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Pandemics Past, Present and Future and their effects: lessons from COVID-19, the Black Death and the Spanish Flu

The history of human civilisation is closely intertwined with microscopic pathogens that shadow our progress. While a century of medical advances separates COVID-19 and the Spanish Flu, with the Black Death being hundreds of years prior, they are all bound and linked as tragic for humanity. Also, the evolving threat of influenza each year is a reminder of our biological vulnerability and a constant need for medical advances, almost as if it's always lingering, keeping medical staff "on their toes". Throughout pandemics, we find that the most critical lessons aren't only found in a laboratory but through the nature of human cooperation.

These pandemics aren't just labelled as "scary" because of the thought of being ill, it's the fear of how long they will last, and will they ever truly end?

What have we learnt?

Over the centuries, we as humans have had to learn time after time that our primary lesson is that being prepared is a necessity, not a luxury. For example, when the black death took place from 1346 -1353 there was a sheer lack of medical knowledge, which was catastrophic for humanity at that time, leading to millions dying. At the time, doctors didn't know that the plague was bubonic which meant it spread via flea vectors targeting the lymphatic system or that it was pneumonic meaning it can target the pulmonary tissue however over the years doctors have adapted their knowledge to treat these multiple pathogenic forms in certain ways. In 1918-1920, humans experienced what was one of the deadliest viruses in history, the Spanish Flu. From the Spanish flu the medical community has derived critical lessons which form the backbone of modern pandemic preparedness. The Spanish flu proved that infectious diseases needed to be treated at population levels and not just individually. It also helped to determine who was most vulnerable in a pandemic and who should receive vaccination the fastest.

Over recent years, COVID-19 has taken a massive toll on global health both mentally and physically, revealing that even with the 21st century's technology advancements, we remain susceptible to global pandemics and rapid viral transmission. However, COVID-19 proved that mRNA vaccines could be developed, tested and authorised in record time. This rapid vaccine development has set a new higher standard for future pandemic threats globally. A useful technique used by doctors was clinical trials to determine the effectiveness of treatments to make developing vaccines more successful.

Pandemics statistics and global impact

- The Black Death
- Estimated deaths: 75 – 200 million people worldwide
- Spread across Europe, Asia and North Africa
- Killed around 30% - 60% of Europe's population

- The Spanish flu
- Estimated deaths 50 million people worldwide

- Infected rates of up to 500 million
- Spread rapidly due to World War 1 movement
- High death rates among young adults
- COVID-19
- Confirmed deaths of over 7 million people
- Over 700 million cases worldwide
- Over 13 billion vaccine doses administered globally
- Mental health took a massive decline

The statistics from each of these pandemics both illustrate the devastating impacts of global pandemics and how humans have developed over the years. While millions of people died during each pandemic, the numbers have significantly decreased after each pandemic which represents the importance of continuous advancements in medicine and vaccinations.

Although pandemics remain a massive threat to us in the present day. The trends in these statistics show that scientific advances, modern public health infrastructure and global cooperation have made humanity far more able to be resilient when battling a pandemic as a globe.

Communication and Public Behaviour

Dissemination of information has its consequences as a core characteristic of a pandemic and as a determinant of community response and mortality. During the Black Death of the 14th century, there was no scientific knowledge behind the dissemination of the information about the cause of the plague. People believed in superstitions and the information was fragmented. Uncertain and often contradictory, it was spread mainly by oral communication, religious doctrine and by local posters. This led to fear, suspicions and noncompliance with all the few regulations that were imposed.

During the Spanish Flu, the distribution of information occurred immediately: at the time, the media were based on newspapers and on word of mouth, which had to manage new and difficult to understand concepts, such as “influenza” or “how it is spread”. Misconceptions regarding the mode of spread of the disease had a very high impact. Many people refused to wear masks and to respect the social distancing rules. This has not changed even in the presence of a huge amount of scientific knowledge which has been developed over the centuries.

Now we have seen the first example of the COVID-19 pandemic, which is providing a new example of information spread in the “age of the digital media”. The instant availability of any new scientific finding, like for instance the complete and precise description of the viral genome, the vaccine development etc. has been run over by the infinite variety of “fake news” and conspiracy theories that are distributed on social networks. Consequently, the population behaved in many ways. From panic buying and hoarding to vaccine refusal and to a noncompliant behaviour to the imposed restrictions. We conclude that even with the presence of vast amounts of scientific knowledge, communication is not always effective in controlling the human response

to pandemics. We emphasise the relevance of taking into account also the human response to pandemics in the decades to come, given the dramatic changes in the dissemination of information and the corresponding need for media literacy and communication strategies to counteract the spread of false information and to control the reaction of the population to an outbreak.

Government response

Across history, government responses to pandemics have been a desperate tug of war between global safety and economic survival. During the black death, medieval authorities felt powerless against the plague due to its rapid spreading and deadliness, which led to countries falling apart and becoming infested with the plague. Centuries later, the Spanish flu had many more preventative measures put into place by the government than during the black death era. This is primarily due to the new scientific findings and technology advances. In the U.S the main problem was cities not working together, with some shutting down schools and theatres, with others holding parades which ended up turning into mass spreader events. However, in this era there was news sources which slightly prepared people but still not enough as the preventative measures were either not useful or they just didn't have any in some parts of the world. By the time COVID-19 emerged in 2020, tools had evolved into more efficient digital communication and rapid vaccine development. As the virus began to leap borders, governments started implementing stay at home orders for people who were going on unnecessary travel. They also had mandatory business closures take place to minimise human contact and people being within 2 metres of one another to prevent spreading the virus. Many more preventative measures were put in place such as masks and vaccine passports becoming the new legal frontier, which sparked intense debates over individual liberties. The governments initial response was determined to be "too slow" with COVID-19 with many people becoming annoyed and aggravated by the government.

Mental health and psychological effects

The psychological impacts of pandemics have been a consistent yet overlooked theme throughout history. During the Black Death widespread fear and confusion, combined with a lack of scientific and medical knowledge, led to extreme anxiety and social breakdowns. The unknown nature of the plague at the time made people panic and become overwhelmed causing their mental health to decline.

Similarly, the Spanish flu caused emotional distress on a global scale, sending shockwaves of fear around the globe. As communities faced overwhelming loss people felt at constant unease making life difficult to live with constant fear of what's going to happen to me?

In contrast, during COVID-19 even though medical knowledge had significantly improved, mental health struggles became more visible than ever before. Between the lockdowns, misinformation and uncertainty of the future people were left in depression and extreme levels of anxiety. Unlike the other pandemics people were able to acquire more information than ever before which led to health anxiety and the fear of having covid completely take over people. This constant need of reassurance and support from mental health services caused them to become overwhelmed with people

in need and put unbearable amounts of pressure on the people working for these services.

- Globally there were around 53 million additional cases of depression during COVID-19
- This shows a 27.6% increase in depression
- There were also 76 million additional cases of anxiety during the pandemic
- This shows a 25.6% increase in anxiety cases worldwide
- Young people were most drastically affected during the pandemic with the highest rates of anxiety and depression.

The spike in anxiety and depression cases during COVID-19 demonstrates how widespread social distress became during this time. These statistics also suggest that factors such as isolation, uncertainty and fear of illness all combined had people spiralling into a panic causing anxiety and depression cases to flood mental health services.

The fact that young people were most significantly affected reveals that the mental health burden of the pandemic was not evenly distributed, as the majority of young people went through major disruptions to their education, social development and experienced social isolation for long periods of time with repeated lockdowns. Overall, these statistics conclude that mental health should be a central part of pandemic response. They show that beyond controlling infection rates, governments and health care should address psychological impacts and offer help just as often, and particularly to younger people.

Global inequality and Access to Healthcare

Pandemics often expose the significant differences in how nations cope. Those with fewer financial means struggle more due to limited health infrastructure. Response speed tends to lag where systems are underfunded or stretched thin. In poorer regions, hospitals may lack basic equipment needed during emergencies. When outbreaks hit, existing weaknesses in staffing show clearly. Medical workers in these places often face heavier loads with less support.

During the COVID-19 pandemic, wealthier countries managed critical patients more effectively through the pandemic due to wider access to clinics and skilled workers. As basic facilities were scattered, weaker economies dealt with higher risks during outbreaks. Unequal resources shaped outcomes across borders.

Unequal Vaccine distribution further widened this gap, revealing uneven progress in global healing. During earlier outbreaks like the Spanish Flu and the Black Death, weaker communities suffered more as unsanitary environments combined with limited medical help shaped their fate.

- Low-income countries have fewer than 1 doctor per 1,000 people on average, compared to over 3 per 1,000 in high-income countries.
- Around 40% of the global population lacks access to basic healthcare services.

- High-income countries secured a disproportionate share of COVID-19 vaccines, while some low-income nations vaccinated under 5% of their population.
- Worst-off towns saw far more deaths when the Spanish Flu hit due to the lack of resources and little access to care.
- Few survived the Black Death, especially those trapped in overcrowded, unsanitary areas. Poor living spaces turned deadly when plague struck.

Preparing for the next pandemic

Building on the record-breaking development of the mRNA technology within the COVID-19 era, the next step for pandemic management lies in prevention and medical infrastructure. COVID-19 demonstrated that to truly prevent a pandemic from occurring, we need to treat a pandemic as a continuous need rather than an emergency.

The sudden effect of the black death is the main reason so many were killed due to their lack of awareness and technology. However, in the 21st century, we have global news which can warn people beforehand to allow people to be aware. Equally important is public education to highlight the importance of hygiene and vaccinations.

Global collaboration is also key to prepare for a future pandemic, as infectious diseases and viruses don't respect borders so countries must work together and share information to monitor outbreaks and share research. By combining scientific knowledge, government planning and international cooperation, the world would respond more rapidly to reduce casualties, social and global impacts.

- Around the world, models on a massive scale suggest severe outbreaks may reach billions if responses remain too weak - loss of life might then stretch into millions.
- For instance, projections during the Omicron period estimated reached 3.83 billion, while death toll predictions stood at 2.44 million.
- Models also estimated that resuming high mask reaching roughly 80% death totals, may drop off by half regardless of virus changes.
- These predictions help shape decisions on vaccine output alongside rules for cross-border movement, Hospital gear gets arranged because of these outlooks.
- Pandemic readiness depends on sophisticated forecasting tools that assess how different responses might play out, unexpected outcomes often emerge when these systems simulate real-world conditions.

Conclusion

In conclusion, the pandemics the Black death, COVID-19 and the Spanish Flu all clearly demonstrate that even though humanity has made major advancements in science, medicine and technology, the threat and vulnerability to a pandemic still very much remains. While diving deeper into these pandemics, a pattern emerged which is that early prevention is key along with global cooperation to share information between countries for a more rapid vaccine development.

Furthermore, pandemics truly show that managing a global health crisis is not just purely a scientific challenge in a laboratory, but it's also a definitive social challenge. From our research, we have found that human behaviour is the biggest

factor when trying to mitigate risks while in a pandemic, with people turning against laws and causing the viruses to spread further. COVID-19 displayed that even with advanced knowledge and technology, a lack of coordination between countries can worsen the impact of a virus or disease. Carrying on from this point different countries' economies such as low-income countries can put them more at risk due to their lack of resources. That's why it's so important that when a pandemic happens, that all countries support each other and work together.

Looking into the foreseeable future, it is evident that pandemic prevention and preparedness must become a priority across the globe if we want to mitigate the risks of a pandemic as much as possible. Along with these factors public education, sanitation and hygiene also all play vital roles in mitigating risks of viruses and diseases spreading.

Ultimately, the lessons learned from past and present pandemics should help us as a globe reduce pandemic risks and build on this knowledge in the future, while pandemics may be inevitable but following certain procedures and preventative measures can and will significantly reduce the consequences of a pandemic.

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