PLANNING COVID-19 VACCINATION IN INDIA

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Countries across the globe have started working on preparing plans for management of **eventual COVID-19 Vaccination** in their respective jurisdictions. With second largest population (1.33.billion) in the world, planning and managing "eventual COVID-19 vaccine administration" is going to be an extremely challenging task for Government(s) in India. Administering a billion COVID-19 vaccines within a stringent time frame (couple of months), in a highly diversified (socio-economic-cultural-lingual-educational) and unevenly distributed society with inadequate public health infrastructure / resource support, will be extremely challenging. COVID-19 immunisation project has to be implemented in "mission mode (to be completed in a short span of time)" unlike "programme mode" implementation strategy followed in the past for polio and other vaccinations.

Planning constraints are many in COVID-19 vaccination project. The most unique planning constraint is in "devising a method for speedy vaccination of more then a billion people without "crowding and queues at vaccine stations". Crowd / gathering (even small number of people) is considered "hazardous" due to highly contiguous nature of COVID-19 virus. For preparation of "COVID-19 vaccination Project" plan - a list of key steps are proposed as given below.

STEP 1: OBJECTIVES, GOALS AND CONDITION ASSESSMENT

Goal is to vaccinate one and all in the country against COVID-19 virus. National Government would need to initiate pro-active planning for management of "PAN India eventual COVID-19 vaccination programme" considering factors like – number of people to be vaccinated with their age group, criteria for assigning priority COVID-19 vaccination; geographic distribution of population to be vaccinated; resource requirements at various levels in Governance hierarchy for implementing COVID-19 vaccination programme, lessons learned in the past on various immunisation programmes in India, existing public health related resources at various levels in Governance hierarchy (Panchayat, Taluka, District and State), gaps between "what is needs and what is available" for implemenD-19 vaccination programme, provisioning required resources for filling identified gaps, COVID-19 vaccination project mile-stone and time-line for accomplishing final goal, vaccination programme monitoring and evaluation system.

STEP 2: PUBLIC HEALTH RESOURCES AND SELECTION OF VACCINE TECHNOLOGY (DISSOLVABLE MICROARRAY PATCHES)

There is huge gap between Urban and rural India as far as availability of public health related skill-set and infrastructure are concerned. Bridging / filling these gaps can only be done through stringent long term (5-10 years) planning as there is no short term solution available. But the vaccination need not to wait and Government should critically review existing public health resources with respect to "COVID-19 vaccination project needs" and evolve a strategy for deployment of supplementary resources.

Gaps in public health resources between urban and rural setup in India also necessitates planners to look and review available **technology options offered by manufacturer for administering vaccination**. Conversely – Government may, pro-actively, review and conclude on the best suited technology for administering vaccine for population in rural, semi-urban and urban area matching to trained manpower available there and place purchase order accordingly.

Most vaccines are administered via intramuscular (IM) or subcutaneous (SC) injection, oral gels, jet injectors / Nasal spray etc. The major challenge for use of injectable vaccines includes – storage, transportation, disposal and need for trained manpower / health workers. A newer technology i.e. use of **Dissolvable microarray patches or dissolving micro-needles (DMN)** not only offers more effective results but also circumvents most of other challenges attached with injectable vaccines. DMNs overcome the requirement for trained personnel for correct vaccine delivery because they are simply inserted by hand or utilizing an applicator device. This may be especially beneficial under current COVID-19 situation whereby hundreds of thousands of lesser-trained health care workers would be added to expand access to lifesaving vaccines across the country. As DMN are fabricated from water-soluble, biocompatible materials that dissolve in the skin post-insertion, they overcome the generation of bio-hazardous sharps wastes. Also DMN are fabricated such that the vaccine is contained within the DMN in its dried form, in many cases in combination with suitable excipients to improve thermo-stability. Accordingly, because of their solid-state formulation, **DMN can be stored at ambient temperatures, overcoming the requirement for cold chain storage completely or partially.**

DMN technology based vaccine looks most appropriate and befitting for COVID-19 vaccination project, specifically in rural India. Health experts / Planners / decision makers should discuss with potential vaccine manufacturer about their capabilities to produce DMN based vaccine. Final decision on vaccination technology should be made based on by matching demand manufacturers capabilities. Type of vaccines technology will influence structural and non-structural capacity building measures including training of health workers deployed / to be deployed in remote area.

STEP 3: PROJECT COST / BUDGETING

With a COVID-19 vaccination plan in hand, **the next step will be project budgeting** which will include (but not limited to) cost of number of COVID-19 vaccines to be procured (which most difficult part as on today!), cost of additional physical infrastructures to be created at all various levels, cost of insurance, storage and handling vaccines, cost of human resources, cost of training and capacity building, cost of awareness generation programme, cost of monitoring and evaluation.

Estimating cost of eventual COVID-19 vaccine is the most difficult part while preparing detailed estimates which will include all components contributing to the project cost. But India is at advantage with one of the largest pharmaceutical manufacturing base in the country. Also six in-house Indian companies, including consortium of Bharat Biotech and National Institute of Virology, working on development of COVID-19 vaccines. India policy makers may like to look at a report published stating that “Jenner Institute at Oxford University” has placed an advance order for mass-manufacturing (40m-50m doses to be ready by Sept. 2020 !) the vaccine ChAdOx1 nCoV-19 to “Serum Institute of India”. This is of-course a “high risk – higher benefit” action taken by Jenner Institute at Oxford University. In any case – Indian Government would need to acquire quotation for

eventual COVID-19 vaccine cost / magnitude of supply and time-line for completing supplies for one or multiple potential research / manufacturing agency.

This is important to note that the **cost of project implementation has inverse relationship with "total time for implementation**", i.e. quicker implementation (lesser time) will need more people / health workers and hence a bigger budget, where as slower implementation (longer time line) may not need extra manpower and may cost less. Looking to the highly contiguous nature of COVID-19 virus, a very cautious approach should be followed by the planning agency while fixing and finalising project implementation time-line. Project plan will be considered as "complete" as soon a budget estimate is annexed to it. Budget allocation and utilisation will be used for tracking the project progress while the work is on-going and will be interfaced with project monitoring and evaluation tools.

STEP 4: PROJECT ADMINSTRATION:

In a typical hierarchical Government system, the "District Administration" plays a key role in interfaces developmental projects with citizens under its jurisdiction. District Disaster Management Authority (DDMA) responds first during any natural or human made disaster in their jurisdiction. Obviously, District authority will remain at forefront while executing COVID-19 vaccination project implementation plan. It will be advantageous if resource planning for COVID-19 vaccination project is cantered around "Existing Public Health Management System in a District".

As COVID-19 is "a disaster and a crisis" – it would help if State Executive Committee (SEC) and District Executive Committee (DEC) under the lead of Chief Secretary and District Collector respectively are activated during project implementation. All DECs are interfaced respective SECs and all SECs are connected with NEC. As vaccination relates to "health service", hence committees constituted at each level in hierarchy will give due to emphasis to the participation of health and medical related experts.

STEP 5: HUMAN RESOURCES AT GROSS ROOT

Lots of work has been done in last couple of years towards improving **"rural resilience"** with investments focused to "health, hygiene and education" in villages. At grass root level - India has three cadres of CHWs (community Health Workers). The first created is the Auxiliary Nurse-Midwife (ANM), who is based at a sub-canter and visits villages in addition to providing care at the sub-canter. The second is the Anganwadi Worker (AWW), who works solely in her village and focuses on provision of food supplements to young children, adolescent girls, and lactating women. The most recently created cadre is the Accredited Social Health Activist (ASHA), who also works solely in her village. ASHA workers focus on promotion of MCH (Maternal & Child Health), including immunizations and institutional-based deliveries.

Existing institutional strength of workers / health workers in rural India includes about 208,000 ANMs, 1.2 million AWWs, and 857,000 ASHA workers (report published by CHW central). For bringing efficiency and effectiveness - COVID-19 vaccination sub-plan for rural area should be designed around existing workforce. Rural Sub-plan would address need for supplementing additional human resources and training requirements.

STEP 6: PROJECT MONITORING AND EVELUATION

Project progress will be monitored using a state-of-the-art MIS (management information system) application for gathering and analysing data from multiple online systems / sources and generating alerts for defined deviations. All health workers attached with the project will use web-enabled COVID-19 vaccination project MIS application for all project related activities.

Plan for "COVID-19 Vaccination project" will define format and procedure for entering patient data immediately after administering vaccine. Provision of issuing "COVID-19 vaccination certificate" will be included in the plan. "Point of Service (POS)" gadget to be used by the health worker will have feature to print a COVID-19 vaccination token with unique ID.

CONCLUSION / RECOMMENDATIONS:

It is likely that we'll eventually have a coronavirus vaccine and this plan is proposed based on this optimism. I am summarising my recommendation for an actionable COVID-19 vaccination plan as below.

1. **COVId-19 Vaccination plan** should facilitate **"No Crowd - No Queue"** mechanism for vaccination at all levels across the country.
2. **COVId-19 Vaccination plan** will define a mechanism for "reaching to people" with "no crowd no queue" criteria. Mobile based vaccine stations should be conceived and augmented during project implementation for reaching to small "population cluster / mohala" and ensure "no crowd-no queue" criteria is fulfilled.
3. **COVId-19 Vaccination plan** should define a template for scheduling vaccination for each micro-zone / Mohall. Vaccination schedule should be generated and disseminated in advance.
4. **A representative from respective "population cluster/ Mohalla"** should be associated with vaccine station team during schedule decided for that location.
5. This is very important to ensure that **communities are treated equal**, horizontally and vertically, across the country as far as COVID-19 vaccination is concerned.
6. **Government must consider to immunise "health Workers**" across the country first, followed by personnel from emergency services.
7. There should be **no "stringent" requirement for identity proof (ID) for getting vaccinated.** Multiple options should be allowed for ID including - ADHAR, PAN card, Driver's licence.
8. **Each Vaccine should be bar-code**d for connecting with beneficiary (patients name, DOB and ID number).
9. **COVID-19 vaccination should be free for all** irrespective of economic status. Affluent people may donate money to PM and other specific funds created for COVID-19 vaccination;
10. As a proof of **COVID-19 vaccination - a certificate / sticker / card with specific** "number assigned to individual patient" should be generated spontaneously after administering vaccine. Facility should be made available to printing and issuing "COVID-19 Vaccination Certificate" at eSeva Kendra / Community Information Canter (CIC) on production of patient's ID.
11. **COVId-19 Vaccination plan** should indicated – **"Estimation of required doses of vaccine + contingency"**.
12. **COVId-19 Vaccination plan should specify numbers for – injectable, Nasal-spray, Dissolvable microarray patches to be procured for each State**;

13. **Government must sign MoU / contract with potential manufacturers for supplying pre-determined number of doses.** Vaccine technology and time scale for supplies should constitute as apart of the MoU / contract between Government and manufacturer. This activity must be done as soon potential manufacturers are identified as no manufacturer in the world would be able to supply 1 billion doses of vaccine in one hit. Also knowledge of type / technology of vaccine in advance will help planning and augmenting storage and logistics required for handling such vaccines at all levels in hierarchy.
14. **COVId-19 Vaccination plan should address – storage and handling requirement / procedure to be followed by each State / District.**
15. COVID-19 Vaccination plan should identify gaps in **public health system** at various levels and propose ways and means for supplementing required resources for filling these gaps.
16. India has thousands of Medical and Nursing schools. Government should **integrate medical and nursing students with COVID-19 Vaccination Mission Mode Project**. This will not only help in bridging existing deficient human resources but also reduce training burden to a greater extent. Students associated with "COVID-19 Vaccination Mission Mode Project" should be awarded education credits against project work.
17. In addition to NDRF / SDRF and other similar funds available for disaster mitigation, National Government may consider collecting "**mandatory contribution of about 10 % of existing CSR** reserve" from industrial houses;
18. "COVID-19 Vaccination Project" should be implemented in "**mission mode" with a defined period (to be fixed in consultation with experts)**.
19. After expiry of mission project implementation schedule - Government may consider imposing mandatory requirement of "**COVID-10 vaccination" proof for taking intercity / interstate train and bus transportation system**.
20. After expiry of the mission mode project implementation schedule - **extended arrangements should be made for administering COVID-19 vaccine at public transport stations / points** to attend to "residual population" who could not be vaccinated.
21. COVId-19 Vaccination plan should define requirements for "**monitoring and evaluation" during "mission mode project phase" and "after completion of project" for each state.**
22. System planning for **"monitoring and evaluation mechanism" should be done in such a way that same can be integrated with "National pandemics / epidemics surveillance" system and continue to work for years.**

The above suggestions are indicative and intended to facilitate further discussion and brain storming amongst planning team in India. It is important that **"health workers"** across the country are immunised first on priority basis.

The biggest advantage with Indian administration is that they have experience of managing general elections at National and State level successfully for many years. Under a well established and rehearsed mechanism - more then 600 million people casted their votes out of total 911 million eligible voters across the country during 2019 general elections. The National election was conducted in seven phases between 11 April to 19th May 2019.

Geographical coverage remains same in National elections and in a National vaccination programme but a larger population (age 6 months and above) segment would be targeted under vaccination project unlike election where voters right starts from the age of 18 years. Although elections and

vaccines are characteristically different area but both are PAN National activities with people's participation.

Planning, designing and implementing PAN National "COVID-19 Vaccination Project" based on "No Crowd – No Queue" principal is going to a difficult task for Government(s). However, with active cooperation and collaboration of public (already COVID-19 aware), Government's experience of conducting largest election in the world would pave way for a successful planning and implementing world's largest COVID-19 vaccination project. **India is poised to set a Global example by implementing "world's largest COVID- 19 vaccination Project" very soon.**