INTEGRATING SCIENCE AND SCIENTIFIC INFORMATION IN MESSAGES FOR EFFECTIVE COMMUNICATION DURING PANDEMIC AND BEYOND—SPECIAL REFERENCE TO COVID-19 PANDEMIC

Chong Shimray

Department of Education in Science and Mathematics
National Council of Educational Research and Training
New Delhi - 110 016
Email: cshimray@gmail.com

An enormous volume of information is being circulated since the beginning of the COVID-19 pandemic by all and sundry using all possible mediums, mostly electronic media, thanks to internet facilities which are now available at everybody's disposal. Barring those official publications of the governments or organisations such as WHO, much of the information were not checked, verified, or authenticated by experts. As a result, misinformation and disinformation spread faster than the virus itself leading to pandemic-induced attitudes such as undue fear, over-complacency, utter carelessness, unnecessary bravado, vaccine-hesitancy, etc., among the public. The information circulated are often haphazard without considering the what, when, where, how, for whom, and who components. Most importantly, much of the information circulated even by authentic sources were mostly 'instructions' to make the public aware about the DOs and DON'Ts but lacked information on the science behind such instructions. Understanding the basic science behind it could help avoid some, if not all, pandemic-induced attitudes. Hence, there is a need for effective communication to fight pandemic which can be achieved only when the research community and professionals in different disciplines such as epidemiology, social sciences, research and development, diplomacy, logistics, and crisis management come together. Such efforts need to be made even beyond the COVID-19 pandemic.

Keywords: COVID-19 pandemic, SARS-CoV-2, COVID-19 appropriate behaviour, vaccine, herd immunity, effective communication, misinformation, disinformation.

Introduction

"...But we're not just fighting an epidemic; we're fighting an infodemic..." said World Health Organization (WHO) Director-General, Dr. Tedros Adhanom Ghebreyesus, during his address at the Munich Security Conference on 15 February 2020. He went on to say "... Fake news spreads faster and more easily than this virus, and is just as dangerous..." (WHO-1). This clearly tells us the magnitude of information that is being generated and circulated through all possible mediums as we fight this war against SARS-CoV-2 and the nasty disease it wreaks called the Coronavirus disease 2019 (COVID-19) which led to this pandemic. Given this situation, it is left to the sense and sensibilities of the users to decide which information to consume and share. Such decisions are, more often than not, biased and scientifically incorrect, and dangerous.

There are broadly three stages during which information and communication can be provided related to a pandemic:

1. Before/ Preventive preparedness (Pre-pandemic)
2. During/ Emergency response (During pandemic)
3. After/ Continuing after the threat (Post-pandemic)

In this article, the focus will be on communication as an emergency response during the pandemic in the context of India. Here, emphasis will be on effective communication in a public setting and not in formal setting (pedagogy or in classroom setting) though the information will still be useful for formal settings as well.

Brief Review of Literature

The need for scientifically sound effective communication is paramount to address any issue which requires participation and contribution of every individual and hence, it is not limited to infectious diseases but to many other areas as well such as communicating about climate change (AAAS, 2007, Spitzer, 2014, Corner, et al., 2015, Jordan, et al., 2018). With the increase in the emergence of infectious diseases, the need for effective communication is increasingly felt. Numerous studies have been undertaken and articles written in this area, for example, understanding risk communications theories and suggestions thereof (Holmes, 2008), crisis, and emergency risk communication–be first, be right, be credible (Centers for Disease Control and Prevention, 2014), how poor communication, especially risk communication will not only undermine its effectiveness but exacerbate the threat and lead to greater disease effects as well as loss of trust in the government's ability to protect the nation (Sell, 2017), the need for rapid dissemination of trustworthy information during uncertainty in terms of transparent identification of cases, data sharing, unhampered communication, and peer-reviewed research (Editorial-Lancet, 2020), the role of media in the spread of anxiety about the COVID-19 outbreak in Iraqi Kurdistan (Ahmad and Murad, 2020), the need to develop communication strategy with toolkits to address COVID-19 pandemic (Depoux, et al., 2020), the need for clear, specific, unambiguous, and consistent lay language and elements that determine how to communicate health information to the public effectively, how information is received by different audiences (Finset, et al., 2020), the various aspects that need to be considered for effective communication during COVID-19 pandemic highlighting some examples specific to India (Reddy and Gupta, 2020), factors influencing public panic during the COVID-19 pandemic in Henan Province, China (Nie, et al., 2021), etc.

Some Unpleasant Episodes during the Pandemic

It is not to our surprise that the virus is evolving, and so is our knowledge, and understanding about the implications, complications and ramifications this can cause in our attempt to neutralize the virus through drugs, vaccines, hygiene, appropriate diet, etc. Yet during the course of this pandemic, the content and the manner in which information has been circulated should make us realise how haphazardly they have

been disseminated and how dangerous many of which are turning out to be. We are aware of the stigma healthcare workers and their families have to face from the same people for whom they risk their lives. We also saw the increasing homophobia as if everybody was loaded with the virus that is ready to explode. There was a lot of myths regarding the carriers of the virus as if people from a particular race was to be blamed, or the myth that one could get the virus from a non-vegetarian diet thus leading not only to giving up a non-vegetarian diet, especially birds such as chicken, but also phobia and stigmatization of people who consumed a non-vegetarian diet. This eventually led a set of lawmakers from a state in India to widely circulate a picture of them eating chicken in an attempt to remove the myth from the minds of the people. This was hilariously necessary. Then there was, and is, a lot of misconceptions and fear about the effects of vaccines and hence, the hesitation to get the shots. Sometimes it is misinformation that is doing the damage but there is also disinformation circulated on purpose. We are aware that a huge chunk of Americans and many others, including many in India are anti-vaccine. There are people who still believe that the pandemic is a hoax and the virus nothing more than those that cause flu. The list could be endless but we get the point.

Communicating during Pandemic

It is true that during a pandemic the focus is to address a crisis that requires immediate action with little time for dialogue or to obtain feedback. Therefore, during such a situation, we see only "one-way transmission of information to the public by 'experts,' often via the mass media, and focuses on getting across 'the facts' so that the public: (a) won't panic and (b) will do what the experts advise."(Holmes, 2008). But such one-way transmission of information could also instead lead to confusion, panic, or distrust because of ineffective communication which could be giving out mixed messages, not convincing explanation, risk not clearly communicated, obscure presentation of data, etc. It is quite possible that a good chunk of the stigma, myths, phobia, misconceptions, etc., associated with this pandemic as discussed above could have been avoided if we had paid directed and focussed attention to the various aspects related to effective communication—the what, when, where, how, for whom and who.

While there are social, economic, environmental, or political components that can form part of the communication, the focus here will be in such areas where, the contribution and intervention of the scientific community are crucial, i.e., those related to the science aspects which is the core in this whole pandemic crisis.

Messages (What)

The science of various aspects of the COVID-19 pandemic needs to be communicated which constitutes the "what" component. These are broadly discussed under the following heads:

(i) COVID-19 appropriate behaviour

We are all aware that since the COVID-19 pandemic was declared by WHO on 11 March 2020, several 'instructions' have been produced and disseminated to the general public about COVID-19 appropriate behaviour such as hand hygiene, masking, and physical distancing. These were intended to make the public aware of the DOs and

DON'Ts. However, the science behind such recommended behaviours has not been communicated adequately and effectively. For example, many might wonder, including the educated lot, why should one wash hands with soap or hand wash for twenty seconds. The science behind the role of soap or hand wash was never considered a matter to be clarified. A person with an understanding is more likely to use soap or a hand wash while washing hands. Similarly, there has been much confusion regarding the use of masks, much to do with the lack of understanding of what a mask does and how different types of masks serve different purposes. The confusion was no less with physical distancing as well. Since the scientific findings of how the 6-feet or 1-metre distance was arrived at were not known, it was assumed to be sacrosanct.

(ii) Testing

The types of testing available for SARS-CoV-2 have also caused confusion. There was a lack of clarity on the difference between Rapid Antigen Test (RAT), Rapid Antibody Test (RAT), and Reverse Transcription Polymerase Chain Reaction (RT-PCR), and how there could be seemingly contradictory results. In addition, there was also a lack of clarity on when a person was supposed to take which test. Educated and people who have personal interest look for resources or sources and try to find the answers for themselves but others are lost in doubt and confusion and live with it.

To make matters worse, with the detection of new strains, there have been increasing test results showing false-negative. Adequate attempts have not been made to effectively communicate regarding this.

(iii) Quarantine and isolation

The basic difference between quarantine and isolation and what is the science behind 14 days for quarantine and 10 days for isolation from the time one tested positive are questions that many are still asking. Understanding the rationale behind those recommendations is more likely to motivate or influence people to follow the norms.

(iv) About SARS-CoV-2

While adequate information about SARS-CoV-2 virus itself has been circulated, not much authentic information on the origin, spatial spread (in terms of geographical locations or its spread from animals to humans, etc.), mode of transmission (through droplets and air), super spreaders, new strains, etc., is available for the public to understand. For example, during the first few months of the pandemic, there was fear psychosis for SARS-CoV-2 as if it was running after us. The awareness material on how to protect oneself from infection did not seem to convince the public. Similarly, there is so much fear every time we hear about mutation and detection of new strain as if a mutation or new strains are being observed only in this virus. On the other extreme, there are those who believe they are superhumans and would not be infected or affected by the virus. If we had understood the science behind how the virus is transmitted or how it is common for the virus to mutate, then we could have avoided, or we would have been able to reduce, if not avoid, some of the pandemic-induced attitudes such as undue fear, or over-complacency, utter-carelessness, unnecessary bravado, etc., exhibited by people in different settings and sectors of our population.

(v) Opening and closing of institutions

Every now and then we saw the debate surrounding the safety or danger of opening up or closing down of schools, universities, businesses, offices, etc. However, what science and scientific understandings say about such opening and closing have never been explained.

(vi) Vaccines and plasma therapy

More than any other aspect, information related to vaccines has been the most poorly communicated. Questions related to the types of vaccines, the efficacy, possible side effects, associated myths, why the same vaccine has to be taken in both the doses, why Covaxin should be taken after a gap of 4-6 weeks (extendable to about 8 weeks) between the two doses while it is 6 to 8 weeks (extendable to about 12 weeks) for Covishield, why should there be dose interval of 4 to 12 weeks for Covishield, in case of infection after the first dose just before eligibility for the second dose, why should one get the second dose only after 10 days for asymptomatic persons after detection and 4-8 weeks after complete disappearance of symptoms for persons who have a symptomatic infection, the severity of re-infections after fully getting vaccinated, etc., have not been part of information disseminated for public awareness. Asking the public to get vaccinated or telling them that it is safe may not work for many. There are numerous misinformation and disinformation that are advocating against vaccination and people do come across such information and are often convinced by it too. Therefore, for a successful vaccination campaign, it is necessary to explain scientifically, the importance of vaccination and how it will help. Having an understanding of the science behind all these will also avoid people from getting panic even if they do not get their shot on the appointed day. At the same time debunking myths, misinformation and disinformation need to be done simultaneously and convincingly. Often complete information is not shared with the public to avoid fear but such an attempt could backfire leading to mistrust. For example, we may not want to tell the public openly that people do die (very rarely, though) even after vaccination fearing that this may result in apprehension and hesitation for vaccination. But when the public figures out this fact from other sources then, it could lead to a lack of trust in the system and stir up doubt at the same time. Therefore, transparency in sharing scientific information could be the key to effective communication. Instead of keeping specific information from the public we need to tell them the pros and cons and how the pros overweigh the cons. For example, it will be a good idea to inform the public about why and how not getting a vaccination can kill more people. Also related to vaccination is the lack of clear communication on herd immunity (Fincet et al., 2020) which could be crucial to bring the pandemic under control. In the recently published news item in *New York Times*, hesitancy for vaccination is considered to be one of the reasons herd immunity may not be achieved in the United States (Aschwanden, 2021). This conforms to the earlier findings that a high vaccination rate is necessary to reach the herd-immunity threshold (Ministry of Health and Family Welfare).

Another aspect of vaccines that needs to be clarified is related to who should get

vaccinated and why. In India, we started off the vaccination programme with the healthcare workers, those above 60 and those with co-morbidities, followed by 45 and above, and subsequently, the drive began for those who are 18 and above. WHO says that vaccine, for now (while the article is being written), is only for those 18 and above, because the trials for children below 18 have not been done. However, it is now learned that US Food and Drug Administration is poised to authorize Pfizer/BioNTech's vaccine for those aged between 12 to 15 after clinical trials involving 2260 of those 12 to 15 year-olds showed 100 per cent efficacy and is well-tolerated by adolescents. The fact that vaccine administration to different age groups is not only done based on a priority basis but more so because of successful clinical trials for those age groups, people need to be made aware of such information related to scientific studies.

Plasma therapy has also become a commonly used term ever since the COVID-19 pandemic hit us. However, the science behind this has never been explained in a term to be understood by the public. Just like blood donation, understanding the science of plasma therapy might encourage more eligible people to donate their plasma and save lives.

(vii) Pandemic-appropriate lifestyle

We have often heard experts and doctors suggest that the best way to build our immune system during a pandemic is to maintain pandemic-appropriate lifestyles—eating healthy, getting sufficient sleep, physical exercise, keeping in touch with friends and family for mental and emotional health, etc. It will help the public if we could explain how this works scientifically.

(viii) Post-recovery

This aspect seems to be the most neglected one. However, we are aware of the issues people who came out of COVID-19 have to go through. It is, therefore, important to understand the science behind complications that can be experienced post-recovery. This will help people who have recovered and their families deal better with post-recovery issues.

The mental and emotional health of patients (during and after treatment) and their families, medical staff, etc., are altogether a huge challenge that is beyond the purview of this article.

Having discussed the various aspects where messages need to be disseminated, it may be emphasized here that several Awareness materials (audio, video, text, infographics, posters, etc.) have been prepared by the Ministry of Health and Family Welfare, Government of India such as on COVID-19 appropriate behaviour, quarantine, myth busters, stigma, and discrimination, vaccine, etc. More than 50 posters (both in English and Hindi) were prepared on Stigma and Discrimination alone many relating to healthcare workers (Ministry of Health and Family Welfare). Although, such a huge collection of information are available online, not many people will be able to access those. Rightly so, such information have been prepared for circulation by the concerned department or people and everyone was not expected to be accessing such resources. In addition to information overload, while preparing such huge resources for public consumption, if not carefully examined and reviewed, some resources could turn out to be misleading. For example, one of the posters had this message:

"Let's not reject, harass, abuse, hurt, or harm anyone

Not all who cough or sneeze have COVID-19"

It almost seems to suggest that it is okay to reject, harass, abuse, hurt, or harm anyone if they have COVID-19! It is therefore important to produce specific resources for a specific message with clear and correct information to be circulated widely.

The WHO also prepared such advice for the public on mythbusters, how to report misinformation, masks, transmission, vaccines, etc. (WHO-2). Again, such resources are informative but they will be useful only to those who will intentionally go to the website and are interested to learn more, but not so useful for the general public.

Therefore, the attempt should be to prepare resources that are authentic and reviewed by experts, specific, and useful for the intended target groups that should be circulated so widely that there is a lesser chance for the public to stumble upon misinformation or disinformation. Such resources should also be updated as and when there are new findings of the way the virus behaves and mutates or those related to treatment. When it comes to uploading such resources on the website, it is also important to indicate when the information was last updated. This will remove a lot of confusion that might arise due to change in the data frequently as the virus evolves and so also our understanding associated with it.

Method (How)

However important the message may be, it has to be communicated systematically so that the intended audience will be able to grasp the message. Therefore, how the message is communicated becomes crucial. The 'how' can be broadly divided into two:

(i) How to present the message such as data

For example, whether it will make more sense to provide absolute numbers or provide percentages. How to present the message will also be determined by what you want to emphasize in the data obtained. People, including experts/ scientists/ researchers, interpret the same data differently. They have their own biases. So, nobody is wrong or evil but just that their biases are different from others. What we value is often reflected in our interpretations. For example, let's say 15 crore doses of 270 crores have been vaccinated in 20 days. In this case, if one wants to show to the public that a lot of people have been vaccinated, he/she will give the absolute numbers only i.e., 15 crores without showing the total number to be vaccinated which is a lot for a layperson. However, if one is not biased, he/she will present the data in terms of percentage as well which is just about 5.5 per cent. It is also important to focus on which part of the fact of the message we want to emphasise. For example, there has been a lot of information circulating about the loss of lives due to blood clot after getting vaccinated. However, there has not been adequate information circulating about the number of people who die due to such clots and what percentage of the vaccinated population they constitute. It will turn out that it is insignificantly low. We have also failed to highlight that not taking the vaccine was costing more lives. It is definitely easy to empathize with those who died from clots but in doing so many fail to focus on the usefulness of vaccination and how many lives it has saved or could save.

During a pandemic, due to the enormous number of deaths, the number of lives lost

becomes just a statistic. However, for a family who lost a loved one, it is unbearable. A more humane and ethical way of presenting such numbers may be considered while presenting data.

While transparency in sharing information to the public could be a good idea, it is important to note that unnecessary information should not be given out, such as those information where there is no clarity yet, such as, when herd immunity will be achieved. We do not want to give out confusing or mixed messages to the public. If in a school or college setting, we can talk about all the different views, dissect them, debate them, etc., but we cannot afford to do that for general public messaging.

(ii) How to present the message using different media

Different media can be used to present the message–TV, radio, WhatsApp, Facebook, ringtones, texts, posters, infographics, fliers, pamphlets, websites, etc. However, all media do not serve the same purpose. It has to be decided based on the kind of message (general or specific, short of long, etc.), the period, the location and the audience for whom it is to be presented. This will be discussed in more detail when discussing about the 'when', 'where' and 'to whom.'

Periods (When)

The messages that are to be communicated during a pandemic are different for different periods/phases of the pandemic. Provided below are four phases of the COVID-19 pandemic beginning with the declaration of the COVID-19 pandemic by WHO in March 2020 along with the messages that could require more emphasis during the corresponding phase. However, as we can see below, some of the messages may be equally relevant in most or all phases.

1. **First quadrimester (March to June 2020)—**COVID-19 appropriate behaviour, testing, quarantine, removal of myths, stigma, and fear in patients, public and healthcare staff, etc.
2. **Second quadrimester (July to October 2020)—**About SARS-CoV-2 origin, spatial spread, mode of transmission, super spreaders, COVID appropriate lifestyle, etc.
3. **Third quadrimester (November 2020 to February 2021)—**Safety/ danger of opening up/closing down, herd immunity, rigorously advocating for COVID appropriate behaviour using role models, detection of new strains, etc.
4. **Fourth quadrimester (March 2021 onward)**—Vaccines, testing flaws such as false negativity with the detection of new strains, etc.

Location (Where)

Communication is also different for different settings. For example, the message, in terms of content as well as medium, is meant for public transportations (trains, bus, airplanes, etc.), residential areas (slums, colonies, etc.), schools, colleges, institutions, offices, hospitals, etc., have to be different.

Audience (For Whom)

Much of the information circulating seem to target the English-educated, techno-savvy population. For example, useful information shared on Instagram will not be accessed by a huge chunk of the population and the same information is not necessarily available on other platforms or media. Therefore, for whom (audience) the message is targetted is crucial for effective communication. We know

that people's opinions are formed based on the context, their upbringing, their privileges, their opportunities, their society, education, exposure to technology, occupation, etc. Nobody is stupid, ignorant, foolish, dumb, etc. It is just that we learn differently. Therefore, it is important to take into consideration such aspects. Without understanding the intended audience, the message may never reach them. For example, how could you reach out to a migrant worker during a pandemic? Without an appropriate message in terms of content and medium, most probably they will miss the message. Or how should we provide scientific information to people who are more at risk? What would be the ramifications of labelling them at risk more than others?

Communicator/Messenger (Who)

Finset, et al., (2020) pointed out that for effective communication the number of spokespersons should be limited and consistent. Contrary to this, in this age of the internet, information is being shared by all and sundry, trained or untrained, based on their understanding using social media such as Facebook, Instagram, Twitter, WhatsApp, TikTok, etc. We also see in every possible news channel several new faces sharing information on different topics related to the pandemic every day. The authenticity of such information is not checked or verified. The attempt should therefore be to have as few communicators or messengers as possible who are highly acclaimed in the field and therefore can be trusted with the message they give out. However, when it comes to motivating the public into a certain behaviour, communicators could also be popular personalities but their role should be limited to motivation and not replace the role of experts in the field.

Conclusion

One might ask why would public need all such information discussed in this article. Well, all human beings are curious by nature, not just kids. However, in this 'fast' world we want information short and fast. We also seem to have a short attention span. More importantly, we do not want to be told always and we want to know the 'why' so as to be convinced. We search from the enormous volume of information available on the internet and tend to believe based on what we want to believe resulting in pandemic-induced attitudes. Therefore, there is a need to provide authentic, appropriate science-based information to different audiences depending upon their ability to spend time, socio-economic background, education, profession, etc. However, this is easier said than done. It cannot be done by scientists or epidemiologists or virologists alone. It would also require interdisciplinary and transdisciplinary response from the research community and professionals in different disciplines such as social sciences, research and development, diplomacy, logistics, and crisis management (Bedford, et at., 2019). Professionals in the fields of communication, education, and health behaviour change need to take responsibility for carefully evaluating what is known and insights currently emerging (Finset, 2020). It is also of utmost importance that mixed messages should not be sent out to the public at any cost. A consensus on the messages needs to be arrived at before it is put out for the public. Providing science-based and scientific information effectively that is suitable for different audiences could help us fight this pandemic, and any pandemic for that matter, better.

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