ACTIVELINK HEALTH BULLETIN

Vaccine Newsletter

Issue 1 • May 2021

Vaccine development: What we know so far

More than a year into the pandemic, more questions arise about COVID-19 vaccines, "When am I getting my vaccine?" or "Why should I get vaccinated now?" We must keep in mind that vaccine development and approval is a very complex process.

Building immunity

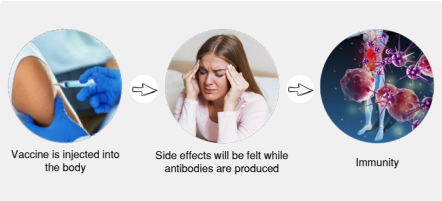
The immune system is our body's built-in defense against infections. It is a powerful army of cells that fights pathogens (e.g., bacteria, virus, parasite).

When pathogens enter the body, our immune cells work to recognize the pathogen and then fight off the invader. After this, the B-lymphocytes, or B cells, release **antibodies** that stay in our body in case it needs to fight the same pathogen again.

This is the reason why we get asked if we had chickenpox before: Someone who has previously had chickenpox will usually not get sick from it again, because a body that has seen and fought the chickenpox pathogen before is less likely to succumb to it a second time.

How vaccines protects us

Many vaccines use a weaker version of the pathogen. This weakened version triggers the immune system to produce components of the white blood cells (T-lymphocytes, or T-cells) and antibodies. However, this weaker version of the pathogen may cause minor side effects while the body starts to build immunity from the disease. Once the side effects pass, the body will have a blueprint of the T-cells and antibodies. The body is now trained to fight the actual disease once it enters the body.



Road to vaccine development

All medication, including vaccines, have adverse effects. For each individual, healthcare professionals determine whether the benefits of a medication outweigh the risks.

Healthcare professionals review the data from vaccine manufacturers to decide whether an individual can receive vaccines or not. But where does vaccine data come from? It comes from clinical trials, a.k.a., human studies.

COVID-19 VACCINE UPDATES as of MAY 1, 2021

284,553
Fully Vaccinated Filipinos

Total Vaccines with EUA
6

Vaccine Manufacturers
1. Pfizer-BioNTech COVID-19 Vaccine
2. AstraZeneca COVID-19 Vaccine
3. Sinovac CoronaVac COVID-19 Vaccine
4. Gamaleya Sputnik V COVID-19 Vaccine
5. Janssen (Johnson and Johnson) COVID-19 Vaccine
6. Bharat Biotech Whole Virion COVID-19 Vaccine

Average Daily vaccination
26,819 doses

Target Vaccinees to Achieve Herd Immunity
70M individuals
At this rate, the Philippines will achieve herd immunity by June 2035.

Ideal Daily Doses to Achieve Herd Immunity by 2021
587,484 doses

Clinic Trials

Clinical trials are being conducted to the highest standards of safety evaluation. It is during trials where scientists and professional look into the earliest possible issues of safety. This is why vaccines often take years to be developed, because scientists have to take all the required steps and trials to ensure that vaccines are safe and effective.

Prior to human trials, scientists conduct laboratory research and animal testing to know whether a drug is likely to be safe in humans. These tests are known as the pre-clinical phase.

Phase I focuses on safety in humans. Trials usually include 20–100 human participants who haven't been exposed to the disease. If there are no significant concerns in Phase 1, the trial will proceed to Phase 2.

In **Phase II**, vaccines are tested in over a hundred individuals with varying health conditions and demographics. The immune response from the vaccine is tested in larger numbers of people, to gather more data on the safety of vaccines.

Phase III is crucial in determining the safety and effectiveness of the vaccine. The vaccine is administered to many thousands of people.

Vaccines with clearance from Phase III then undergo approval and validation from government agencies such as the Food and Drug Administration (FDA) of the country where the vaccine is made. Once the vaccine has been cleared by the FDA, it will undergo the proper prescribing and labelling process to prevent errors in prescription and use.

When the vaccines have been properly labeled, then it is time to begin mass production, logistics planing, and immunization programs.

Emergency authorization

It is important that vaccines finish the Phase III trials, because this is when scientists assess efficacy and safety on a wide range of demographics. However, Phase III trials take a long time to finish, and in an emergency, the Phase III data may not be complete.

In this case, an Emergency Use Authorization (EUA) may be given, based on safety and efficacy data from the Phase II trials and, perhaps, early data from the Phase III trials still in progress.

It is important to note that, no matter how urgent a drug or diagnostic tool is, country agencies or authorities will not conduct assessment unless there is at least Phase II data on both efficacy and safety. No vaccine should be administered without at least an EUA.

A vaccine may apply for an EUA, provided that:

1. There is an outbreak, epidemic, or pandemic;
2. No existing products are able to prevent the disease;
3. The products or vaccines are compliant with Good Manufacturing Practices;
4. The applicant completes the development of the vaccine; and
5. Manufacturer applies for prequalification once granted with EUA.

Once these are satisfied, the applicant may proceed with the EUA process. EUA application and approval is a long and tedious process before a vaccine is authorized for emergency use in a country.

On December 14, 2020, the Philippines' FDA issued the "Guidelines on the Issuance of Emergency Use Authorization for Drugs and Vaccines for COVID-19." Vaccine manufacturers are required to follow these guidelines before they can distribute their vaccines for immunization programs.

Application requirements

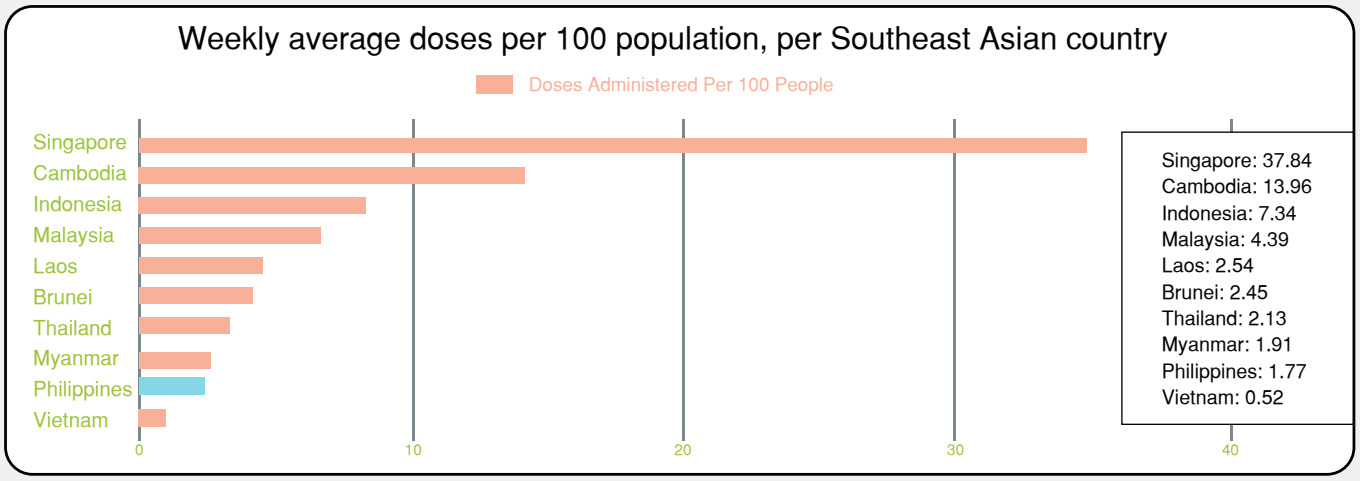
1. Cover letter with comprehensive discussion on the public health needs of the vaccine
2. Valid license to operate (LTO) as drug importer
3. Good manufacturing practice (GMP) certificate, with exclusive distributorship
4. List of countries where EUA is approved, including proof of approval
5. Reports on actual use from the EUA issuance of approving counterpart National Regulatory Authority (NRA)
6. Complete assessment report, including question and answer from the approving counterpart NRA
7. Clinical trial data and results with inclusion of racial distribution showing Filipino/Asians/Pacific Islanders
8. Currently available stability studies and list of ongoing studies
9. Risk management plan
10. Summary of product characteristics
11. Summary of lot protocol
12. Product labeling with minimum information:
    a. Name of vaccine
    b. Type of vaccine
    c. Method of administration
    d. Dose per vial
    e. Storage
    f. Batch or lot number
    g. Manufacturing and expiration dates
13. Undertaking by manufacturer to complete the drug and vaccine applied for an EUA

Once requirements are complete, an expert panel and the Center for Drug Regulation and Research (CDRR) will further review the application based on the requirements, while the expert panel comes up recommendations for the FDA Director General. During the review, the following must be determined:

a. The product is effective in preventing, diagnosing, or treating the disease based on the totality of evidence available;
b. The benefits of the product outweigh its risks.

Upon submission of the recommendations, the FDA Director General must provide their decision on whether to approve, disapprove, or terminate/suspend the EUA application.

Overall, the process of vaccines from development to emergency use takes a long time. But these steps are necessary to ensure the safety and quality of what goes into our body.



Source: Our World in Data, May 1, 2021

References:

1. Johns Hopkins University. The Immune System. Retrieved from https://www.hopkins-medicine.org/health/conditions-and-diseases/the-immune-system
2. Harvard School of Public Health. Nutrition and Immunity. Retrieved from https://www.hsph.harvard.edu/nutritionsource/nutrition-and-immunity/
3. National Human Genome Research Institute. Talking Glossary of Genetic Terms. Re-trieved from https://www.genome.gov/genetics-glossary
4. Centers for Disease Control and Prevention. About Parasites. Retrieved from https://www.cdc.gov/parasites/about.html
5. Centers for Disease Control and Prevention. Understanding How Vaccines Work (2018, July). Retrieved from https://www.cdc.gov/vaccines/hcp/conversations/downloads/vacsafe-understand-color-office.pdf
6. World Health Organization. Module 2: Types of vaccines and adverse reactions. Retrieved from https://www.who.int/vaccine_safety/initiative/tech_support/Part-2.pdf
7. US Food and Drug Administration. Vaccine Development 101. Retrieved from https://www.fda.gov/vaccines-blood-biologics/development-approval-process-cber/vaccine-de-velopment-101
8. Department of Health. FAQs: Emergency Use Authorization. Retrieved from https://doh.gov.ph/faqs/emergency-use-authorization
9. Food and Drugs Administration-Philippines. FDA Circular No. 2020-036 || Guidelines on the Issuance of Emergency Use Authorization for Drugs and Vaccines for COVID-19. Retrieved from https://www.fda.gov.ph/fda-circular-no-2020-036-guidelines-on-the-issu-ance-of-emergency-use-authorization-for-drugs-and-vaccines-for-covid-19/
10. Herd Immunity PH (herdimmunity.ph)
11. Our World in Data (ourworldindata.org)