COVID 19: Where are we heading?

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Abstract
The present Covid-19 pandemic has caused havoc around the global getting to analyse the causes and the future events likely to occur. Although the 1918 flu pandemic is considered the most severe due to its spread and mortality, the present pandemic needs to be analyzed for comparison, lessons to be learnt and outcomes to be expected.
The present article analyses the previous pandemics and the course they took to predict how the present pandemic is likely of behave.
The article reviews previous pandemics and suggests steps to be taken for the present covid-19 pandemic. It also contemplates how the present pandemic is likely to behave and the course it might take.

Keywords: Pandemic, Covid19, Influenza, Mortality.

Introduction
The present Covid-19 pandemic has caused havoc around the globe. Although flu or influenza is one of the commonest ailments which we suffer from, when it infects a large proportion of the population worldwide it is termed as an influenza pandemic.

Ten pandemics are on record before the watershed Spanish flu of 1918.[1] Three influenza pandemics occurred during the 20th century and killed millions of people. Although the 1918 flu pandemic is considered the most severe due to its spread and mortality, the present pandemic needs to be analyzed for comparison, lessons to be learnt and outcomes to be expected.

The most recent one, the 2009 swine flu pandemic, with under a million deaths and is considered relatively mild compared to the Spanish flu which is estimated to have been responsible for the deaths of 50–100 million people.

Influenza pandemics generally occur when a new strain of the influenza virus arises out of mutation and is transmitted to humans (probably from another animal or avian species). Species important in the emergence of new human strains are pigs, chickens and ducks (recently speculated are bats in connection with the present pandemic). The propagation of influenza viruses throughout the world is thought in part to be by bird migration[5] or shipments of live bird products. It could be a direct spread resulting from human travel. Influenza is usually transmitted from infected mammals through the air by cough or sneezes, creating aerosols containing the virus and from infected birds through their droppings. Influenza can also be transmitted by direct contact with saliva, nasal secretions, faces and blood. Healthy individuals can become infected if they breathe in a virus-laden aerosol directly, or if they touch their eyes, nose or mouth after touching any of the aforementioned bodily fluids (or surfaces contaminated with those fluids). Flu viruses can remain variably infectious (for about one week at human body temperature, over 30 days at 0°C and indefinitely at very low temperatures). Most influenza strains can be inactivated easily by disinfectants and detergents, therefore hygiene has an important role in prevention of spread of infection.

Epidemiological factors, such as were typically seen in the WWI with a practice of packing soldiers with severe influenza illness into field hospitals while soldiers with mild illness stayed outside on the battlefield, are an important determinant of whether or not a new strain of influenza virus will spur a pandemic.

Classification
A six-stage classification describes the process by which an influenza virus moves from the first few infections in humans through to a pandemic. This starts with the virus mostly infecting animals, with a few cases where animals infect people, then moves through the stage where the virus begins to spread directly between people to the stage of wide local spread. The regional spread which follows may end in a pandemic, when infections from the new virus spread worldwide.

Influenza is an infectious disease of birds.,[7,8] and mammals and is caused by an RNA virus of the family Orthomyxoviridae. Symptoms usually seen in humans are fever, sore throat, muscle pains, severe headache, coughing, and weakness and fatigue. In the more serious cases, influenza causes pneumonia, which can be fatal. While sometimes confused with the common cold, influenza is a much more severe disease and is caused by a different type of virus. These NOVEL strains are unaffected by any immunity people may have to older strains of human influenza and can therefore spread extremely rapidly and infect very large numbers of people.

Nature of a pandemic
Some pandemics are relatively minor such as the one in 1957 called Asian flu (1–4 million dead, depending on source). Others have a higher Pandemic Severity Index whose severity warrants more comprehensive social isolation measures (3) for management.

The 1918 pandemic killed millions and sickened a similar number of people; the loss of so much of the population caused upheaval and psychological damage to many people.[14,15] There were not enough doctors, hospital rooms, or medical supplies for the living as they contracted the disease, a parallel which we see today also. Dead bodies were often left unburied as few people were available to deal with them. Efforts to deal with pandemics can leave a great deal to be desired because of human selfishness, lack of trust, illegal behavior, and ignorance. There can be great social disruption in such situations as well as a sense of fear for survival.

The Influenza A virus subtypes are labeled according to an H number (for hemagglutinin) and an N number (for neuraminidase). Each subtype virus has mutated into a variety of strains with differing pathogenic profiles. Many are pathogenic to one species but not others, whereas some pathogenic to multiple species. Most known and recognized strains are already extinct.

Influenza A viruses are negative sense, single-stranded, segmented RNA viruses. There are 16 different HA antigens (H1 to H16) and nine different NA antigens (N1 to N9) for influenza A.

Wave Nature of Pandemic

Flu pandemics typically come in waves. The 1889–1890 and 1918–1919 flu pandemics each came in three or four waves, each wave proving to be more lethal than the previous ones. However it was noted that the mortality was greater at the beginning of each wave.

The **First Wave** appeared in March 1918 in Kansas, USA and was relatively mild. The mortality rates were not above normal and it resembled typical flu; those most at risk were the sick and elderly, while younger, healthier people recovered easily. No reported quarantines during the first quarter of 1918. Similarly, the first wave of this NOVEL corona virus appeared in the beginning of 2020 and waned after a few months to again affect populations towards the later part of the year.

The SECOND WAVE appeared in the second half of August 1918 and was much more deadly than the first. The present pandemic came back with a vigour in 2021 and caused wide spread morbidity and mortality. Many countries like Australia and new Zealand escaped this due to a complete lockdown of travel.

The THIRD WAVE occurred in january 1919 and hit mainly Australia, where it killed 12,000 following the lifting of a maritime quarantine until June 1919.The present pandemic would likely come as a third wave in the later part of 2021 if adequate preventive measures are not taken.

The FOURTH WAVE happened in the spring of 1920. It occurred in isolated areas, with a late peak between January–April 1920. It is still too early to predict if mankind will be able to manage this outbreak and prevent further waves of this pandemic.

Transmission and mutation

It is important to note that the close quarters and massive troop movements of World War I hastened the pandemic, and probably both increased transmission and augmented mutation. Another factor was lies and denial by governments to manage the war effort, leaving the population ill-prepared to handle the outbreaks.

The large scale destruction during the war and the non availability of proper nutrition may also have reduced resistance to disease. To add to this was the stress of combat and different warfare modes (like chemical attacks). An important factor promoting the worldwide occurrence of the flu was increased travel.

The present pandemic can be associated with the widespread air travel which has revolutionized the globe. The authorities did reduce travel but it was not possible to completely shut down everything as the economies had become dependent on travel, tourism and hotelling.

It is postulated that the 1918 virus mutated extremely rapidly to a less lethal strain, which is well known. There is a tendency for pathogenic viruses to become less lethal with time, as the hosts of more dangerous strains tend to die out. Rapid mutations have been noted in the present pandemic as well. With the SA strain, UK strain, India strain and Singapore strain showing different behavior and effects.

Discussion

Taking the base of discussion as the Spanish flu pandemic,[2] we realize that it was a classic case of misinformation or suppressed information. Although the first cases were seen in Kansas, it was kept a closely guarded secret in the Allied ranks due to war issues.

Andrew Price-Smith has made the argument that the virus helped tip the balance of power in the latter days of the war towards the Allied cause.[4] He argued that the viral waves hit the Central Powers before the Allied powers. A parallel can be drawn to the present pandemic where much wrong information started floating from the time the first cases were reported. There was a rumor that the virus would be destroyed by heat and by the time summer arrives, the tropical countries would be free of the disease.

The Russian flu of 1890-1895 is not very well documented but due to generally lower standards of living, worse hygiene, and poorer standard of medicine, the proportion of vulnerable people was higher than in the modern world. A parallel is the situation in today's third world. The young, the old, and those with underlying conditions were most at risk, and usually died of pneumonia or heart attack caused by physical stress. In many third world countries people died due to lack of treatment for other diseases (like TB, MI etc.) and trauma. A marked decrease in road side accidents and medico legal trauma case was seen during the first wave in 2020.[11]

An outcome of the Asiatic flu in Malta was that influenza became for the first time a compulsorily notifiable illness. It was noted that the virus could cause pneumonia by itself without the presence of secondary bacterial infection. Also noteworthy is that it may have infected as many as or more people than the 1918 Spanish flu pandemic, but the vaccine, improved health care, and the invention of antibiotics to manage opportunistic bacterial infections contributed to a lower mortality rate.

It caused many infections in children, spread in schools, and led to many school closures. The virus was rarely fatal in children and was most deadly in pregnant women, the elderly, and those with pre-existing heart and lung disease. The present pandemic stirred the administrators to close down schools and colleges and the availability of electronic media and internet helped education in the absence of regular schools. Due to this the infections amongst children have been much less.

The Hong Kong flu, also known as the 1968 flu pandemic killed between one and four million people worldwide. It was attributed to the H3N2 virus. The second, deadlier wave was seen in the 1969–70 flu season, which was much deadlier with a wave of deaths just like we have noted in the present pandemic.

Improved medical care gave vital support to the very ill. The availability of antibiotics that were more effective against secondary bacterial infections helped decrease morbidity and mortality.

The compulsory closing of schools resulted in reduced educational attainment. The long term effects will be seen after a few years and some students might actually benefit by becoming tech savvy. There were restrictions in some of the pandemics which lead to loss of livelihood and lower income, lower socioeconomic status. The present pandemic has been most tortorous for the below poverty line population and migrant labour. Due to restrictions on the population there were increased rates of physical disability. In the changing times where populations have taken to gym and exercising as an alternative to physical work, the lockdown had serious health outcomes. All this resulted in human behavioral changes.

The 1977-79 RUSSIAN FLU pandemic mostly affected population younger than 25 or 26 years of age. Not much is shared about this pandemic but it is estimated to have caused about 700,000 deaths worldwide. Genetic analysis and several unusual characteristics of the 1977 Russian flu have prompted many researchers to speculate that the virus was released to the public through a laboratory accident which mostly affected students in middle and primary schools who lacked immunity to H1N1 virus. Clinical symptoms seen were relatively mild with few reports of infection in people older than 26, and the death rate in affected individuals was low.

An epidemic of influenza-like illness of unknown causation occurred in Mexico in March–April 2009. Following the isolation of an A/H1N1 influenza in several ill patients, it was officially declared by the WHO to be the first influenza pandemic of the 21st century and a new strain of Influenza A virus subtype H1N1. It was thought to be a mutation of four known strains of influenza A virus subtype H1N1.[13]

During the earlier pandemics, there were no antiviral drugs and no antibiotics to treat the secondary bacterial infections, resulting in morbidity and mortality which to some extent has been alleviated during the present pandemic. At present we have an assortment of medications and instrumental support (High flow Oxygen and ventilators) which affect the outcomes.

In this time of extensive travel, the curbing of flights has had a very important and positive outcome on the climate. The airline industry is considered the most polluting industry in the world (above the livestock industry) and the reduction of flights has been the one good outcome of this pandemic.

Table 1: Major modern influenza pandemics[11]

Name	Date	World Population	Subtype	Infected Estimated	Deaths	Fatility rates	Severity
Flu Pandemic	1889-90	1.53 Billion	?H3N8/ H2N2	20-60% 300-900 million	1 million	0.10–0.28%	2
Spanish flu	1918–20	1.80 billion	H1N1	33-56% (0.5-1 billion)	17-100 million	2–10%	5
Asian flu	1957–58	2.90 billion	H2N2	17%	1–4 million	0.2%-0.67%	5
Hong Kong flu	1968–69	3.53 billion	H3N2	14% (500 million)	1–4 million	0.2%	2
Russian flu	1977–79	4.21 billion	H1N1 ?	?	?	?	1
Swine flu	2009–10	6.85 billion	H1N1/ 09	11-21% (0.7–1.4 billion)	1,51,700/ 5,75,400	0.01%	1
Typical seasonal flu	Every year	7.75 billion	A/H3N2 /H1N1,B	5–20% (0.24 – 1.6 billion)	0.29-0.65 million	0.1%	1

Assessment of a flu pandemic

Phase 1 No animal influenza virus circulating among animals have been reported to cause infection in humans.

Phase 2 An animal influenza virus circulating in domesticated or wild animals is known to have caused infection in humans and is therefore considered a specific potential pandemic threat.

Phase 3 An animal or human-animal influenza re-assortant virus has caused sporadic cases or small clusters of disease in people, but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks.

Phase 4 Human to human transmission of an influenza reassortant virus able to sustain community-level outbreaks.

Phase 5 Human-to-human spread of the virus in two or more countries in one WHO region is noted.

Phase 6 In addition to the criteria defined in Phase 5, the same virus spreads from human-to-human in at least one other country in another WHO region.

The World Health Organization (WHO) developed a global influenza preparedness plan, which defines the stages of a pandemic, outlines WHO's role and makes recommendations for national measures before and during a pandemic.

In the 2009 revision of the phase descriptions, the WHO has retained the use of a six-phase approach for easy incorporation of new recommendations and approaches into existing national preparedness and response plans. WHO spokesperson Tarik Jasarevic explained in February 2020that the WHO no longer uses this six-phase classification model.

Results

After the first wave and following the post-peak period, disease levels in most countries with adequate surveillance dropped below peak levels. This period signifies that pandemic activity appears to be decreasing but it was still uncertain if additional waves will occur and countries will need to be prepared for a second, third and fourth wave.

Previous pandemics have been characterized by waves of activity spread over months. During the present crisis, once the level of disease activity drops, a critical communications task will be to balance this information with the possibility of another wave. Pandemic waves can be separated by months and an immediate relaxation, as seen in many countries in Dec Jan 2020-21 might have been rather premature.

In the post-pandemic period, influenza disease activity is expected to return to levels normally seen for seasonal influenza. It is expected that the pandemic virus will behave as a seasonal influenza A virus.[9] At this stage, it is important to maintain surveillance and update pandemic preparedness and response plans accordingly. An intensive phase of recovery and evaluation may be required.

The main ways available to tackle a flu pandemic are behavioral.[6] Doing so requires a good public health communication strategy and the ability to track public concerns, attitudes and behavior. By traveling less, working from home or closing schools, there is less opportunity for the virus to spread. Reduce the time spent in crowded settings if possible. However, social distancing will likely carry severe mental health consequences. Therefore sequestration protocols as prescribed by local governments from time to time should take mental health issues into consideration.

Respiratory hygiene, Hand washing hygiene and other hygiene (Avoid touching your eyes, nose and mouth as much as possible).

The N95 standard mask are recommended for health-care workers by the World Health Organization and are thought to provide good protection while patients can wear surgical masks. Any mask may be useful to remind the wearer not to touch the face. This can reduce infection due to contact with contaminated surfaces, especially in crowded public places where coughing or sneezing people have no way of washing their hands. The mask itself can become contaminated and must be handled as medical waste when removed.

To encourage the public to comply with strategies to reduce the spread of disease, communications regarding possible community interventions, such as requiring sick people to stay home from work, closing schools, for pandemic influenza that flow from the government to communities and from community leaders to the public are useful to show involvement as well as to boost morale of the public.

Conclusion

People have short memories and have to be reminded about the previous incidents to put them wiser for the future. That is why history and archives hold immense value.

The lessons to be taken are that we are in fact better prepared than before for the influenza pandemic with knowledge, anti viral drugs, good antibiotics and better hospitalization facilities.

We need more research into this pandemic, extensive vaccination, restrictions on travel, virtual teaching and offices, protection through distancing, masks and hygiene till this pandemic settles down to the normal flu. Extensive psychological support is also needed and would help for the coming years.

Not being complacent, we should expect another wave later this year and if we are unable to curtail the pandemic then a further wave could be seen next year.

The virus has a history of alterations and mutations. The further waves could be more severe than the preceding ones or could be so mild as not to be considered threatening at all.

I repeat that what is needed is consulling[11] and psychological support to the public at large and not just those persons who have lost family members or friends.

Conflict of Interest

The authors declare that there are no conflicts of interest in this paper.

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