**Better Strategies For Coronavirus (COVID-19) Vaccination**

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**Abstract**

The first case of COVID-19 a coronavirus disease was reported in December 2019 in Wuhan, China, and spread globally. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is regarded as the most challenging pandemic in the current century. COVID-19 has brought scientists together on a platform where they are searching to find out different therapeutic and preventive strategies to combat this coronavirus. Scientists and healthcare workers are working on developing new vaccines that are safe and take less time to develop. They are trying to elucidate various target sites on 2019-nCov that could act as potential candidates for effective vaccine preparation. Besides this, there is also a need for proper community involvement to elicit the coronavirus disease by taking preventive measures and spreading awareness. In this review, we have focused that how scientists can develop vaccines against new variants and convince the public about vaccine acceptance at the community level. This manuscript reviews Strategies for Covid-19 Vaccination Development, Strategies for Covid-19 Vaccination Acceptance, and Community Engagement in Covid-19 Vaccination plans.

**Introduction:**

Coronavirus Disease 2019 (COVID-19) has transmitted very quickly around the globe after the first case was discovered in Wuhan, China, in December 2019. The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the cause of COVID-19[1]. The World Health Organization (WHO) declared this outbreak to be a pandemic on March 11, 2020 [2] More than 108.8 million people had COVID-19 infection as of February 17, 2021, and 223 different countries had reported over 2.4 million casualties [3] [4]. Until COVID-19 vaccinations became widely available, countries relied upon contact tracing to control the virus's spread [5]. Nearly 20 million cases had been reported worldwide by August 2020, with over a half million deaths. Although the disease affects persons of various ages, it primarily affects elderly aged individuals and those who are already suffering from many health complications [6]. One of the most problematic and worrying pandemics is now being caused by a coronavirus associated with severe acute respiratory syndrome (COVID-19). Vaccine-preventable disease (VPD) surveillance and routine pediatric vaccines for individual children in clinics should continue as long as possible throughout the pandemic [7].

Prioritizing vaccination for the older age group decreases infection occurrences more efficiently in areas with a high level of social distance while prioritizing immunization for the younger age group has a greater impact in areas with a low level of social distancing. Regardless of the extent to which people are socially isolated or resistant to vaccines, providing elderly aged individuals with a higher immunization preference is the most effective way to decrease mortality rates [6]. Vaccine hesitancy is the reluctance to receive or outright rejection of a vaccine due to personal beliefs about the vaccine or the disease it is intended to prevent, or because of access issues and continuous development in vaccines play a critical role in halting coronavirus pandemic [8] [9]. To control these challenges it is required to make sure community-engaged initiatives that highlight messages that can be easily understand and in other way culturally appropriate, which address people's reservations about vaccine safety and accessibility, and that fully utilize trusted individuals to offer timely and precise information regarding vaccines [10]. In this review, we have highlighted the strategies that are required for vaccine development, to eradicate the stigma about vaccination and ensure proper implementation of covid vaccines in the community.

**2.** **Strategies for Covid-19 Vaccination Development**

COVID-19 is caused by the novel SARS-CoV-2 coronavirus, and its emergence has propelled the scientific community towards action in search of treatment and prevention methods. Modifying known pharmaceutical treatments or developing new therapies are among the key goals in the fight against the rapidly evolving virus. Second, as a more permanent measure, the scientific and larger pharmacological sector have been challenged with developing, testing, and mass-producing a safe and effective vaccine to prevent further transmission and recurrence among the population [11]. Some of the strategies for vaccine development are mentioned in this review.

**2.1. Non-replicating viral vectors (NRVV)**

Vaccines against SARS-CoV-2 that do not require replication have the best odds of success if they are based on adenoviruses, which are the most commonly used viral vectors. Adenoviruses are viruses that replicate by copying their own double-stranded DNA, and replication is often inhibited by removing the E1 region [12]. Infection with target cells results in increased transgene expression and elevation of costimulatory molecules, which in turn trigger cytokine and chemokine activation, thereby increasing immunogenicity. Knowing that the S protein is required for SARS-CoV-2 to enter cells, all the vaccines under development exhibit either the full-length S protein or components of the S protein [13]. Using the definition of immunogenicity as the identification (using enzyme-linked immunosorbent assays, ELISA) of antibodies induced against the spike protein, preliminary findings from clinical trials of SARS-CoV-2 vaccine candidates based on nonreplicating viral vectors revealed that all these vaccines are safe and effective [14].

**2.2. Messenger RNA (mRNA) vaccines**

### Because of their rapid development and excellent level of safety and efficacy, mRNA vaccines had emerged as leading contenders. Two messenger RNA (mRNA) vaccines have been licenced for use in humans, proving the viability of this emerging vaccination technology [15]. The open reading frame of the target antigen (in this case, spike protein) with a 3′ polyadenylated tail is a standard component of conventional mRNA vaccine formulation, and it often elicits both humoral and cellular immune responses. BioNTech and Pfizer have developed four RNA-based vaccine candidates that have been tested in Phase I clinical trials, and two vaccines are moving on to Phase II. Their LNP-encapsulated vaccines encoded a trimerized, secreted SARS-CoV-2 receptor-binding domain (BNT162b1) and a perfusion-stabilized, membrane-anchored full-length spike (BNT162b2) [16] [14].

### 2.3. DNA based vaccine.

### DNA vaccines are beneficial even in infant children; they are harmless; they are stable; and the production process is quick; cheap; and it does not result in an anti-vector immune reaction [17]. DNA vaccines have a substantially longer shelf life than mRNA vaccinations because they can be handled at 4 °C . In addition, DNA vaccines are more rapidly developed and manufactured than mRNA vaccines [18]. Spike (S) protein, a viral glycoprotein that projects from SARS-CoV-2, is a prominent target for vaccine research because it mediates viral entrance into host cells by binding to angiotensin-converting enzyme 2 (ACE2). Furthermore, furin cleavage at the interface of the S1 and S2 subunits stimulate the S2-mediated fusion of viral and host membranes [19]. This is achieved via interacting with the ACE2 receptor. Thus, the two subunits serve different purposes in the infection process. Proline substitution (HexaPro) is commonly used in vaccine production for prefusion-stabilizing S-protein six because it elicits increased expression and resilience to varied temperature conditions, giving improved stability [20].

### 2.4. Inactivated whole-virus vaccine

### Inactivated pathogen vaccines have a long history of usage in pandemic preparedness. Variants of the SARS-CoV-2 virion are grown in Vero (African Green Monkey) cell lines for use in this vaccine strategy. Beta -propiolactone is used to inactivate the virus after viral extraction, and the inactivated virus particle is subsequently adsorbed in on an adjuvant (aluminum hydroxide) [3]. These inactivated viral vaccinations seem to have fewer side effects than live virus vaccines. Redness as well as pain at the injection site were the most prevalent local adverse effects [26], while only moderate systemic adverse effects occurred. Although inactivated vaccines are generally thought to be safe for use on a global scale, studies of inactivated vaccines against SARS-CoV (the initial SARS epidemic's causative agent) have shown that anti-viral IgG levels rapidly decline 16 months after inoculation, becoming specifically undetectable 3 years upon inoculation [16].

**3.** **Strategies for Covid-19 Vaccination Acceptance**

Vaccine hesitancy and refusal have emerged as major public health issues in several countries. 30 Due to some issues including dysfunctional and underfunded health systems, it is practically difficult to provide vaccines to individuals who need them, which has led to several significant measles outbreaks in low and middle-income countries (LMIC) [13]. Covid-19 has a high fatality rate and spreads quickly, thus a vaccination to stop it is desperately needed. This has led to unprecedented collaboration between academic institutions, private companies, and government agencies in the quest to rapidly develop and test new vaccines [14].

**4.** **Community engagement**

Perhaps there could be Greater confidence in COVID-19 vaccines is connected with clear, consistent, and open information about how vaccines are developed, how they work, their efficacy, and safety; efforts towards these may boost vaccine adoption [21, 22]. It was suggested that celebrities and other highly visible people be used to increase immunisation rates against COVID-19. Vaccine safety and effectiveness information should be disseminated with the help of health and scientific professionals [22]. In order to increase vaccination uptake, it was suggested that intensive campaigns be launched to address the risk perception of COVID-19 infection, as well as techniques that express the emotional and immediate economic benefits of the COVID-19 vaccine [6].

**Conclusion**

Despite substantial advancement and results obtained from vaccine trials, several barriers still exist, notably more severe logistical challenges involving massive manufacturing and distribution of millions or trillions of doses to the global population, which will likely represent the major problem. Some vaccines, like mRNAs, are very unstable when present at room temperatures or might need freezers, which are not always readily available in rural hospitals and medical centers far off from academic research institutions; non-refrigerated vaccine forms may be a more viable answer in these situations. Studies reveal high acceptability; localized initiatives based on larger trust-building and vaccine-delivery-system-strengthening actions are necessary to involve the community and resolve fears and misconceptions. This unique and fast-spreading viral virus has presented enormous problems, but the world has responded with a tremendous degree of scientific involvement and cooperation that will serve as a model for the upcoming pandemic situations in future.

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