VIPS VACCINE INNOVATION PRIORITISATION STRATEGY

VIPS Phase I executive summary: Freeze indicator on primary vaccine containers

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Gavi The Vaccine Alliance

World Health Organization

Bill & Melinda Gates foundation

PATH

unicef

Freeze indicator on primary vaccine containers

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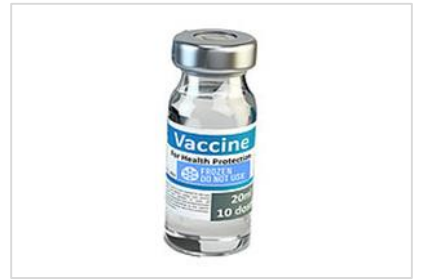
About Freeze indicator on primary vaccine containers

- Freeze indicators are labels that respond by changing color or activating alarm devices in case of exposure to freezing temperatures and that can be attached to a vaccine primary container.
- There are two types of freeze indicators:
  - **Electronic**, which are digital devices
  - **Chemical-based**
- The indicators are single-use only and are irreversible, so even if the surrounding temperature in which the vaccine is stored increases after a freezing event, the alarm or colour change on the freeze indicator will remain unchanged.

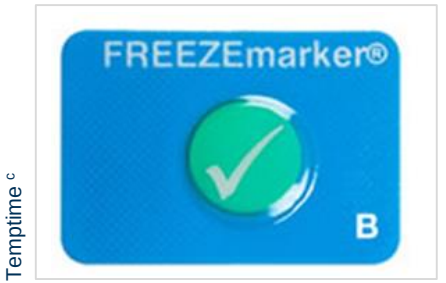
Tempmate [a]

Electronic device (Tempmate.®-i1)



C TI Links [b]

Freeze alert technology (BlindSpotzTM)



Temptime [c]

A self-adhesive label (Temptime FREEZEmarker®)

Stage of development

- Many freeze indicators are **commercially available**, however, some have **not yet been miniaturized** to make them suitable **for placement on a vaccine primary container.**

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[a] https://www.tempmate.com/wp-content/uploads/sites/2/tempmate-i1-Datasheet-EN.pdf
[b] https://www.ctiinks.com/blindspotz-freeze-alert
[c] http://temptimecorp.com/temperature-indicators-sensors/freeze-indicator/

Freeze indicator on primary vaccine containers scorecard

Comparator: No freeze indicator on the primary vaccine container and use of standalone freeze indicators and temperature monitoring devices

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Quality of evidence: Low to Moderate

VIPS Criteria		Indicators		Priority indicators - Country consultation		
				RI* Facility	RI* Community	Campaigns
Primary criteria	Health impact	Ability of the vaccine presentation to withstand heat exposure	Neutral	+	++	++
		Ability of the vaccine presentation to withstand freeze exposure	Neutral			
	Coverage & Equity impact	Ease of use [a]	Better	+	+	++
		Potential to reduce stock outs [b]	Better			
		Acceptability of the vaccine presentation to patients/caregivers	Neutral		+	+
	Safety impact	Likelihood of contamination	Neutral			+
		Likelihood of needle stick injury	Neutral			
	Economic costs	Total economic cost of storage and transportation of commodities per dose	Neutral	+		
		Total economic cost of the time spent by staff per dose	Neutral	++	++	+
		Total introduction and recurrent costs [c]	Neutral			
Secon-dary criteria	Potential breadth of innovation use	Applicability of innovation to one or several types of vaccines	All vaccines that are freeze-sensitive.			
		Ability of the technology to facilitate novel vaccine combination	No			

* RI : Routine immunisation

++	Given significantly more importance
+	Given more importance
	Kept neutral

[a] Ease of use can prevent missed opportunities and impact ability for lesser trained personnel to administer the vaccine, including self-administration
[b] Based on the number of separate components necessary to deliver the vaccine or improved ability to track vaccine commodities
[c] Total economic cost of one-time / upfront purchases or investments required to introduce the innovation and of recurrent costs associated with the innovation (not otherwise accounted for)

Freeze indicator on primary vaccine containers: Antigen applicability

- Freeze Indicator on primary vaccine containers **could be applied to all vaccines containing aluminum-salt adjuvant** and potentially to **other freeze-sensitive vaccines, such as IPV**.
- **Hepatitis B vaccine is an example** of a liquid freeze-sensitive vaccine, which includes an aluminum adjuvant.

Freeze indicator on primary vaccine containers:
Assessment outcomes

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KEY BENEFITS

- **Potential to positively impact coverage and equity:**

✚✚ May be **easier to use:**

  - **Less complex** than the comparator since user can examine the freeze indicator or assess freeze exposure on a primary container instead of a separate device, which is not attached to the vaccine and can be easily separated.

  - Potential to **reduce stock-outs:** as **the freeze indicator is attached to the primary container**, it tracks the freeze exposure of individual primary containers and there are **no additional components** (e.g., standalone freeze indicators or temperature monitors) **to track during stock management**.

- Freeze indicator could **prevent administration of freeze-damaged vaccines that are no longer potent**.

KEY CHALLENGES

- The temperature at which vaccines freeze is dependent on several factors, and **freezing doesn't necessarily equate to a complete loss of potency**. Freeze-indicators are **not able to account for all these complexities**, so thresholds will have to be conservative, and therefore likely to **result in undamaged vaccines being discarded.**

- There is **limited real estate on the vaccine primary containers to place a freeze indicator** given the existing VVM, labeling requirements, and barcodes (on some vaccines).

- **Limited applicability** to vaccines that are freeze-sensitive, due to the inclusion of an aluminum adjuvant and potentially vaccines with epitopes that are freeze-sensitive.

✚✚ Important attribute for at least 2 settings or for the 3 settings based on the country consultation (see slide 3)

✚ Important attribute for campaigns or routine facility-based immunisation based on country consultation (see slide 3)

Freeze indicator on primary vaccine containers: Rationale for prioritisation

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- Freeze indicator on primary vaccine containers are **not recommended to be prioritised** for further analysis under Phase II.
- Freeze indicators on vaccine primary containers, like the comparator ‘standalone freeze indicators’, provide a **single benefit in signaling freeze exposure**, yet are **unlikely to be accurate indicators of freeze-damage**.
- In addition, besides standalone freeze indicators and temperature monitoring devices, **other mechanisms are increasingly used to monitor or protect vaccines from freeze damage** including the shake test, cold chain equipment with improved temperature control, freeze-resistant vaccine formulations, and freeze-protective vaccine carriers and cold boxes.