

## Commentary

# COVID-19 Journey: From Initial Learning to Vaccine

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The evolution of COVID-19 has been challenging and has left medical fraternity bewildered and baffled. As is the practice of any disease process with protean manifestations the COVID-19 pandemic witnessed a deluge of conflicting information, also known as *infodemic*. COVID-19 has challenged the frontiers of medical science and tested its limits. However, the incorrigible human spirit rose from the ashes and led to evolution of a multi disciplinary approach involving specialties from fields of medicine, healthcare, economics, social sciences and industrial science leading to development of logistic measures to tackle the menace of pandemic. The course of the disease has now been identified with knowledge of the disease profile and evolution of definitive management strategies.

### EVOLUTION OF THE PANDEMIC

The first case of the novel corona virus was first reported from Wuhan, China in December 2019. The Chinese authorities later reported similar cases in early December 2019.<sup>1</sup> While most of the cases were linked to the wholesale food market in Wuhan, some were not. Many of the early patients worked or visited the market and samples taken from the area around the market implicated this area as the source of the outbreak, though questions remain relating to origin of the virus. The looming specter of COVID-19 stunned the humankind and most countries took the most viable preventive guidelines for such rapidly evolving pandemic. Adherence to evolving guidelines became a herculean task. The Government of Rajasthan authorized its major teaching hospital, SMS Medical College Hospital, Jaipur, to take up the onerous task of combating the menace of the pandemic in a scientific and objective manner by evolving definitive prevention and management protocols for tackling COVID-19. We created an exclusive state-of-the-art intensive care unit (ICU) with 50 beds for this purpose. The ICU included advance ventilators, provisions for high flow nasal oxygen therapy, dialysis and

in-house monitoring for COVID-19 patients. We also enhanced capacity at other units and created capacity and skill development training labs.

We, at the SMS Medical College Hospital, Jaipur, also closely monitored the profile and course of the pandemic and carefully evolved a strategy aimed at curbing the upsurge and spread and evolving a definitive management protocol to improve recovery rates to the maximal and decrease the dread of the pandemic to a minimum. The State of Rajasthan was witness to an aggressive modus operandi against the virus from early March 2020, when the first case was documented from the state.<sup>2</sup> This response was a result of marathon brain-storming sessions of the adroit faculty of the institute under chairmanship of the Principal and Controller. This led to evolution of a definitive management protocol and prevention guidelines. These guidelines became the benchmark for others to follow across the state of Rajasthan as well as in some other states of the country. We also developed an appropriate and widely available testing strategy for *SARS-CoV-2*. The number of diagnostic tests for *SARS-CoV-2* in Rajasthan have consistently been higher than national average. This strategy has been recognized as a landmark achievement and has been followed by other States of the country.

### THE YEAR 2020

A brief chronology of events surrounding COVID-19 that unfolded in 2020 are provided in table 1.<sup>3</sup> COVID-19 appeared and spread quickly and has made its way to more than 200 countries. According to the WHO weekly operational update on COVID-19 in the first year (2020) itself the worldwide death toll reached 1.6 million with 9% cases reported from India; while the number of confirmed cases reached 71 million with India accounting for 14% of the cases.<sup>4</sup> The cases further escalated towards the end of December 2020, led by surges in Europe and North America. Details of policy and programs implemented by

**Table 1: Important time lines in the first year of COVID-19**

<b>Year 2020</b>	<b>Events</b>
9 January	World Health Organization (WHO) announces emergence of COVID-19 in Wuhan, China
21 January	China confirms COVID-19 human transmission
27 January	India confirms its first COVID-19 case
31 January	WHO issue global health emergency of concern
25 February	US Centre for Disease Control and Prevention (CDC) says the COVID-19 is heading towards a pandemic status
11 March	WHO declares COVID-19 a global pandemic
30 March	US Food and Drug Administration (FDA) authorizes use of Hydroxychloroquine (HCQ)
29 April	National Institute of Health (NIH) trial shows promise for antiviral drug Remdesivir
1 May	Remdesivir gets emergency use authorization (EUA) from FDA
21 May	US Government and Astra-Zeneca close a vaccine deal
4 June	The Lancet and New England Journal of Medicine (NEJM) retract observational studies on benefits of HCQ
18 June	WHO stop testing Hydroxychloroquine (HCQ) for prevention and treatment of COVID-19
22 June	Pfizer-BioNTech collaboration start phase 3 vaccine trials
9 July	WHO announce that COVID-19 infection is airborne
23 July	An NEJM article indicates that antibody level drop after 3 months of infection
27 July	Moderna vaccine enters phase 3 of clinical trials
23 August	Convalescent plasma therapy gets EUA by US-FDA
14 September	Pfizer - BioNTech collaborators expand phase 3 vaccine clinical trial program
21 September	Johnson & Johnson vaccine enters phase 3 of clinical trials
29 September	Regeneron announces favorable results for monoclonal antibody cocktail- Casirivimab and Imdevimab as therapy
22 October	FDA approves Remdesivir as the first COVID-19 drug
9 November	FDA issues EUA for Eli Lilly monoclonal antibody treatment Bamlanivimab
16 November	Moderna phase 3 clinical trials report the m-RNA vaccine efficacy at 94%
18 November	Pfizer-BioNTech vaccine effectiveness reported at 95%
19 November	FDA issues EUA for drug combination (Baricitinib and Remdesivir) for treatment of COVID-19
20 November	Pfizer-BioNTech vaccine EUA application submitted to US-FDA
21 November	Regeneron monoclonal antibody cocktail (Casirivimab and Imdevimab) gets EUA by FDA
23 November	AstraZeneca vaccine effectiveness revealed at 90%
11 December	EUA for Pfizer - BioNTech as the First COVID-19 Vaccine by FDA
26 December	Vaccine deployment starts in UK and USA for patients outside of clinical trials

the Rajasthan government in the first year of the epidemic are listed in table 2. As can be seen, Rajasthan has been implementing the updated public health, prevention, treatment, management and governance guidelines.

Though COVID-19 is an unpredictable condition (as many undefined symptoms are being continuously seen among people), it has not deterred the Government in providing awareness to people about symptoms and preventive measures through television, radio, social media and other avenues. It has had a great impact in restoring faith in the Government among public in general. These inner

developments to fight against the pandemic- public health measures, population attitude and the perception for the steps taken to manage and prevent COVID-19 that includes provision of latest medical equipment, drugs, treatments and vaccines along with the high number of testing and contact-tracing has resulted in difference for Rajasthan. Our state has one of the lowest case-fatality from COVID-19 in the country.<sup>5</sup> These strategies for containment of COVID-19 have given promising results. Our team has evolved a combination management protocol (using available data of nature, mode and portal of infection) with use of anti-malarial, anti-influenza and anti-HIV drugs.

**Table 2: The state of Rajasthan timelines in the first year of pandemic**

<b>Year 2020</b>	<b>Events</b>
2 March	Rajasthan reports its first case of COVID-19
19 March	Section 144 imposed with restriction of gathering of 5 or more persons
22 March	Announces complete lockdown (except for essential services)
22 March	Started screening all passengers reaching Jaipur through air services keeping those with symptoms in home isolation for 14 days
22 March	Ban public transport
24 March	Ban private transport
11 April	Announces COVID-19 insurance scheme
7 May	Seals state borders
31 May	Lockdown extended up to 30 June (with few relaxations)
18 June	Special mobile COVID-19 awareness program started
19 June	COVID-19 and other illnesses' survey started
20 June	Initial notification of COVID-19 testing and treatment rates
7 July	Clinical management protocol for COVID-19 uploaded
7 September	COVID-19 dead body disposal management guidelines published
11 September	Guidelines for COVID-19 control in educational and training institutes published
5 October	Guidelines for rational use of oxygen released
18 November	Post COVID-19 syndrome management protocol released
28 November	RT-PCR testing rates slashed to Rs 800 for private laboratories
29 November	Mobile medical units deployed for high risk zones
1 December	COVID-19 insurance scheme approved by the government
9 December	As per recommendations of the Core Treatment Committee of SMS Medical College Hospital, Jaipur, revised COVID-19 management protocol published by the Rajasthan government
16 December	Vaccination program started in Rajasthan and author took the first vaccine in the state

This provided evidence of recovery among the first few cases in March 2020.

An aggressive diagnostic approach (assessment of pulmonary disease, the primary infection site) was designed indigenously combining data from chest radiographs and high-resolution CT scans. We also developed an institute-specific severity scoring system. We have been pioneers in COVID-19 lung biopsies to evaluate the hypothesis of underlying coagulopathy and vasculopathy in COVID-19. In addition, our hospital was the first to start comprehensive COVID-19 care with top-of-the-line investigations including high resolution CT scan of chest, CT pulmonary angiography, ultrasono-graphy of lung, and echocardiograms. Data from CT pulmonary angiography provided new insights and identified pulmonary thrombosis as one of the primary causes of critical complications in COVID-19. We also demonstrated usefulness of blood biochemistry profile for evaluating ongoing inflammatory and thrombotic status of the patients and prediction of cytokine storm using serological biomarkers: IL-1, IL-6, IL-10, TNF alpha,

CD4, CD8, D-dimer, FDF, CRP, procalcitonin, etc. We developed a definitive management protocol that included Remdesivir, steroids, plasma therapy and monoclonal antibodies (Tocilizumab) etc. within rapidly evolving time lines of COVID-19.<sup>6</sup> These efforts were instrumental in bringing the attention of national and international health regulatory bodies- Indian Council of Medical Research (ICMR) and World Health Organization (WHO) to our organization. We collaborated with these bodies to execute multicentric convalescent plasma therapy trial and the WHO SOLIDARITY trial. Thus, the COVID-19 pandemic should be a great lesson to various state, national and international governments to put their priorities right to save lives. Although the virus has presented us with an unprecedented threat, it has also provided an unprecedented opportunity to come together to develop strategies to tame a common enemy.

### **PUBLIC HEALTH STRATEGIES**

The public health measures (distancing, masking, hygiene, etc.) may not have been perfect, but to increase their

effectiveness populations and individuals are required to adhere to guidelines. Evidence shows that this was not always the case which could partly be due to inconsistent and changing advice due to a complex situation and rapid developments in understanding of the virus. Although it's not possible to establish if these items have caused the second wave of infection, particularly in India, it is believed that they have contributed to it.

We also fully support population wide deployment of a safe and effective vaccine. Vaccine development had previously taken more than 10 years from initial research, testing, validation, approval to general use. With the COVID-19 vaccines, there have been exponential advances in scientific understanding from the initial genetic code released globally to numerous laboratories developing potential vaccines in only 10 months and more importantly there has been the sharing of information (Table 1).<sup>7</sup> The development of definitive management protocols along with vaccines are vital to prevent and control the pandemic. Although, certain people are more likely to suffer worse or die from COVID-19 based on age, underlying health conditions, deprivation and ethnicity, there are no guarantees, and there have been young people in intensive care units as well as many 90-year old who have recovered. A word of caution needs to be laid down regarding the role of the vaccines in dampening the surge of the pandemic: vaccines can help give protection, but they will not eradicate COVID-19 from the face of our planet.

### **CONCLUSIONS**

Even after 2 years of the emergence of the virus, we still do not understand many aspects of COVID-19. A large variety of ideas and theories have been proposed. Science is not infallible - scientific methods are based on the principle that when a theory becomes inconsistent with observations

it must be rejected. This is how we achieve the best outcomes. The rapid authorization for COVID-19 treatments and vaccines is partially due to trial results being processed faster than has been the case earlier (Table 1). COVID-19 has greatly impacted health and finances of both the developed and developing countries that is unprecedented and this has been the impetus for rapid development of vaccines and treatments.

### **REFERENCES**

1. Wang C, Horby PW, Hayden FG, Gao GF. A novel corona virus outbreak of global health concern. *Lancet*. 2020.;15:395(10223):470-73. doi:10.1016/S0140-6736(20)30185-9.
2. Anonymous. Italian tourist tests positive for coronavirus in Rajasthan, samples sent to Pune for confirmation. *The New Indian Express*. Accessed: 17 December 2020.
3. World Health Organization. Timeline of WHO's response to Covid-19. Geneva. WHO.10 September 2020.
4. World Health Organization. Weekly operational update on coronavirus disease (COVID-19). Geneva. WHO.14 December 2020.
5. Fong MW, Gao H, Wong JY, Xiao J, Shiu EYC, Ryu S, et al. Nonpharmaceutical measures for pandemic influenza in nonhealthcare settings: Social distancing measures. *Emerging Infect Dis*. 2020;26:5:976-84.
6. Rizk JG, Kalantar-Zadeh K, Mehra MR, Lavie CJ, Rizk Y, Forthal DN. Pharmaco-immunomodulatory therapy in COVID-19. *Drugs*. 2020; 80:1267-92.
7. Caddy S. Developing a vaccine for COVID-19. *BMJ* 2020;369:m1790 doi: 10.1136/bmj.m1790.

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