

Learning From The Past

How Sharing Clinical Science Research During the Pandemic has better Prepared Us for The Future

“The scientific community working together can do some pretty amazing things.” That was the conclusion of John Cooke, M.D., a hospital director from Houston, when reflecting on the pandemic. Previously, vaccine development has taken up to 20 years, but researchers were able to accelerate the process to produce a coronavirus vaccine in only eleven months, changing the future of drug development. Here Charlie Rapple, co-founder of science showcase Kudos, explores other ways the pandemic has been a catalyst for research discoveries.

People want to believe that science deals in absolute truths – that scientific ‘facts’, once established, don’t change, but they do. Science is a process of constantly expanding knowledge, and new research can contradict what was previously understood to be true. The pandemic threw this reality into stark relief – both in terms of the public’s expectations of scientific infallibility and the pace that scientists’ own beliefs were challenged. In a 2022 Guardian interview, several scientists acknowledged they had changed their minds as the pandemic progressed, on topics ranging from vaccines to the use of masks. Professor Peter Openshaw of Imperial College London, for example, had not expected COVID vaccines to work, explaining “there had been no example of a vaccine for a human coronavirus, yet they were more effective than I’d hoped.”

Innovation

There was a lot of innovation during the pandemic, from increased telemedicine devices to experimental treatments. As the pandemic identified one area for improvement, scientists and healthcare practitioners strove to solve it.

One of the biggest challenges faced during the pandemic was the ability to stay ahead of the virus. Hospitals and other care facilities became overwhelmed at the high infection rate before they could find a solution, needing to process high volumes of data to identify patterns in symptoms, infection rates and virus longevity.

However, this helped fast-track automated processes. For example, developments in artificial intelligence that can identify patterns in symptoms and other ‘red flags’ to healthcare professionals. These can help provide early diagnosis of infections, quicken drug discovery and identify warning signs for diseases so that healthcare workers can better manage cases early on. AI and machine learning can then build platforms for automatic monitoring and predicting the spread of the virus, including identifying virus ‘hot spots’ to make it easier to find those who had come into contact, like the NHS Track and Trace app.

According to research by De Gruyter, the World Economic Forum used its ML expertise to help researchers and practitioners analyse large volumes of data to forecast the spread of COVID. The tools acts as an early warning system for future pandemics while also identifying vulnerable populations and predicting what treatment will be the most effective.

While this study showed the benefits of using digital technologies in healthcare, it also explored its limitations. Currently,

AI technologies are not as advanced as they need to be, hindering accuracy when making predictions. AI can also amplify inequalities and bias in training data.

This research highlighted both AI’s advancements and limitations, giving scientists a deeper understanding of how reliable AI can be and the steps needed to improve this in the future. The improvements outlined in the research can help contain future virus outbreaks to avoid the challenges faced over the last few years.

Treatment

During the pandemic, scientists used research conducted during previous research into other illnesses to streamline treatment options. For example, there was already research conducted on the Coronavirus family – SARS and MERS by The University of Oxford. This research offered scientists a head start on COVID-19.

As of early 2022, very few drugs have been approved by the World Health Organization to treat critical COVID cases. During the pandemic Hoang Linh Nguyen et al found that remdesivir, which can block the activity of RNA-dependent RNA polymerase (RdRp) in old SARS-CoV and MERS-CoV viruses, had been used to treat symptoms of COVID in many countries.

The drug was originally developed to treat hepatitis C and respiratory syncytial virus, but was later used as one of the medications during the Ebola outbreak. Studies in cells and animals suggested that remdesivir was effective against viruses in the Coronavirus family, by preventing the virus from multiplying. After testing 1,062 hospitalised patients with either remdesivir or a placebo, they found that it could help speed the recovery of covid.

Using drugs like remdesivir for more than one condition not only speeds up the treatment process for the patient, but also avoids time and money spent during clinical trials for drug safety. Repurposed drugs are a gold mine in pharmaceutical research, particularly during times where drug discovery is declining or when treatment options are needed at an accelerated rate. In 2016 Professor Jan Baumbach from the University of Denmark and his team found thirty thousand “repurposable” drug candidates using pharmaceutical data. Eleven thousand had been mentioned in scientific literature, and about 1,400 were described as concrete “repurposing” options. This left roughly 19,000 highly confident drug-disease combinations yet to be investigated.

Research conducted to identify potential drugs suitable for repurposing will offer significant benefits for future pandemics to avoid the high mortality rates faced globally over the past two years. This may also allow us to continue to create vaccines and treatment options at a much quicker rate than before.

Welfare

Another factor that wasn’t initially considered during the early stages of the pandemic was the amount of patients experiencing symptoms after the two week isolation period. While originally thought to only last during those few weeks, around a third of



people diagnosed with covid experienced long-term effects and symptoms.

Patients experiencing 'Long Covid', as it has now been described, often continue having symptoms for months. There was also no correlation between how critical the patient was and the length of symptoms to identify why some experienced this. In many cases it was young and healthy patients that suffered from Long Covid.

This identified a gap in research and patient care, particularly as non-critical patients weren't offered many treatments for their symptoms when healthcare workers initially identified Long Covid as an illness. This is primarily due to how overwhelmed the healthcare system was at the time due to rapid COVID infection rates, which meant doctors focused primarily on providing resources to patients in a critical condition.

However post-COVID, some scientists and healthcare practitioners believe that the gap between researchers and patients should close. For example, research published by the International Association for the Study of Pain suggested that more researchers should partner with patients and create patient-led research to gain better insight and design effective solutions.

Power of the People

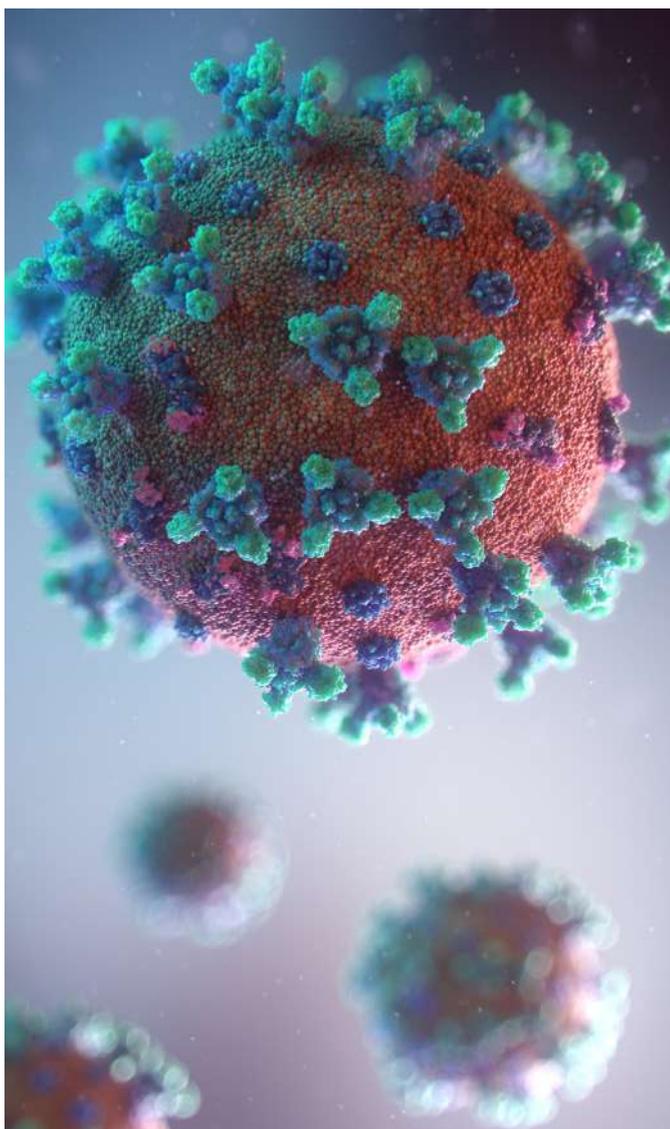
While critics suggest that the public do not have enough knowledge to be involved, having access to resources and clinical research will

not only help researchers understand what patients are experiencing more clearly, but also give them the knowledge to advise doctors on how to treat specific symptoms more effectively.

This is because researchers sometimes have a different sense of what is important compared with patients, such as common symptoms versus less common symptoms that cause more discomfort. This can then reduce the immediate benefit to the patient. It's important to understand the patients' experiences to address the most relevant issues and tackle them efficiently. Having a more patient-centred focus also adds more value, as patients will feel listened to.

Providing access to research summaries on the latest research about infectious diseases can offer non-academics an insight into their own health. Research is often hosted in paid-for, individual academic journals, making it difficult for the general public to access credible information. Academic research is also complex, with technical language that makes it harder for people to digest. Platforms like Kudos offer access to academic content that has been summarised into short, easy-to-understand language by expert writers.

Users can also find all content surrounding a given topic by searching for themed keywords. Collating information in one place allows users to find specific content from different publishers and universities at once, making it easier to absorb, understand and act on findings.



As the number of patients experiencing the impact of COVID and Long Covid increases, focus on patient-specific symptom management will offer significant advantages. Monitoring its prevalence and developing effective management strategies based on patient experience can help minimise its impact on both their mental and physical health.

Prevention

Clinical research has not only offered insight into how to improve treatment options for patients with COVID, but also how to predict future pandemics using improved data collection.

Data collection is beneficial for every industry but can drastically improve challenges faced during virus outbreaks and better prepare healthcare practitioners for what's to come. COVID spread to over 180 countries, threatening both public health and social stability, something that many didn't see coming.

It also highlighted limitations in the current ways data is being recorded, leading to inaccurate estimations that left both the public and hospitals unprepared for the surge in cases. Enhanced data collection can help countries better protect themselves against the virus and future pandemics by predicting its spread.

Documenting data during COVID was difficult, as countries documented their data in different ways. Numerical models were the

common method to document COVID cases as they estimate how the disease spreads, infection rates and the number of infections. Yet it proved challenging as predictions made needed a deep knowledge of how the disease spread, something that was hard to do, especially early on in the pandemic. This led to inconsistencies and data needing to be redone, causing delays and preventing institutions from effectively predicting future cases.

Instead, researchers at the American Institute of Physics have offered improved ways to collect data using numerical models and the main factors affecting prediction accuracy. While numerical models are useful, they are only as effective as the data used. An important takeaway from the pandemic is that the initial data from the early stages is critical, as well as taking regional variables into account.

Further outbreaks of this kind are likely to occur in the future, so having the ability to predict them accurately is crucial. It will also provide the public with accurate stats on infection and mortality rates to avoid any miscommunication.

COVID 2.0

Unfortunately, many experts believe that another pandemic is inevitable. According to Dr. Larry Brilliant, an epidemiologist and CEO of Pandefense Advisory, we "live in an age of pandemics," with the last pandemic occurring only ten years prior with the H1N1 virus swine flu.

More than six out of every ten infectious diseases have originated in animals and jumped to humans. This risk has "been increasing for the last 20 years," explained Brilliant. "Every year, the risk increases more." Other factors such as population growth, climate change, staff shortages in healthcare and urbanisation all effect the likelihood of additional pandemics.

As future pandemics loom over us, it's more important than ever to enhance research and its accessibility, so that both healthcare practitioners and the general public have a deeper understanding of infectious diseases and the current technology and medicine available to help prevent future scenarios like COVID.

The research conducted during the pandemic helped healthcare practitioners and researchers improve data collection, patient welfare, predicting infection rate and developing treatment. However, it also identified the need to share such research with the public, and make it more accessible for everyone, not just other scientists. Better sharing of research will prevent fear mongering, reduce the spread of fake news and help individuals feel more knowledgeable about current and future events.

Charlie Rapple



Charlie Rapple set up Kudos because she believes that every paper deserves to have a platform where it can be found and understood by both academia and the public, removing any barriers to publishing research.

Charlie strives curate content that is easy to access and digest, by creating summaries of each piece of content into short and easy-to-understand language, so the public can easily find and read credible research. Her marketing background helps her understand the importance of clear communication and promoting important topics of discussion to the public.