

A(H1N1) 2009 Vaccine Production Process

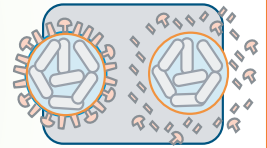
Virological Surveillance

- WHO^a reference laboratories around the world collect samples of wild influenza virus carried by humans and characterize its genetic makeup. The virus is continually monitored and closely tracked by health authorities.



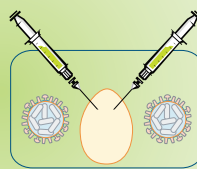
Strain Selection

- The Global Influenza Surveillance Network, under the aegis of the WHO, analyzes and identifies the dominant circulating strain.
- Selected viruses are consigned to accredited laboratories in charge of the preparation of seed viruses adapted to production.

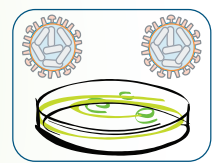


Preparation of Seed Virus

- Seed viruses are prepared by accredited laboratories using conventional reassortment or reverse genetics methods:
- Conventional reassortment - Two flu strains (the pandemic strain and a licensed laboratory strain) with the preferred features for a new vaccine are injected into an egg and the genes reassort naturally.



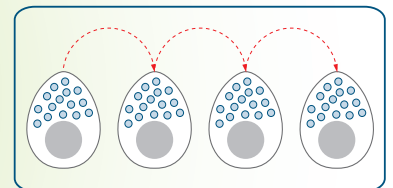
- Reverse genetics - A modern technique permitting the combination of certain genes from the pandemic virus with those of a licensed laboratory virus.



Seed Passaging and Selection

- Accredited laboratories distribute seed viruses to manufacturers to begin the production process.
- Once the seed viruses have been received, the working seed can be prepared by passaging the seed virus in eggs.

- These passages are necessary to determine the optimum growing conditions to improve virus yield in the industrial environment.



Large-scale production^{b,c}

- Millions of specially-prepared chicken eggs are used to produce the vaccine. Throughout the year, fertilized eggs are delivered to the manufacturer. Each egg is injected with the working seed.
- The eggs are incubated for several days to allow the virus to multiply. After incubation, the virus-loaded fluid is harvested.

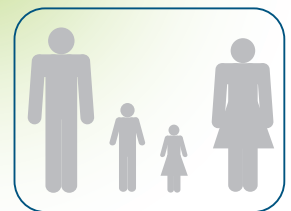


Clinical Trials

- A portion of the vaccine produced is used for clinical trials designed to demonstrate whether the vaccine meets expectations.
- Clinical trials may occur simultaneously with manufacturing.

Purification and Testing^{a,b}

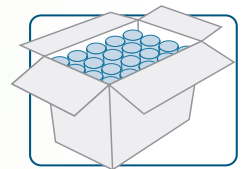
- Manufacturers test the vaccine concentrate using specially prepared reagents provided by WHO Collaborating Centers to measure the quantity of virus produced and guarantee the optimal dosage of ready to use vaccines.



Formulation, Filling and Packaging

- Quality control testing is done throughout the production process.
- Samples of each batch of vaccine are sent to national testing laboratories for official release.
- Manufacturers begin filling vials and syringes with doses of vaccine. These are then sealed

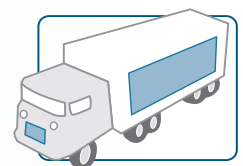
- and carefully inspected before being labeled. Each label indicates the batch, lot number and expiration date.
- Once the vaccine has been approved and licensed by the authorities, the manufacturer can ship the vaccine in time for the vaccination campaign.



Shipping

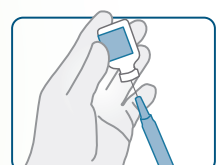
- Vaccine shipments take place over time as vaccine is produced.

- Health authorities determine the distribution process for public immunization campaigns.



Vaccination

- Health authorities establish recommendations and priorities for vaccination.



^aWorld Health Organization ^bTo ensure safety and purity, vaccine is produced in a clean, carefully controlled environment where quality control experts enforce strict standards, continuously monitoring the process. ^cThe majority of the time required for the phases of production and testing is dedicated to quality control and approval.