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Perspective

Prevention and control of COVID-19 in India: Strategies and options

Rajneesh K. Joshi^a, Sanjay M. Mehendale^{b,*}^a Assistant Director Health & Senior Advisor (PSM), HQ 15 Corps (Med), C/o 56 APO, India^b Former Additional Director General ICMR, New Delhi & Director Research, PD Hinduja Hospital & Medical Research Centre, Mumbai, India

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Introduction

COVID-19 has changed the way we live, work and interact with others, like no other disease. In spite of intensive global and national efforts for more than one year, the pandemic continues to spread unabated and has taken a heavy toll on human health and economy. Till 05th May 2021, 154 million cases and 3.2 million deaths have been reported globally due to COVID-19.¹ Similar to other countries as the USA, UK, Brazil, France, Russia, South Africa and Turkey, India is experiencing the second COVID-19 wave, which is much larger and steeper than the first wave observed in Aug–Oct 2020.^{1,2}

Timing of relaxation in restriction policies by the central and state governments, resumption of public transport, opening up of market places and businesses, large gatherings

at social, religious and political events, noncompliance of COVID appropriate behaviour by the general public and emergence of new mutant strains presumed to have high infectivity potential, are thought to be factors resulting in the second COVID wave in India.³ Daily more than 350 thousand cases are being currently reported and the number of deaths per day has also crossed the 3500 mark in this wave.¹

India is facing tremendous challenges in its efforts to control second wave of COVID 19. A huge rise in number of new cases are clearly reflective of the inadequacy of current prevention efforts and failure in breaking the chain of transmission. In states such as Delhi, Maharashtra, Uttar Pradesh, Madhya Pradesh and Chattisgarh, the health system is overburdened and stretched by a sudden surge in COVID cases. The focus of the policy that was adopted when the first wave started declining was on test, trace and treat, continued emphasis on COVID-specific prevention behaviour, conservative stepwise approach to reverse lockdown restrictions and anti-COVID-19 vaccination drive beginning with health care and frontline workers and subsequently addition of senior citizens and people with comorbidities, followed by people above 45 year of age in a stepped approach. The original anticipation that these measures would be able to curtail the spread of SARS-CoV-2 in the community did not yield the anticipated results and could not prevent the occurrence of second wave of COVID-19 in India.

A theoretical simplistic model for control of COVID-19 pandemic can be built around the two-pronged strategy of preventing the spread of infection and reducing mortality among infected people. Designing the policies and strategies for the surge of COVID-19 cases must be based on the lessons learnt and evidence generated during the first wave.

* Corresponding author.

E-mail address: sanjaymehendale@yahoo.com (S.M. Mehendale).<https://doi.org/10.1016/j.mjafi.2021.05.009>

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It should be pragmatic, flexible and sustained.⁴ There could be some long-term strategies which are not sustainable and likely to adversely affect the economy. Conversely, there could be some expensive, manpower and technology intensive strategies which can yield quick results. The national- and state-level policy should design a guidance framework for prevention and control of COVID-19 transmission duly factoring in the cost-benefit, cost-effectiveness, community acceptability and sustainability of the proposed interventions (Table 1).

Prevention and control measures: Re-emphasising on previously implemented strategies

Sustaining COVID appropriate behaviour

It appears that the major debate on transmission of SARS-CoV-2 is settling in favour of airborne transmission of the virus rather than the surface transmission.⁵ This potentially highlights the importance of correct use of face masks, social distancing and avoiding crowded places as a huge priority. The utility of hand hygiene must be continued to be emphasised during the epidemic situation; but excessive perceived fear and anxiety of COVID-19 transmission associated with handling of doors handles/knobs, elevators buttons, newspapers, vegetables and eatables needs to be addressed with appropriate information, education and communication (IEC) campaigns. These measures involve low cost and minimal hindrance in daily living and can directly benefit the individuals practising

these behaviours. However, their sustained acceptability would require persistent IEC efforts at all levels as well as change in the mindset at the individual level and also at the societal level which would help in community-level prevention and control of spread of COVID-19.

Contact tracing, testing and quarantine

As the disease is spreading very rapidly across the country, operationalising measures for tracing, testing and placing the infected individuals in quarantine is becoming an arduous task with severe pressure on the public health system. Although these measures are typically more impactful during initial stages of the epidemic, they must also be continued in the second phase. The real challenges to implementation of this strategy include its limited use in the situations of community transmission and occurrence of a large proportion of asymptomatic individuals. As this activity is manpower and money intensive, finding these resources is likely to be a great challenge during the second wave when community based transmission appears to have actively set in all over the country.

Government imposed restrictions

Government imposed restrictions such as weekend curfew, night curfew, shutting down or restrictions on use of public transport, closure of markets, complete lockdown etc. should be the last resort as they have limited effectiveness and also result in economic loss. Moreover, the hindrance in daily life of general public and economic hardships faced by people during the past year are likely to result in community

Table 1 – Relative importance of available options for prevention and control of COVID-19 pandemic.

Control strategy	Govt resources required	Monitoring	Feasibility	Acceptability to public	Economic cost for general population	Effectiveness ^{7,11–13}
1. To reduce spread of infection						
Social distancing and restrictions in gathering of people	Low	Difficult	Difficult	Low	Low	High
Vaccination	High	Easy	Easy	High	Low	High
Use of face masks	Low	Difficult	Easy	Moderate	Low	High
Closure of schools and colleges	Low	Easy	Easy	High	Low	High
Travel and border restrictions	High	Difficult	Difficult	Low	High	Moderate
Educate and communicate with public	High	Easy	Difficult	High	Low	Moderate
Closure of nonessential businesses	Low	Easy	Easy	Low	High	Moderate
Quarantine and isolation	High	Difficult	Difficult	Low	High	Moderate
Hand hygiene	Low	Difficult	Easy	Moderate	Low	Low
Environmental cleaning and disinfection	High	Difficult	Difficult	High	Moderate	Low
Airport health checks	High	Easy	Easy	High	Low	Low
Night curfew	Low	Easy	Easy	Low	Low	Low
Complete lockdown (in addition to other restrictions)	High	Difficult	Difficult	Low	High	Low
Contact tracing and testing	High	Difficult	Difficult	Low	Low	Low
2. To reduce mortality among COVID cases						
Hospital treatment of moderate/severe cases	High	Easy	Easy	High	High	High
Vaccination	High	Easy	Easy	High	Low	High

reactions and instances of societal unrest. Such measures have a more profound impact on the poor and vulnerable people. Hence, restrictions and lockdown kind of measures should be employed only in exceptional circumstances when there is no other option left.

Prevention and control measures: introducing newer approaches and tools

Vaccination

In addition to behavioural measures for COVID prevention, the biological prevention option of vaccines has also been made available. It might take some more time to arrive at a concrete evidence explaining the relative roles of humoral response in the form of neutralising antibodies vis-à-vis cellular response in COVID prevention and disease progression particularly in the context of ability of the currently employed COVID-19 vaccines to elicit the same. The fast-track vaccine development and use of newer platform technologies to develop mRNA, viral vector-based, protein or subunit vaccines has been truly unprecedented and several vaccine candidates have been given emergency use authorisation. This tool was not available during the first COVID wave and having a range of vaccines in 12–14 months after the first report of COVID is a remarkable scientific achievement. The Phase I and II trials as well as interim analyses of Phase III trials have given very encouraging evidence of safety, immunogenicity and efficacy of various COVID-19 vaccine candidates and their wide spread use will certainly help in building of herd immunity and eventually breaking the chain of transmission. COVID-19 vaccines have possibly played a significant role in curtailing the second wave of COVID-19 in countries such as the USA, Israel and UK. Articles have been published documenting efficacy of vaccines in health care workers and front-line workers.^{1,6,7} Modelling forecasts that even a 65–70% efficacious vaccine with 85% or more coverage or a 85–90% efficacious vaccine with 65–70% coverage will succeed in breaking the chain of COVID transmission.⁸ Hence, vaccination drive should be carried out at a very fast pace so that maximum population can be covered in a short span of time.

India has developed Covaxin indigenously and along with Covishield of AstraZeneca has been made available for the Indian people. It is very likely that the vector-based Sputnik V vaccine, Janssen's adenovirus vector-based one shot vaccine and mRNA vaccines of Moderna and Pfizer are likely to be available in India after their approval for emergency use. On 20th April 2021, the Government of India has announced availability of the COVID vaccines in the open market and permission has been given for vaccination of all above 18 years of age from 1st May 2021. Availability of vaccines to the younger and more mobile population is likely to assist in breaking the chain of COVID transmission.

However, as majority of the vaccines are unlikely to have 100% efficacy, some cases of breakthrough COVID infections

are expected to occur. The real problem would be if such cases happen to be asymptomatic or mildly symptomatic because they would continue to spread the virus, despite vaccination, possibly due to nonadherence to COVID-specific behaviour. However, the early evidence indicates that even though vaccinated individuals might get COVID infection, they do not progress to severe or complicated disease requiring hospitalisation and deaths are expected to be very rare.⁷

Antivaccine lobby is active even in the present COVID scenario and will continue to work against any new vaccine. It would be important to address critical issues such as duration of vaccine-induced protection, correlates of immune protection, vaccine portability and interchangeability by providing strong research-generated evidence. This would help in reducing vaccine hesitancy and improve vaccine coverage.

Increasing care and treatment capacity to minimise complications and mortality

Indian response in creating large care and containment facilities in the first wave was excellent. However, by December 2020 to January 2021, the process of dismantling these facilities and dispensing the manpower had begun. This proved to be a miscalculation because in March 2021, we started witnessing flaring up of COVID-19 cases as the second wave started building. Consequently, we are currently struggling with deficiencies in hospital beds, beds with oxygen facility, ICU beds and ventilators across the country. The trained and experienced manpower was also dispensed with and hence we are also facing shortage of manpower. Capacity building should be augmented manifold in view of upsurge in number of cases. Building or creating adequate facilities in terms of hospital beds, oxygen supply, medicines, ventilators and other critical care facilities in each district to provide proper medical care to moderate and severe cases is critical. We must start using standardised clinical protocols for patient management throughout the country and avoid use of expensive medications wherever possible. This will help in reducing the financial burden on the patients and their families. Models must be worked out to facilitate assessment of clinical condition on digital platforms and referral for hospital admission and treatment in a centralised manner in specified geographical locations. It would also be critical to insist on home-based treatment for milder cases to reduce unwanted occupation of hospital beds, but community acceptance to this will improve only if it is supported by high-quality home-based care by competent teams.

Prevent panic

The current scenario appears to be of widespread panic, misinformation and chaos which is influenced by furious use of social networking platforms and aggressive coverage in print and visual media. Wrong messages get forwarded even without checking the rationality and authenticity of the source. We are getting bombarded with information and misinformation related to interpretation of test results,



Fig. 1 – Priority prevention and control measures based on level of transmission and response capacity of health system.

vaccine-related information (adverse reaction, efficacy etc), diet and medicines for COVID patients and for COVID prevention and many other topics. It is important to prevent panic as it leads to undue pressure on health system, unjustified demand for testing and hospitalisation and shortage of essential medicines and equipment.¹⁰ Media has an important role in pandemic settings and media should be constructively involved in prevention and control activity for COVID-19 possibly by making the media a partner in COVID prevention and control.

Prevention and control measures: What is the role for strategizing as per local situation?

Various regions, states and districts of India are at different stages or levels of COVID pandemic. In certain areas, community transmission is evident while in some areas there are few cases/clusters. Action plan for COVID prevention and control should factor in the level of transmission and capacity of local health system to respond to the situation.⁹ Activities such as vaccination, COVID appropriate behaviour, testing and treatment of cases, IEC and surveillance are core activities which should be carried out on priority in all districts of India while other activities such as contact tracing, restrictions on gatherings, closure of business and travel restrictions should be undertaken based on prevalent scenario in an area (Fig. 1).

The principle of “one size does not fit all” probably fits India well. In the first wave, community response and accountability to control measures and impact, responsiveness and adaptability of local health system resulted in extremely variable economic impact on the general population. Economies of certain industrialised states got badly impacted. Therefore, during the second wave, it might be important to implement innovative and locally relevant approaches which

will be readily accepted by the community. We also need to plan to mitigate the impact of COVID in Tier II/Tier III cities and in rural areas, where medical resources may be insufficient to respond to the COVID crisis.

What do we do to prevent the third wave of COVID-19 in India?

Once peak of the second wave is over, all future actions should be planned with a basic presumption or anticipation of the third wave. Surveillance for new cases, COVID-related mortality and viral variants must be continued sufficiently long after the flattening of the second wave. Similarly, emphasis on COVID appropriate behaviour, cluster containment, contact tracing, testing and quarantine will have to be continued much beyond the second wave. It might be critical to attain self-sufficiency in the area of COVID vaccine production and availability in India and it is certainly possible because at least 3–4 Indian COVID 19 vaccines are expected to be available by the end of 2021. We will have to address the issues surrounding vaccine hesitancy and create dependable evidence to mitigate the same. We have to strengthen our health care infrastructure and enhance the laboratory capability of detection and diagnosis of emerging infections in the country, forecasting impending outbreaks, increase the number of beds with oxygen supply, ICU beds, ventilators and infection control practices in general. A continuous dialogue with people of India about the current and emerging situations will help us to face the challenges in future more efficiently and effectively.

Disclosure of competing interest

The authors have none to declare.

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