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NUVA
Unified Nomenclature of Vaccines
Concept of valence

vaccine safety net
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Prix Galien International Vaccine Codes

Definitions

VACCINE

ANTIGEN

Vaccine

A vaccine is an antigenic preparation, either similar to or derived from a pathogen, or composed of genetic material encoding the target antigen. It is administered to an individual to elicit a specific and active immune response that protects against the natural disease caused by the corresponding pathogen.

International Vaccine Codes

Antigen

An antigen (“antibody generator”) is any substance or molecule that is recognized by the immune system as foreign or potentially harmful, triggering an immune response. When an antigen enters the body, it stimulates the production of specific antibodies or activates immune cells to neutralize or eliminate the threat.

International Vaccine Codes

The concept of valence

Immunisation Schedule 2025, France

Vaccins contre :	*Naissance*	*2 mois*	*3 mois*	*4 mois*	*5 mois*	*6 mois*	*11 mois*	*12 mois*
Diphtérie (D), Tétanos (T), coqueluche acellulaire (Ca), Poliomyélite (P)		DTCaP		DTCaP			DTCaP	
Haemophilus influenzae b (Hib)		Hib		Hib			Hib	
Hépatite B (Hep B)		Hep B		Hep B			Hep B	
Pneumocoque (PnC)[1]		PnC		PnC			PnC	
Rotavirus		Rota	Rota	+/- Rota[2]				
Méningocoque B[3]			MnB		MnB			MnB
Méningocoque ACWY (vaccin conjugué)						MnACWY		MnACWY
Rougeole (R), Oreillons (O), Rubéole (R)[4]								ROR 1

DTCaP = DTaP-IPV
PnC = PCV
ROR = MMR

MnACWY = MenACWY-CRM or MenACWY-TT
MnB = MenB-4C or MenB-FHbp

International Vaccine Codes

Immunisation Schedule, USA

COVID-19 vaccine	1vCOV-mRNA	Comirnaty/Pfizer-BioNTech COVID-19 Vaccine
		Spikevax/Moderna COVID-19 Vaccine
	1vCOV-aPS	Novavax COVID-19 Vaccine
Dengue vaccine	DEN4CYD	Dengvaxia
Diphtheria, tetanus, and acellular pertussis vaccine	DTaP	Daptacel Infanrix
Haemophilus influenzae type b vaccine	Hib (PRP-T) Hib (PRP-OMP)	ActHIB Hiberix PedvaxHIB
Hepatitis A vaccine	HepA	Havrix Vaqta

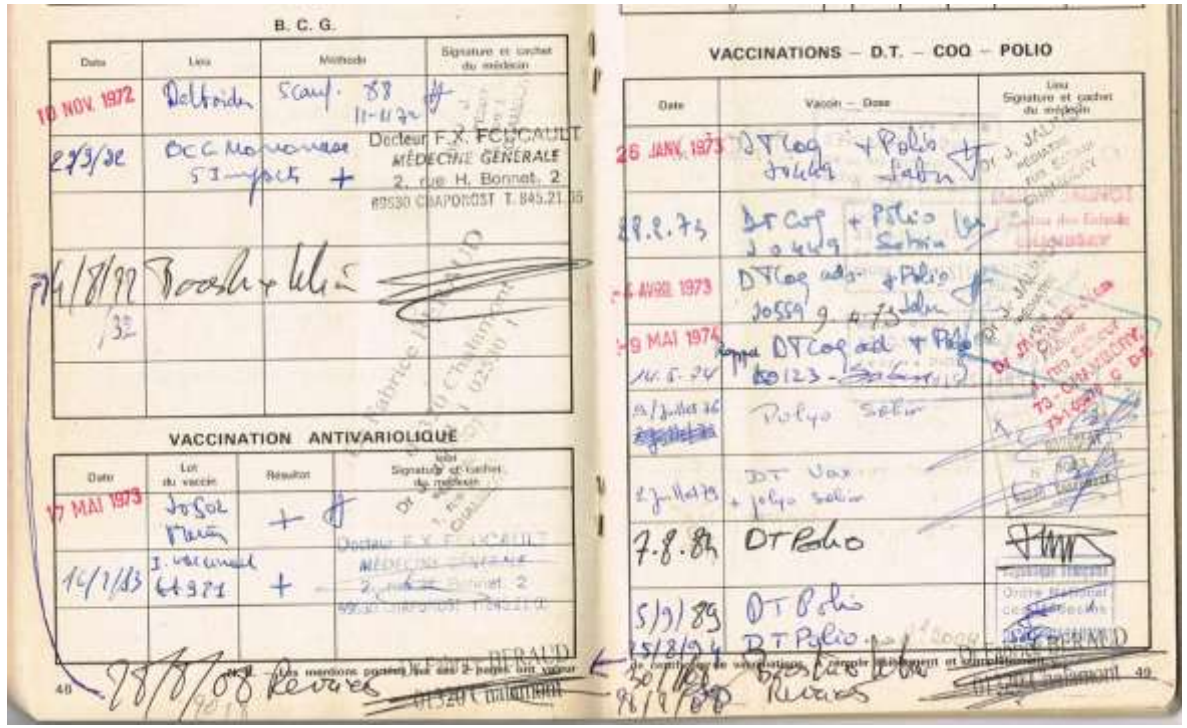
International Vaccine Codes

Vaccine scheduler, ECDC (Poland)

	Birth	Months								Years					
		2	3	4	5	6	7	13-15	16-18	5	6	10	12-13	14	18
Coronavirus disease (COVID-19)										COVID-19					
tuberculosis	BCG[3]														
rotavirus infection		ROTA													
diphtheria		D	D		D				D		D			d	
tetanus		TT	TT		TT				TT		TT			TT	
pertussis		wcP[4]	wcP[4]		wcP[4]				wcP[4]		acP			acp	
poliomyelitis		IPV	IPV		IPV				IPV		IPV				
Haemophilus influenzae type b infection		Hib	Hib		Hib				Hib						

International Vaccine Codes

Vaccine records

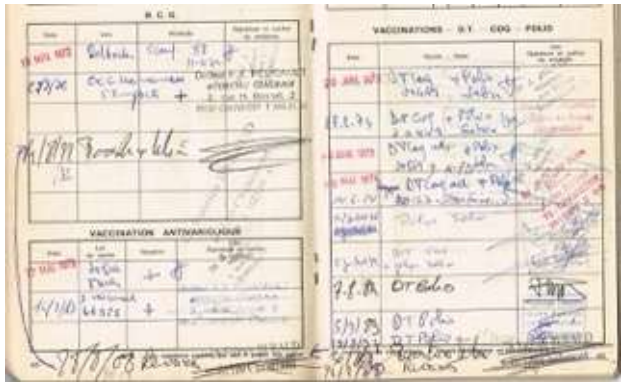


External Codes

30010001	30010146
30010015	30010155
30010027	30010169
30010042	30010174
30010058	30010188
30010073	30010203
30010084	30010217
30010096	30010226
30010107	30010239

International Vaccine Codes

From Raw Codes to Immunisation Decisions via Valence Interpretation



External Codes

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30010096	30010226
30010107	30010239

Valence-based interpretation engine

- Vaccine status
- Decision

International Vaccine Codes

Valence concept in NUVA: an Operational Objective

- The valence is the smallest functional unit of a vaccine, knowledge of which is necessary and sufficient to assess an individual's immunisation status against a specific infectious agent (or a subspecies thereof) and to plan the next vaccine dose, if appropriate.
- A valence represents an antigen, or a relevant group of antigens, that is specific to a given target infectious agent or subspecies (such as serotypes or shared proteins).

The concept of valence in NUVA was primarily introduced to facilitate and standardise the interpretation of vaccine histories by a vaccine decision support system, regardless of how the recorded vaccines are designated.

International Vaccine Codes

Valence in NUVA – Example : BEXSERO

- This vaccine contains 4 antigens
  - Recombinant Neisseria meningitidis group B NHBA fusion protein
  - Recombinant Neisseria meningitidis group B NadA
  - Recombinant Neisseria meningitidis group B fHbp fusion
  - Outer membrane vesicles (OMV) from Neisseria meningitidis group B

- This vaccine has one valence in the NUVA representation
  - 4CMenB: Four-component Meningococcal Group B Vaccine

International Vaccine Codes

Why does the valence not coincide with the antigens in this case?

Because precise knowledge of the four different antigens in this vaccine does not impact the evaluation of the immune protection of the person who received it, nor does it affect the determination of the next dose to be administered..

International Vaccine Codes

Valence label

401 | EJ-I-Vero-3

Japanese encephalitis valence, Inactivated, Whole-virion, Derived from Vero cells, 3 µg

379 | COVID-mRNA-S-OMI-JN.1-30

COVID-19 valence, Omicron variant JN.1, mRNA based, Encoding SARS-CoV-2 spike protein, 30 µg

- ✓ Name of the disease or target microorganism
- ✓ More info on the target
- ✓ Vaccine type 1
- ✓ Vaccine type 2
- ✓ Vaccine type 3
- ✓ Dosage

International Vaccine Codes

The valence concept allows:

- To identify equivalent vaccines
- To interpret combined vaccines and calculate dose rank
- To take into account the level of information available
- To make decisions, either manually or with the help of a decision support system

International Vaccine Codes

Decomposition of Vaccines into Valences

Vaccines received:

01/02/2022 : BOOSTRIXTETRA

01/04/2022 : REVAXIS

Disease	Valence	No.
Pertussis	ap	1
Diphtheria	d	2
Tetanus	T	2
Polio	IPV	2

International Vaccine Codes

Antigen comparison

VAXELIS

- Diphtheria Toxoid: ≥ 20 IU
- Tetanus Toxoid: ≥ 40 IU
- Bordetella pertussis antigens:
  - Pertussis Toxoid (PT): 20 µg
  - Filamentous Haemagglutinin (FHA): 20 µg
  - Pertactin (PRN): 3 micrograms
  - Fimbriae Types 2 and 3 (FIM): 5 µg
- Hepatitis B surface antigen: 10 µg
- Poliovirus (Inactivated)
  - Type 1 (Mahoney): 40 D antigen units
  - Type 2 (MEF-1): 8 D antigen units
  - Type 3 (Saukett): 32 D antigen units
- Haemophilus influenzae type b polysaccharide:
  - Polyribosylribitol Phosphate: 3 µg
  - Conjugated to meningococcal protein: 50 µg

HEXYON

- Diphtheria Toxoid: ≥ 30 Lf
- Tetanus Toxoid: ≥ 10 Lf
- Bordetella pertussis antigens:
  - Pertussis Toxoid (PT): 25 µg
  - Filamentous Haemagglutinin (FHA): 25 µg
- Hepatitis B surface antigen: 10 µg
- Poliovirus (Inactivated)
  - Type 1 (Mahoney): 29 D antigen units
  - Type 2 (MEF-1): 7 D antigen units
  - Type 3 (Saukett): 26 D antigen units
- Haemophilus influenzae type b polysaccharide:
  - Polyribosylribitol Phosphate: 12 µg
  - Conjugated to Tetanus protein: 22-36 µg

Valence comparison

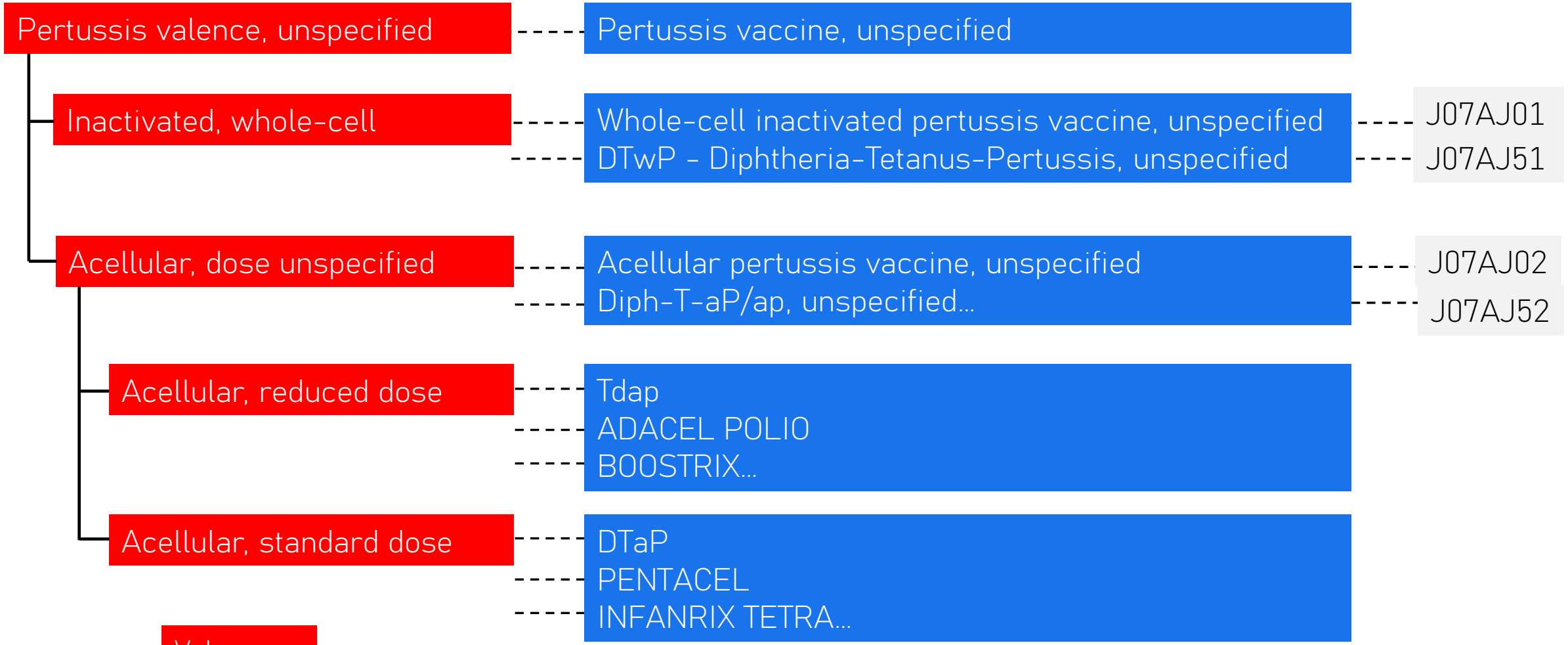
VAXELIS

D	Diphtheria valence, toxoid, standard dose
T	Tetanus valence, toxoid
aP	Pertussis valence, cellular, standard dose
rHBsAg-10	Hepatitis B valence, recombinant HBs, 10 µg
IPV	Polio valence, trivalent, inactivated, whole-virus, injectable
PRP-OMP	Hib valence, PRP conjugated to OMP of Neisseria meningitidis B

HEXYON

D	Diphtheria valence, toxoid, standard dose
T	Tetanus valence, toxoid
aP	Pertussis valence, cellular, standard dose
rHBsAg-10	Hepatitis B valence, recombinant HBs, 10 µg
IPV	Polio valence, trivalent, inactivated, whole-virus, injectable
PRP-T	Hib valence, PRP conjugated to tetanus toxoid

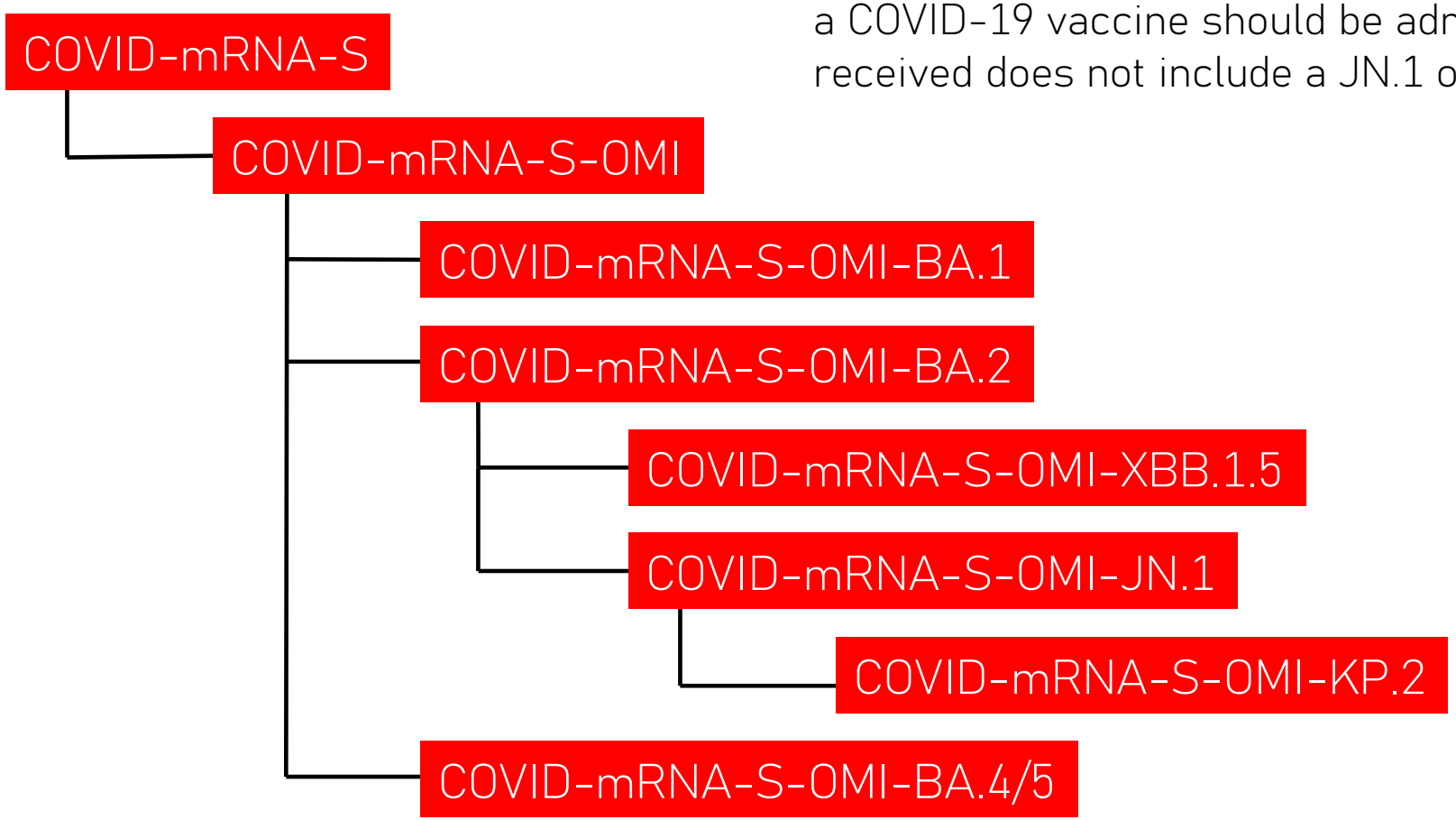
Hierarchical representation of valences



Enables the inclusion of vaccines that are not fully identified.
Illustrated here with the pertussis valences.

International Vaccine Codes

COVID-19 hierarchical valences



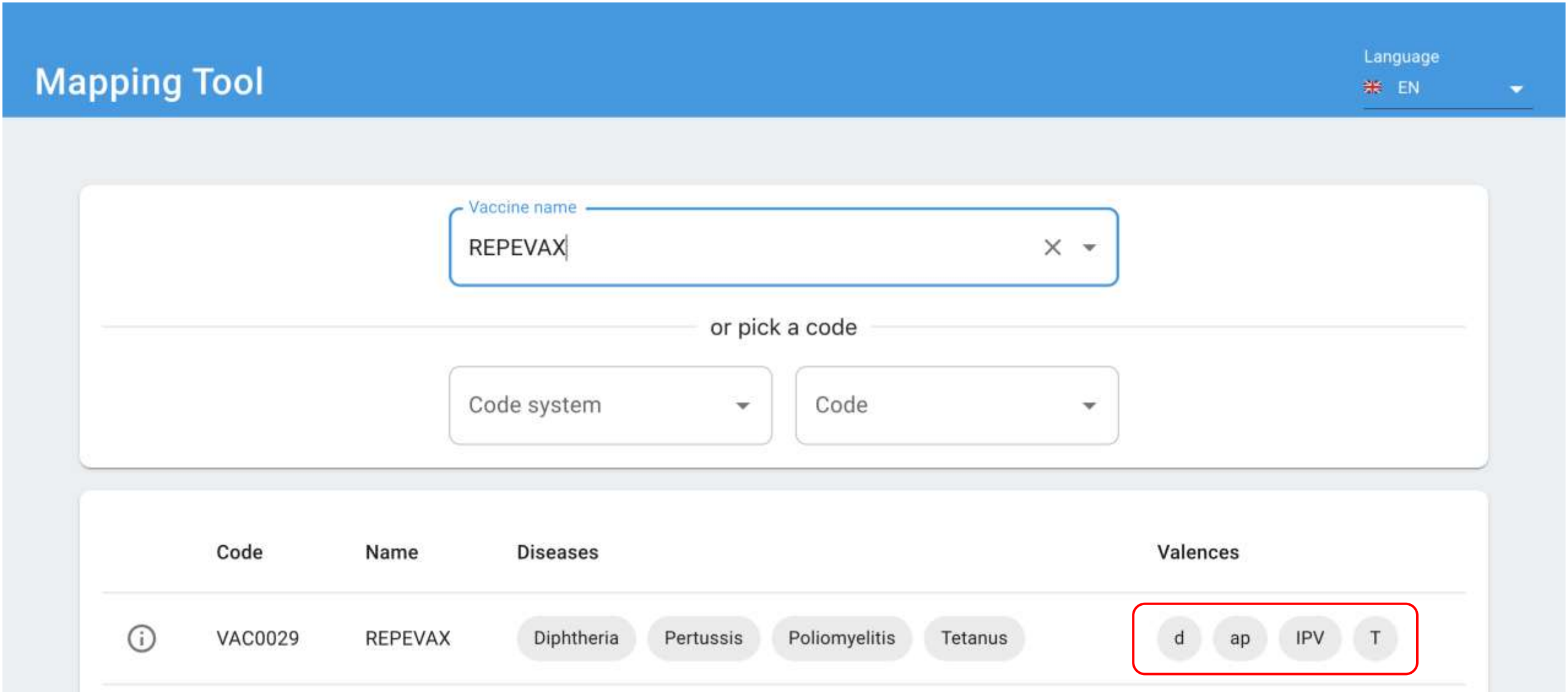
An example of a rule enabled by the hierarchisation:
a COVID-19 vaccine should be administered if the last dose received does not include a JN.1 or KP.2 valence.

International Vaccine Codes

Applications

LOOKING FOR EQUIVALENT VACCINES

PRESCRIPTION



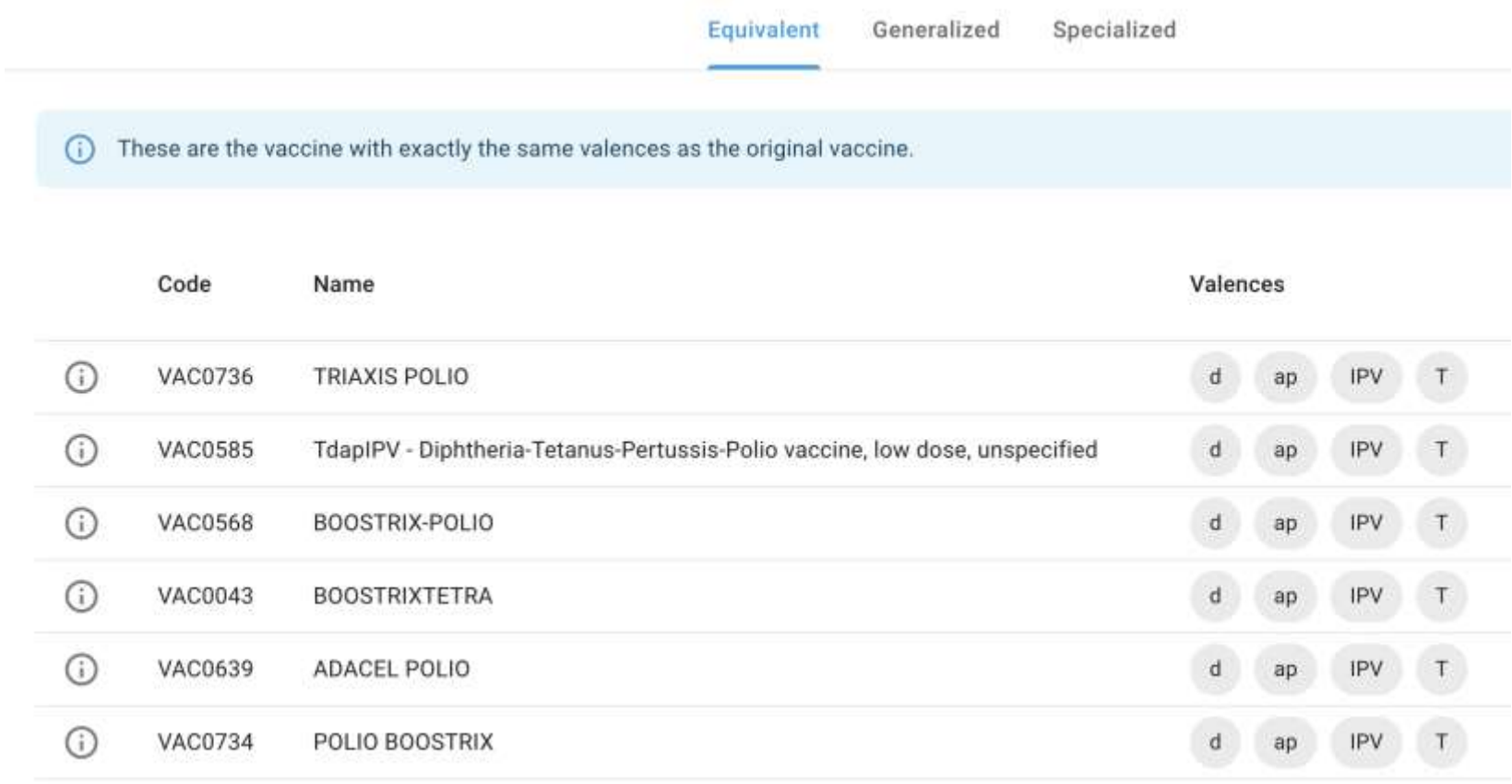
https://nuva.syadem.com/

International Vaccine Codes

Equivalent vaccines inferred from valence content

REPEVAX

ap | **Pertussis** valence, acellular, reduced dose
d | **Diphtheria** valence, toxoid, reduced dose
IPV | **Polio** valence, trivalent, inactivated, whole-virus, injectable
T | **Tetanus** valence, toxoid



International Vaccine Codes

Equivalent vaccines inferred from valence content

INFANRIXTETRA

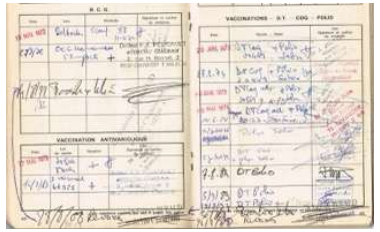
aP | **Pertussis** valence, acellular, standard dose
D | **Diphtheria** valence, toxoid, standard dose
IPV | **Polio** valence, trivalent, inactivated, whole-virus, injectable
T | **Tetanus** valence, toxoid

Code	Name	Valences
VAC0347	QUADRACEL	D aP IPV T
VAC0350	QUATRO-VIRELON	D aP IPV T
VAC0569	INFANRIX-IPV	D aP IPV T
VAC0490	KINRIX	D aP IPV T
VAC0037	TETRAVAC-ACELLULAIRE	D aP IPV T
VAC0735	POLIOINFANRIX	D aP IPV T
VAC0544	TETRAXIM	D aP IPV T
VAC0551	DTaPIPV vaccine, standard dose, unspecified	D aP IPV T
VAC0776	TETRABIK	D aP IPV T
VAC0066	DTCP PASTEUR	D aP IPV T
VAC0515	INFANRIX POLIO	D aP IPV T

International Vaccine Codes

Valences: support for vaccine recommendation

Child
6 year-old



Vaccine history

Vaccine interpretation

Last valence received at the age of 6:
ap Pertussis valence, acellular, reduced dose

Valence-based recommendation

aP Pertussis valence, acellular, standard dose at the age of 11

International Vaccine Codes

The concept of valence could be a means of prescribing a vaccine using a generic name, without reference to a specific brand name.

Perspective

Classification of valences

1. Live
   - 1.1. Live attenuated
   - 1.2. Live viral vector
     - 1.2.1. Replicating viral vector
     - 1.2.2. Non-replicating viral vector
   - 1.3. Chimeric live
2. Non-live
   - 2.1. Nucleic acid
   - 2.2. Whole inactivated
   - 2.3. Subunit

International Vaccine Codes

Non-live valences

2.1. Nucleic acid

2.4.1. DNA

2.4.2. RNA

2.2. Inactivated

2.2.1. Whole-cell (bacterial)

2.2.2. Whole-virion (viral)

2.2.3. Split (viral)

2.3. Subunit

2.3.1. Toxoid

2.3.1. Polysaccharide unconjugated

2.3.2. Polysaccharide conjugated

2.3.3. Purified protein

2.3.4. Recombinant protein - non-VLP

2.3.5. Recombinant protein - VLP

2.3.6. Multi-antigen protein

International Vaccine Codes

INFANRIX HEXA : 6 diseases, 10 antigens

Valence	Class	Disease
D	Toxoid	Diphtheria
T	Toxoid	Tetanus
aP	Multi-antigen protein	Pertussis
IPV	Inactivated whole-virion	Polio
rHBsAg-10	Recombinant protein	Hepatitis B
PRP-T	Polysaccharide conjugated	*H. Influenzae* b

→ Diphtheria (toxoid)-Tetanus (toxoid)-Pertussis (Multi-antigen protein) – Polio (Inactivated whole-virion) – Hepatitis B (Recombinant protein) - Hib (Polysaccharide conjugated) vaccine,

International Vaccine Codes

Conclusion

- The valence concept enables seamless navigation across heterogeneous vaccine coding systems.
- It empowers users with more precise, interoperable, and automated vaccination decision-making.
- Designed to be adaptable, the valence model can evolve across levels of abstraction and shifting public health contexts - without disrupting vaccine code integrity.