Disposable-Syringe Jet Injectors

Health need

According to the World Health Organization (WHO), reuse of contaminated needles and syringes, needlestick injuries among health workers, and threats to the community from improperly disposed of and potentially contaminated needles and syringes are serious health risks, spreading infection and diseases such as HIV and hepatitis.[1] Due to vaccine supply shortages, WHO has recommended delivery of fractional doses of inactivated poliovirus vaccine (fIPV) intradermally (into the top layer of the skin) to stretch vaccine supplies and reach more children. However, challenges with the conventional needle and syringe intradermal injection technique have limited adoption of fIPV.

Technology solution

Jet injectors deliver vaccines and medicines without using needles, producing no sharps waste. They generate a pressurized liquid stream that pushes through the skin to deliver injections directly into the tissue. First introduced in the 1940s, early model jet injectors were used for millions of injections—even helping to eradicate smallpox. More recently, disposable-syringe jet injectors (DSJIs) have been developed to prevent cross-contamination between patients. DSJIs require no change in vaccine formulation and can be filled from multi-dose and single-dose vials at the point of use. Some DSJIs deliver full doses of vaccines subcutaneously or intramuscularly. Other DSJIs are designed to deliver fractional, intradermal doses, which could facilitate fIPV delivery.

Current status and results

PATH has worked with several DSJI developers to advance designs that are suitable and affordable for routine and campaign immunization programs in low-infrastructure settings—assisting with design, regulatory advances, economic analysis, and clinical research. PATH has conducted user assessments of device prototypes in Brazil and India and suggested design adjustments based on user feedback, and has supported clinical research activities comparing DSJIs to traditional needles and syringes for the delivery of influenza, tuberculosis, inactivated poliovirus, measles, mumps, and rubella vaccines. DSJIs have been found to be very acceptable to health care workers and patients, and to reduce crying in infants after vaccination.

PATH helped to develop and finalize a WHO Performance, Quality and Safety specification and verification pathway for DSJIs, which resulted in the first WHO prequalification of a DSJI, the PharmaJet Stratis® device. The Stratis is currently licensed for delivery of influenza vaccine in the United States and for measles, mumps, and rubella vaccines in India. The PharmaJet Tropis® device is being advanced for intradermal delivery of fIPV.

1. World Health Organization (WHO). *WHO Guideline on the Use of Safety-Engineered Syringes for Intramuscular, Intradermal and Subcutaneous Injections in Health Care Settings.* Geneva: WHO; 2016. Available at http://apps.who.int/iris/bitstream/10665/250144/1/9789241549820-eng.pdf?ua=1.

PharmaJet

Needle-free immunization with a disposable-syringe jet injector.

"Needle-free delivery systems offer an answer to the problem of sharps in the vaccination programs. That is why WHO is so interested in this technology."

Dr. Roland Sutter of the World Health Organization and the Global Polio Eradication Initiative.

Availability

For more information regarding this project, contact Darin Zehrung at dzehrung@path.org.

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