily discourse and its influence on trust in 'official' information – that is government public health guidance, medical expertise, and pharmaceutical science (Altman, 2020). Currently a range of conspiracy theories, often associated with extreme right-wing politics, is driving anti-vaccination (known as anti-vax) sentiment towards COVID-19 amongst significant numbers of people in many countries (Germani and Biller-Adorno, 2021; Rothschild, 2021).

A growth in access, volume and sharing of information through the internet has been described as an 'infodemic' (Bin Naeem et al., 2020). An 'infodemic' may be characterised by 'false claims, half backed conspiracy theories and pseudoscientific therapies' (Bin Naeem et al., 2020: p. 1). Intersecting with the concept of 'infodemic', is the concept of 'network' – that is, the interconnectivity and relationships between different lines of information, people and groups, how and why they are linked and operate (Borgatti and Halgin, 2011).

Within the context of a world increasingly reliant on digital sources of information for its view of reality it may be argued that online 'networked infodemics', particularly as this relates to future global health threats and the need for collective responses to contain them (Brown and Suskind, 2020), needs to be considered as a driver of civilisational change – a 'sixth 21st century horseman' to add to the five identified by Morris. The source of the infodemic misinformation may be derived from an influential 'patient zero source' (an initial network node) based on a position of authority such as a President Trump at the political end or someone with a science or medical background (Germani and Biller-Adorno, 2021) and spreads like a pandemic through a vector network – that frames the discourse, alters the social perception and ultimately impedes/affects the collective understanding and response.

Kucharski (2020) notes, 'With detailed data on social interactions, researchers are discovering how information can evolve to become more persuasive and shareable ... [and] how rumours emerge and spread, why some outbreaks are harder to explain than others, and how online algorithms are influencing our lives ...' (Kindle location 93). Kurchaski (2020) argues that online information spread through networks, both human and algorithm based, can be understood in the same way that we examine and understand viruses and contagion.

Networks have a tendency toward homophily, that is, they lead to polarisation of networks within networks. One example is the bifurcation and polarisation within social media along left and right divides. Networks are connected to other networks with dyadic ties. These ties can be very impactful (Granovetter, 1973), particularly when trust in them is high (Levin and Cross, 2002) and algorithms direct individuals to online belief confirmation information referenced to that which they have previously searched for, attended to and comprehended to the exclusion of inconsistent/countervailing information. This confirmation bias information is then reproduced and distributed by individuals to the rest of the network (Hills, 2019).

In this context, extreme or novel views, opinions and sentiments are favoured and amplified (Whittaker et al., 2021). For example, one study found that fake news was more novel than real news and spread 'farther, faster, deeper and more broadly than the truth' (Vosoughi et al., 2018). Usual discourse and disagreement between scientists can be used by malign actors (Centre for Countering Digital Hate, 2021; Matthews et al., 2021) to discredit

scientific opinion and the influence of science in relation to public trust (Monpettit, 2011), particularly in the field of health care and vaccines (Merchant and Asch, 2018).

A seminal example of misinformation spread is Dr. Andrew Wakefield's study linking MMR vaccine to autism (Eggertson, 2010). The devastating effects of this now widely discredited study are a primary inspiration for what is now called the 'anti-vaxer/vaccination' movement (Merchant and Asch, 2018) which is driving so much hostility towards vaccination in relation to COVID-19.

Understanding how networks work in relation to how a disease can become a pandemic provides instruction as to how a rumour can become a widely held belief. In this context there are two types of network nodes – individuals and public places (Feng et al., 2020). Previous work on the Black Death suggests that transitivity (when nodes are connected to two nodes which are connected to each other) and centrality of nodes (the number and intensity of connections with other nodes) may be key to understanding disease spread within cities (Gómez and Verdú, 2017). MERS, SARS and Ebola were all influenced by 'super spreaders', namely, well connected individuals (nodes) in a population which quickly spread the disease among their own and connected networks (Marineli et al., 2013; Wong et al., 2015). A recent paper (Worobey, 2021) identified that most of the initial COVID-19 cases were linked to one point of contact – the Wuhan wet market.

This spread takes place through existing networks and is then amplified through promotion by celebrities, sports groups or media outlets – 'nodes' (Bruns et al., 2020). Within the current COVID-19 crisis much misinformation is shared through highly connected 'super spreader' networks of individuals and groups such as US President Donald Trump (Naeem et al., 2020) whose dyadic ties with a range of conspiracy groups have been implicated in the spread of the misinformation film 'Plandemic' through Twitter (Kearney et al., 2020). Another example is the rise of 'Q Anon' and its network amplification of rumour and conspiracy (Rothschild, 2021). A report by the Centre for Countering Digital Hate (2021) identified 65% of all COVID-19 misinformation on the internet could be traced to 12 individuals. Most strikingly in this report was the number of health care professionals amongst these which was four out of 12 (Centre for Countering Digital Hate, 2021).

As highlighted the most famous exemplar of a former health care professional involved with misinformation is Andrew Wakefield and MMR. Wakefield remains active in relation to COVID-19 anti-vax information (Jamison, 2020). Though there are many others who have been widely reported in the media beyond those reported by the Centre for Countering Digital Hate (2021), for example the current surgeon general of Florida has called into question the efficacy of vaccines and public health measures to contain COVID-19, surprisingly, they are little studied within the research literature, with some exceptions (Grace, 2021). What one can say is that a professional health care background is likely to add credibility to amplify health related misinformation spread and acceptance.

This spread of misinformation often directly attacks the expertise of public health officials (Bargain and Aminjonov, 2020). There can be significant consequences not only for wider attempts to contain a public health threat but for individual health care professionals. Thus, during the COVID crisis, there have been several reports of doctors and nurses in countries such as Mexico and Italy being attacked or evicted from their homes because they are accused of being vectors of disease transmission, whilst national public health experts have had death threats because they are portrayed online as part of a conspiracy to oppress people (Mello et al., 2020). In the most famous case to date, a conspiracy was organised through social media, to kidnap and broadcast online the execution of the Governor of Michigan, USA because she had mandated a series of public health measures to contain COVID-19 in her State (Bogel-Burroughs et al., 2021).

Discussion

The public good approach, referenced to public health, emphasises the creation of a societal consensus about health protection of the population and the promotion of health equity over the privileging of some individuals (Abdalla et al., 2020). It has clear national and international health management advantages (Anomaly, 2021). These include dealing with international health emergencies such as pandemics, the future global dynamic of climate change, food scarcity tipping over into famine and resultant large scale and rapid population movements, leading to destabilised national and international governance (Smith, 2003).

In 2019, the WHO declared vaccine hesitancy as one of the top 10 global threats to world health. David Mechanic, writing in 1996, pointed out that societal trust in institutional health care is based upon a shared sense of norms, values, and common interests across society. It can be quickly undermined when those institutions are perceived to be failing (Mechanic, 1996). As indicated in the foregoing narrative, these issues are exacerbated and fuelled by a polarising networked infodemic, linked to political contestation of expertise (Devine et al., 2020) that suggests the public good should not be the dominant health response paradigm but trumped by the rights of individuals to opt out of such responses because they mistrust or reject the underlying science of public health (see Rothschild, 2021 and Flores et al., 2022). The result, as COVID-19 has shown, is significant minorities of the population refusing to engage with protective measures (Helm, 2020). This may well lead to a public health environment which will be challenged to address the predicted health threats likely to arise over the next 40 years (Kreslake et al., 2016).

Such negative sentiment may grow in the future because of a more destabilised world in which disease threats and disease responses, may be malignly used for political ends (World Economic Forum, 2020). This has happened in past times of epoch change (Cohn, 2012) and happened recently with racialised slurs used by President Trump in relation to the origins of COVID-19 (Delaney, 2020; Kuo, 2020). It should be noted that this equating of 'the other' as a public health threat has a long and dark history (Bidess, 1997) and currently is used by politicians in the USA to discredit the public health expertise of medical scientists such as Dr Anthony Fauci (Finn, 2021). Shortages and distribution problems in relation to medicines may also feed into this as questions of who should or who is getting prioritised become a focus of contention (Fiddler, 2020).

Such a context will invite a conservative response in which health care professionals such as nurses, concerned about their immediate needs to deflect criticism and maintain personal safety, will align with rather than challenge views and practices that they know are politically rather than clinically driven (Van Hout and Wells, 2021). There are historical precedents, such as in Nazi Germany, where nurses adapted to and implemented malign policies to manage their personal anxieties and later defended their actions on the basis that they had no choice (McFarland-Icke, 1999: pp. 210–256).

A malign element in this context is the role played by a minority of health care professionals as nodes of networked infodemic misinformation. From a regulatory point of view this needs to be addressed as significant malpractice (National Council of State Boards of Nursing, 2021), warranting withdrawal of the professional licence to practice thereby removing their professional credibility when disseminating misinformation (Mitchell, 2021; Wu and McCormack, 2018).

At the same time a vigorous approach to inoculate the population and society against 'networked infodemics' needs to take place. This inevitably means both short and long-term measures. Health authorities need to forward plan and address 'networked infodemics'. In this regard, principles of viral epidemiology can be used to conduct contact tracing of misinformation spread and sources (Scales et al., 2021). It has been suggested that one might use the R rate (or 'replicability') as a

measure of the spread of misinformation through social networks (Shrivastava et al., 2020). This approach can then inform both strategy and tactics for containment and eradication.

Short term measures mean training health care professionals in digital and rhetorical skills to combat online misinformation and vigorously prosecuting members of the public who threaten the safety of health care professionals. Longer term measures involve teaching critical thinking skills at schools and embedding respect for expertise and the scientific method amongst children and young people. This will effect cultural change and reassert rational informed debate and discussion as this relates to medical science, public health and the rights of the citizen versus the health of the population in a less politically stable and more pandemic disease vulnerable world.

Conclusion

The world in the 21st century will experience epochal change (Wallace-Wells, 2019). Morris's model of the Five Horsemen, by taking a long view of human history, attempts to make sense of the dynamics at play in driving such epochal change; however, perhaps because it looks back, Morris's model fails fully to take account of a new driver of global change consequent of the rise of the internet. We propose an interactive dynamic of the Five Horsemen with an added Sixth Horseman – the networked infodemic – whose transformative power can be understood in the same way that we understand disease spread and impact. COVID-19 illustrates this Sixth Horseman's power to break societal bonds in relation to trust and acceptance of health advice. Health impacts will be one of the most significant challenges facing the world in the future. Combatting and containing 'networked infodemics' should be seen as a core part of disease management by health care services and health care professionals in the 21st century.

Key points for policy, practice and/or research

- A more destabilised world interacting with the rise and spread of a networked infodemic of health misinformation will lead to a crisis of trust amongst a large minority of populations in public health advice.
- Networked infodemic health misinformation spreads across the internet in a similar way to how a virus spreads amongst a population and needs to be contained and eliminated in much the same way as we contain and eliminate viruses.
- Networked infodemic misinformation will have significant impacts on the practice of health care professionals in the future and needs to be addressed by the health care professionals' regulatory bodies.

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Ethics

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ORCID iD

John SG Wells  <https://orcid.org/0000-0002-9560-8945>

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John Wells is a Fellow of the American Academy of Nursing, Fellow Ad Eundem of the Faculty of Nursing and Midwifery of the Royal College of Surgeons in Ireland.

Florian Scheibein is a Research Assistant and PhD Student. His research focuses on online behaviours, drug use, stress management and work-life-flow.