INTERNATIONAL JOURNAL OF CURRENT MEDICAL AND PHARMACEUTICAL RESEARCH
ISSN: 2395-6429, Impact Factor: 4.656
Available Online at www.journalcmpr.com
Volume 8; Issue 01(A); January 2021; Page No. 46-50
DOI: http://dx.doi.org/10.24327/23956429.ijcmpr20220011

Research Article

FACING THE THREAT OF FUTURE PANDEMICS

Raghavendra Rao M.V[1]., Mubasheer Ali[2]., Chennamchetty Vijay Kumar[3]., Raghunandan Reddy V[4]., Manick Dass[5]., MahendraKumar Verma[6]., Hitesh Lakshmi Billa[7]., Dilip Mathai[8] and Aruna Kumari B[9]

[1]Department of Medicine, Apollo Institute of Medical Sciences and Research, Jubilee Hills, Hyderabad, Telangana, India
[2]Apollo Hospitals and Apollo Tele Health Services, Associate Professor Department of General Medicine, Shadan Medical College, India
[3]Department of Pulmonary Medicine, Apollo Institute of Medical Science and Research, Hyderabad, TS, India,
[4]Librarian, Apollo Institute of Medical Sciences and Research, Hyderabad, TS, India
[5]Department of Microbiology, Apollo Institute of Medical Sciences and Research, Hyderabad, TS, India
[6]American University School of Medicine Aruba, Caribbean islands
[7]Interventional Pulmonology, Apollo Institute of Medical Science and Research, Hyderabad, TS, India
[8]Apollo Institute of Medical Science and Research, Hyderabad, TS, India
[9]Department of Respiratory Medicine, ESIC Medical College, Sanathnagar Hyderabad, TS, India

ARTICLE INFO

Article History:
Received 10th October, 2021
Received in revised form 2nd November, 2021
Accepted 26th December, 2021
Published online 28th January, 2022

Key words:
Ebola, influenza, Zika, and novel coronaviruses SARS, MERS, COVID-19

ABSTRACT

2020 was a devastating year for global health. Pandemics do not die-they fade away. The pandemics will bring indescribable tragedy across the globe. The best you can do is to not make it worse. Diagnosis of viruses is an increasing importance in the challenges for future pandemics. The early awareness of pandemic storm is to cut down morbidity and mortality. Pandemic aggregation of victims from infectious diseases is not new. Different disciplines Immunologists, Virologists, material scientists, Clinicians, natural scientists, engineering computational scientists, must work together to prepare for future pandemics.

Imperial College London's Institute of Infection aims to break down the barriers between medical, engineers, natural scientists and economists in the battle against infectious disease. We will need to bring together researchers from diverse disciplines to fight for the future pandemics. Unforeseen, unpleasant, entirely unknown threats stand a challenge to researchers to prepare for a future infectious disease. The majority of emerging infectious diseases recorded in the last century were of zoonotic origin. Scientists and clinicians were not on the lookout for a life threatening retrovirus in 1980's with a decade-long incubation period, but along came HIV/AIDS. Prions are not viruses but misfolded proteins with the ability to transmit several fatal neurodegenerative diseases in humans and many other animals. Prions cause of Bovine Spongiform Encephalopathy (BSE), mad cow disease in 1980s. Prions are not even conventional pathogens, like bacteria, fungi, viruses, or parasites. Are we ready to detect and combat another one if it emerges? The universe scrambled the pandemic. Most of us are convinced that we will over power it. And yet we are all conscious that our collective shield was down when COVID-19 first emerged. We cannot manage to repeat this mistake. Teams will need to operate autonomously in a pandemic.Learn to plan and lead effective medical and public health responses.

INTRODUCTION

The Black Death or The Plague, which killed nearly 200 million people. The first influenza pandemic to be pathologically described occurred in 1510
There were about 3 million deaths from epidemic typhus in Russia from 1918 to 1922

Smallpox was responsible for 300–500 million deaths.
In 2000 alone, measles killed some 777,000 worldwide

Cholera pandemic spread across India by 1820. 10,000 British troops and thousands of Indians died during this pandemic One-quarter of the world's current population has been infected with *Mycobacterium tuberculosis*, and new infections occur at a rate of one per second Optimizing team performance via enhanced nontechnical skills can result in improved decision making, increased efficiency, higher adherence to safety standards, greater resilience, and better outcomes The

*Corresponding author: **Raghavendra Rao M.V**
Department of Medicine, Apollo Institute of Medical Sciences and Research, Jubilee Hills, Hyderabad, Telangana, India

1918 H1N1 influenza pandemic was unprecedented, with rapid global spread and high mortality and social disruption.

Vaccination can help reduce the burden of emerging infectious diseases, but there are unique challenges of developing a vaccine in a pandemic setting.

For both emerging and re-emerging pathogens, such as those on the World Health Organization's list of Blueprint priority diseases

Deadly viral outbreaks

Viral infections are inevitable, and since ancient times, there is increasing records of such outbreaks affecting a million lives

Ebola and Marburg viruses are zoonotic pathogens. They cause an acute, serious illness, characterized by fever and bleeding manifestations in humans, that carries a very high case fatality rate. First outbreaks of Ebola occurred in 1976 in Eastern Sudan and later in Congo (1977), again in Sudan (1979), Western Uganda (2007), The largest Ebola outbreak was declared in 2014 - 2016 in Western Africa, infecting 28,616 individuals and causing 11,310 deaths.

Filo virus hemorrhagic fever was first reported in 1967 in Marburg (Germany). Laboratory workers were exposed to the virus (later identified as Marburg virus) after coming in contact with infected imported monkeys of *Chlorocebus spp*. Several sporadic outbreaks of Marburg infections noticed in 1975 onwards. Two large outbreaks in Democratic Republic of Congo (1998 - 2000) and Angola (2004 - 2005). Fruit bats are believed to be important reservoirs for both the viruses. Infection also be acquired by contact with infected gorilla and chimpanzee.

In 1918-1920, the deadly viral outbreak (Spanish Flu) in human history affected the 2/3rd human population with a high mortality rate. In the 21st century, there has been a subsequent viral outbreak, including SARS in 2002 in China, MERS in the Middle East, NiPAH in India (2009), Ebola, and H1N1 (also new variants). The rise in such a viral outbreak affected human lives and posed challenges to the existing health-care system

In the last two decades of the 21st century, more than ten viral outbreaks have been reported worldwide. More than 2.5 million deaths in the case of novel SARS-CoV2 has been reported; however, the pandemic is not over yet. New strains of novel SARS-CoV2 are cautiously emerging in different geographical areas with varying infection rates and fatality rates

Nipah virus is an emerging zoonotic virus that spills over from bats to humans causing severe disease and chains of transmission in humans.World Health Organization of a confirmed outbreak of Nipah virus in Kozhikode, a district in Kerala.19 cases of the disease had been reported, where 17 of them succumbed to the deadly virus.Nipah virus, which can damage the brain, was first isolated in the 1990s following an outbreak in Malaysia. One doctor, A. S. Anoop Kumar, head of the critical care department at Kozhikode Baby
Memorial Hospital, described its symptoms

The providence of Pandemics in 2022

In December 2019, the city of Wuhan, China became the centre of a pneumonia outbreak. The virus spread outside china in January 2020 and spread globally more than 220 Countries. The world have reported a total of 150 million confirmed cases of COVID-19 and a death toll of 3 million patients. India became the second country in the world to record more than 200,000 cases in a single day, after USA. Till date 15 million COVID positive cases and 175,000 deaths have been detected in India. Currently more than 1.9 lakhs new COVID cases are diagnosed everyday with over 1700 deaths daily. Later on the virus developed mutations and transformed Delta and Omicron variants.

Omicron is a variant of nSARS-CoV-2 that has been identified initially in COVID-19 patients in Botswana and South Africa. The risk of reinfection with the Omicron variant is over 5-fold higher and seems to be no milder than the Delta variant. Scientific advisers to Britain's government said it was "almost certain" that thousands of people were being infected with the Omicron variant every day and hospital admissions were likely to surge.

Pandemic spread leads to fear

It's a horror-struk medical enigma. Pandemic diseases sweep across borders and cause stupendous alarm. Globally, healthcare has made great strides in making vaccines, diagnostics and therapeutics available to more people. Yet, infectious diseases continue to pose a significant threat in many parts of the world, and the SARS, Ebola, and Zika crises are only a few of the recent outbreaks that draw attention to the weaknesses of public health systems.

Recent outbreaks

In India, the recent epidemics of Nipah virus and acute encephalitis syndrome call attention to the important changes that need to be made in the country's public health infrastructure. The outbreaks—and the subsequent responses—show that despite advances, biomedical prevention and treatment remain inadequate in combating these threats. This paper outlines the history of recent and current infectious disease crises, examines the shortcomings of both national health ecosystems and international cooperation, and offers recommendations

From tragedy came progress

In this process of recovery, rebuilding, we need to begin with most vulnerable populations Omicron may push Covid to turn endemic The spread of the Omicron virus hold up, and then in the coming years, the SARS-CoV-2 virus could become an endemic disease just like flu and common cold. Early data has indicated that it is less severe, which are ideal conditions for any virus to transform from an epidemic to endemic stage" says Former Director, CCMB, Dr. Ch. Mohan Rao, at Hyderabad.

A welcome change that could replace our dangerous delta variant. A pandemic ends after a series of mutations causing herd immunity and weakens the virus severity. We have reached that change (Dr.DevasenaRadhakrishnan, Professor in Microbiology from Madras Medical College).
The SARS-CoV-2 virus has mutated over time, resulting in genetic variation in the population of circulating viral strains over the course of the COVID-19 pandemic. Molecular, antigen, and serology tests are affected by viral mutations differently due to the inherent design differences of each test.
After repeated mutations, the virus loses its vigour, vitality and physiological efficiency. At the end of 2022, pandemic terminates after a succession of mutations causing herd immunity and debilitate the virus intensity.

Slow down transmission of the infection

The emergence of a lethal infectious pathogen can lead to a pandemic, resulting in a serious global health emergencylife saving drugs, PPE, adequate oxygen therapy, ventilators, ORs, vaccines, drugs with anti-viral properties, anti-inflammatory drugs, inpatient beds and hospital paramedical and medical staff, may be restricted in pandemics; Availability of these resources may fluctuate by day or within hospitals in the same system or region. Developments in diagnostics and finding out new methods and the early observation of outbreaks using social media hold on to the word of honour of reducing the mortality. Vaccines are the powerful weapons to fight against pandemic viral diseases.

Challenges evaluating in emerging infectious diseases

Explosion of turn up of pathogens create an unique and practical challenges for the implementation, and evaluation of vaccine potency trials

When a novel pathogen emerges there may be opportunities to eliminate transmission - locally or globally - whilst case numbers are low. However, the effort required to push a disease to elimination may come at a vast cost at a time when uncertainty is high.

Their transmission from wildlife or domestic animals encompasses diverse routes of spill over, through direct contact and aerosol to vector-borne While some pathogens have been known for decades to cause recurrent spill over events (e.g. rabies virus, *Borreliaburgdorferi* and *Yersinia pestis*), new pathogens are discovered sporadically following outbreaks. For example, Hendra and Nipah viruses were identified twenty years ago, and are now recognised as members of the family Paramyxoviridae, comprising viruses infecting mammals, birds and reptiles with various levels of host specificity.

Emerging and re-emerging viruses

The pandemic threatens to slow down hard-won global health progress achieved over the past three decades. WHO will work with countries to improve their own preparedness for pandemics and health emergencies. In recent decades, the issue of emerging and re-emerging infectious diseases, especially those related to viruses, has become an increasingly important area of concern in public health. It is of significance to anticipate future epidemics by accumulating knowledge through appropriate research and by monitoring their emergence using indicators from different sources. Most of the emerging pathogens in humans originate from known zoonosis.

Disciplines must work together to prepare for future pandemics

In spite of modern medicine, scientific development in health, pandemic response, and emergency preparedness, are still highly susceptible to death from organisms. A pandemic is an explosion of a disease that affects high proportion of the population.Outbreaks of severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), Covid - 19, Ebola and Nipah viruses, pandemic influenza, make clear, emergent infectious agents pose a continued and considerable threat to human health. Significant progress in diagnostic and pharmaceutical research, help us to overcome the pandemics. More research on disease emergence and transmission will be needed to understand the factors that affect disease risk. Unknown infections are harder to monitor, although breakthroughs in genome-sequencing techniques have allowed open-ended searches. This type of surveillance should be expanded to include those who work in forests, on farms with animals, and in virology laboratories, or anywhere else where diseases may be prevalent.Institutions and nations take 'pandemic preparedness' seriously. The vision of the solitary scientist in the laboratory winning the war on infection is far from modern reality.

These pandemics produced global economic disturbance and public health assets. Refinement in supervision, planning, coordination, assessment, lessening the spread of disease, are the challenges of future pandemics. Covid-19-illness affected more than130 million patients in all age groups throughout the world. The attack of the SARS-CoV-2 virus in an out of the ordinary convening of global Science.

Can future epidemics be predicted?

In a pandemic, resource limitations may influence complicate medical management Resources such as PPE, ventilators, hospital staff, and inpatient beds may be restricted. Supplies of these resources may fluctuate within hospitals in the same system Teams have developed pertaining responses to, resources, staff, communications, and systems

The world has faced numerous outbreaks of infectious agents over the last 20 years, including Ebola, influenza, Zika, and novel coronaviruses (SARS, MERS, COVID-19). These pathogens have caused global economic disruption and strained public health resources.

Effective pandemic preparedness would necessitate a protracted health-care system, medical skillset, and resources, global health coordination, medical regulatory alignment, public-private partnerships, technological alignment with health-care, and adequate up-front and continuing medical education.

How to protect the world against future pandemics?

In order to protect the world against future pandemics, all concerned healthcare and associated stakeholders must work together.

Surveillance to detect emergent pathogens and disease patterns, data capture and modelling to see how they would spread, improvements to public-health guidance and communication, and the development of therapies and vaccinations are the fundamental components of being prepared.

Epidemiologists discover new diseases by crunching numbers, and the accuracy of their findings is dependent on having access to raw data. Better data would allow epidemiologists to more quickly and confidently assess, for example, whether SARS-CoV-2 travels via the air and can be transmitted by persons who have no symptoms. This could have pushed experts to call for more widespread testing and face masks sooner.

Predictions based on mathematical models

Predictions based on mathematical models are more precise. Researchers and politicians must consider incentives and finances into the healthcare system in order to obtain better raw medical data. The purpose should be to gather, interpret,

and share information on the risk of a pandemic before one happens, and also to monitor pandemic activity and characteristics once they have begun. To comprehend the genetic modifications taking place and the resulting changes in biological characteristics, data on prior pandemics of influenza viruses and SARS COV2 must be acquired and promptly accustomed mathematical models to analyse and predict epidemics.

Communication techniques

Communication techniques that merely convey epidemic information and suggestions will be insufficient given the complex hazards and attitudes connected with an influenza pandemic. The task's magnitude and complexity necessitate frequent, transparent, and proactive communication and information exchange about decision-making, health recommendations, and associated information with the public, partners, and other healthcare stakeholders.

Response to future pandemics

Sylvie Briand, Director of Global Infectious Hazard Preparedness at WHO, spoke of the need for far greater operational research on public health interventions. Dominique Costagliola, Deputy Director of Inserm, explained that our response to future pandemics would depend largely on the provision of systematic science funding. Ewan Birney, EMBL Deputy Director General and Director of EMBL's European Bioinformatics Institute (EMBL-EBI), pointed out that the single greatest lesson from the pandemic "is that 'the unit' is the globe. It's not institutes, it's not countries, it's not humans. It is the planet." Jeremy Farrar expressed his wish that, "we learn the lessons [from the pandemic], and don't move on too fast and pretend that things have gone better than they actually did.

Can a new app predict the next pandemic?

Scientists say it's only a matter of time before another deadly virus jumps from animal to human and goes viral. A new global database attempts to rank the risk from wildlife.

Finding ways to prevent that is the motivation driving a team of researchers at the University of California at Davis. They are trying to help the world's scientists determine how dangerous each one might be by ranking its likelihood of being transmitted between species and evolving into a form that humans could easily pass to one another.

This poorly understood phenomenon called "viral spillover" has a long track record in causing outbreaks, including Ebola, MERS, SARS, and HIV, the virus that causes AIDS.

Is it harder to predict the next pandemic virus?

The observation that most of the viruses that cause human disease come from other animals has led some researchers to attempt "zoonotic risk prediction" to second-guess the next virus to hit us. Dr Michelle Wille at the University of Sydney, Australia with co-authors Jemma Geoghegan and Edward Holmes, it is proposed that these zoonotic risk predictions are of limited value and will not tell us which virus will cause the next pandemic. Instead, we should target the human-animal interface for intensive viral surveillance.

CONCLUSION

Isolation is for individuals who are confirmed cases of COVID-19 and quarantine is for those who are exposed but not yet tested positive or developed symptoms of COVID-19. Infection control measures, COVID-appropriate behavioural changes and vaccines remain the cornerstones of pandemic response to COVID-19. This Strategy based on citizen preparedness measures such as person-to-person distancing, mask-wearing, isolation and good personal hygiene (hand-washing) Mild cases are being managed at home or COVID Care Centres with monitoring for warning symptoms and oxygen saturation by pulse oximeter,

Suggested reading

1. ABC/Reuters (29 January 2008). "Black death 'discriminated' between victims (ABC News in Science)". Australian Broadcasting Corporation. Archived from the original on 20 December 2016. Retrieved 3 November 2008.
2. "Pandemic Flu". Department of Health and Social Security. Archived 7 January 2012
3. Conlon, Joseph M. "The historical impact of epidemic typhus" (PDF). Archived from the origin on 11 June 2010.
4. "UC Davis Magazine, Summer 2006: Epidemics on the Horizon". Archived from the original on 11 December 2008. Retrieved 3 January 2008
5. Stein CE, Birmingham M, Kurian M, Duclos P, Strebel P (May 2003). The global burden of measles in the year 2000--a model that uses country-specific indicators*J. Infect. Dis*. 187 (Suppl 1): S8–14.
6. Pike, John. "Cholera-Biological Weapons". Globalsecurity.org. Retrieved 26 August 2010.
7. World Health Organization (WHO). Tuberculosis Fact sheet No. 104-Global and regional incidence. March 2006, Retrieved on 6 October 2006.
8. Neily J, Mills PD, Young-Xu Y, *et al*. Association between implementation of a medical team training program and surgical mortality. *JAMA* 2010; 304:1693–1700.
9. Barbara J. Jester, RN, MSN, Timothy M. Uyeki, MD, MPH, MPP, Anita Patel, PharmD, MS, Lisa Koonin, MN, DrPH, MPH, and Daniel B. Jernigan, MD
10. S. Han, Clinical vaccine development, Clin. Exp. Vaccine Res., 4 (1) (2015), pp. 46-53, 10.7774/ cevr. 2015. 4.1.46
11. Zachary J.Madewella Natalie E.Deana Jesse A.Berlinb Paul M.Coplancd Kourtney J. Davise Claudio J. Struchinerf M. Elizabeth Hallorang,
12. Challenges of evaluating and modeling vaccination in emerging infectious diseases, Epidemics Volume 37, December 2021, 100506
13. Bauerfeind R, von Graevenitz A, Kimmig P, *et al* 2016, *Zoonoses: Infectious diseases transmissible from animals to humans. Fourth Edition.* Washington, DC, USA: ASM Press; 2016.
14. Tong TR 2006, Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV). *Perspect Med Virol*. 16:43-95. doi:10.1016/S0168-7069(06)16004-8
15. Junejo Y, Ozaslan M, Safdar M, *et al* 2020, Novel SARS-CoV-2/COVID-19: Origin, pathogenesis, genes and genetic variations, immune responses and phylogenetic analysis. *Gene Rep*. 20:100752.
16. Rajesh Trichur Venkiteswaran, India's Nipah virus outbreak, and misleading media, Lowy Institute, the interpriter, 2018

17. Jessie Huang, Deepeshvendoti, The fight against infectious diseases: Considerations for public health systems and international cooperation, ORF (Observer research foundation, 2019
18. lC. Jessica E.Metcalfab SoaFy Andriamandimbyc Rachel E.Bakerad Emma E. Glennone Katie Hampsonf T. Deirdre HollingsworthgPetra KlepachAmy Wesolowskii, Challenges in evaluating risks and policy options around endemic establishment or elimination of novel pathogens, Epidemics Volume 37, December 2021, 100507
19. Jones K.E., Patel N.G., Levy M.A., Storeygard A., Balk D., Gittleman J.L., Daszak P., Global trends in emerging infectious diseases Nature, 451 (2008), pp. 990-994
20. Han B.A., Kramer A.M., Drake J.M., Global patterns of zoonotic disease in mammals, Trends Parasitol., 32 (2016), pp. 565-577
21. Christian A Devaux, Emerging and re-emerging viruses: A global challenge illustrated by Chikungunya virus outbreaks, *World J Virol*, 2012 Feb 12; 1(1): 11–22.
22. Sarah Elizabeth Richards, Can a new app predict the next pandemic? Science, Coronavirus Coverage, 2021
23. Vladimir M. Cvetković, Neda Nikolić, UnaRadovanović Nenadić, AdemÖcal, Eric K. Noji, and Miodrag Zečević,Preparedness and Preventive Behaviors for a Pandemic Disaster Caused by COVID-19 in Serbia, *Int J Environ Res Public Health*. 2020 Jun; 17(11): 4124.

How to cite this article:

Raghavendra Rao M.V *et al* (2022) 'Facing the Threat of Future Pandemics', *International Journal of Current Medical and Pharmaceutical Research,* 08(01), pp 46-50.

****