World Health Organization

Target Product Profiles

Plague Vaccines

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Purpose of the TPP

Plague target product profile development followed the prioritization of plague as part of the WHO R&D Blueprint for Action to Prevent Epidemics

The target audience includes vaccine scientists, product developers, manufacturers and funding agencies.

All the requirements contained in WHO guidelines for WHO policy recommendations and prequalification will also apply.

The criteria below lay out some of the considerations that will be relevant in WHO's case-by-case assessments of plague candidate vaccines in the future.

None of the characteristics in the tables below dominates over any other.

Therefore, should a vaccine's profile be sufficiently superior to the critical characteristics under one or more categories, this may outweigh failure to meet another specific critical characteristic.

Vaccines which fail to meet multiple critical characteristics are unlikely to achieve favourable outcomes from WHO's processes.

TPP – Version 5.0 – April 2018

This version of TPP results from a consultation process with key stakeholders in public and animal health, scientific research, funding agencies, manufacturer communities, and policy-making bodies.

It is intended that it will guide and prioritize the development of vaccines.

As new scientific evidence is generated, this TPP may require further review and revision.

In the development of a Plague vaccine TPP, two scenarios were considered:

1. Non-emergency setting (preventive use):

- The vaccine is intended for the **protection of populations living in areas where Plague is endemic.**
- HCW at particularly high risk of plague due to their profession (i.e., HCW in endemic areas, laboratory personnel, deployed international HCWs) would also benefit from a preventive use vaccine.

2. Emergency setting (reactive/outbreak use):

- The vaccine is intended for protection of **at-risk persons in the area of an ongoing outbreak** for the prevention of plague as well as to interrupt chains of transmission and to terminate outbreaks.
- The use will be in populations experiencing an outbreak, and in populations at high risk for importation of plague cases from areas experiencing an outbreak.

	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Indication for use	For active immunization of **persons considered potentially at risk** to protect against plague. **Risk groups** will include communities in endemic areas and certain healthcare workers (HCWs in endemic areas, lab personnel, deployed international HCW).		For active immunization of at-risk persons **in the area of an on-going outbreak** to protect against plague; to be used in conjunction with other control measures to curtail or end an outbreak.	

	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Target population	All age groups Suitable for administration to pregnant and lactating women and to immunodeficient persons.	All age groups **excluding pregnant and lactating women and immunodeficient persons**	All age groups **excluding infants** Suitable for administration to pregnant and lactating women and to immunodeficient persons.	All age groups, **potentially excluding infants, pregnant and lactating women**, **and immunodeficient persons at the time of initial authorization** based on the safety profile of the vaccine in these special populations

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	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Safety/ Reactogenicity	Safety and reactogenicity at least comparable to WHO-recommended routine vaccines, ideally with only **mild and transient adverse events** related to vaccination and **no serious adverse events related to vaccination with the vaccine or vaccine platform**, including in individuals with compromised immune function or when administered in pregnancy	Safety and reactogenicity whereby vaccine **benefit** clearly **outweighs safety risks.**	Safety and reactogenicity **sufficient** to provide a **highly favorable risk-benefit profile**, ideally with only **mild and transient adverse events** related to vaccination and **no serious adverse events related to vaccination with the vaccine or vaccine-platform**, including in individuals with compromised immune function or when administered in pregnancy.	Safety and reactogenicity whereby vaccine **benefit** clearly **outweighs safety risks.**

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	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Measure efficacy	At least **80%** efficacy in preventing bubonic and pneumonic form of plague in the target population	At least **70%** efficacy in preventing bubonic and pneumonic form of plague in the target population	At least **80%** efficacy in preventing bubonic and pneumonic form of plague in the target population. **Rapid onset of protective immunity** (**less than one week**).	At least **70%** efficacy in preventing bubonic and pneumonic form of plague predicted and stop transmission in the affected population. **Rapid onset of protective immunity** (**less than 10 days**).

	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Dose regimen	**Single-dose** regimen highly preferred.	Primary series: **no more than 3 doses**, and with preference for **less than one-month interval between doses**.	**Single-dose** regimen highly preferred.	Primary series: **no more than 2 doses**, and with preference for **less than one-month interval between doses** and **good protection after the first dose**.

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	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Durability of protection	Confers long-lasting protection of **10 years or more** following the primary series and can be **maintained by booster doses**.	Confers protection of **at least 5 years** after primary series and can be **maintained by booster doses**.	Confers long-lasting protection of **2 years**.	Confers protection of **at least 1 year**.

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	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Route of Administration	Oral or non-parenteral route. A route compatible with use in routine immunization programs.	A route compatible with use in routine immunization programs. Where injection (IM, ID or SC) is required, using standard volumes for injection as specified in programmatic suitability for prequalification.	Oral or non-parenteral route. A route enabling **rapid mass administration**.	A route enabling **rapid mass administration**. Where injection (IM, ID or SC) is required, using standard volumes for injection as specified in programmatic suitability for prequalification.

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	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Coverage	Coverage against all plague strains.	Coverage against plague strains circulating in the endemic areas.	Coverage against all plague strains.	Coverage against the most common outbreak plague strains.

	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Product Stability and Storage	Ideally: stable at **room temperature for 2-3 years**. Shelf life of at least **5 years** at 2-8oC. Preferably thermostable at higher temperatures for several days. The need for a preservative is determined and any issues are addressed including absence of toxicity. Vaccine Vial Monitor (**VVM**): Proof of feasibility and intent to apply a VVM to the **primary container**.	Shelf life of at least **2 years** at **-20°C** and **6 months** at 2-8°C. The need for a preservative is determined and any issues are addressed including absence of toxicity. Vaccine Vial Monitor (**VVM**): Proof of feasibility and intent to apply a VVM to the **primary distribution container.**	Shelf life of **at least 5 years at 2-8°C.** Preferably thermostable at higher temperatures for several days. The need for a preservative is determined and any issues are addressed including absence of toxicity. Vaccine Vial Monitor (**VVM**): Proof of feasibility and intent to apply a VVM to the **primary container**.	Shelf life of at least **12 months** at **-20°C** and **1 month** at **2-8°C**. The need for a preservative is determined and any issues are addressed including absence of toxicity.

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	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Product Stability and Storage	Vaccines that are **not damaged by freezing** temperatures (<0°C) are preferred. Vaccines stable out of cold chain are preferred. If not, vaccines that can be delivered via the Controlled Temperature Chain are preferred		Vaccines that are **not damaged by freezing** temperatures (<0°C) are preferred. Vaccines stable out of cold chain are preferred. If not, vaccines that can be delivered via the Controlled Temperature Chain are preferred	

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	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Co-administration with other vaccines	The vaccine can be **co-administered** with other vaccines.	The vaccine will be given as a **stand-alone** product not co-administered with other vaccines	The vaccine will be given as a **stand-alone product** not co-administered with other vaccines.	

	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Presentation	If **oral** administration, **2-5 doses with a volume of 1-2 mL in plastic tubes**. If **injectable** administration, vaccine is provided as a **liquid product in mono-dose or multi-dose (2)** presentations with a **maximal** dosage volume of **0.5 mL**.	If oral administration, **2-5 doses with a volume of 1-2 mL in plastic tubes**. If **injectable** administration, vaccine is provided as a **liquid or lyophilized product in mono-dose or multi-dose (5-10)** presentations with a maximal dosage volume of **0.5 mL**.	If oral administration, **mono-dose presentation** in **plastic** tubes with a volume of **1-2 mL**; or **multi-dose** (10-20) with a **dropper** presentation with a maximal **dosage** volume of 0.05 mL (**1 drop**) or 0.1 mL (**2 drops**). If injectable administration, the route is SC/IM route in **10-dose presentation** with a volume of **0.5 mL**.	If oral administration, **mono-dose presentation** in **glass** vial with a volume of **1-2 mL** or **multi-dose** container with a **dropper** device with 10-20 doses. If injectable administration, vaccine is provided as a **liquid or lyophilized product in mono-dose or multi-dose (10-20)** presentations with a volume of **0.5 mL**.

	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Presentation	Multi-dose presentations should be formulated, managed and discarded in compliance with WHO's multi-dose vial policy.	Multi-dose presentations should be formulated, managed and discarded in compliance with WHO's multi-dose vial policy. If not supplied in a dual-barrel syringe, lyophilized vaccine will need to be accompanied by paired separate vials of the appropriate diluent.	Multi-dose presentations should be formulated, managed and discarded in compliance with WHO's multi-dose vial policy.	Multi-dose presentations should be formulated, managed and discarded in compliance with WHO's multi-dose vial policy. If not supplied in a dual-barrel syringe, lyophilized vaccine will need to be accompanied by paired separate vials of the appropriate diluent

	Preventive use		Reactive use	
Vaccine characteristic	Preferred	Critical or minimal	Preferred	Critical or minimal
Registration and Prequalification	Should be WHO pre-qualified according to the process outlined in Procedures for assessing the acceptability, in principle, of vaccines for purchase by United Nations agencies.		Should be WHO pre-qualified according to the process outlined in Procedures for assessing the acceptability, in principle, of vaccines for purchase by United Nations agencies	

THANK YOU

Link: https://www.who.int/publications/m/item/who-target-product-profile-for-plague-vaccines

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