The evolution and current status

### of vaccination programs for adults in Europe

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#### Reduction of cases and deaths associated caused by vaccine-preventable diseases in the United States

		Cases	All post-vaccine cases refer to 2006	[	Deaths	All post-vaccine deaths refer to 2004
Diphtheria	Pre-vaccine: 158 cases per million per year (1936-45)	100% Reduction	Post-vaccine: 0 cases per million per year	Pre-vaccine: 13.7 deaths per million per year (1936-45)	100% Reduction	Post-vaccine: 0 deaths per million per year
Measles	Pre-vaccine: 3044 cases per million per year (1953-62)	<b>99.99%</b> Reduction	Post-vaccine: 0.2 cases per million per year	Pre-vaccine: 2.5 deaths per million per year (1953-62)	100% Reduction	Post-vaccine: 0 deaths per million per year
Mumps	Pre-vaccine: 830 cases per million per year (1963-68)	97.4% Reduction	Post-vaccine: 22 cases per million per year	Pre-vaccine: 0.2 deaths per million per year (1963-68)	100% Reduction	Post-vaccine: 0 deaths per million per year
Pertussis	Pre-vaccine: 1534 cases per million per year (1934-43)	96.6% Reduction	Post-vaccine: 52 cases per million per year	Pre-vaccine: 30.8 deaths per million per year (1934-43)	99.7% Reduction	Post-vaccine: 0.09 deaths per million per year
Acute Poliomyeltis	Pre-vaccine: 141 cases per million per year (1941-50)	100% Reduction	Post-vaccine: 0 cases per million per year	Pre-vaccine: 10 deaths per million per year (1941-50)	100% Reduction	Post-vaccine: 0 deaths per million per year
Paralytic Poliomyeltis	Pre-vaccine: 103 cases per million per year (1951-54)	100% Reduction	Post-vaccine: 0 cases per million per year	Pre-vaccine: 11.8 deaths per million per year (1951-54)	100% Reduction	Post-vaccine: 0 deaths per million per year
Rubella	Pre-vaccine: 242 cases per million per year (1966-68)	<b>99.98%</b> Reduction	Post-vaccine: 0.04 cases per million per year	Pre-vaccine: 0.09 deaths per million per year (1966-68)	100% Reduction	Post-vaccine: 0 deaths per million per year
Congenital Rubella Syndror	Pre-vaccine: 0.76 cases per million per year (1966-69)	99.6% Reduction	Post-vaccine: 0.003 cases per million per year	Pre-vaccine: no data (1966-69)	no data	Post-vaccine: 0 deaths per million per year
Smallpox	Pre-vaccine: 250 cases per million per year (1900-49)	100% Reduction	Post-vaccine: 0 cases per million per year	Pre-vaccine: 2.9 deaths per million per year (1900-49)	100% Reduction	Post-vaccine: 0 deaths per million per year
Tetanus	Pre-vaccine: 4 cases per million per year (1947-49)	96.6% Reduction	Post-vaccine: 0.14 cases per million per year	Pre-vaccine: 3.2 deaths per million per year (1947-49)	99.6% Reduction	Post-vaccine: 0.01 deaths per million per year
Hepatitis A	Pre-vaccine: 465 cases per million per year (1986-95)	89% Reduction	Post-vaccine: 51 cases per million per year	Pre-vaccine: 0.5 deaths per million per year (1986-95)	88.7% Reduction	Post-vaccine: 0.06 deaths per million per year
Acute Hepatitis B	Pre-vaccine: 273 cases per million per year (1982-91)	83.9% Reduction	Post-vaccine: 44 cases per million per year	Pre-vaccine: 1 death per million per year (1982-91)	83.6% Reduction	Post-vaccine: 0.16 deaths per millon per year
Haemophilus Influenza type b	Pre-vaccine: 84 cases per million per year (1980s)	99.8% Reduction	Post-vaccine: 0.17 cases per million per year	Pre-vaccine: no data (1980s)	no data	Post-vaccine: 0.02 deaths per million per year
Pneumococca Disease	Pre-vaccine: 233 cases per million per year (1997-99)	40.5% Reduction	Post-vaccine: 139 cases per million per year	Pre-vaccine: 24 deaths per million per year (1997-99)	31.3% Reduction	Post-vaccine: 16.5 deaths per million per year
Varicella	Pre-vaccine: 16018 cases per million per year (1990-94)	87.2% Reduction	Post-vaccine: 2046 cases per million per year	Pre-vaccine: 0.41 deaths per million per year (1990-94)	84.3% Reduction	Post-vaccine: 0.06 deaths per million per year

Roush and Murphy. Historical comparisons of morbidity and mortality for vaccine-preventable diseases in the United States. JAMA 2007;298:2155-2163

#### Reduction of cases and deaths associated caused by vaccine-preventable diseases in the United States



Roush and Murphy. Historical comparisons of morbidity and mortality for vaccine-preventable diseases in the United States. JAMA 2007;298:2155-2163







Young adults were disproportionately affected during epidemics of VPDs the last two decades



- → gaps in vaccination programs
- vaccine hesitancy
- → barriers to attend vaccination services

### Unsufficient protection through immune memory against diphtheria, tetanus, pertussis, poliomyelitis

#### need for booster doses for

children, adolescents and adults



#### **Determinant factors of immune response after vaccination**

age: immature immune response in young infants,
 waning immunity in the elderly (immunosenescence)

previous exposure to vaccine antigens

maternal antibodies

underlying diseases and conditions

malnutrition

incubation period

vaccination schedule and vaccine dose

Poland GA. Influenza vaccine failure: failure to protect or failure to understand? Exp Rev Vaccines 2018;17:495-502

### **Rational for vaccinating adults**

- provide protection because of waning immunity (e.g. pertussis)
- prevent serious morbidity and mortality (e.g. measles, varicella)
- address ageing-related decline of immune system
  (immune second control

(immunosenescence)

→ comorbidities

#### **Increase of life expectancy in Europe**













#### Article Vaccination Programs for Adults in Europe, 2019

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#### Government and public health websites of 42 European countries

Adults  $\geq$  18 years old

General population or specific high-risk groups

23 pathogens (vaccines)

**Catch-up vaccinations for childhood vaccinations** 

Vaccination programs for adults in Europe, 2019

• All countries had vaccination programs for adults.

 Differences in terms of number of vaccines, target populations, number of doses, and implementation frame (mandatory vs recommended)

#### Vaccination programs for adults in Europe, 2019

Country	D	Т	Р	Polio	Hib	HepB	HepA	Me	Mu	R	VZV	HZ	BCG	HPV	Flu	MenB	MenC	MCV4	PPV	PCV	TBE	TF	Rabies	YF
Albania	R	R	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R∕spR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR
Austria	R	R	R	R	nMnR	R	nMnR	R	R	R	nMnR	R	nMnR	R	R/spR	nMnR	nMnR	nMnR	R∕spR	R/spR	R	nMnR	nMnR	nMnR
Belarus	М	Μ	nMnR	nMnR	nMnR	nMnR	nMnR	R	R	R	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR
Belgium	R/spR	R/spR	spR	spM	nMnR	spR	spR	R	R	R	R/SpR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	R∕spR	R/spR	nMnR	nMnR	nMnR	nMnR
Bosnia	м	м	nMnR	nMnR	nMnR	snM	snR	nMnR	nMnR	nMnR	spR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	snR	snR	nMnR	snR	snM	enM	nMnR
Herzegovina							- PA				- PA				iyopit.			-pro-	- pro-		-pro-			
Bulgaria	M	M	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR
Croatia	K	M/K	K	K	nMnK	nMnK	nMnK	nMnK	nMnK	nMnK	nMnK	nMnK	nMnK	nMnK	K/spK	nMnK	nMnK	nMnK	nMnK	nMnK	nMnK	nMnK	nMnK	nMnK
Cyprus	K	K	nMnK	nMnK	nMnK	K	spK	nMnK	nMnK	nMnK	nMnK	nMnK	spK	nMnK	K/spK	nMnK	nMnK	spR	K/spR	nMnK	nMnK	nMnK	nMnK	nMnK
Czech Republic	R/spR	M/R/spR	R/spR	nMnR	spR	spM/R	R/spM	nMnR	nMnR	nMnR	spR	R/spR	nMnR	R/spR	R/spR	spR	nMnR	spR	nMnR	spM/R	R	nMnR	spR	nMnR
Denmark	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R	R	R	nMnR	nMnR	nMnR	spR	R/spR	nMnR	nMnR	nMnR	R∕spR	R/spR	nMnR	nMnR	nMnR	nMnR
Estonia	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR
Finland	R	R	R	nMnR	nMnR	spR	spR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	R∕spR	R/spR	spR	nMnR	nMnR	nMnR
France	R∕spR	R/spR	spR	R	spR	nMnR	spR	R	R	R	spR	R	nMnR	spR	R/spR	spR	R	spR	spR	spR	nMnR	nMnR	nMnR	spM
Germany	R	R	R	R	nMnR	nMnR	nMnR	R	nMnR	nMnR	nMnR	R	nMnR	nMnR	R/spR	spR	nMnR	spR	R	nMnR	nMnR	nMnR	nMnR	nMnR
Greece	R/spR	R/spR	R/spR	R	spR	spR/R	spR	R/spR	R/spR	R/spR	R/spR	R	nMnR	spR	R/spR	spR	nMnR	spR	R∕spR	R/spR	nMnR	nMnR	nMnR	nMnR
Hungary	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	R/spR	R/spR	nMnR	nMnR	nMnR	nMnR
Iceland	spR	spR	spR	spR	nMnR	spR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	R/spR	R/spR	nMnR	nMnR	nMnR	nMnR
Ireland	spR	spR	spR	nMnR	nMnR	nMnR	nMnR	R/spR	R/spR	R/spR	nMnR	nMnR	spR	nMnR	R/spR	nMnR	nMnR	nMnR	R	nMnR	nMnR	nMnR	nMnR	nMnR
Italy	M/R/spR	M/R/spR	M/R/spR	М	nMnR	spR	spR	R/spR	R/spR	R/spR	nMnR	R/spR	nMnR	R	R/spR	nMnR	nMnR	R	R/spR	R/spR	nMnR	nMnR	nMnR	nMnR
Latvia	R/spR	R/spR	R	nMnR	nMnR	spR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	nMnR	nMnR	R	nMnR	nMnR	nMnR
Liechtenstein	R	R	R	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R	R/spR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR
Lithuania	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	nMnR	spR	nMnR	nMnR	nMnR	nMnR
Luxembourg	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R	R	R	nMnR	nMnR	nMnR	snR	R/spR	nMnR	nMnR	nMnR	R/snR	R/snR	nMnR	nMnR	nMnR	nMnR
Malta	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	nMnR	R	nMnR	nMnR	nMnR	nMnR
Moldova	M	M	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	cnR	enR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR
Monaco	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	snR	nMnR	nMnR	nMnR	nMnR	nMnR
Montenegro	M	M	nMnR	nMnR	enM	en M	enR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	enR	spR	nMnR	nMnR	enM	enM	nMnR
Notherlands	nMnR	nMnR	nMnR	nMnR	nMnR	spR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR
NorthMacedonia	nMnR	M	nMnR	nMnR	nMnR	sp M	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	snR	snR	nMnR	nMnR	enM	enM	nMnR
Norway	nMnR	nMnR	nMnR	nMnR	nMnR	pMpR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/cpR	nMnR	nMnR	nMnP	p	nMnR	nMnR	nMnR	nMnP	nMnR
Poland	M	M	nMnR	nMnR	nMnR	cpR	nMnR	D	P	P	nMnR	nMnR	nMnR	nMnR	R/cpR	an R	P	R/cpR	nMnP	P	nMnR	nMnR	nMnR	nMnR
Pertural	D/mD	D/m D	D/m D	-M-P	-M-D	spr.	-M-P	-M-P	-M-P	-M-D	-M-P	-M-D	D D	-M-D	nyspix p/p	-M-P	-M-P	-M-P	-M-D	-M-D	-M-P	-M-D	-M-D	-M-D
Portugal	Kyspk	K/SPK	K/spK	nMnK	nwink	spk	nMnK	nivink	nivink	nMnK	nMnK	nivink M-P	spr.	nMnK	Ryspk D/D	nivink - M- P	nMnK	nivink	nivink	nivink	nMnR	nwink	nivink	nMnR
Romania	M	M	nMnK	nMnR	nMnR	M	nMnR	nivink mM/mP	nMnR	nwink	nMnR	nMnR	nMnR	nMnK p	R/spK	nMnR	nMnK	nwink	D/mp	D/mp	nwink	nMnR	nMnR	nMnR
Cushia	- D	M	nimink	nivink 	IIIVIIIK	M	nivink	spiwyspix	-M-P	spivi	D/m	nivink	nwink	N	R/mM	-M-P	nivink	spivi	N/P	NSPR	spr	nimink 	INVITIX	nwink
Serbia	spr	spk	spk	nMnK	spivi	spm/spK	spiw/spix	nivink	nivink M-P	spr M-D	Kyspivi M-P	spr M-P	nivink	spr.	R/spM	nivink - M- P	nMnK	spiyspin	spiwi/K	spivi/K	spr M P	nivink	spixi	nMnR
Slovakla	K	K	nMink	nMinK	nMnK	nwink	nMnK	nMnK	nMnK	nMnK	nMink	nMnK	nMnK	nMnK	KyspM	nMnK	nMINK	nMINK	nMnK	KyspM	nMINK	nMnK	nMnK	nMnK
Slovenia	M	M	M	nMnK	nMnK	spK	nMnK	nMnK	nMnK	nMnK	nMnK	nMnK	nMnK	nMnK	K/spK	spK	nMnK	spK	K/spK	K/spK	spK	nMnK	nMnK	nMnK
Spain	K	K	nMnK	nMnK	nMnK	spK	spK	nMnK	nMnK	nMnK	nMnK	K	nMnK	nMnK	K/spK	nMnK	nMnK	nMnK	K/spK	K/spK	nMnK	nMnK	nMnK	nMnK
Sweden	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	R/spR	nMnR	nMnR	nMnR	R	nMnR	nMnR	nMnR	nMnR	nMnR
Switzerland	R	R	R	spR	nMnR	nMnR	nMnR	R	R	R	spR	nMnR	nMnR	spR	R/spR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR
Ukraine	М	М	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	spR	R/spR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR	nMnR
United Kingdom	spR	spR	spR	spR	nMnR	nMnR	nMnR	R	nMnR	nMnR	spR	R	nMnR	spR	R/spR	nMnR	nMnR	spR/R	R∕spR	nMnR	nMnR	nMnR	spR	nMnR

#### Cassimos et al. Vaccines 2020;8:34





### **Pertussis**





#### Reported NNDSS pertussis cases: 1922-2014



SOURCE: CDC, National Notifiable Diseases Surveillance System and Supplemental Pertussis Surveillance System and 1922-1949, passive reports to the Public Health Service

### **Prognosis of pertussis**

# infants: 2% fatality rate (96% of all deaths), permanent complications

#### older adults: increased morbidity and complications





Immunity against pertussis wanes significantly

- 7 years after vaccination
- 12 years after natural infection



**Evolution of vaccination indications against pertussis** 

- adolescents
- family members of young infants (cocooning strategy)
- pregnancy
- adults



#### Pertussis vaccination for pregnancy women in Europe, 2021

- in 28 of 42 countries
- all but one regardless of past dose
- most countries in third trimester (+ second trimester)

Country	1 <sup>st</sup> trimester	2 <sup>nd</sup> trimester	3rd trimester
Albania			
Austria			
Belarus			
Belgium <sup>1</sup>			
<b>Bosnia and Herzegovina</b>			
Bulgaria			
Croatia			
Cyprus			
Czech Republic			
Denmark <sup>2</sup>			
Estonia <sup>3</sup>			
Finland			
France			
Germany			
Greece			
Hungary			
Iceland			
Ireland			
Italy			
Latvia			
Liechtenstein			
Lithuania			
Luxembourg4			
Malta			
Moldova			
Monaco			
Montenegro			
Netherlands			
North Macedonia			
Norway			
Poland			
Portugal <sup>s</sup>			
Romania			
Russia			
Serbia			
Slovakia			
Slovenia			
Spotaf			
Spain-			
Sweden Switzenland			
Switzerland			
Ukraine			
United Kingdom <sup>7</sup>			

Green color: all women; dark green color: if more than 10 years have elapsed after the last dose; yellow color: premature labor expected; red color: during epidemics; orange: during epidemics or high-risk condition

<sup>1</sup>ideally in weeks 24-32 <sup>2</sup>around a full week 32 <sup>3</sup>from week 20 <sup>4</sup>ideally weeks 13-26 <sup>5</sup>ideally after week 32 <sup>6</sup>weeks 27-28 <sup>7</sup>ideally weeks 20-32

Maltezou et al. Vaccine 2021;39:6137-6143

### Pertussis vaccination in Europe, 2024



### Measles vaccination in Europe, 2024



### **Poliomyelitis vaccination in Europe, 2024**



### Herpes zoster vaccination in Europe, 2024

	Years							
	18	50	60	64	65	74	75	>= 76
Austria					ZOS			
Belgium					ZC	DS (1 )		
Bulgaria								
Croatia								
Cyprus					ZC	DS (2 )		
Czechia					ZOS			
Denmark								
Estonia							ZOS	
Finland								
France						ZOS (3 )		
Germany			ZOS (4 )					
Greece		ZOS (5 )				ZOS (6 )		
Hungary								
Iceland								
Ireland								
Italy					ZOS (7 )			
Latvia								
Liechtenstein							ZOS	
Lithuania								
Luxembourg		Z	2OS (8 )				ZOS (9 )	
Malta								
Netherlands								
Norway								
Poland								
Portugal								
Romania								
Slovakia								
Slovenia								
Spain		Z	OS (10 )			1	ZOS (11 )	
Sweden								

### Influenza vaccination in Europe, 2024



#### Influenza vaccination for pregnancy women in Europe, 2021

- in 36 of 42 countries
- 27 countries for all women regardless of trimester

Country	1st trimester	2 <sup>nd</sup> trimester	3 <sup>rd</sup> trimester
Albania			
Austria			
Belarus			
Belgium			
Bosnia and Herzegovina			
Bulgaria			
Croatia			
Cyprus			
Czech Republic			
Denmark			
Estonia			
Finland			
France			
Germany			
Greece			
Hungary			
Iceland			
Ireland			
Italy			
Latvia			
Liechtenstein			
Lithuania			
Luxembourg			
Malta			
Moldova			
Monaco			
Montenegro			
Netherlands			
North Macedonia			
Norway			
Poland			
Portugal			
Romania			
Russia			
Serbia			
Slovakia			
Slovenia			
Spain			
Sweden <sup>1</sup>			
Switzerland			
Ukraine			
United Kingdom			
ennes migson			and the second

Green color: all women; yellow color: only women with high-risk conditions; rec color: during epidemics <sup>1</sup>from week 16

### **COVID-19 vaccination in Europe, 2024**

	Months	Years									
	6	4	5	12	18	60	64	65	79	80	>= 81
Austria							COVID-19 (1 )				
Belgium							COVID-19 (2 )				
Bulgaria							COVID-19 (3)				
Croatia									CO	VID-19 (4 )	
Cyprus											
Czechia							COVID-19 (5 )				
Denmark									CO	VID-19 (6 )	
Estonia							COVID-19 (7 )				
Finland							COVID	-19 (8 )			
France							COVID-19 (9 )				
Germany						COVID-19 (	10)				
Greece						COVID-19 (	11)				
Hungary							COVID-19 (12 )				
Iceland								COV	VID-19 (13 )		
Ireland						COVID-19 (	14)				
Italy							COVID-19 (15 )				
Latvia							COVID	19 (16 )			
Liechtenstein							COVID-19 (17 )				
Lithuania							COVID-19 (18 )				
Luxembourg							COVID-19 (19 )				
Malta							COVID-19 (20 )				
Netherlands							COVID-19 (21 )				
Norway							COVID-19 (22 )				
Poland							COVID-19				
Portugal								COVID-19 (2	23)		
Romania							COVID-19 (24)				
Slovakia							COVID-19 (25)				
Slovenia							COVID-19 (26 )				
Spain	CO	/ID-19 (27 )					COVID-19 (28)				
Sweden						COVID-1	9 (29 )	(	COVID-19 (29)	COV	/ID-19 (30 )

### **RSV vaccination in Europe, 2024**

	Years		
	60	74	>= 75
Austria		RSV	
Belgium		RSV (1 )	
Bulgaria			
Croatia			
Cyprus			
Czechia			
Denmark			
Estonia			
Finland			
France			
Germany			
Greece			
Hungary			
Iceland			
Ireland			
Italy			
Latvia			
Liechtenstein			
Lithuania			
Luxembourg			
Malta			
Netherlands			
Norway			
Poland			
Portugal			
Romania			
Slovakia			
Slovenia			
Spain			
Sweden	RSV	(2)	RSV (2)

## Still significant differences\* in vaccination programs for adults across Europe in 2024

#### **Country A**

					Ye	ars				
	18	19	26	50	59	60	64	65	75	≥ 76
Coronavirus disease (COVID-19) <sup>1</sup>					COVI	D-19 <sup>1</sup>				
diphtheria	d		d <sup>6</sup>							
tetanus	π					Π6				
pertussis	аср					acp <sup>6</sup>				
poliomyelitis	IPV					IPV <sup>6</sup>				
Haemophilus influenzae type b infection	Hib		НЪ							
hepatitis B		HepB <sup>7</sup>								
pneumococcal disease <sup>2</sup>				PCV20					PCV20	
meningococcal disease <sup>3</sup>	MCV4				Μ	ICV4/Men	В			
measles <sup>4</sup>	MEAS		MEAS <sup>8</sup>							
mumps	MUMPS									
rubella	RUBE									
varicella	VAR	VAF	۲ <sup>9</sup>							
influenza		IIV3 IIV3								
herpes zoster <sup>5</sup>			ZO	S <sup>10</sup>				Z0S <sup>11</sup>		
hepatitis A	НерА		HepA <sup>12</sup>							

#### **Country B**

	Y	ears
	18-45	≥ 65
Coronavirus disease (COVID-19) <sup>1</sup>		COVID-19 <sup>1</sup>
pertussis	acp <sup>3</sup>	
influenza <sup>2</sup>		IIV4

• in terms of number of vaccines, target populations, number of doses, and time intervals

**Challenges for new vaccines: common pathogens** 

### & threats for public health globally

- Tuberculosis (XDR)
- Respiratory syncytial virus
- Malaria
- Dengue fever
- Ebola
- Multidrug-resistant pathogens
- Disease X



#### THE LANCET Infectious Diseases

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**REVIEW | ONLINE FIRST** 

## Use of a meningococcal group B vaccine (4CMenB) in populations at high risk of gonorrhoea in the UK

Prof Shamez N Ladhani, MRCPCH A Peter J White, PhD • Helen Campbell, PhD • Sema Mandal, FFPH •
Prof Ray Borrow, FRCPath • Prof Nick Andrews, PhD • Sunil Bhopal, PhD • John Saunders, PhD •
Hamish Mohammed, PhD • Lana Drisdale-Gordon, BSc • Emma Callan, MPH • Katy Sinka, FFPH • Kate Folkard, FFPH •
Helen Fifer, FRCPath • Prof Mary E Ramsay, FFPH • Show less

Published: March 20, 2024 • DOI: https://doi.org/10.1016/S1473-3099(24)00031-8 • 🖲 Check for updates

 Vaccination program targeting individuals at higher risk of gonorrhea infection

• Expected protection: 33% - 47%

#### Incidence of N. gonorrhoeae\* and N. meningitidis, Cuba 1978-2016



unvaccinated people (herd immunity)

#### \*80-90% genetic similarity (sequencing)

Ochoa Azze RF. Expert Review on Vaccines 2019;8:110-115



### Thank you for your attention!

