Opinion

Hope and Despair in Epidemics Management: an Alert for Governments

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Opinion

A variety of viruses exist in nature. Severe Acute Respiratory Syndrome (SARS) appeared in 2002. Middle EastRespiratory Syndrome (MERS) broke in the Middle - East in 2011 [1]. I was in Kingdom of Saudi Arabia with myfamily during this period. I could not even know that there was such a thing. One of the reasons could be that it might not have spread to all the countries of Middle - East or all the parts of KSA. Wuhan Municipal Health Commission notified an outbreak of pneumonia on December 31, 2019. When COVID broke in 2019, I knew that it is related to MERS. MERS is caused by the same family of Corona viruses as common cold. It spreads very fast as its mode of transmission is Sneezing and Coughing. Emergence of SARS – CoV – 2 viruses; the causative agent of COVID – 19, was discussed in [2]. The associated viruses are following a 9 year cycle. Next pandemic is predicted in 2028.

Mutations decide the course of evolution of a virus [3]. High rates of mutations and large population sizes favor genomic diversity in a population. Different strains are generated during the course of this evolution; Variants of Concern (VOC) and Variants of interest (VOI). The transition from former to latter is governed by its genomic diversity. VOCs are characterized by parameters: high rates of transmission, severity, low performance of vaccines against them. Severity and performance of vaccines are two critical parameters. When values of these parameters go down, VOCs become VOI (variants of interest). Effective vaccines exist for the delta variant of the virus. RNA viruses are characterized by high mutation rates which generate extremely high genomic diversity within a short span of time. DNA viruses which reverse transcribe, single – stranded viruses and a few small stranded DNA viruses also have high mutation rates. High mutation rates and large population sizes facilitate adaptation to their hosts [4].

Cayuela explored systems of nonlinear replicators [5]. Alfaro and Veruete [6] studied effect of density dependence on replicator - mutator systems in directed mutation. Directed mutation studies involve generation of diversity through random mutagenesis or recombination of parental genes in a PCR machine and resulting products are scanned for 'Winners'; mutations with improved activity. These are mutations which are passed down to the next generation. Mentzer et al examined association of Human Leukocyte Antigen type with COVID – 19 vaccine antibody response and how it relates to risk of breakthrough infection [7].

Researchers have found lower vitamin D levels in patients who have recovered from COVID after six months of their hospitalization for post COVID care. Patients with 'brain fog' symptoms are reported to possess with lower vitamin D levels (< 20n/mg) which are of concern for those involved [8]. Vitamin D is known for its extra - skeletal effect; bone metabolism and calcium and phosphorous homeostasis. National Institute for Health and Care Excellence issues guidelines for post – COVID COVID - 19 care. Public health measures; e. g., imposition of lockdowns (timing and frequency), declaration of a medical emergency, etc. help control the spread

of an epidemic/pandemic. Since lockdowns affect economy of a country adversely, these should be imposed only when necessary. Mathematical Modeling studies provide clues to decide the timing and frequency of lockdowns. Fu et al. [9] presented a procedure to work out these parameters of lockdowns to be imposed. Authors use Cournot's equilibrium [10, 11] to model people's behavior.

Social measures; e. g., distribution of herbal immunity boosters, honoring social distancing norms, disallowing congregations, restricting number of individuals participating in it; etc., contribute to containment of COVID – 19 in a local population. Genomic surveillance coupled with risk assessment and pheno - typing of mutations contribute to restrict the advance of an epidemic wave. Work on the possibility of an Early Warning System is in progress. A reasonable lead time interval ranging from six days for clinical testing to four days for WBE during community –level wastewater surveillance was worked out keeping in clinical testing lag and delayed result reporting [12] in view. Social measures must be in place to prevent an outbreak becoming a public health emergency. Governments must ensure timely procurement of medical equipments of highest quality for doctors and paramedics.

Acknowledgement

Conflict of Interest

No conflict of interest.

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