Optimising Vaccine Supply Chain, Stockpiling and Procurement Efficiencies to overcome Shortages and Stockouts - Skin Vaccination to the rescue

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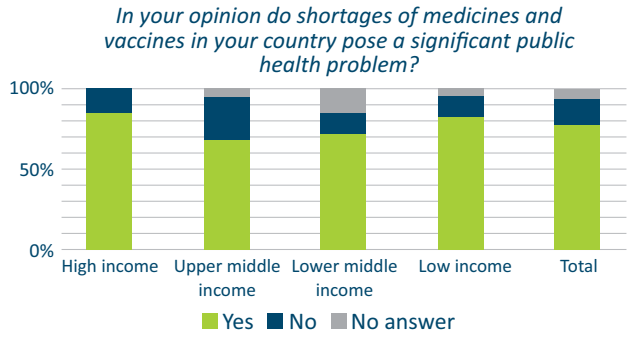
Introduction

Prophylactic vaccines are available for > 25 infectious diseases. Immunization has been shown to save 4-5 million lives per year. Yet still 20,5 million children are missing out on lifesaving vaccines globally. Latin America and the Caribbean records world's biggest drop in childhood vaccination over the past decade. The shortages as well as stockouts of vaccines are seen globally and impact access and quality of healthcare [1].



*On the supply side: A "**shortage**" occurs when the supply of medicines, health products, and vaccines identified as essential by the health system is considered to be insufficient to meet public health and patient needs*

*On the demand side: A "shortage" occurs when demand exceeds supply at any point in the supply chain and may ultimately create a "**stock out**" at the point of the appropriate service delivery to the patient if the cause of the shortage cannot be resolved in a timely manner relative to the clinical needs*

The 96th assembly of the World Health Organization (WHO) addressed this global shortage of medicines and vaccines and urged for a global reporting as well as prevention and mitigation measures, including (1) market visibility, (2) regulatory system strengthening and collaboration; (3) procurement and supply chain; (4) access to quality products [1].

Additionally, a pandemic like COVID-19 has proven that global capabilities of purchasing, stockpiling and distribution of healthcare products is limited. Considering pandemic preparedness, strengthening of effective and sustainable stockpiling of medical technologies at national and EU level is of critical importance [2].

> *"No one is safe until every one is safe*
>
> ***Dr Tedros Adhanom Ghebreyesus, WHO Director-General***

Supply Chain and Vaccines Procurement Challenges – Lessons learnt from COVID-19 and Mpox

The COVID-19 pandemic illustrated the challenges within current supply chain systems while also expediting the uptake of revolutionary technologies [3]. First we needed to find a vaccine, next we needed supply chain efforts to ensure sufficient availability. Also, the recent Mpox health emergency serves as a case example highlighting the importance of regulatory actions for optimizing the supply chain and associated availability and procurement of Mpox vaccine [4,5].

Intradermal vaccination, typically requiring only 20% of the vaccine dose, has the potential to enable the immunization of five times the number of individuals with the available limited stock. Notably, both FDA as well as EMA authorized the use of intradermal vaccination employing only one-fifth of the conventional Mpox vaccine dosage [4,5,6], based on the data by Frey et al. to resolve the ongoing health emergency and ensure vaccine availability for those at risk [7].

MedTech Advancement for Addressing Supply Chain and Immunization Challenges

Administering vaccine antigens to the dermal layers of human skin, commonly referred to as intradermal delivery or skin vaccination, has the potential to offer greater efficiency when compared to traditional muscle or subcutaneous injections [8]. This approach could result in reduced antigen quantities, a concept known as dose-sparing. Clinical trials have provided evidence supporting dose-sparing effects for several vaccines, e.g., HepB, Influenza, and more recently COVID [8].

Immunization initiatives could benefit from the dose-sparing potential of intradermal vaccination, including the possibility of lower expenses related to vaccine procurement, distribution, and storage. Additionally, it may lead to increased vaccine availability and enhanced effectiveness [8].

Notwithstanding the existing evidence of dose-sparing through skin vaccination, thereby facilitating the supply chain and procurement process, several gaps in our understanding and operational hurdles must be overcome to comprehensively harness the advantages of intradermal delivery [8].

Additionally, a solid combination of packaging and delivery technologies for vaccines can provide advantages to the immunization supply chain. These encompass innovative delivery methods, such as intradermal delivery devices [9].

VAX-ID®: Enhancing Supply Chain Efficiency and Standardizing Vaccine Delivery

VAX-ID® is an award-winning, patented intradermal drug delivery device renowned for its exceptional user-friendliness, standardization, consistency and reliability of injection at a controlled depth. VAX-ID® is used by administering the substance perpendicular to the skin by healthcare professionals [10].

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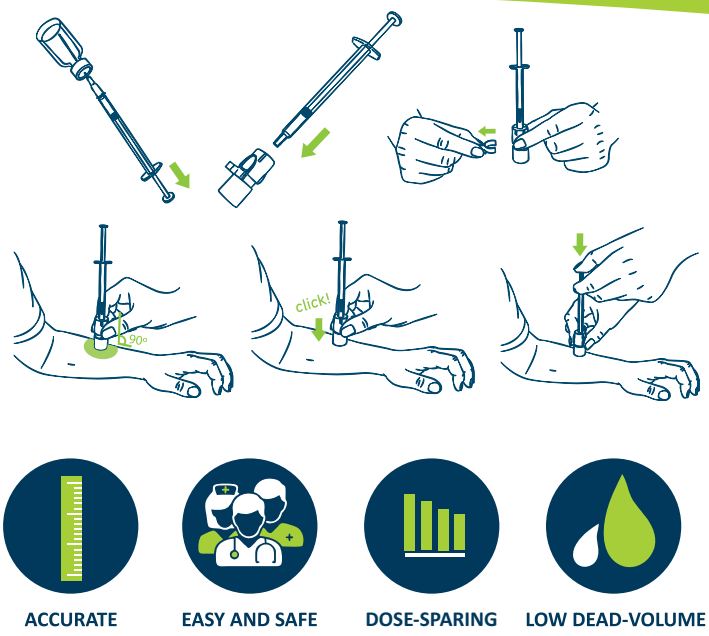


The device presents several advantages to the vaccine supply chain and procurement processes.

VAX-ID's intradermal delivery technique can offer the dose-sparing effect, which will significantly reduce the quantity of vaccine needed to achieve immunity, thus extending vaccine availability and reducing procurement costs.

Reduced vaccine quantities mean smaller storage and transportation requirements. This can lead to cost savings in terms of refrigeration, warehousing, and logistics. Additionally, the decreased vaccine volume can simplify transportation, making it easier to reach remote or underserved areas.

Traditional vaccine administration methods may result in leftover vaccine that cannot be re-used. VAX-ID's precision intradermal delivery minimizes vaccine wastage, contributing to more efficient resource utilization.

Lower vaccine requirements translate to reduced procurement expenses. Organizations and governments can allocate their budgets more effectively and potentially cover a larger population with the same resources.

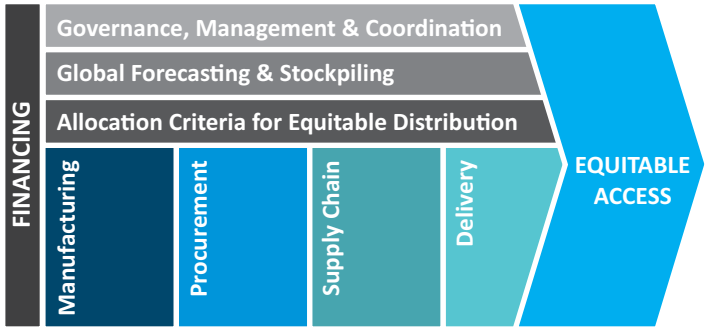
Medical Technology Stockpiling: A Critical Component for Streamlined Supply Chain and Procurement in Healthcare Emergencies

To achieve a successful and enduring strategy for stockpiling medical technologies, the primary emphasis should be on guaranteeing the accessibility of essential medical devices and services at unforeseen circumstances [2].

As per recommendation by MedTech Europe, a solution could be a mix between real and virtual stock (Stockpiling as a Managed Equipment Service). In this case, the equipment manufacturer would commit a minimal stock and be paid as a service to ensure the availability and maintenance of this stock [2].

For each unit taken out of the stockpile, the national healthcare system pays the difference between pre-agreed price and already paid subscription and a new unit will be added to the stockpile. On top, a retainer fee would give healthcare systems the right to a pre-determined number of units that could be delivered within a pre-determined timeline. This combination of a real minimal stock and a virtual, convertible stock would create a financially viable medical equipment subscription model [2].

Furthermore, the model could support delivering on the promise of the equitable access to vaccines [11].



Source: CGDEV.ORG [11]

VAX-ID® presents an excellent option for stockpiling, particularly in pandemic scenarios where the use of reduced-dose vaccines via the intradermal route is essential. Its versatility lies in its availability as a non-sterile device, which boasts a substantial shelf-life of 5 years. What makes VAX-ID® even more attractive for long-term stockpile planning is the fact that it can be (steam) sterilized at the end of the first 5 years, effectively doubling its shelf-life to a remarkable 10 years.

This extended shelf-life not only offers a cost-effective solution but also greatly contributes to the efficiency of supply chain management and the success of pandemic preparedness and readiness programs. With VAX-ID® in the stockpile arsenal, healthcare systems can be better equipped to meet the urgent needs of patients, ensuring a timely and robust response during health crises.

Conclusion

VAX-ID's intradermal vaccination technology offers the potential to revolutionize vaccine supply chain and procurement by conserving doses, increasing vaccine availability, optimizing storage and distribution, reducing waste, and ultimately enhancing the efficiency and effectiveness of vaccination programs.

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