VIPS Phase I executive summary: Barcodes

June 2019
Barcodes

About Barcodes

- Barcodes are symbols that **encode information** such as **product numbers, serial numbers, supplier data, batch numbers and expiry dates** which can be scanned electronically using two dimensional (2D) scanners, laser or mobile device cameras to automatically capture information.

- Barcodes **enable tracking and monitoring of vaccine products** in supply chains, providing information to manufacturers, transport providers, health facilities and other relevant parties involved in the logistics management systems, assuming the supporting infrastructure is in place.

- 2D barcodes can hold a significant amount of information and there is a possibility to automatically import data into patient electronic medical records (EMRs).

- This assessment is based on barcode placement on vaccine primary and higher packaging levels.

Stage of development

- 2D Barcodes are **commercially available and pilots have been introduced** in a number of countries.

- **WHO currently recommends GS1 compliant barcodes for secondary and tertiary packaging** of vaccines containing the Global Trade Item Number (GTIN), vaccine expiry date and vaccine batch/lot number. **This recommendation is anticipated to soon become a critical characteristic necessary for WHO prequalification.**
### Barcodes scorecard

**Quality of evidence: Low to moderate**

<table>
<thead>
<tr>
<th>VIPS Criteria</th>
<th>Indicators</th>
<th>Comparator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Health impact</strong></td>
<td>Ability of the vaccine presentation to withstand heat exposure</td>
<td>Neutral</td>
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<tr>
<td></td>
<td>Ability of the vaccine presentation to withstand freeze exposure</td>
<td>Neutral</td>
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<tr>
<td></td>
<td>Ease of use (^1)</td>
<td>Worse</td>
</tr>
<tr>
<td></td>
<td>Potential to reduce stock outs (^2)</td>
<td>Better</td>
</tr>
<tr>
<td></td>
<td>Acceptability of the vaccine presentation to patients/caregivers</td>
<td>Better</td>
</tr>
<tr>
<td><strong>Coverage &amp; Equity impact</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Likelihood of contamination</td>
<td>Neutral</td>
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<td></td>
<td>Likelihood of needle stick injury</td>
<td>Neutral</td>
</tr>
<tr>
<td><strong>Safety impact</strong></td>
<td>Total economic cost of storage and transportation of commodities per dose</td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td>Total economic cost of the time spent by staff per dose</td>
<td>Better</td>
</tr>
<tr>
<td></td>
<td>Total introduction and recurrent costs (^2)</td>
<td>Worse</td>
</tr>
<tr>
<td><strong>Economic costs</strong></td>
<td>Applicability of innovation to one or several types of vaccines</td>
<td>All vaccines are candidates.</td>
</tr>
<tr>
<td></td>
<td>Ability of the technology to facilitate novel vaccine combination</td>
<td>No</td>
</tr>
</tbody>
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**Primary criteria**

- **Health impact**
- **Coverage & Equity impact**
- **Safety impact**
- **Economic costs**

**Secondary criteria**

- **Potential breadth of innovation use**

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\(^1\) Ease of use can prevent missed opportunities and impact ability for lesser trained personnel to administer the vaccine, including self-administration

\(^2\) Based on the number of separate components necessary to deliver the vaccine or improved ability to track vaccine commodities

\(^2\) 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)

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<table>
<thead>
<tr>
<th>Priority indicators - Country consultation</th>
<th>RI* Facility</th>
<th>RI* Community</th>
<th>Campaigns</th>
</tr>
</thead>
<tbody>
<tr>
<td>RI*</td>
<td>+</td>
<td>++</td>
<td>+</td>
</tr>
<tr>
<td>Comparator</td>
<td></td>
<td></td>
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</tbody>
</table>

* RI : Routine immunisation

- ++ Given significantly more importance
- + Given more importance
- Kept neutral
**Barcodes: Assessment outcomes**

### KEY BENEFITS

- **Potential to positively impact coverage and equity:**
  - Potential to *reduce missed opportunities* by *improving the quality and accuracy of immunisation data* for patient vaccination records and surveillance.
  - Potential to *increase acceptability* by *improving patient safety* in terms of reducing errors for vaccine administration and timeliness/accuracy of documentation of data in health records.
  - May *reduce stock-outs*: Integration of barcodes on primary packaging could *improve traceability* of vaccine commodities in supply chains, *increase efficiencies in stock management*.
  - **Potential to save healthcare worker time:** By capturing key vaccine product information quickly and without error and reducing immunisation documentation time.

- **Antigen applicability:**
  - Barcodes could be *applied to all vaccines*, there are *no restrictions based on technical feasibility*.

### KEY CHALLENGES

- **Rated lower than the comparator on some aspects of coverage and equity:**
  + May reduce *ease of use* due to *additional equipment necessary for capturing and processing data* (e.g. reader for scanning barcodes) and *increased number of steps and complexity* compared to having no barcoding system.

- **One-time upfront costs and recurrent costs:**
  - Increased resources and equipment are required, including scanners, software, computers and network connectivity, and integration with electronic data capture systems.

- **Some of the benefits of barcodes may not be realised unless the country has implemented electronic data capture systems for recording vaccinations or for tracking adverse events.**

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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)
Barcodes: Rationale for prioritisation

- Barcodes are **recommended to be prioritised for further analysis under Phase II** given their supply chain and patient record-keeping benefits and broad applicability to all vaccines.

- Additional considerations include WHO’s current recommendations for barcodes on secondary and tertiary packaging, UNICEF’s interest, existing country interest, technology availability, and the need for barcode standardisation on vaccine products.

- While the use of barcodes requires equipment and resources, countries can chose to make such investments (or not) within their own timeframes.

Additional important information to be analysed in phase II (if prioritised for Phase II):

- Barcodes should be evaluated alongside Radio Frequency Identification (RFIDs) in Phase II.

- Appropriate mechanisms to move barcode implementation forward for vaccines given the current lack of global coordination.