Impact of Vaccine Vial Monitors (VVM) in LMICs

25 Years of Supporting Vaccine Rollout with Tailored VVM Types; ready for Regional Vaccine Production

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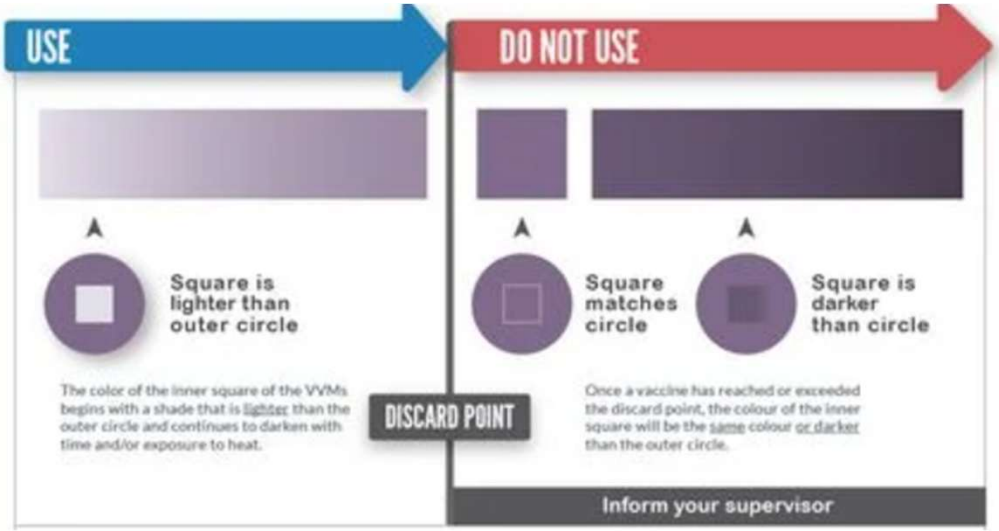
What are VVMs?

Heat-sensitive sensors attached to vaccine vials
Change color based on heat exposure, cumulatively and irreversibly

Their Purpose:
Indicate if vaccines were exposed to excessive heat



Please have a good look at WHO's info graphic on how to use the VVM - there will be a quiz in the second half of this presentation

The Need for VVMs in Global Vaccination Efforts

1974 during a Tanzanian Measles Campaign, John Lloyd & James Cheyne observed unexpected measles disease, in both vaccinated and un-vaccinated children. The suspect was heat damaged vaccine

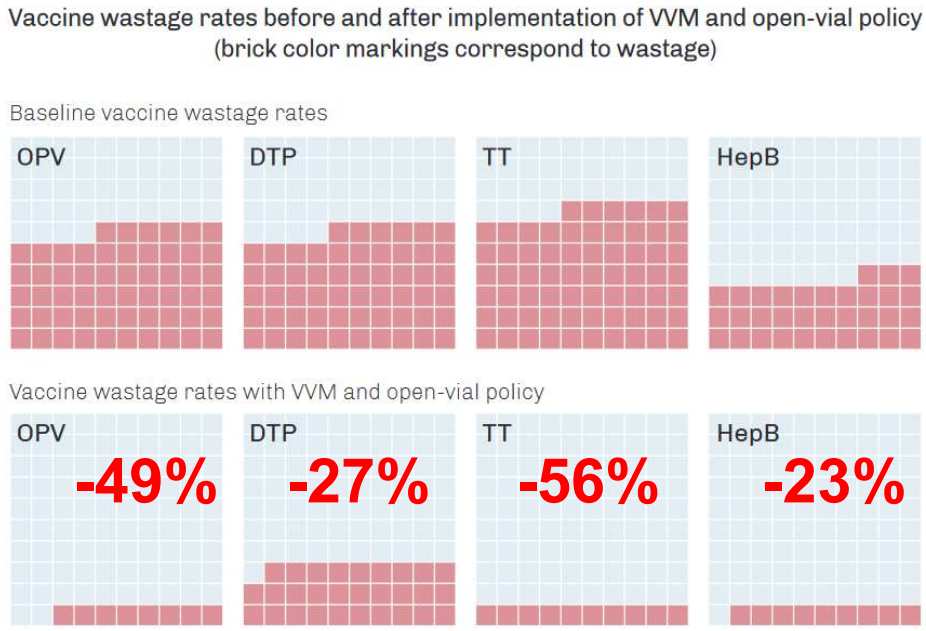
- John Lloyd (and others) became champions in finding a solution
- 22 years later (1996) the first ever vaccines were delivered with VVMs
- The development was led by WHO, PATH and Temptime, now Zebra
- The development is a case study in innovation in public health

The Impact of VVM

The VVM was a Success:

- Help ensured vaccine potency in remote areas
- Allowed campaigns in extreme conditions
- Enable vaccines to be stored longer
- Reduced vaccine wastage from unnecessary discarding (Bhutan study)

In 2001, WHO mandated VVM and in 2003 Gavi followed suit



Bhutan study: Nov-1988, PATH, funded by WHO

VVM mandated for all WHO PQd vaccine programs

World Health Organization

Gavi The Vaccine Alliance

Vaccines have specific (inherent) stability profiles and VVMs have to be made available in different types (or categories), to match them

Look at the text (outside or inside reference ring) there is number

VVM2

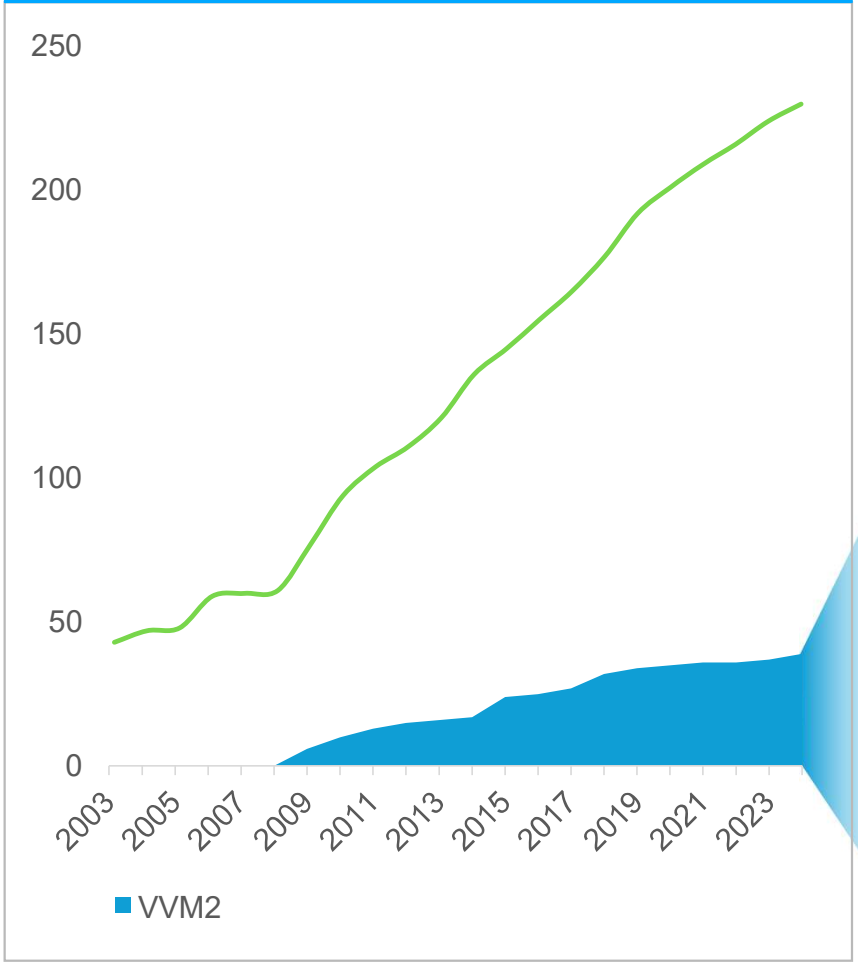
For highly heat labile vaccines, reaches discard point in 2 days at 37^{O}C

VVM14

Medium stable vaccines , reaches discard point in 14 days at 37^{O}C

And so on….

WHO PQd vaccines by VVM Type



VVM2 is used on Highly heat labile OPV, as well as 1 Rota, several Flu and the latest Dengue vaccine.

tOPV

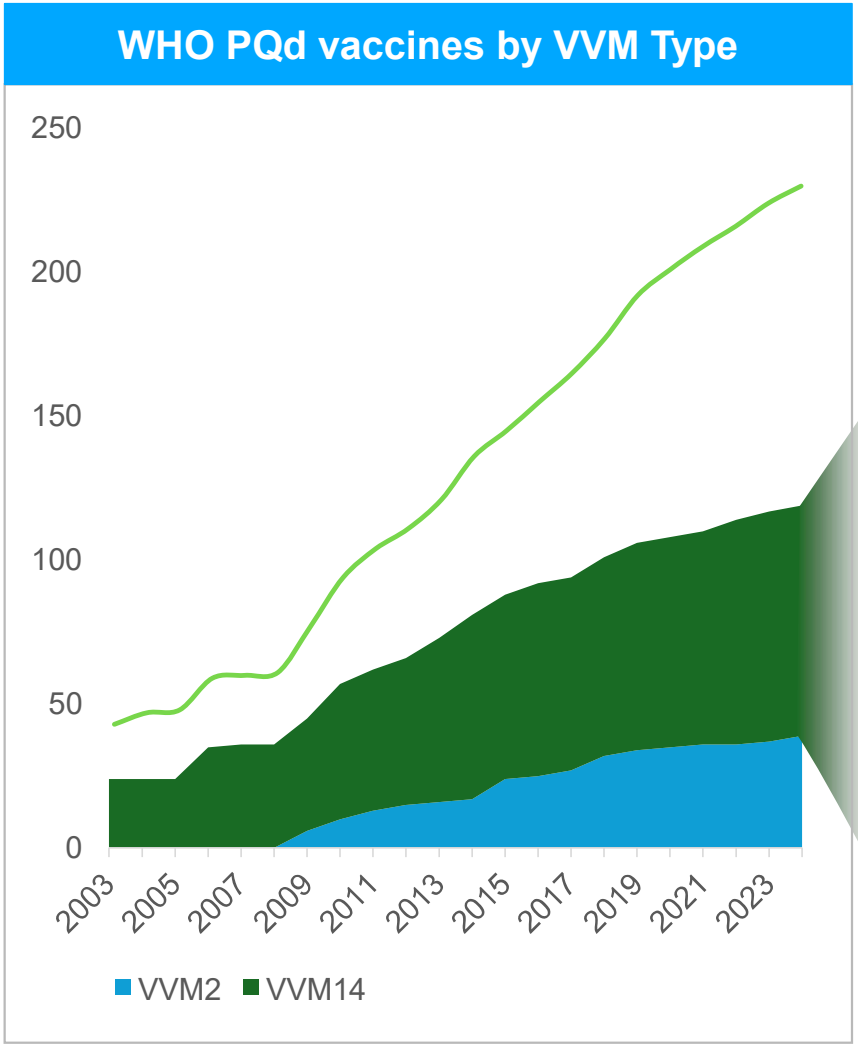
mOPV1

bOPV1&3

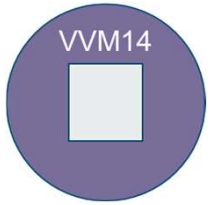
nOPV2

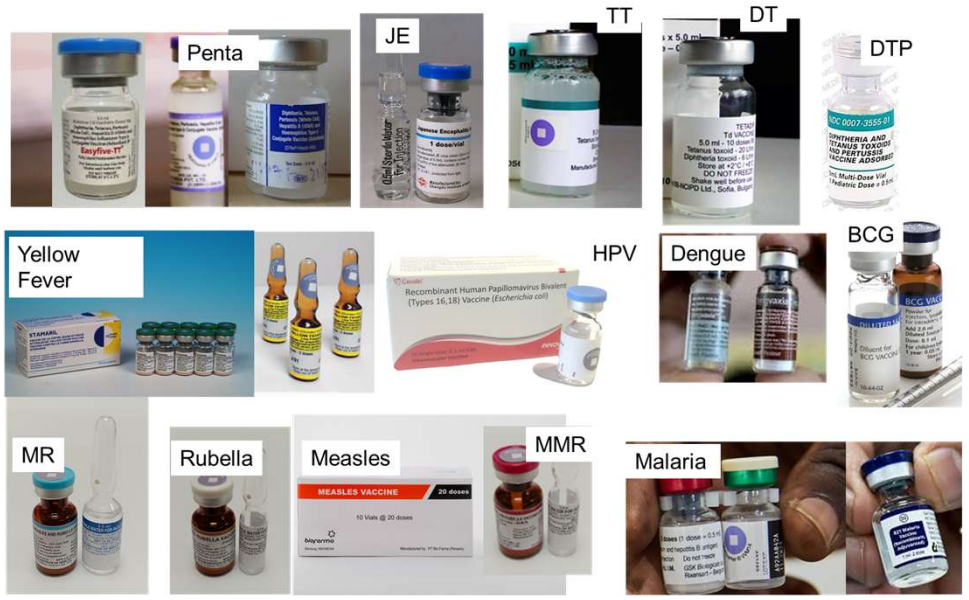
Dengue (Takeda)

WHO PQd vaccines by VVM Type

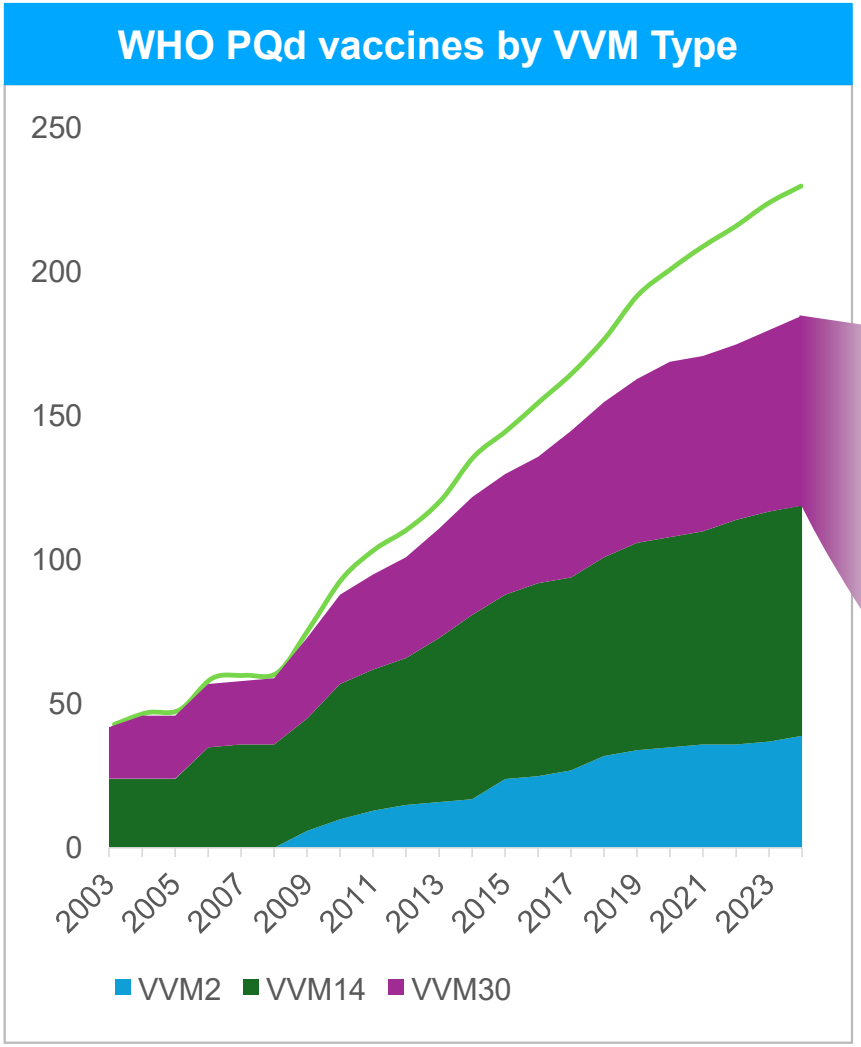


VVM14 is found on medium stability DTP containing vaccines including penta, the lyo vaccines: JE, YF & BCG, Dengue, MR containing and the 2 new Malaria vaccines.

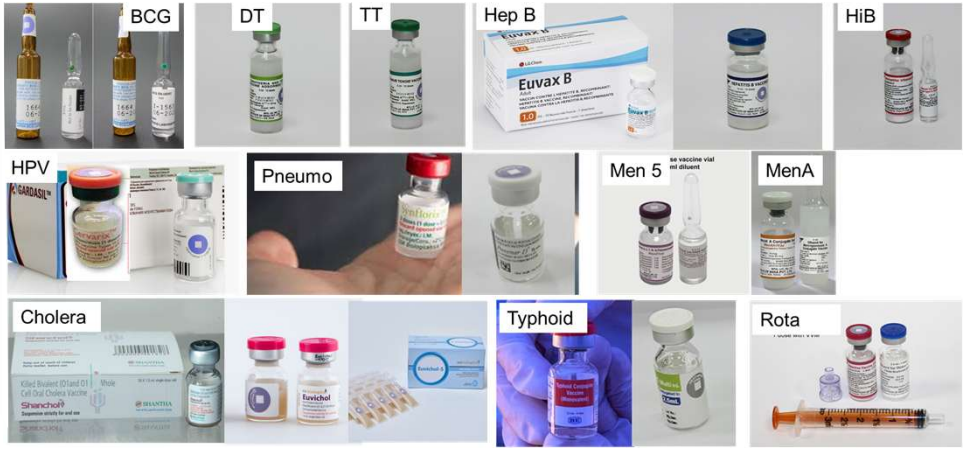




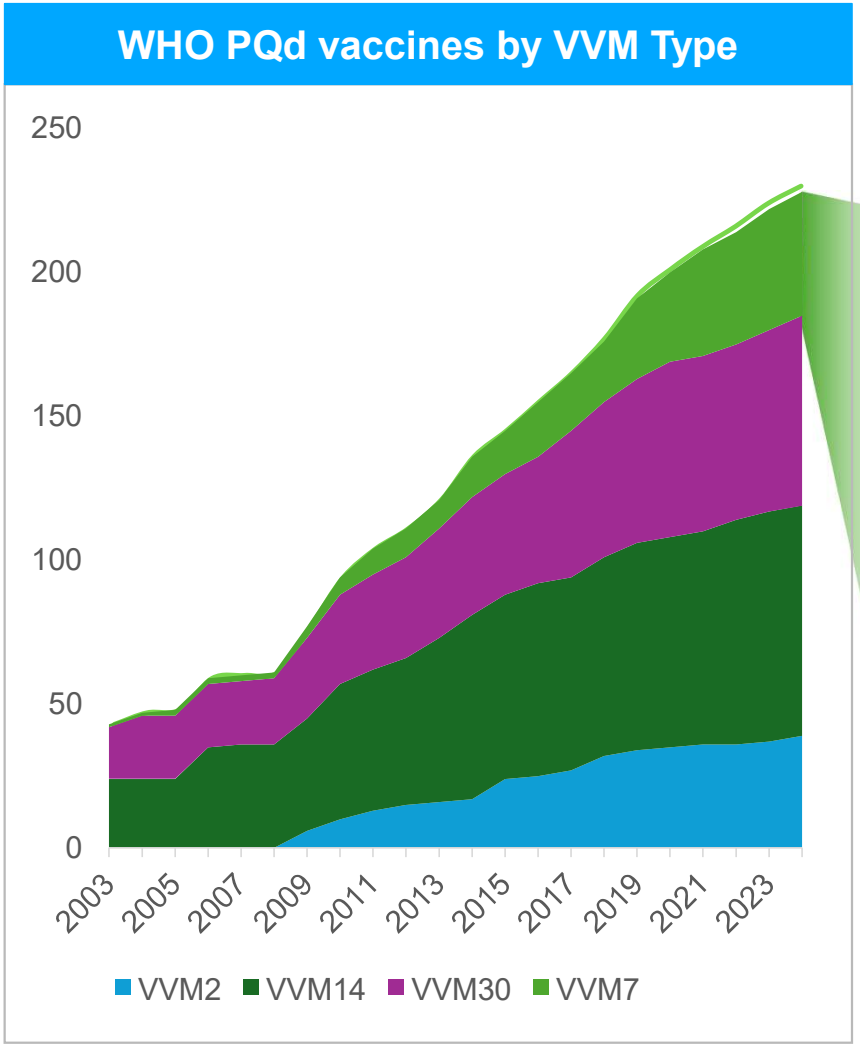
WHO PQd vaccines by VVM Type



VVM30, is used on high stability BCG, DT, TT, HepB, HPV, all the conjugate vaccines, Hib, Pneumo, Men5/MenA, Typhoid as well as Cholera, and Rota

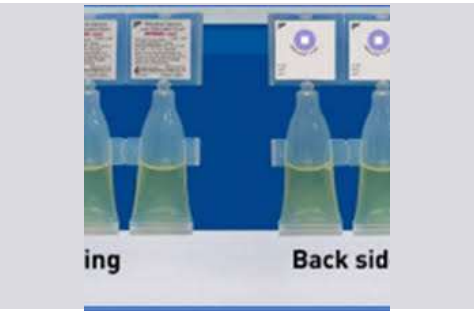


WHO PQd vaccines by VVM Type



VVM7: used for Moderate stability vaccines IPV, Flu and Rota. One of the new Hexavalent vaccines also has it.

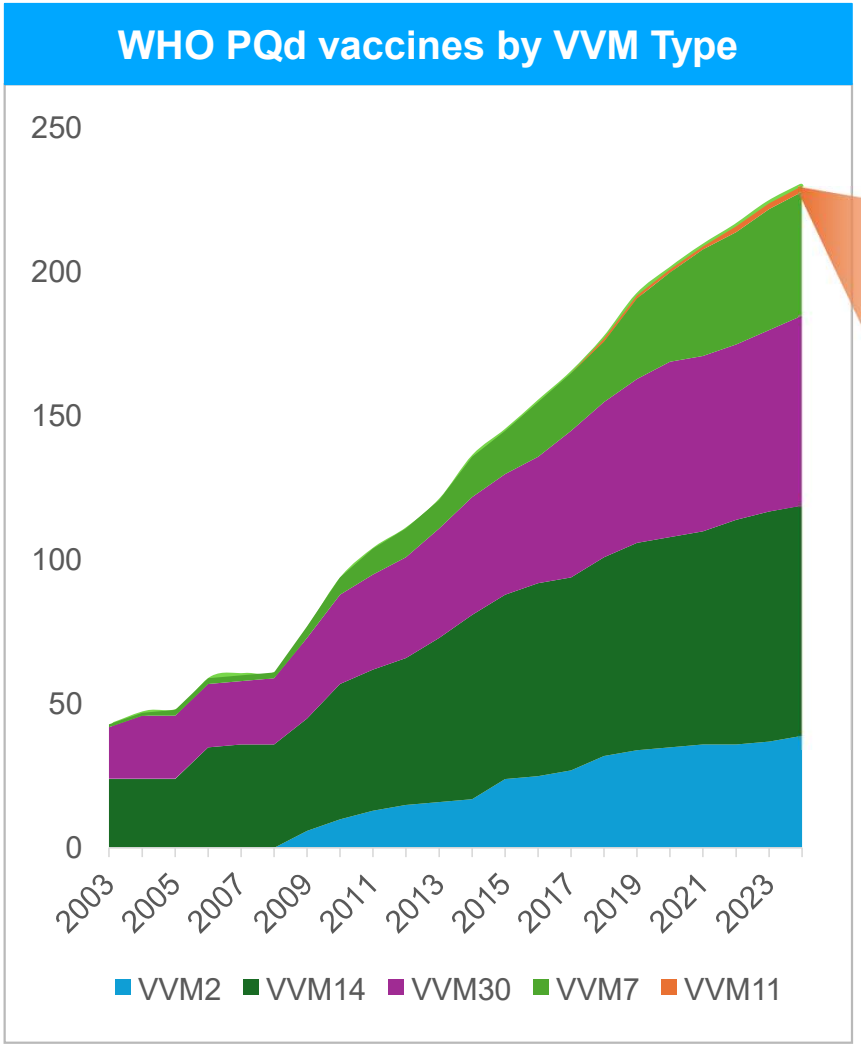
Inactivated Polio Vaccines



Rota

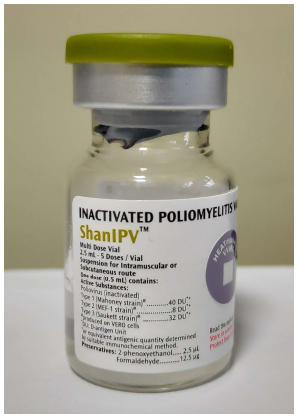
New Hexavalent

WHO PQd vaccines by VVM Type



VVM11, made for one IPV vaccine and also the other Hexavalent just prequalified in 2024.

HEATmarker® VVM11



IPV

Hexavalent

What about the future for VVMs:

New Technologies:

- VVMs for mRNA vaccines (heat labile vaccines needing UCC storage)

VVM1
VVM0.5
VVM0.25

- VVMs for heat stable vaccines, to be used in the last mile without cool packs, in controlled temperature chain – called VVM+

- Digital monitoring systems (making use of the VVM chemistry impregnated into bar codes)

Ready to support regional vaccine manufacturers

VVM is applied to caps, vials, ampoules, and tubes (plastic)

- Provide engineering support to fill finish lines
- Provide training on receipt and storage of VVM shipments
- Facilitate procurement of qualified densitometers used for Quality Control
- Verify vaccine label artwork allow for VVM positioning
- Consult on labeler equipment parameters to ensure VVM application can be performed at speed

Ready to support regional vaccine manufacturers

- Welcome to our New Jersey, USA facility for business reviews and Quality audits
- We stand ready to support regional vaccine producers

Conclusion

- VVMs facilitated vaccine rollouts
- Reduced wastage and expanded coverage
- Supporting future vaccine introductions