Report

Infodemics of COVID-19 pandemic

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Abstract

Infodemics hinder efforts at mitigating the COVID-19 pandemic. This short report aims to highlight the definition, types, sources and effects of infodemics. The COVID-19 pandemic is accompanied by a wave of extensive misinformation, or infodemics, representing a serious challenge for prevention and control activities. This misinformation deepens rather than mitigates the viral risks. International and local authorities must fight this misinformation seriously.

Keywords: COVID-19, infodemics, misinformation, rumours, myths, stigma

COVID-19 pandemisinde infodemi

Öz

Infodemi COVID-19 salgınını hafifletme çabalarını engellemektedir. Bu rapor, infodeminin tanımını, türlerini, kaynaklarını ve etkilerini değerlendirmeyi amaçlamaktadır. COVID-19 salgınına önleme ve kontrol etkinlikleri için ciddi bir zorluk oluşturan yanlış bilgi dalgası veya infodemi eşlik etmektedir. Bu yanlış bilgi, viral riskleri azaltmaktan çok derinleştirmektedir. Uluslararası ve yerel yetkililer bu yanlış bilgiyle ciddi şekilde mücadele etmelidir.

Anahtar Kelimeler: COVID-19, infodemi, yanlış bilgi, söylenti, mit, damgalama

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Introduction

In the past few months, COVID-19 has exploded worldwide. It is an emerging communicable disease caused by a new coronavirus. The virus and the disease were not known before the outbreak in Wuhan, China, in December 2019.[1] COVID-19 spreads through droplets of an infected person during coughing, sneezing or talking. Infection can occur by touching contaminated surfaces and then touching the mouth, eyes, or nose. Despite the virus being present in faeces in some patients; the spread through this route is not proven.[2-4] The basic preventive measures of COVID-19 are social distancing (more than two meters away from the sick person) and self-isolation. The virus has a high transmission capacity with daily changes in infection and death rates.[5]

COVID-19 is more than just a viral pandemic. Online info-torrent of material about it has exacerbated much social and anti-social behaviour. Rapid spread of massive misinformation is among the challenges facing COVID-19 containment efforts. Different types of misinformation arise from many sources. A common feature of modern epidemics is the link between real biological contagions and the social ones resulting from misinformation and fake news. This misinformation is prevalent in all countries due to cultural, political and religious reasons as well as the widespread of mass and social media. The Director-General of the World Health Organization (WHO) stated that "We're not just fighting an epidemic; we're fighting an infodemic".[6,7] Infodemics spread rapidly and internationally through mobile phones, social media, and internet. Contradictory views of experts generate anxiety, confusion and panic.[8] Less emphasis has been given to the infodemics associated with COVID-19 as a component of its prevention and control program.

Despite the multiplicity of publications on COVID-19 infodemics, to the best of our knowledge there is no article that highlights and classifies these infodemics in a single source for healthcare workers. This narrative review aims to cover this gap and to highlight the defintion, types, sources, effects on prevention and how to fight these infodemics.

Search strategy

This is a status quo narrative review which included the current research related to COVID-19 infodemics. A literature search was conducted on Google (google.com) on May 22, 2020. Search terms included "COVID-19," "infodemic," "misinformation," "rumours," "myths," and "stigma". These terms were used in different combinations. All articles and books published in English language were included.

Definition

Eysenbach (2009)[9] defined infodemiology, the epidemiology of misinformation as "the science of distribution and determinants of information in an electronic medium, specifically the Internet, or in a population, with the ultimate aim to inform public health and public policy". He defined infoveillance as the monitoring and surveillance of these infodemics.

Infodemic is the spread of wrong information, especially online. MacMillan Dictionary[10] defined infodemic as excess information about a problem which makes the solution more difficult. The World Health Organization[11] defined infodemic as "an overabundance of information — some accurate and some not — that makes it hard for people to find trustworthy sources and reliable guidance when they need it".

Types of COVID-19 infodemics

Many posts which are widely circulating on social media are falsely claimed; all these claims have been disproven. They can be classified based on the natural history of the disease into different types. Table 1 summarizes these infodemics according their type.

Table 1. Types of COVID-19 infodemics

Type	Misinformation	Truth
Origin of virus	Developed by genetic engineering as a biological weapon or genocide.	Origin is unknown. The virus could have an animal origin.
Misleading and false statistics	Numbers of daily reported cases, infected and deaths are not accurate in many countries	This depends on the testing and reporting policy of each country.
Infectivity	COVID-19 is less infective than Flu.	COVID-19 is more infective than Flu.
Modes of transmission	-Mosquitoes bites -5G mobile network -Contact with infected pets -Packages from infected areas	Droplet transmission during close contact with source, airborne transmission and contact with fomites in the immediate environment around the infected person.
Clinical presentations	COVID-19 has its own unique clinical presentations.	COVID share symptoms with other respiratory infections. Early cases may be asymptomatic.
Diagnosis	-Holding breath for 10 seconds without discomfort excludes infection. -Thermal scanner detects the virus.	PCR is the only confirmatory test. Thermal scanner detects fever as a symptom of infection, not the virus.
Preventive measures	-drinking excess water, boiled ginger on empty stomach, lemon, ginger, hot liquids like tea; alcohol, vitamin C, and immune-supporting supplements (e.g. green tea, zinc, or Echinacea) will prevent COVID-19 - Cold weather, snow and hot bath can kill the virus - Exposure to sunlight, drinking warm water or heating to 26–27 °C will kill the virus - Hand dryers kill the new virus - The pneumonia vaccine prevents the COVID-19 virus - Antibiotics prevent the coronavirus	The best preventive measures are social distancing. Avoid going to crowded places, follow good respiratory hygiene, regular and thorough hand cleaning, proper use of facemasks, and home isolation if presenting with symptoms
Treatment	Chloroquine, antiviral and antibiotics are claimed to be effective and safe.	Only symptomatic and supportive treatment. Many clinical trials are ongoing
Immunity	Some claims that the vaccine is available.	Many vaccines are under trials.
Outcome	COVID-19 is a deadly disease. COVID-19 is a life-long disease.	Fatality is less than 5%. Most of cases recover from illness.

*Origin of the virus

There are many rumours about the origin of the COVID-19 virus. The most popular is that the virus was developed by genetic engineering as a means for biological war.[12] There is no evidence that the virus is man-made. The source of the COVID-19 is unknown. Available evidence suggests that it is not a constructed virus but has an animal origin. Bats are the most probable ecological reservoir of coronaviruses, including COVID-19. Furthermore, the possible animal origins (including pets) of COVID-19 have not been confirmed.[2,13] The COVID-19 virus is not just a mutation from the common cold virus. COVID-19 virus shares more than 90% of its genetic

material with coronaviruses of bats, which strongly suggests that bats are the origin of the virus which later spread to humans.[14,15]

Some claim that the virus will be used as a genocide targeting specific ethnic or religious groups. The Center for Disease and Prevention (CDC)[16] stated that the disease can infect any one regardless of race or ethnicity.

*Misleading and false statistics

The reported numbers of COVID-19 can be confusing in many countries. The data on COVID-19 are changing on a daily basis and there is no accurate statistics on the affected and deaths.[17] This fluctuation is due to different testing and reporting policies in different countries. Some countries include confirmed cases only and others include probable and suspected cases.[18] Despite the daily reporting of cases there is scepticism about real numbers. It is not routine to report the number of contacts as this is difficult to count in real life.

Infectivity

The COVID-19 virus is more infectious than the flu. The basic reproduction number (R_0) of COVID-19 is at least 2.2 (on average an infected subject can infect about 2.2 others) compared to 1.3 in the flu.[15] Liu et al.[19] in their review estimated that the mean R_0 for COVID-19 is about 3.28 which is considered higher than the 1.95 estimate of the WHO. They commented that current estimates for R_0 are biased due to short time of onset and insufficient data. This variation depends on the estimation method used and the validity of the underlying assumptions.

Modes of transmission

The rumours related to modes of spread are numerous and include the following:

- The virus spreads by bites of mosquitoes: there is no evidence to support this.[20]
- COVID-19 spreads through the 5G mobile network: The 5G mobile networks do not spread the virus. The virus is spreading in countries with no 5G mobile networks and it cannot travel on mobile networks and radio waves.[20] It was also falsely alleged that the virus is a waste product from cells poisoned by electromagnetic fields.[21]

- Packages from infected areas can transmit the virus: There is a low risk that an infected person contaminates commercial goods. Furthermore, there is also a low risk of catching infection from a package that has been exposed to different temperatures and conditions. Generally, the pathogenic organisms survive for few hours on coins, parcels, and credit cards. Also, the surfaces of packages are not suitable for the virus' survival.[2,15] No cases have been found related to imported packages, and there is no evidence to support this transmission[14]
- Eating in Chinese restaurants can transmit infection: There is no evidence for this. By logic, one should avoid contact with people returning from countries with a COVID-19 outbreak and working in restaurants[15]
- Pets can spread the new virus: The virus can infect animals but there is no evidence to suggest that the animal could infect humans and much remains unknown about the illness in pets and livestock.[14,15,22]

Clinical presentations

- A person will know when he/she catches the virus: This is not true as COVID-19 shares a variety of symptoms with other respiratory infections such as the flu and the common cold and early infected people may be asymptomatic.[1,2,15]

Diagnosis

- There is a claim that holding one's breath for 10 seconds or more without the feeling discomfort or coughing is an effective self-test for exclusion of the coronavirus. The WHO refuted this claim and emphasized PCR is the only confirmatory test.[20,22]
- Thermal scanners can detect the coronavirus: These scanners detect fever as a symptom of the disease but not infection in early stage.[20,22]

Preventive measures

- The claims that drinking excess water, boiled ginger on an empty stomach, lemon, hot liquids like tea; alcohol, vitamin C, and immune-supporting supplements (e.g. green tea, zinc, or Echinacea) will prevent COVID-19: Most of these are necessary to maintain the immune system, but there is no evidence

for such claims. Also there is no evidence that eating garlic and avoiding ice cream will clear out or kill the virus.[15,20,22]

- In Homeopathic medicine Arsenicum album is claimed as an "add on" to prevent COVID-19.[23]
- Cold weather, snow and hot bath can kill the virus: The is no evidence to support this.[20,22]
- Face masks protect one from the coronavirus: The standard surgical masks cannot protect from the virus since they do not block out the virus and may not lay flat to the face. Surgical masks can prevent infected people from spreading the virus further by blocking any droplets expelled from their mouths. Within health care facilities "N95 respirators", if properly used, greatly reduce the spread of the virus among medical personnel. There is no evidence that masks made of wet wipes are alternative to surgical masks.[14,15]
- Exposure to sunlight, drinking warm water or heating to 26–27 °C (79–81 °F) will kill the virus: the WHO[20] refuted this false claim.
- Lockdowns and school closures do not slow down the spread of COVID-19: In fact school closures are a common public health measure used to mitigate or halt the spread of infectious diseases.[15,20]
- Spraying chlorine or alcohol all over the body and/or exposure to UV lamps kills the virus: This is *not* true. These substances are harmful to clothes or mucous membranes and UV rays irritate the skin.[20]
- Children cannot catch the virus: This is not true as children can catch COVID-19. However, they are less likely to develop severe disease.[15] All ages are susceptible to the virus. Older people and people with pre-existing chronic diseases experience severe illness.[20]
- There is no viral transmission in hot and humid climates: In real world life, the virus has been transmitted in hot and humid weather. It is advisable to adopt the standard preventive measures when living in area reporting COVID-19, regardless of climate.[20]
- Many people claim that hand sanitizer is not antiviral and not effective against the COVID-19 virus: While the effectiveness of sanitizer depends on the specific ingredients, most the commercial hand sanitizers destroy the coronavirus. It is false that hand sanitizer

may be prepared at home for preventing COVID-19, by mixing rum, bleach, fabric softener and Vodka.[20]

- Hand dryers kill the new virus: This is not true. To protect against the virus, clean hands frequently with alcohol-based hand rubs or wash them with water and soap. Then dry thoroughly using paper towels or a warm dryer.[20]
- The pneumonia vaccine prevents the COVID-19 virus: The virus is not comparable to other causes of pneumonia and requires its own vaccine. Existing pneumonia preventions (e.g. *Haemophilus influenza type B* and pneumococcal vaccines) will not protect against the new virus.[20,22]
- Using a saline rinse of nasal sinuses will prevent infection: Despite the limited evidence that rinsing nose with saline can help people recover quickly from the common cold, it has not been shown to prevent other respiratory infections and there is no evidence of it protecting people from the coronavirus.[20,22]
- Antibiotics prevent and treat the coronavirus: This is not true as antibiotics are only effective against bacteria and not viruses. However, COVID-19 patients treated in hospital may need antibiotics to treat the associated bacterial co-infection.[20,22]

- Other unproven misinformation on social media include hot saunas, Turmeric, salt, antiseptic and claims that hair dryers can kill the coronavirus; red soap is more germicidal than soaps of other colours and white handkerchiefs can cause a 'harmful effect' on coronavirus.

Treatments

To date, there is neither specific prevention nor treatment of the COVID-19.[14] Patients should receive symptomatic treatments and supportive care in severe illness. Many drugs are under clinical trials.[20] Other unproven natural and traditional remedies for the treatment of COVID-19 are drinks containing spices and mint e.g. saffron and turmeric in Iran.[12]

- Ibuprofen can make respiratory infections worse. However, there is no substantial evidence for that.[24]
- Chloroquine is claimed to be effective treatment and effectiveness and safety from

long-time clinical use for other diseases justify clinical research on patients with COVID-19. However, it is not promising and there are many concerns about its safety.[25]

- Several disputed tweets that snorting cocaine sterilizes the nostrils and prevents spread of the virus. [26]

Immunity

Multiple social media accounts promote a claim that the virus was known, and its vaccine is available. There are many ongoing trials to develop and test a vaccine against COVID-19, but up until now, no vaccine candidates have completed clinical trials and this can take one or two years.[14]

Death/Burial of dead

- COVID-19 is a deadly disease: Less than 5% of those infected die from the virus. Old patients with chronic medical problems are at more risk of severe illness and death from COVID-19.[14] In case of death, family agreement about the burial process must be obtained, and burial must be carried out in accordance with the cultural and religious practices of the deceased to avoid unethical practice. Dead bodies from COVID-19 should be treated with dignity and respect and people working in mortuaries should take the standard protective measures.[27]

- COVID-19 is a life-long disease: This is not true as the majority of the infected do recover.[20,22]

Sources of infodemics

Both social and mass media act as facilitators and multipliers of COVID-19-related misinformation which have been spread via private messaging platforms.[28] Social media fuels waves of misinformation as users focus on popularity irrespective of accuracy.[12,29] People are bombarded with both useful and harmful information that magnifies peoples' fears. The few correct information raises awareness while most of misinformation creates panic. Misinformation about the new pandemic has been spreading across social and mass media at an alarming rate. Many people share misinformation unintentionally irrespective of its accuracy. Social media platforms cannot prioritize the best information.[12,28-30] Brennen et al.[31] in their analysis of the sources of 225 misinformation about COVID-19 reported that 30%, 29% and 24% of information are fabricated content, misleading content and false context; respectively. Most misinformation came from ordinary public accounts, and about 20% from politicians and other prominent public figures. Another study found that most of the information (56.4%) on the internet came from news sources of the websites returned by Google. This information is a summary interpretation of the statements from the health personnel caring for the patients or information provided from health organizations. Most of these infodemics have no clear scientific basis.[32]

Effects on prevention and control of the COVID-19 pandemic

False health information can cause social harms by spreading false concepts about COVID-19. Recently, there is a great dependency on social media as a source of information, threatening the reliability and credibility of information provided on these platforms.

The infodemic is as dangerous and virulent as the virus itself as it heightens public confusion about who and what information to trust, and generates panic due to rumours, myths and claims. These hinder the efforts to contain COVID-19.[12] Infodemics speed up the epidemic spread by fragmenting and influencing social response. Spreading of misinformation adversely affects people's behaviours and governmental measures of prevention and control.[33] Experts and scientists lose authority in the eyes of the public because what they say is no longer valued. In this confirmation bias, people tend to accept statements that reinforce their views and to reject statements that counter these views, increasing the adverse effects of misinformation.[12] These myths weaken the efforts to promote preventive measures (e.g. personal hygiene and social distancing) and they confuse the public, making it hard to mitigate the disease. Infodemics make it hard to identify solutions, hamper the effectiveness of public health responses and confuse people. Also, it can cause long-term harm and undermine scientific advice, when it appears that experts are going against popular opinion.

This is even more the case when expert advice is rejected by governments.[34]

How to fight infodemics

Addressing infodemics is a crucial component of fighting the COVID-19 pandemic. This requires raising awareness to resist misinformation in the long run to avoid its bad consequences. The suggested solutions include:[14,17,18,34-38]

1. Technological programs such as artificial intelligence, filtering software and modified algorithms aimed at social media.
2. Governmental regulation is a step forward. However; the sheer volume of information on social media may constrain these regulations.
3. Depend on trustable scientific sources such as the CDC, the WHO and local health authorities. Health professionals want information shared online to be from a trusted source, such as a credible media outlets, recognized health and research institutions, as well as government agencies. This enables people to separate fact from fiction in the social media.
4. Media literacy training builds resilience and enlightens the public to critically analyse information available on social media. They should learn how to assess what to trust to be shared; be empowered to recognize emotional upsets and to think before sharing information. Social media can be effective for conveying the approved official guidelines and practices. Accurate information is the best defence against a COVID-19 infodemic. Health care providers should reply on high quality research published in reputable journals.
5. Health authorities must explain the situation transparently, be adaptable and continuously communicate new information, increase the responsibility of the public, solidarity with vulnerable groups and targeted integrated action. It is necessary to develop a tool where health personnel assess the quality of information on websites, and to find reliable information.
6. Increasing health literacy amongst the population would ensure that people access the right information and can distinguish between the credible and incredible sources of information.
7. Establish a multidisciplinary team of scientists, public health decision-makers, medical journalists, technology and civil society. This team will develop an infodemic response framework that identifies evidence, simplifies knowledge, amplifies action and quantifies impact.
8. Poor risk communication increases the effects of the infodemic. Communicators should follow a scientifically based communication strategy to be effective. After the COVID-19 pandemic, the EPI-WIN (WHO information Network for Epidemics) was founded to share correct knowledge with specific groups concerned with risk communication to counter the infodemic risks. Rapid collection and dissemination of correct data could mitigate the negative effects of infodemics. News media are crucial for spreading knowledge about COVID-19 to the population, to allow them to make informed decisions and take correct actions.

To achieve the above solutions, Eysenbach [39] defined the four pillars of infodemic management. These pillars are (1) infoveillance (information monitoring); (2) building science literacy capacity and eHealth Literacy; (3) knowledge refinement and quality improvement processes; and (4) timely and accurate knowledge translation and minimizing political or commercial influences.

In addition, Cuan-Baltazar et al.[32] recommend that healthcare personnel (1) should not share unproven information; (2) share legitimate information on mass and social media; (3) promote preventive measures; (4) educate patients about alarm symptoms and what to do if these symptoms appear; (5) produce media content and promote websites of academic institutions.

Conclusions

Health care workers face the double burden of two pandemics, the virus itself and the infodemics. Mitigating the COVID-19 infodemic is an essential component of any

prevention and control program. To overcome this virus, we need to urgently promote hope, facts, science and solidarity. There is a need for continuous monitoring of infodemics to take timely corrective actions. Healthcare workers should be aware about this misinformation and their adverse effects on prevention and control. They should develop scientific, socially acceptable countermeasures to raise awareness of people about this misinformation. A further comprehensive infodemiologic study is needed to define the distribution and determinants of misinformation about COVID-19 in different languages and cultures.

This review included only English literature available at a single database at the time of the search. The nature, contents and number of infodemics are changeable. The list of infodemics needs to be updated regularly through active search on different social media to take timely corrective measures. This narrative review does not search for evidence and there are no definite criteria about relevance and validity of the included studies.

Conflicts of interest

The authors declare that no conflicts of interest exist.

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Ethical approval

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References

1. WHO. Coronaviruses (COVID-19). 2020 (Online). Available at: https://www.who.int/emergencies/diseases.novel-coronavirus-2019. Accessed March 25, 2020.
2. WHO. Q &A on coronaviruses (COVID-19) 8 April 2020. Available at: https://www.who.int/news-room/q-a-detail/q-a-coronaviruses. Accessed April 17, 2020.
3. CDC. Coronavirus Disease 2019 (COVID-19). Available at: http://www.cdc.gov/coronavirus/2019-ncov/prepare/transmission.html. Accessed April 26, 2020.
4. Chan JF, Yuan S, Kok K, To KK, Chu H, Yang J, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. Lancet 2020;395(10223).
5. Fisher D, Heymann D. Q & A: The novel coronavirus outbreak causing COVID-19. BMC Medicine 2020;18(1):57.
6. WHO. Munich Security Conference.15 February 2020. Available at: https://www.who.int/dg/speeches/detail/munich-security-conference Accessed April 14, 2020 .
7. UN (United Nations). Department of Global Communications. Avoid misinformation and scams. 'infodemic' of misinformation and cybercrime in COVID-19 crisis. 2020. Available at: https://www.un.org/en/un-coronavirus-communications-team/un-tackling%E2%80%98infodemic%E2%80%99-misinformation-and-cybercrime-covid-19. Accessed April 14, 2020.
8. WHO. Managing epidemics: key facts about major deadly diseases. Geneva: World Health Organization. 2018.
9. Eysenbach G. Infodemiology and Infoveillance: Framework for an Emerging Set of Public Health Informatics Methods to Analyze Search, Communication and Publication Behavior on the Internet. J Med Internet Res. 2009;11(1):e11.
10. MacMillan Dictionary. Date access 2020. Available at: https://www.macmillandictionary.com/dictionary/british/infodemic Accessed April 14, 2020.
11. WHO. Novel Coronavirus(2019-nCoV) Situation Report-1. 2020. Available at: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200202-sitrep-13-ncov-v3.pdf?sfvrsn=195f4010_6. Accessed April 17, 2020.
12. Ali SH, Kurasawa F. #COVID19: Social media both a blessing and a curse during coronavirus pandemic. March 22, 2020. Available at: https://theconversation.com/COVID-19-

social-media-both-a-blessing-and-a-curse-during-coronavirus-pandemic-133596. Accessed April 14, 2020.

13. Pomiankowski A. Coronavirus: a veterinary view (Correspondence). Nature 2020;580:321.

14. Covella V, Hayer R. Simple answers to top questions, risk communication guide. Association of State and Territorial Health Officials, March 24, 2020. Arlington, Virginia.

15. Live Science Staff. 13 Coronavirus myths busted by science. March 10, 2020. Available at: https://www.livescience.com/coronavirus-myths.html. Accessed April 17, 2020.

16. CDC. Know the facts about coronavirus disease 2019 (COVID-19) and help stop the spread of rumors. Cdc.gov/COVID-19 March 16, 2020.

17. Hua J, Shaw R. Corona Virus (COVID-19) "infodemic" and emerging issues through a data lens: the case of China. Int J Environ Res Public Health 2020;17:2309.

18. Medical Express. A COVID-19 infodemic. How to make sense of what you're reading (2020, April 10) Available at: https://medicalxpress.com/news/2020-04-covid-infodemic-youre.html. Accessed April 22, 2020.

19. Liu Y, Gayle AA, Wilder-Smith A, Rocklöv J. The reproductive number of COVID-19 is higher compared to SARS coronavirus. J Travel Med 2020;27(2):1-4.

20. WHO. Coronavirus disease (COVID-19) advice for the public: Myth busters. 2020. Available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters. Accessed at April 18, 2020.

21. Nicholson K, Ho J, Yates J. Viral video claiming 5G caused pandemic easily debunked. Canadian Broadcasting Corporation. Archived from the original on March 26, 2020. Retrieved May 14, 2020.

22. Glaz D. Top 10 coronavirus fake news items. 2020. Available at: https://www.theafricareport.com/24698/top-10-coronavirus-fake-news-items. Posted on Tuesday, 17 March 2020 .

23. Shailesh M, Teena T. Can 'Ars Alb-30' protect you from Covid-19? AYUSH Ministry thinks so. The Economic Times. Retrieved April 3, 2020.

24. European Medicines Agency. EMA gives advice on the use of non-steroidal anti-inflammatories for COVID-19. 2020. Available at: https://www.ema.europa.eu/en/news/ema-gives-advice-use-non-steroidal-ant... Accessed March 18, 2020.

25. Cortegiani A, Ingoglia G, Ippolito M, Giarratano A, Einav S. A systematic review on the efficacy and safety of chloroquine for the treatment of COVID-19. J Crit Care 2020;S0883-9441(20):30390-7.

26. Zac C. Sorry to the French people who thought cocaine would protect them from Coronavirus. Pedestrian TV. Archived from the original on March 11, 2020. Retrieved April 11, 2020.

27. WHO. How to conduct safe and dignified burial of a patients has died from suspected or confirmed Ebola or Marburg virus disease. October 2017. Interim guidance. WHO/EVD/GUIDANCE/Burials/14.2Rev1 (2017). Available at: https://apps.who.int/iris/bitstream/handle/10665/137379/WHO_EVD_GUIDANCE_Burials_14.2_eng.pdf?sequence=1. Accessed April 18, 2020.

28. Guirakhoo A. How cybercriminals are taking advantage of COVID-19: Scams, fraud, and misinformation. 2020. Available at: https://www.digitalshadows.com/blog-and-research/how-cybercriminals-are-taking-advantage-of-covid-19-scams-fraud-misinformation. Accessed April 14, 2020.

29. Allem J. The Conversation Media Group. 2020. Available at: https://theconversation.com/social-media-fuels-wave-of-coronavirus-misinformation-as-users-focus-on-popularity-not-accuracy-135179. Accessed April 18, 2020

30. Jandric P. Postdigital research in the time of COVID-19 (Editorial). Postdigital Sci Edu 2020;2:233-238.

31. Brennen JC, Simon FM, Howard PN, Nielsen RK. Types, sources, and claims of COVID-19 misinformation. Fact Sheet 7 April 2020. Available at: . https://reutersinstitute.politics.ox.ac.uk/types-sources-and-claims-covid-19-misinformation. Accessed April 24, 2020.

32. Cuan-Baltazar JY, Muñoz-Perez MJ, Robledo-Vega C, Pérez-Zepeda MF, Soto-

Vega E. Misinformation of COVID-19 on the Internet: Infodemiology Study. JMIR Public Health Surveill. 2020;6(2): e18444.

33. Kim L, Fast SM, Markuzon N. Incorporating media data into a model of infectious disease transmission. PloS one 2019;14(2):e0197646.

34. Enago Academy. Fighting Misinformation During the COVID-19 Crisis. 2020. Available at:https://www.enago.com/academy/fighting-misinformation-during-covid/?utm_source=emailer&utm_medium=email&utm_campaign=gl_news_140420 Last updated Apr 9, 2020. Accessed April 14, 2020.

35. Free Word Center. Viral lies: misinformation and the Corona virus. Policy Brief. Article 19. March 2020 Available at: https://www.article19.org/wp-content/uploads/2020/03/Coronavirus-briefing.pdf. Accessed April 26, 2020.

36. WHO/UNICEF/IFRC. Social stigma associated with COVID-19. A guide to preventing and addressing social stigma. Updated 24 February 2020. Available at: https://www.who.int/docs/default-source/coronaviruse/COVID-19-stigma-guide.pdf?sfvrsn=226180f4_2 Accessed April 26, 2020.

37. Zarocostas J. How to Fight an Infodemic. Lancet 2020;395(10225):676.

38. Vota W. Help WHO Develop COVID-19 Infodemic Response Framework. 2020. Available at: https://www.ictworks.org/COVID-19-infodemic-response-framework/#.XppvFs1lDIU Accessed April 7, 2020.

39. Eysenbach G. How to fight an infodemic: The four pillars of infodemic management. Med Internet Res 2020;22(6):e21820.