VACCINATION IN OLDER PERSONS

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Dept. Public Health and Primary Care, KU Leuven, Belgium

High council of Public Health

- Ad hoc workgroup
  - Pneumococcal vaccination for adults
  - Experts:
    - ID, microbiology, GP, geriatric medicine, vaccinology
  - Scientific literature, (inter)national reports
  - Expert opinion
  - Cost-effectiveness **not** incorporated
- Guideline approval
  - Permanent workgroup (NITAG) vaccination
  - College of the HCPH
  - Publication

Hoge Gezondheidsraad

federale overheidsdienst
VOLKSGEZONDHEID, VEILIGHEID VAN DE VOEDSELKETEN EN LEEFMILIEU

Overview

- Coronavirus in the older prerson
- Influenza in the older person
- Pneumococcal disease in the older person
- Frailty in older persons
  - Immunosenescence
- Vaccination strategies for older persons
  - Age based vaccination
  - Risk based vaccination
  - Herd immunity and vaccination
- Immunosenescence and vaccination
- Ex. Herpes Zoster vaccination

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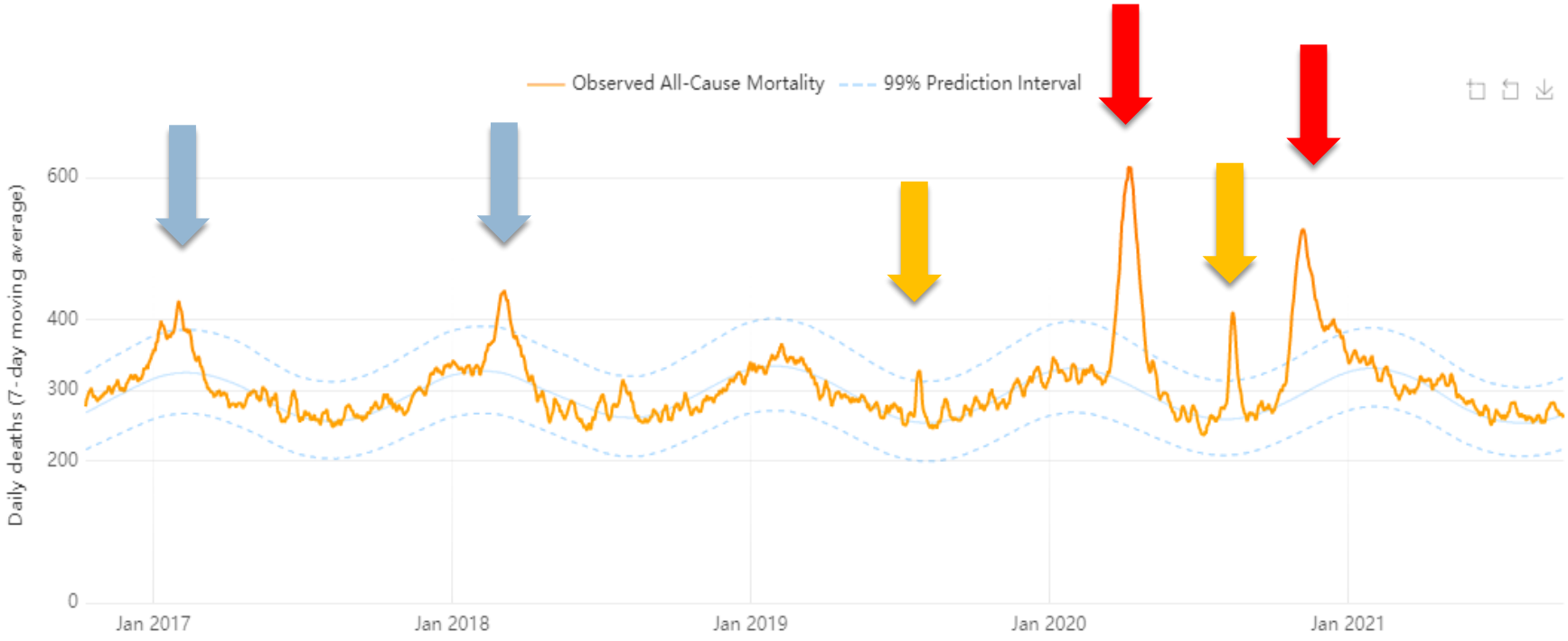
Excess mortality in Belgium



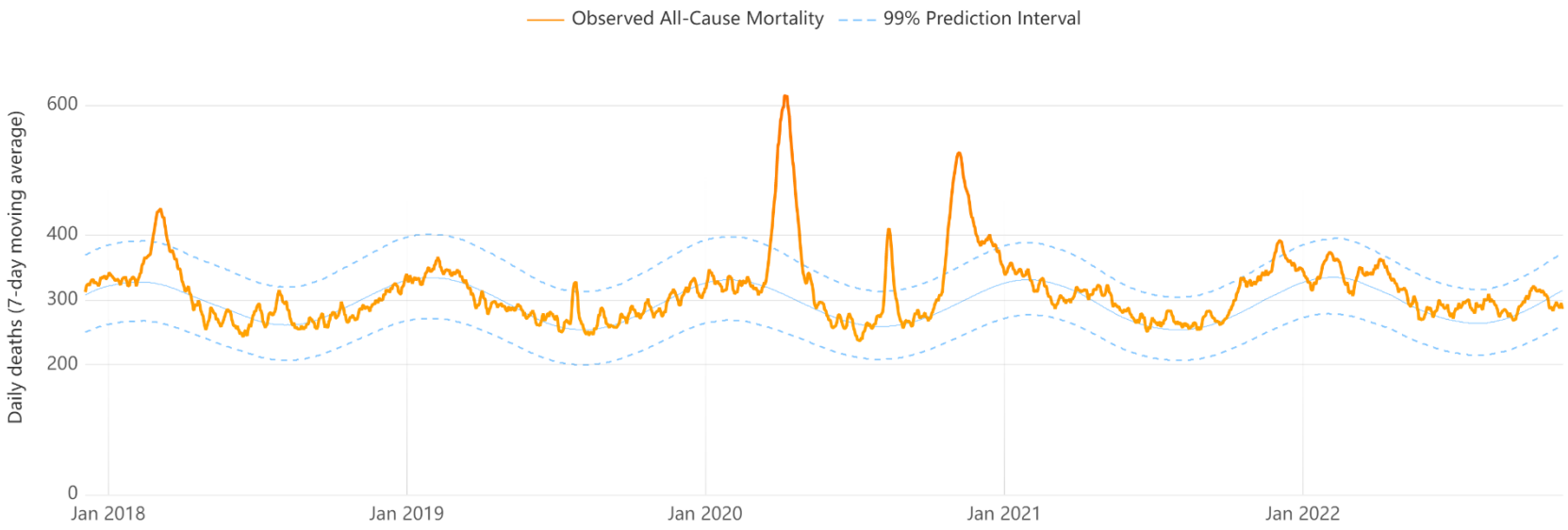
: RSV, Influenza, S. pneumoniae

: Heat

: SARS-Cov2

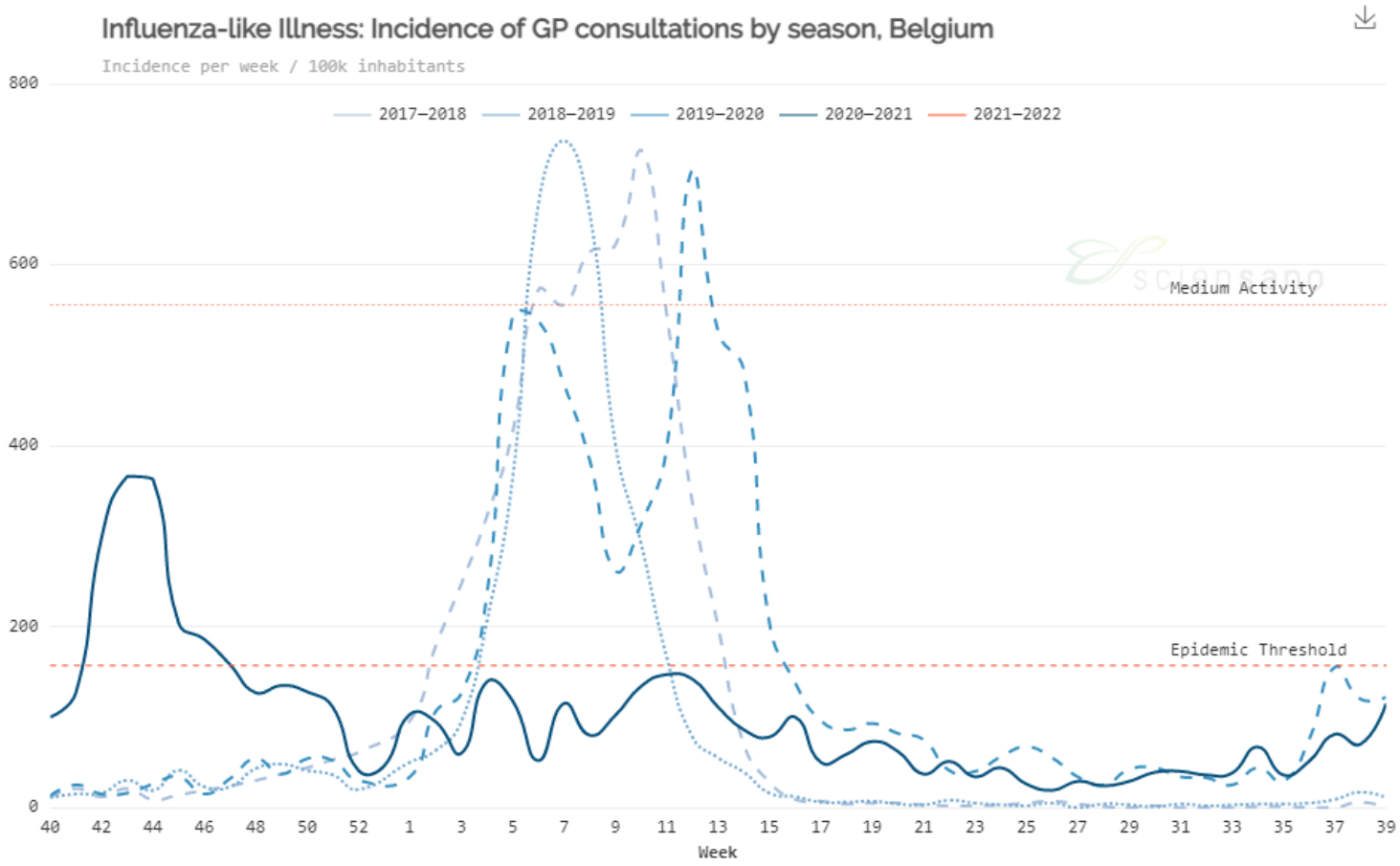
https://epistat.wiv-isp.be/momo/

Excess mortality in Belgium

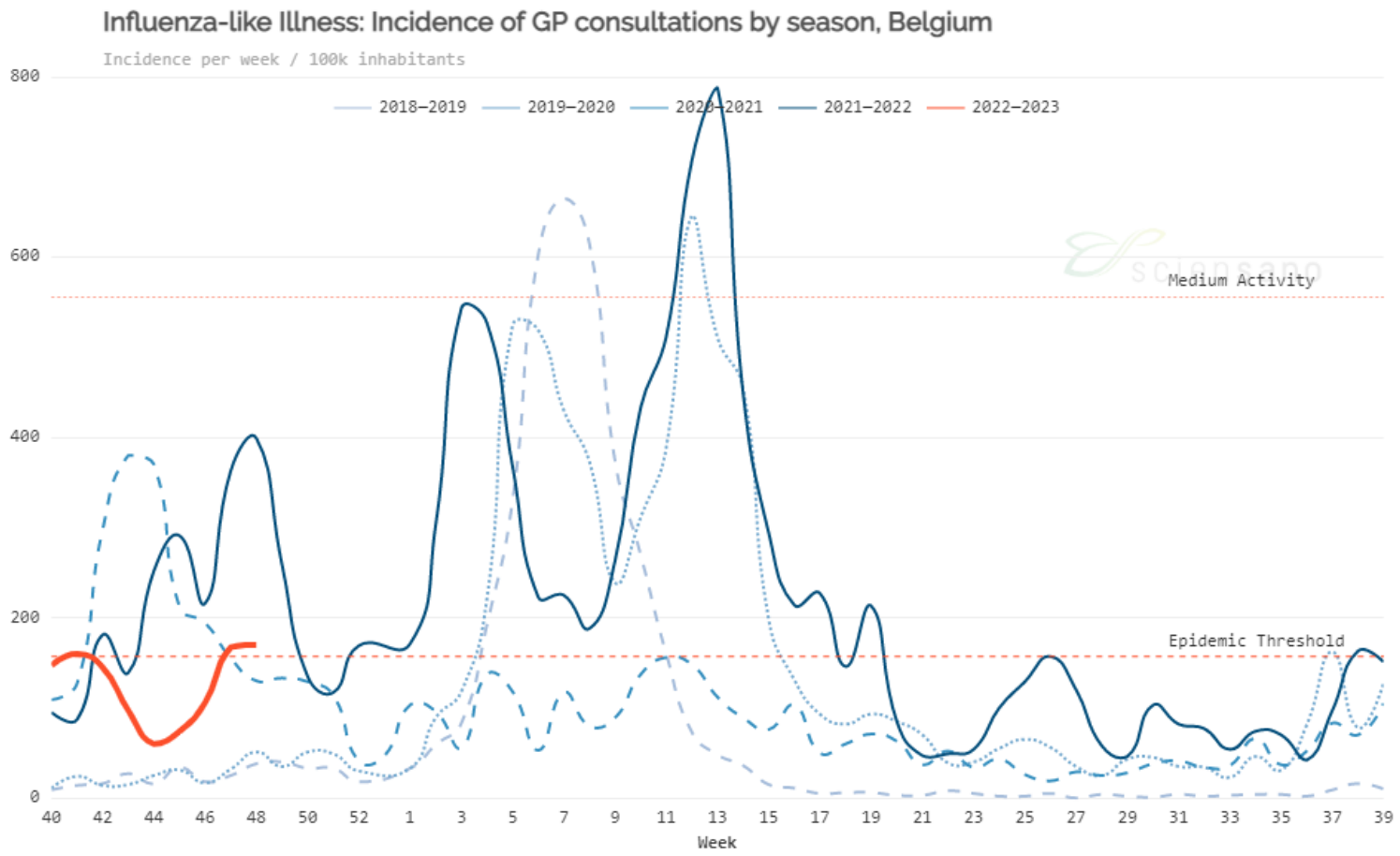


ILI in Belgium

Influenza-like Illness Monitoring

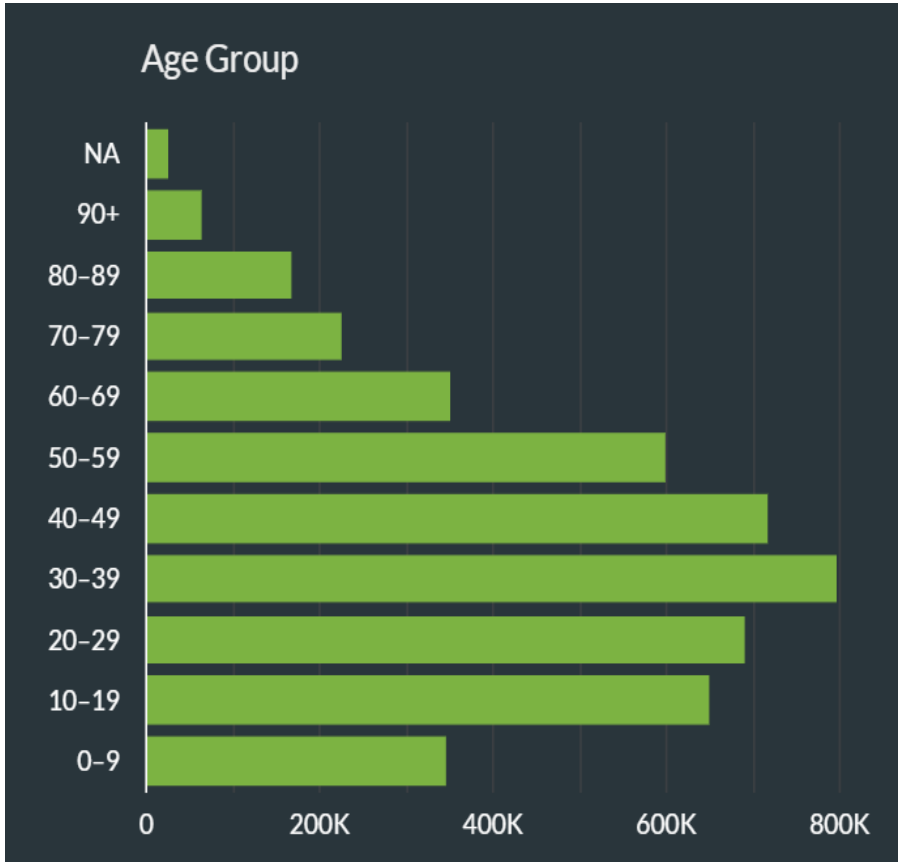


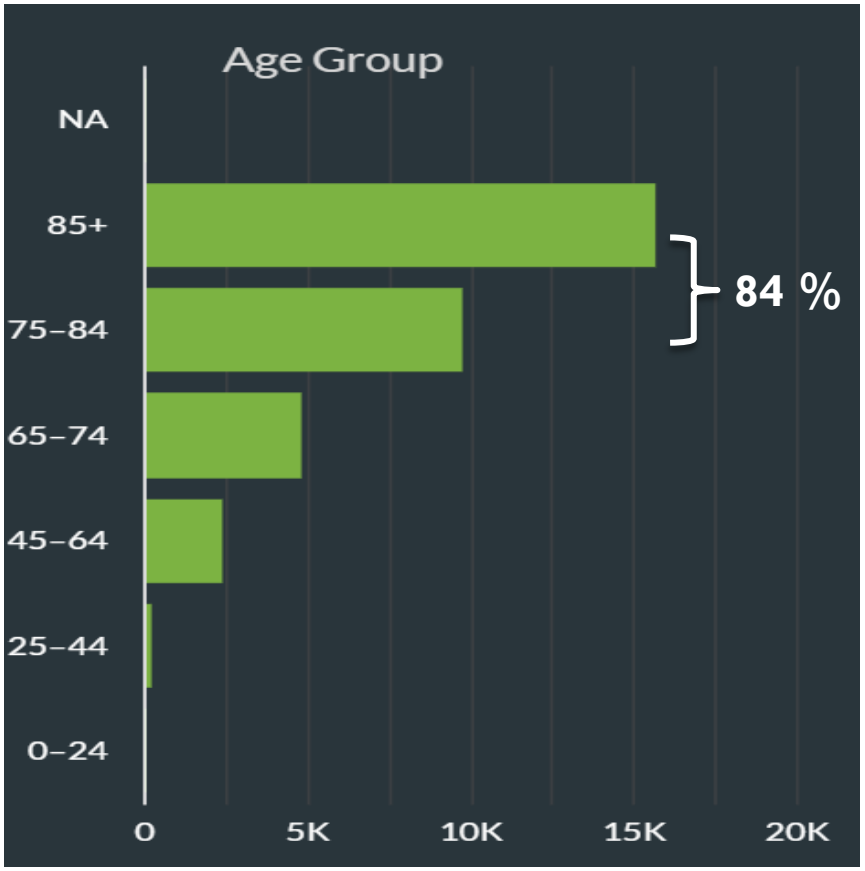
ILI in Belgium



COVID-19 Belgium (7/12/2022)

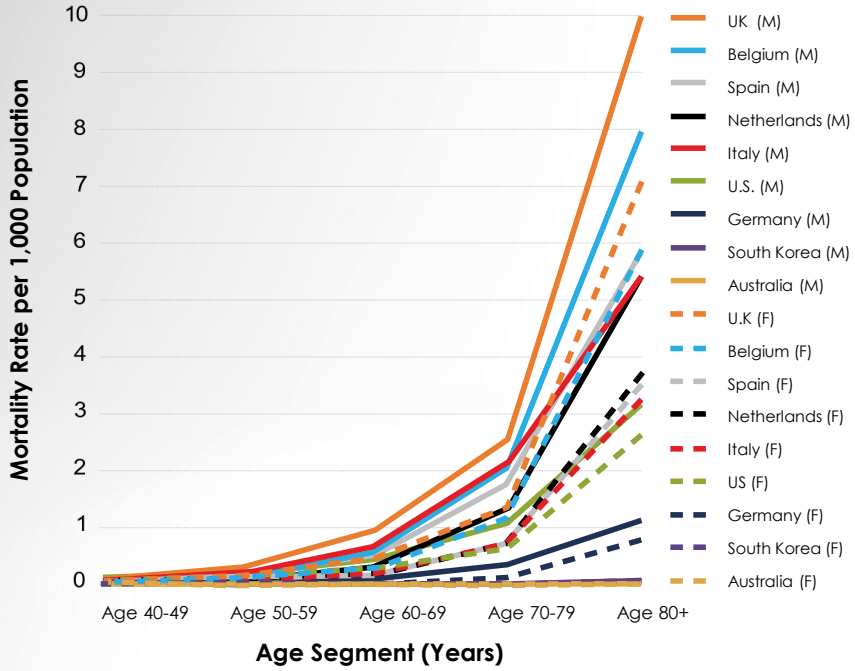
- Cases: 4.644.478
- Deaths: 33.086



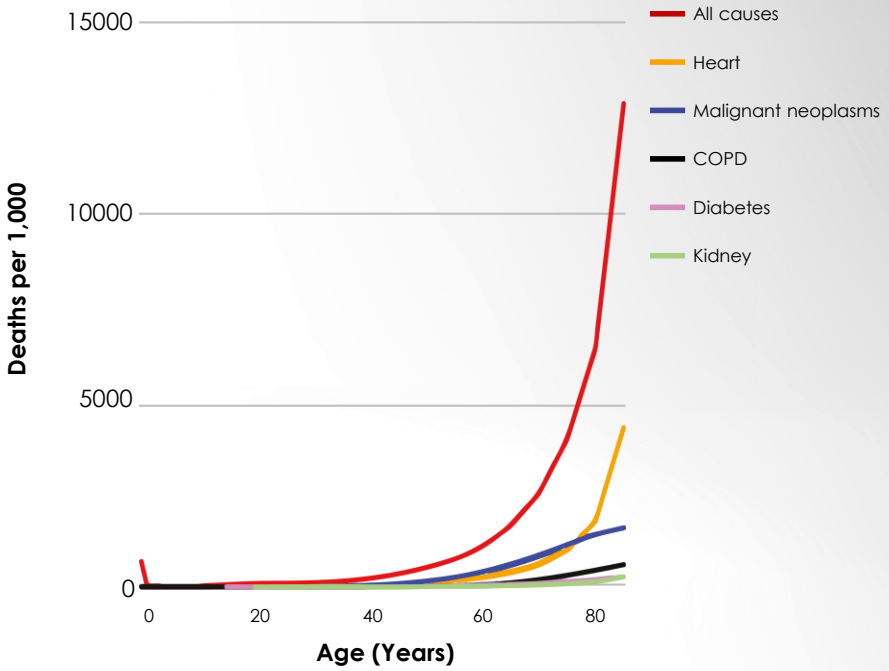


Mortality Due to COVID-19 Increases With Age as Well as Comorbid Conditions

Global COVID-19 Mortality Rates by Age and Gender[1]



COVID-19 Mortality from Specific Causes in the US[2]



UK = United Kingdom; M = males; F = females; US = United States; COPD = chronic obstructive pulmonary disease.

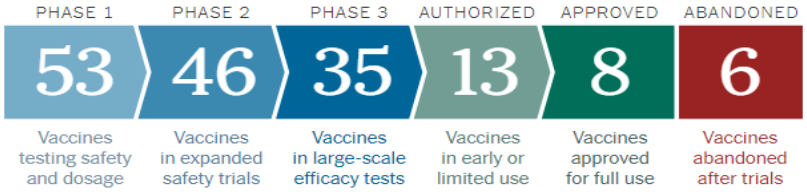
1. RGA Web Site. COVID-19 Mortality Rates by Age and Gender: Why Is the Disease Killing More Men than Women? https://www.rgare.com/knowledge-center/media/research/covid-19-mortality-rates-by-age-and-gender-why-is-the-disease-killing-more-men-than-women. Accessed September 22, 2020. **2.** Promislow DEL. *J Gerontol A Biol Sci Med Sci*. 2020;75(9):e30-e33.


6 GOUDEN REGELS TEGEN CORONA
11 MILJOEN REDENEN OM VOL TE HOUDEN
1.5M
11miljoenredenen.be
.be
Een initiatief van de Belgische overheid


COVID-19
Vaccine
injection only

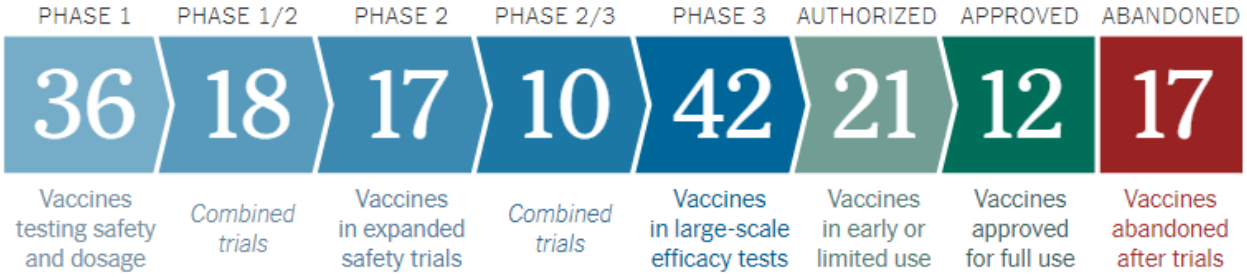
The New York Times

Coronavirus Vaccine Tracker



Coronavirus Vaccine Tracker

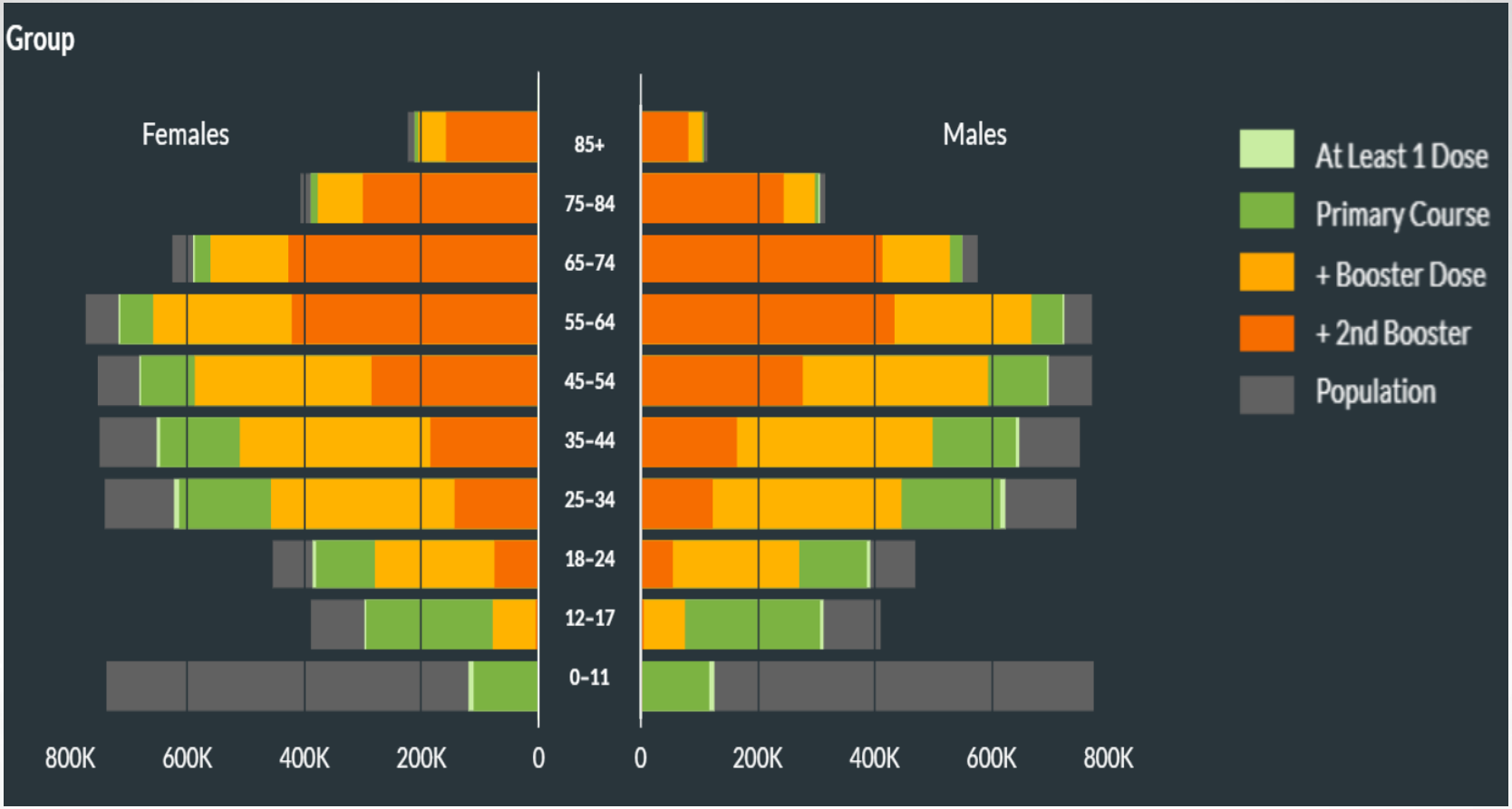
By Carl Zimmer, Jonathan Corum, Sui-Lee Wee and Matthew Kristoffersen Updated Aug. 31, 2022



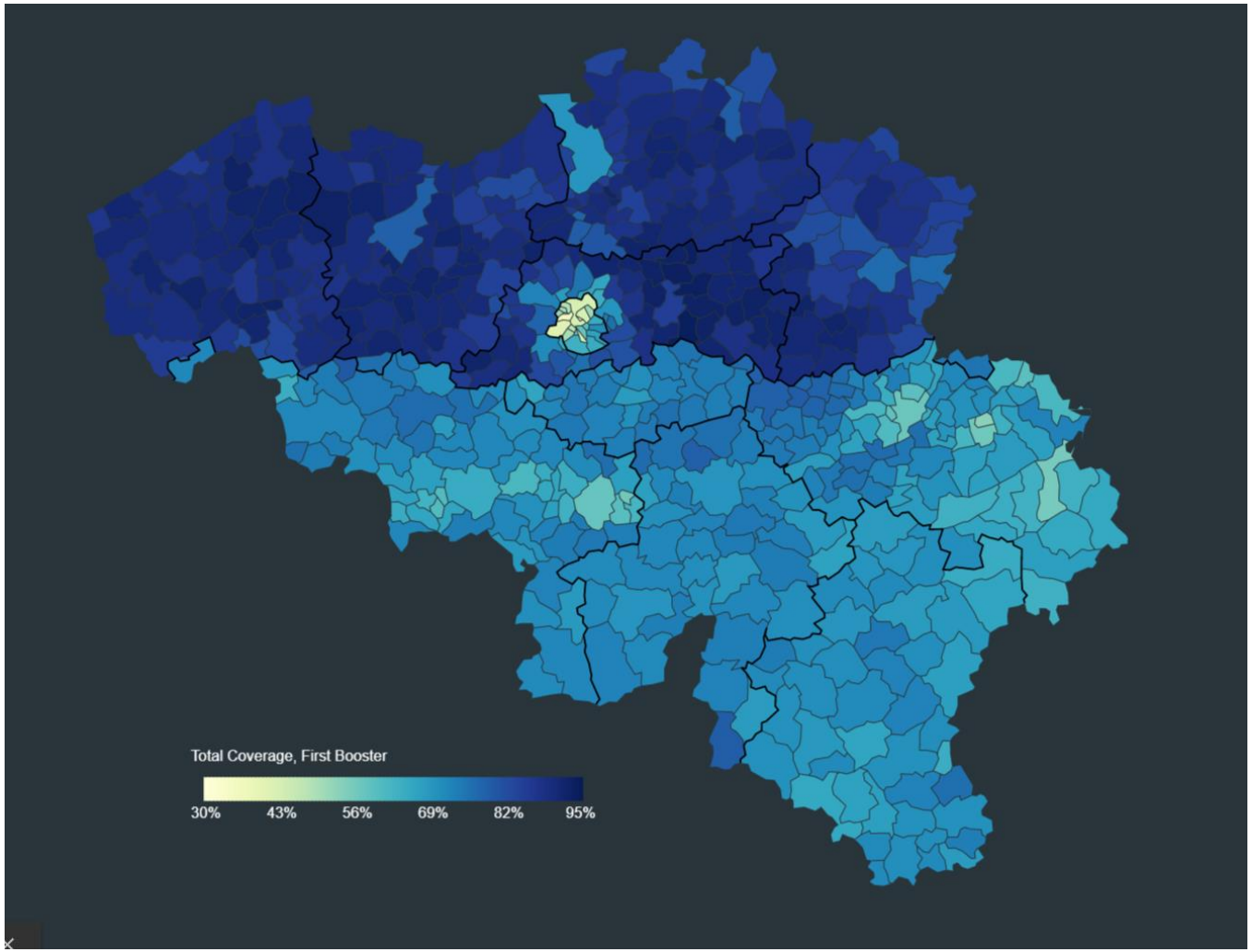
This tracker is no longer being updated. It followed the development of Covid vaccines from early 2020 through August 2022. More than 120 clinical trials were underway at that time.

The Centers for Disease Control and Prevention maintains a list of Covid vaccines that are authorized or approved in the United States.

12/2022

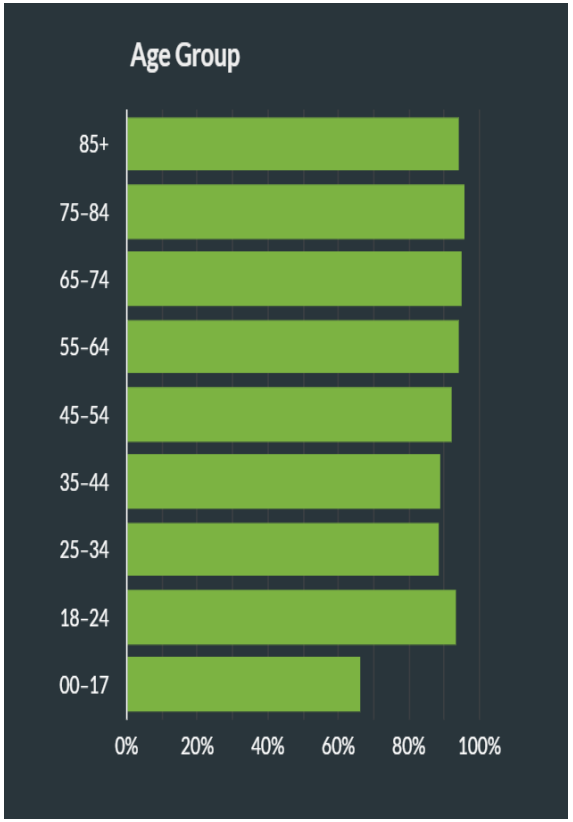

Group
Females
Males
85+
75-84
65-74
55-64
45-54
35-44
25-34
18-24
12-17
0-11
800K
600K
400K
200K
0
0
200K
400K
600K
800K
At Least 1 Dose
Primary Course
+ Booster Dose
+ 2nd Booster
Population

Coverage first booster Coronavaccine Belgium

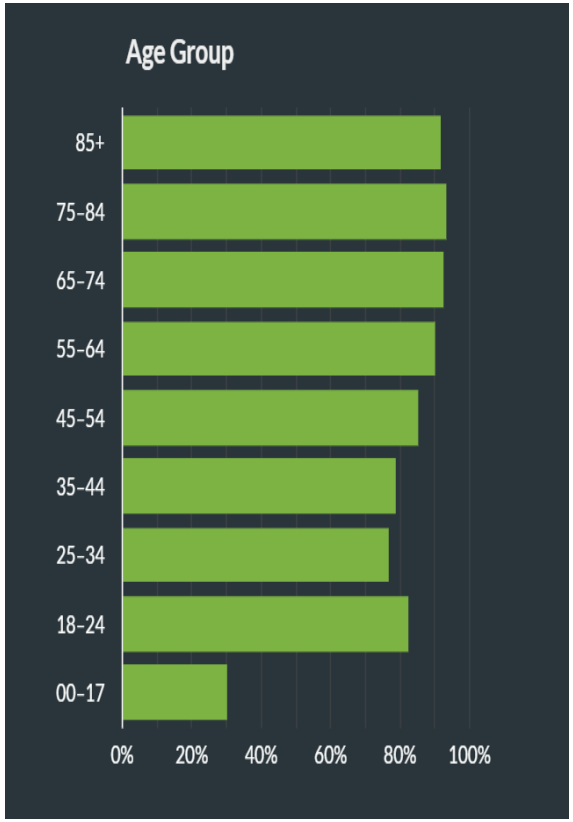


HCW vaccine coverage

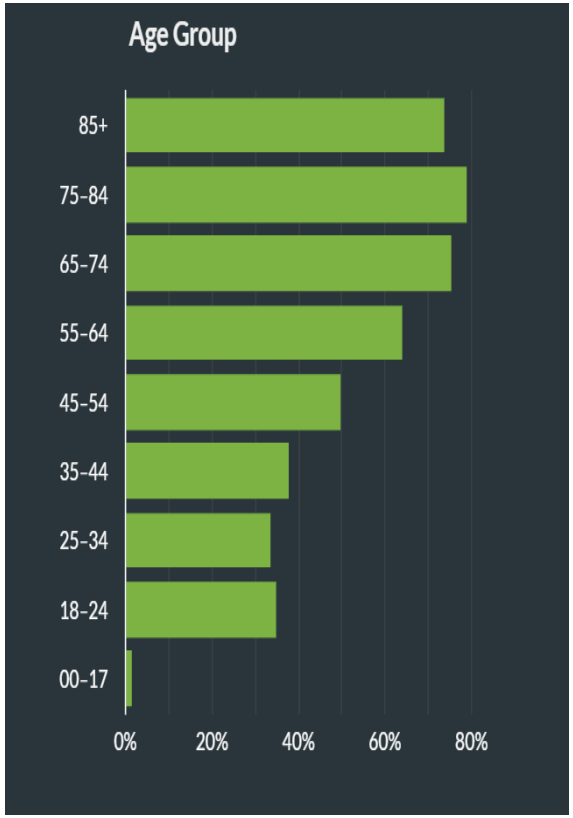
Primary



Booster 1

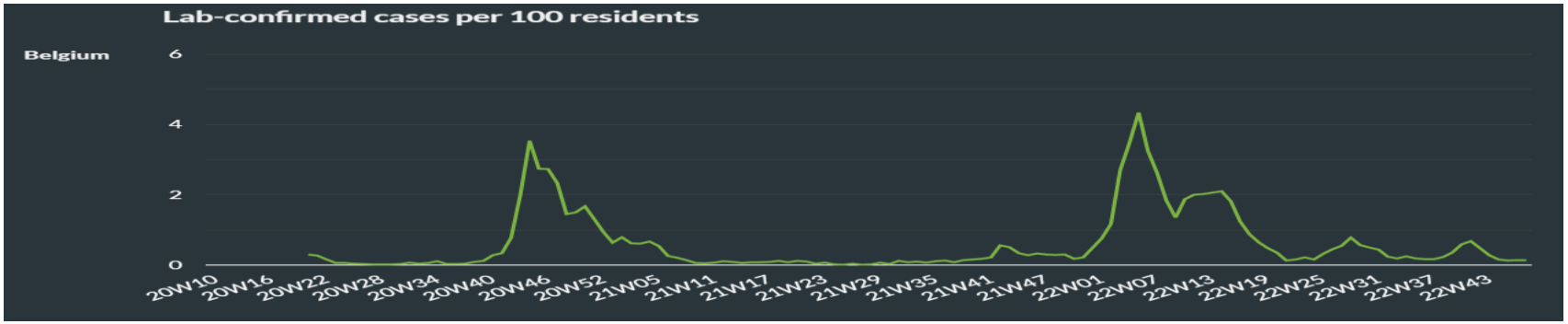


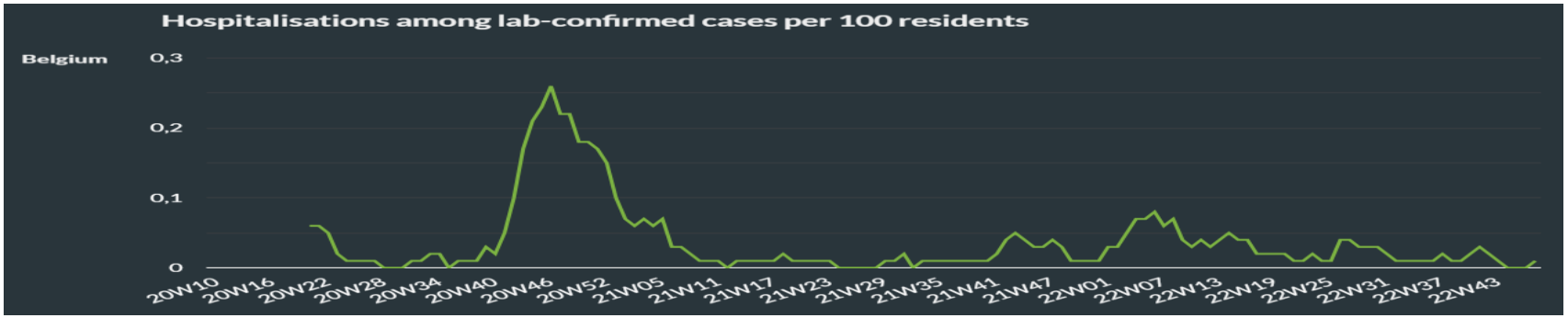
Booster 2

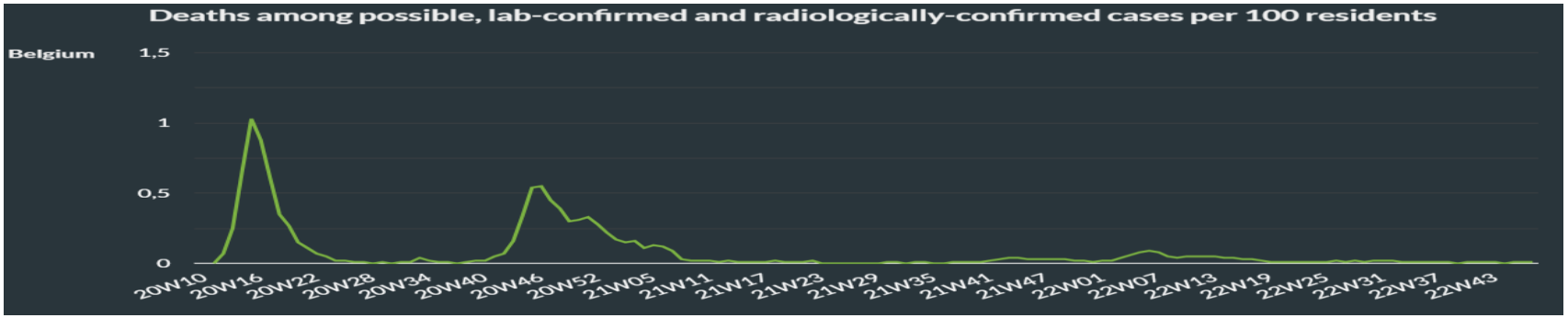


COVID-19 in nursing homes

sciensano







Coronavirus vaccines effectiveness NH residents

TABLE 2. Estimated vaccine effectiveness* of a second COVID-19 vaccine booster dose relative to a first booster dose only, for four COVID-19–related outcomes in nursing home residents — 196 nursing homes, 19 states,† March, 29–July 25, 2022

Outcome	Cumulative incidence§ Controls¶ (n = 1,902)	Second booster dose recipients (n = 1,902)	Risk difference (per 1,000 residents)	Vaccine effectiveness % (95% CI)**
SARS-CoV-2 infection††	101	75	−26	25.8 (1.2 to 44.3)
Hospitalization§§	9	3	−5	60.1 (−18.8 to 91.5)
Death¶¶	8	1	−7	89.6 (45.0 to 100.0)
Severe outcomes***	16	4	−12	73.9 (36.1 to 92.2)

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WEBMD NEWS BRIEF

107-Year-Old Who Beat Spanish Flu Beats COVID

By Allison Aulds

Aug. 19, 2020 -- Anna Del Priore beat the Spanish flu when she was just 6 years old. Now, more than 100 years later, she's successfully recovered from COVID-19.

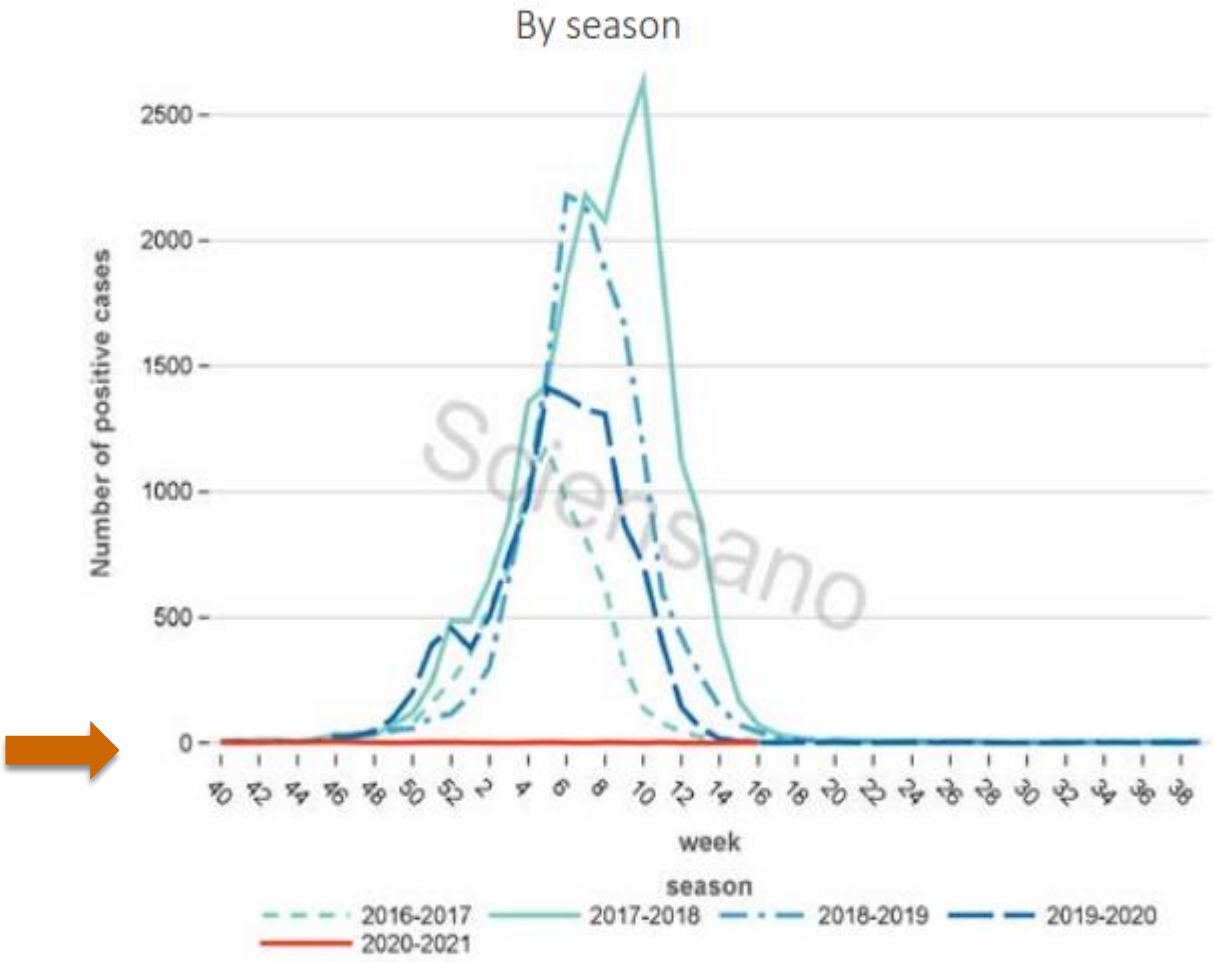
Sunrise Senior Living shared a photo on Facebook of the 107-year-old from New Jersey smiling and dancing after beating the virus.

Coronavirus Outbreak 2020

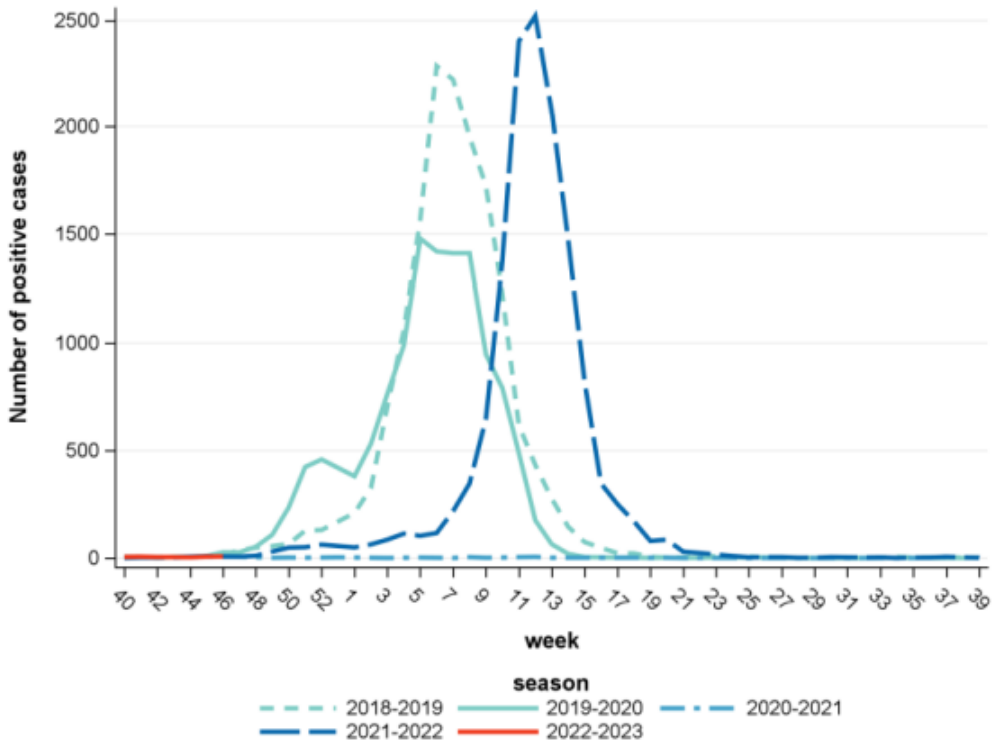
CORONAVIRUS HOME

WebMD's Complete Coverage of the COVID-19 Outbreak

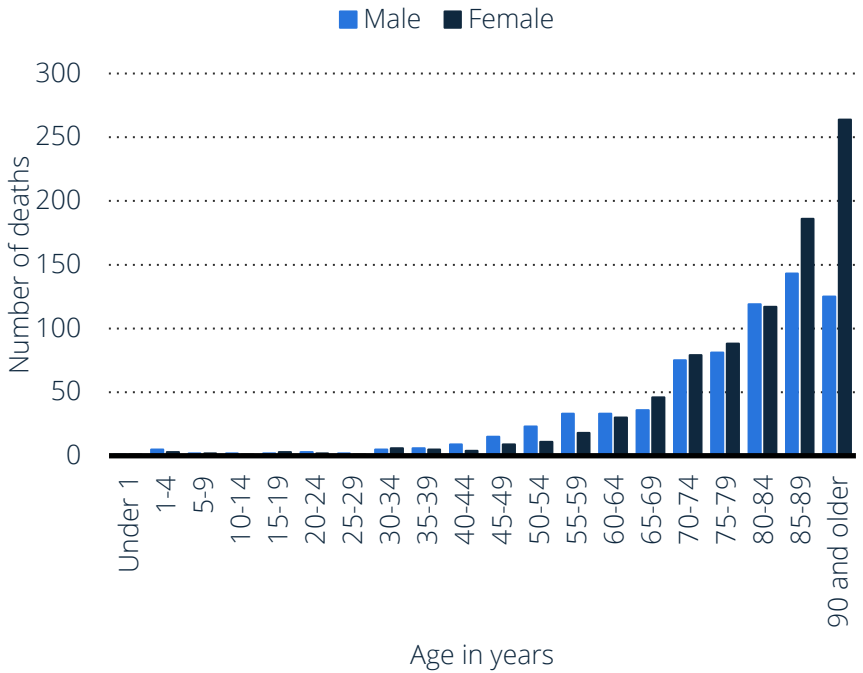
Influenza Belgium
2019 – 2020 - 2021

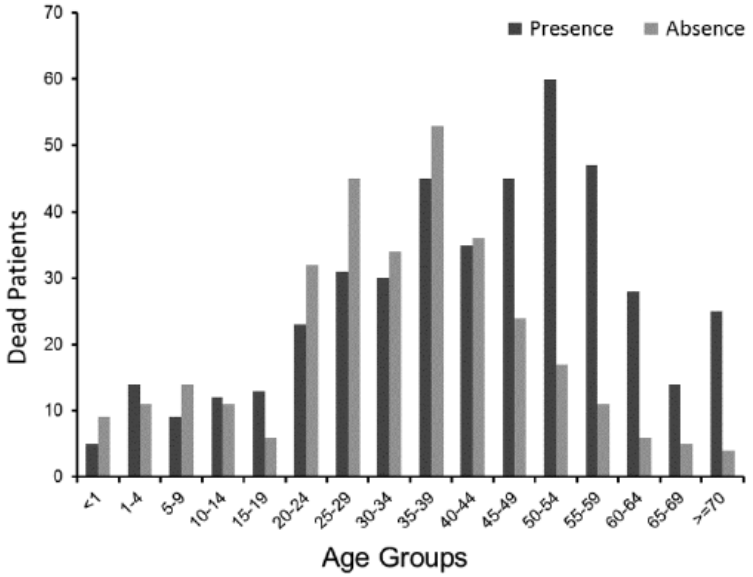


Influenza activity Belgium W47 2022



Influenza mortality by age and comorbidity

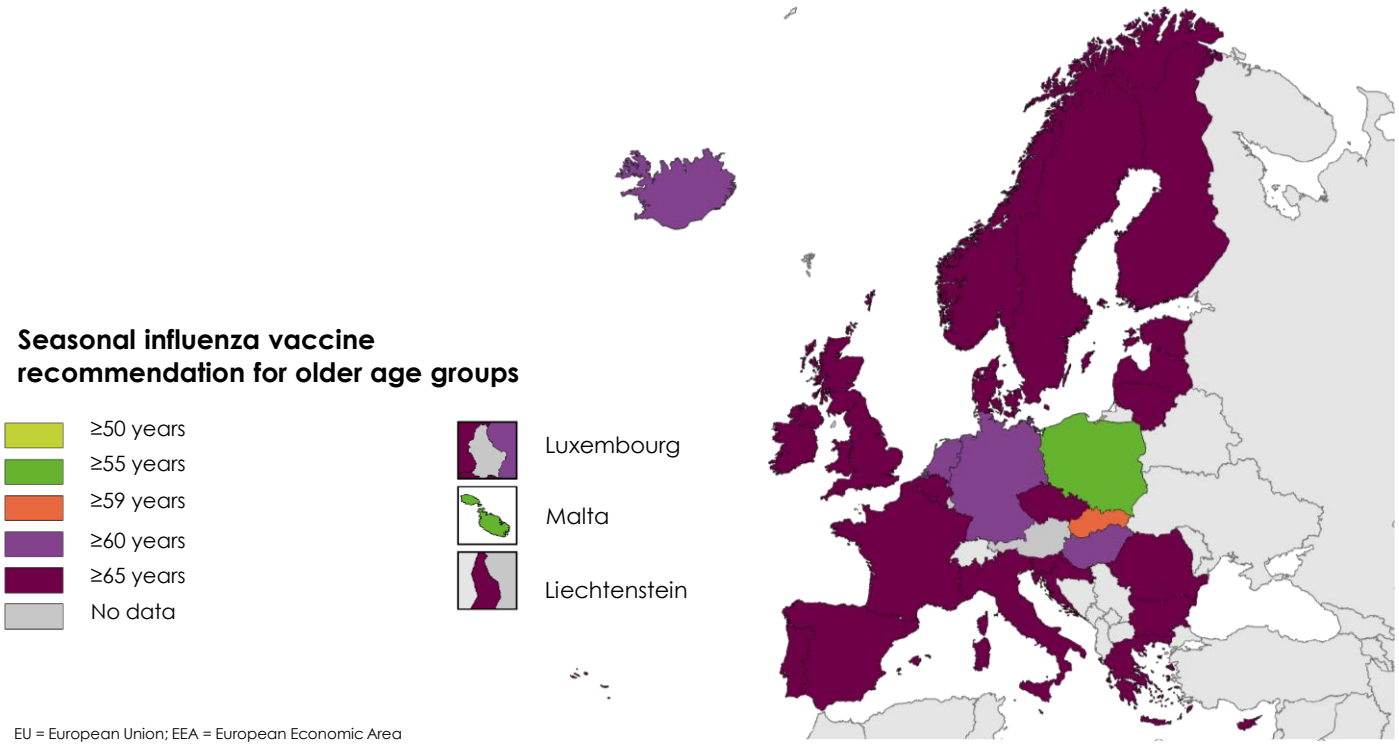




Note: United Kingdom (England, Wales); 2018
Further information regarding this statistic can be found on page 8.
Source(s): Office for National Statistics (UK); ID 970800

Mexico. J Infect Dev Ctries 2014; 8(6):742-748

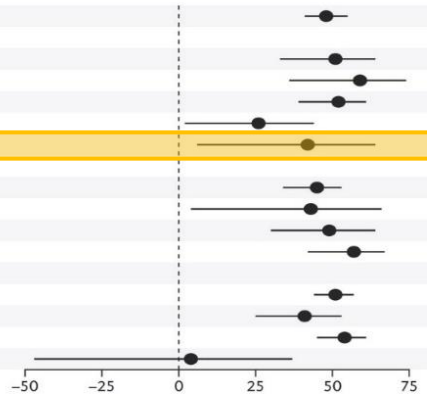
Influenza vaccine recommendations for older adults



1. European Centre for Disease Prevention and Control. Seasonal influenza vaccination and antiviral use in EU/EEA Member States – Overview of vaccine recommendations for 2017–2018 and vaccination coverage rates for 2015–2016 and 2016–2017 influenza seasons. Stockholm: ECDC; 2018.

Influenza Vaccine Effectiveness

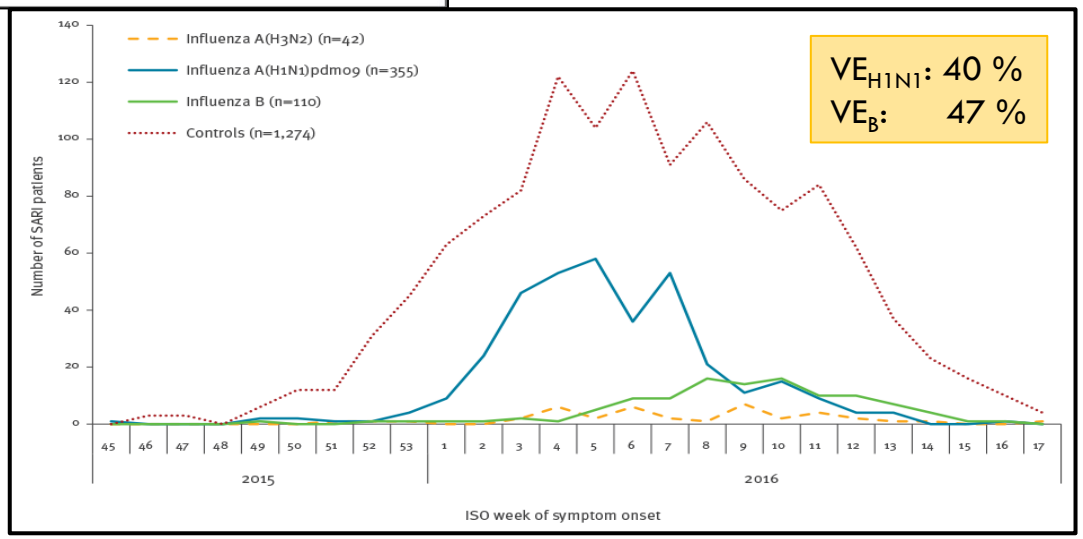
Subgroup	No. of Case Patients/ Total No. (%)	Vaccine Effectiveness %
Overall	1309/6879 (19)	48
Age		
6 mo to 8 yr	254/1526 (17)	51
9 to 17 yr	164/858 (19)	59
18 to 49 yr	499/2456 (20)	52
50 to 64 yr	283/1201 (24)	26
≥65 yr	109/838 (13)	42
Virus subtype or lineage		
A(H1N1)pdm09	768/6338 (12)	45
A(H3N2)	72/4623 (2)	43
B/Victoria	200/5770 (3)	49
B/Yamagata	253/5823 (4)	57
Vaccine type		
Any IIV	1271/6718 (19)	51
IIV3	955/4473 (21)	41
IIV4	1072/5368 (20)	54
LAIV4 (2 to 49 yr of age only)	674/2839 (24)	4



Jackson ML et al. N Engl J Med 2017;377:534-543.

Lab proven Influenza

Influenza Hospitalisation ≥ 65 y.

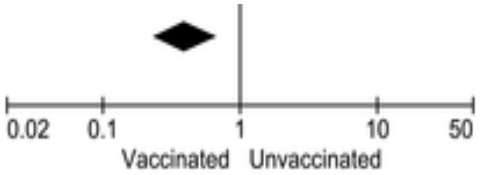


Euro Surveill. 2017 Jul 27;22(30). pii: 30580

Influenza vaccination of **HCW**

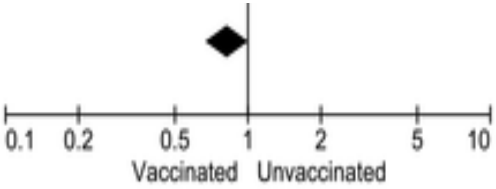
Lab proven Influenza

Total (95% CI) 962 502 100.0% 0.40 [0.23, 0.69]
Total events 59 66
Heterogeneity: Tau² = 0.17; Chi² = 7.42, df = 4 (P = 0.12); I² = 46%
Test for overall effect: Z = 3.32 (P = 0.0009)
Test for subgroup differences: Chi² = 5.14, df = 2 (P = 0.08), I² = 61.1%



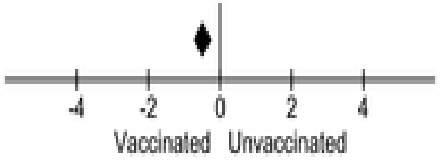
Absenteism incidence

Total (95% CI) 1561 6512 100.0% 0.82 [0.67, 1.00]
Total events 518 2633
Heterogeneity: Tau² = 0.02; Chi² = 7.85, df = 5 (P = 0.16); I² = 36%
Test for overall effect: Z = 1.95 (P = 0.05)
Test for subgroup differences: Chi² = 5.85, df = 1 (P = 0.02), I² = 82.9%



Absenteism duration

Total (95% CI) 39 207 100.0% -0.46 [-0.71, -0.21]
Heterogeneity: Tau² = 0.00; Chi² = 2.39, df = 3 (P = 0.49); I² = 0%
Test for overall effect: Z = 3.57 (P = 0.0004)
Test for subgroup differences: Chi² = 0.01, df = 1 (P = 0.91), I² = 0%



PLOS ONE 13(6): e0198685. https://doi.org/10.1371/journal.pone.0198685
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0198685

Influenza vaccination of **HCW** to protect residents of LTCF

- **Laboratory-proven influenza:**
  - *little or no effect*
  - RD 0 (95% CI -0.03 to 0.03),
  - 2 studies, 752 participants;
  - low quality evidence
- **LRTI**
  - *- 6% to - 4%*
  - RD -0.02 (95% CI -0.04 to 0.01),
  - 1 study of 3400 people;
  - moderate quality evidence
- **Hospital admission for RTI:**
  - *little or no effect*
  - (RD 0 (95% CI -0.02 to 0.02,
  - one study of 1059 people;
  - low quality evidence
- **Death from RTI & all cause:**
  - *Varying direction and size of effect*
  - Very low quality evidence
  - RTI death: two studies of 4459 people
  - all cause deaths: four studies of 8468 people

https://doi.org//10.1002/14651858.CD005187.pub5

Seasonal Influenza Vaccination

(2020-2021, HGR 9581)

A. **Group 1:**

- Pregnant women
- > 6 m. + chronic heart, lung, kidney, liver, metabolic, neuromuscular, immunological disease, BMI >35
- **≥ 65 y.**
- **Institutionalized persons**
- 6m – 18 y. + chronic aspirine use

Group 2:

- **Health care workers**

Group 3:

- Persons living with high risk person of group 1 or child < 6m.

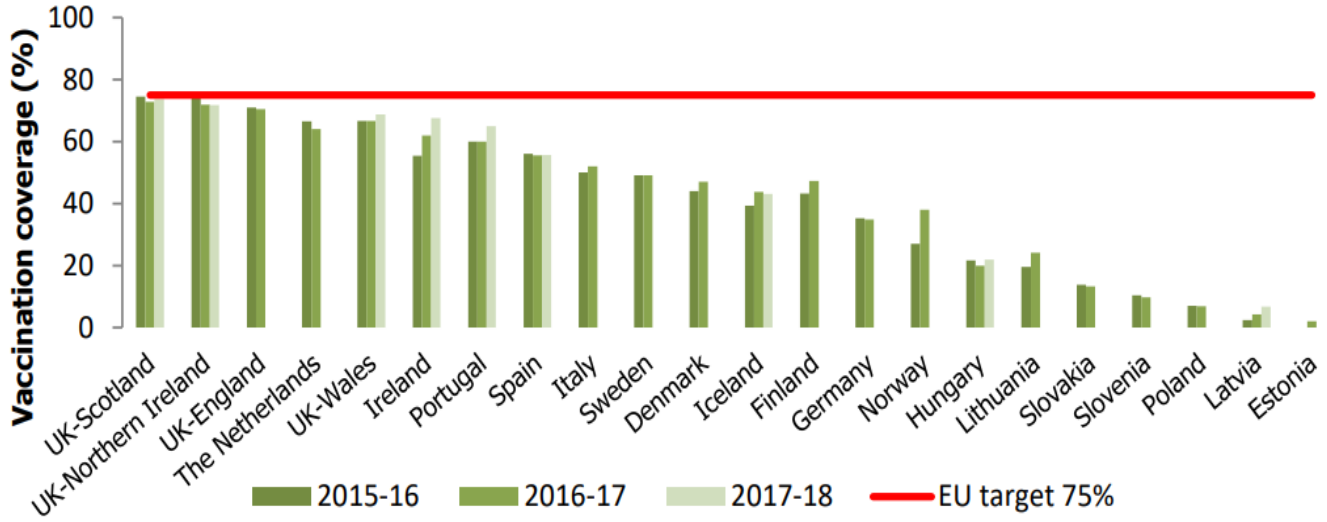
B. **Persons 50 – 65 y**

Hoge Gezondheidsraad

federale overheidsdienst
VOLKSGEZONDHEID, VEILIGHEID VAN DE VOEDSELKETEN EN LEEFMILIEU

Influenza vaccination rates, EU

Figure 4. Seasonal influenza vaccination coverage rates in older age groups, 19 EU/EEA Member States, influenza seasons 2015–2016; 2016–2017 and, if available, 2017–2018*

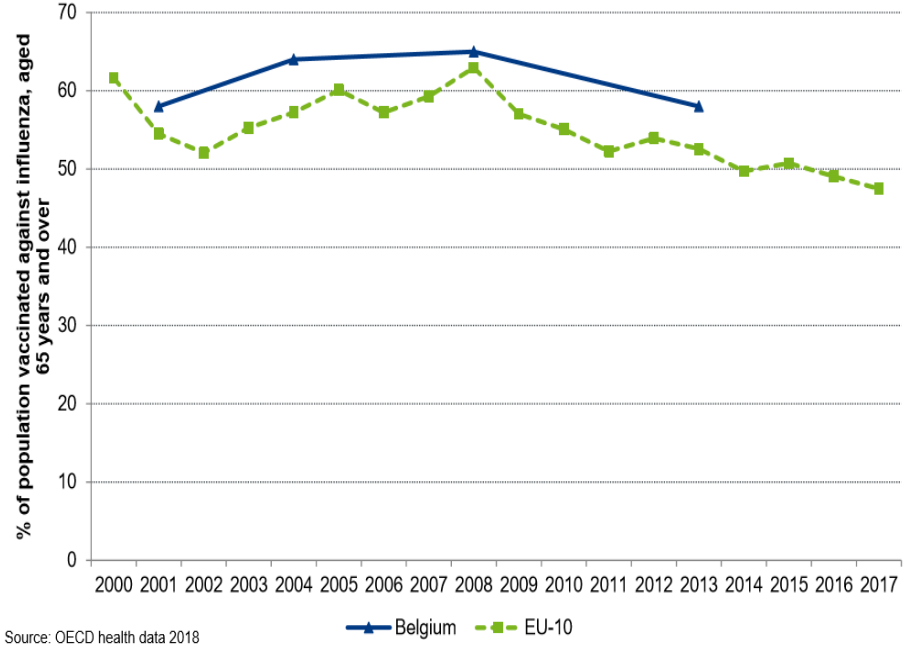


Source: National seasonal influenza vaccination survey, January 2018.
**: data for UK displayed by respective country (England, Northern Ireland, Scotland, Wales).*

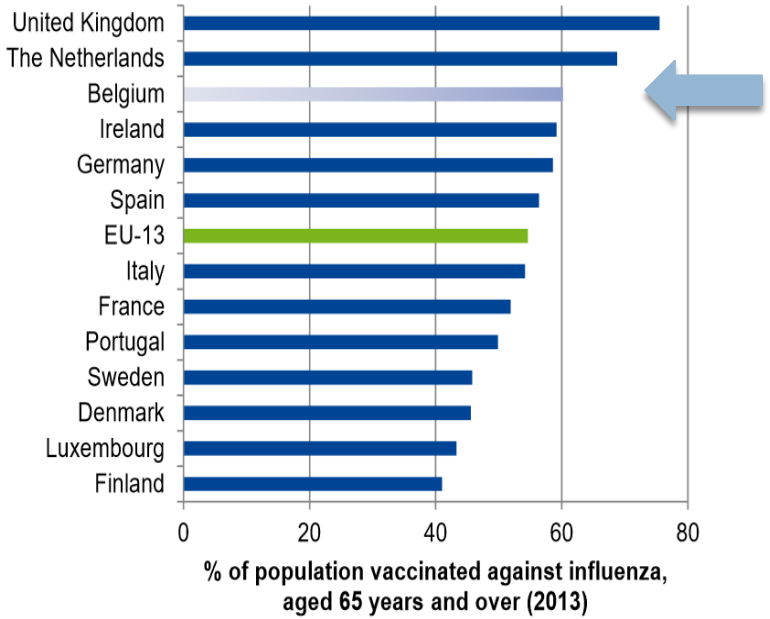
1. European Centre for Disease Prevention and Control. Seasonal influenza vaccination and antiviral use in EU/EEA Member States – Overview of vaccine recommendations for 2017–2018 and vaccination coverage rates for 2015–2016 and 2016–2017 influenza seasons. Stockholm: ECDC; 2018.

Influenza vaccination rate ≥ 65 y. in Belgium and EU

Figure 146 – Coverage of vaccination against influenza for elderly: international comparison (2013, trend 2000-2017)



Source: OECD health data 2018



Source: OECD Health Statistics 2015

Source: Data from Belgium are based on the Health Interview Survey.
Note: fluctuation of the EU-15 is an artefact of the availability of the coverage data of the different countries.

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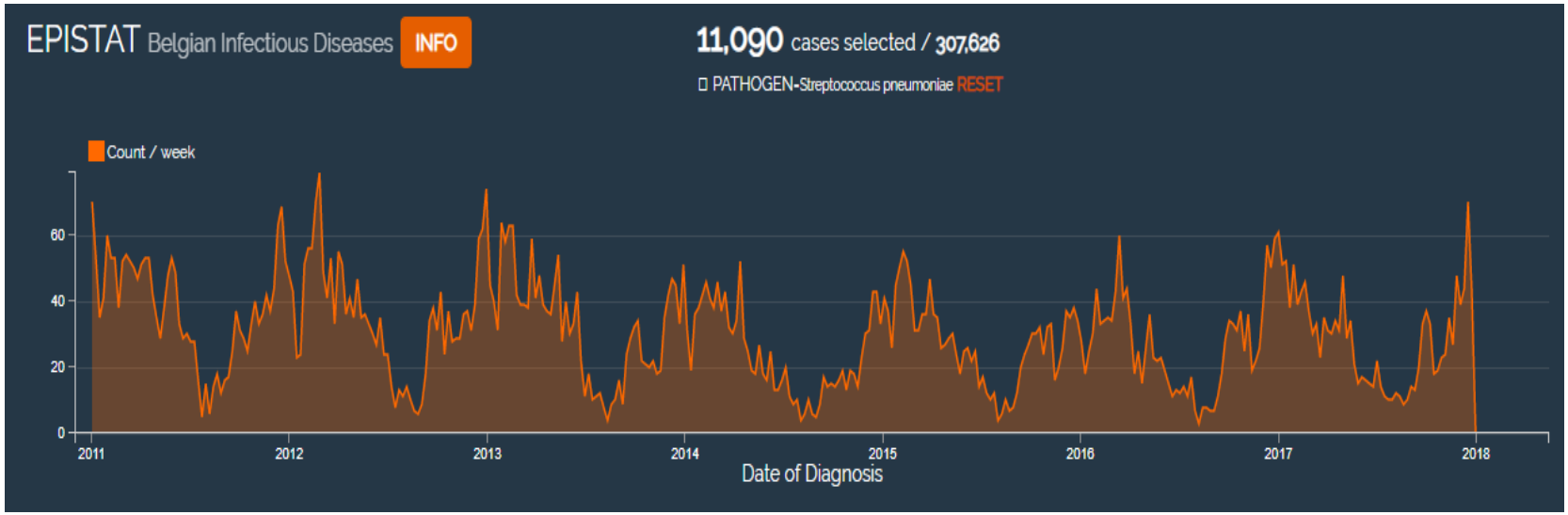
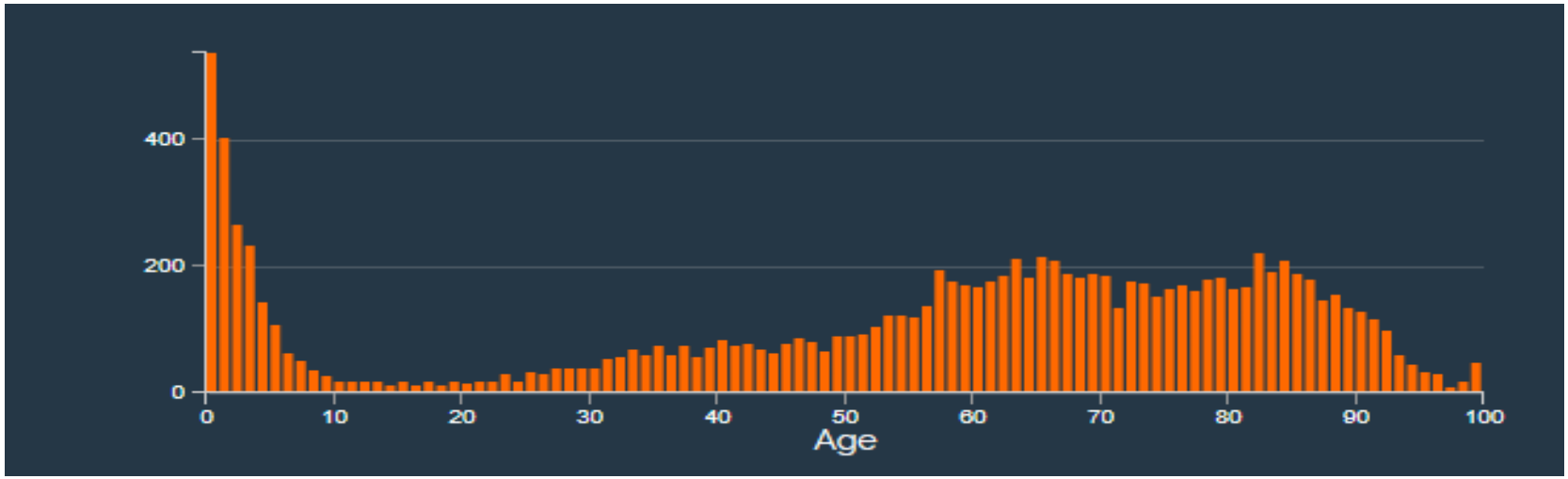
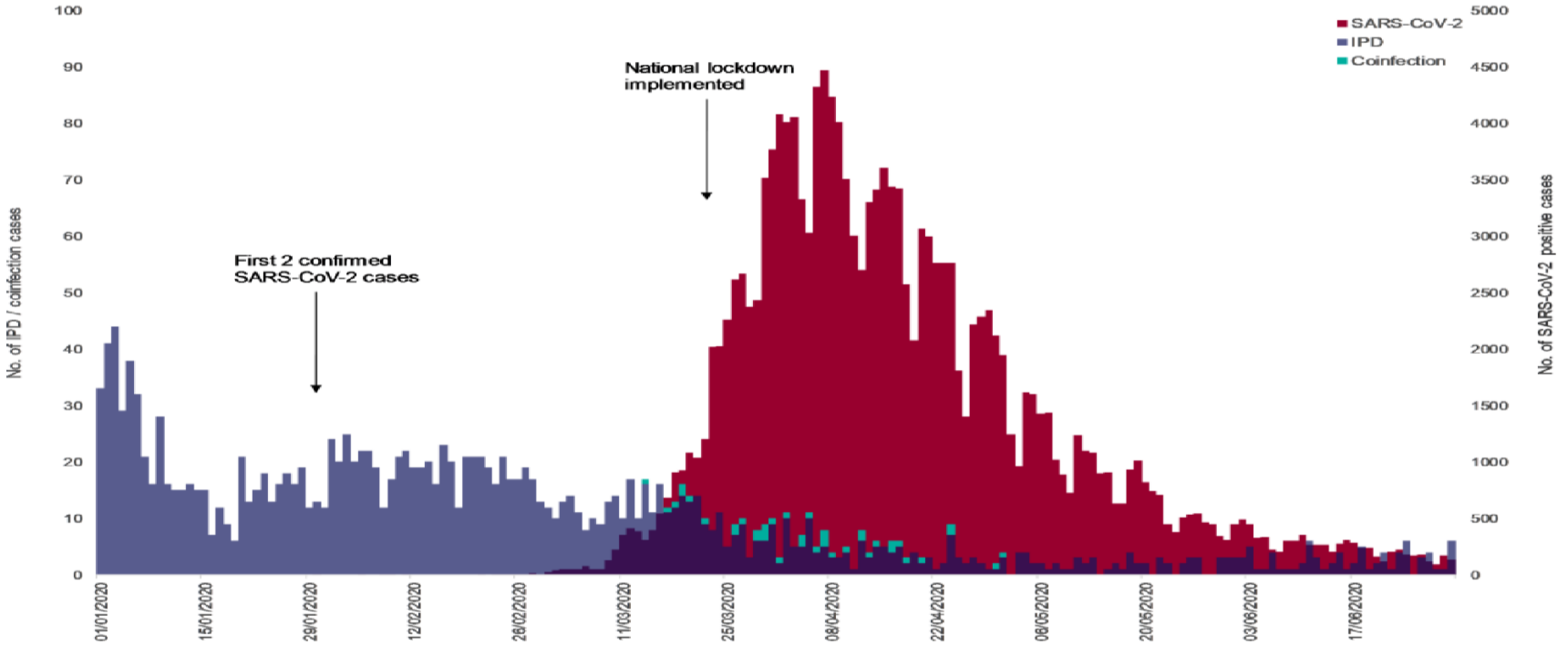
Pneumococcal disease in Belgium





COVID-19 and IPD England



- **IPD incidence** after lockdown: **- 30 %**
- **Co-infection COVID + IPD:**
  - COVID-19: 0.025 %
  - IPD: 3.5 %
  - CFR: x 7.8

Clinical Infectious Diseases, ciaa1728, https://doi.org/10.1093/cid/ciaa1728

IPD mortality

Global Mortality Associated With Pneumococcal Disease Remains High[1]

Across all ages, number of **deaths** attributed to **pneumococcal pneumonia is ≈1.5 million**[1]

Mortality Due to Pneumococcal Pneumonia[2]:

~1 out of 20

Mortality Due to Pneumococcal Bacteremia[2]:

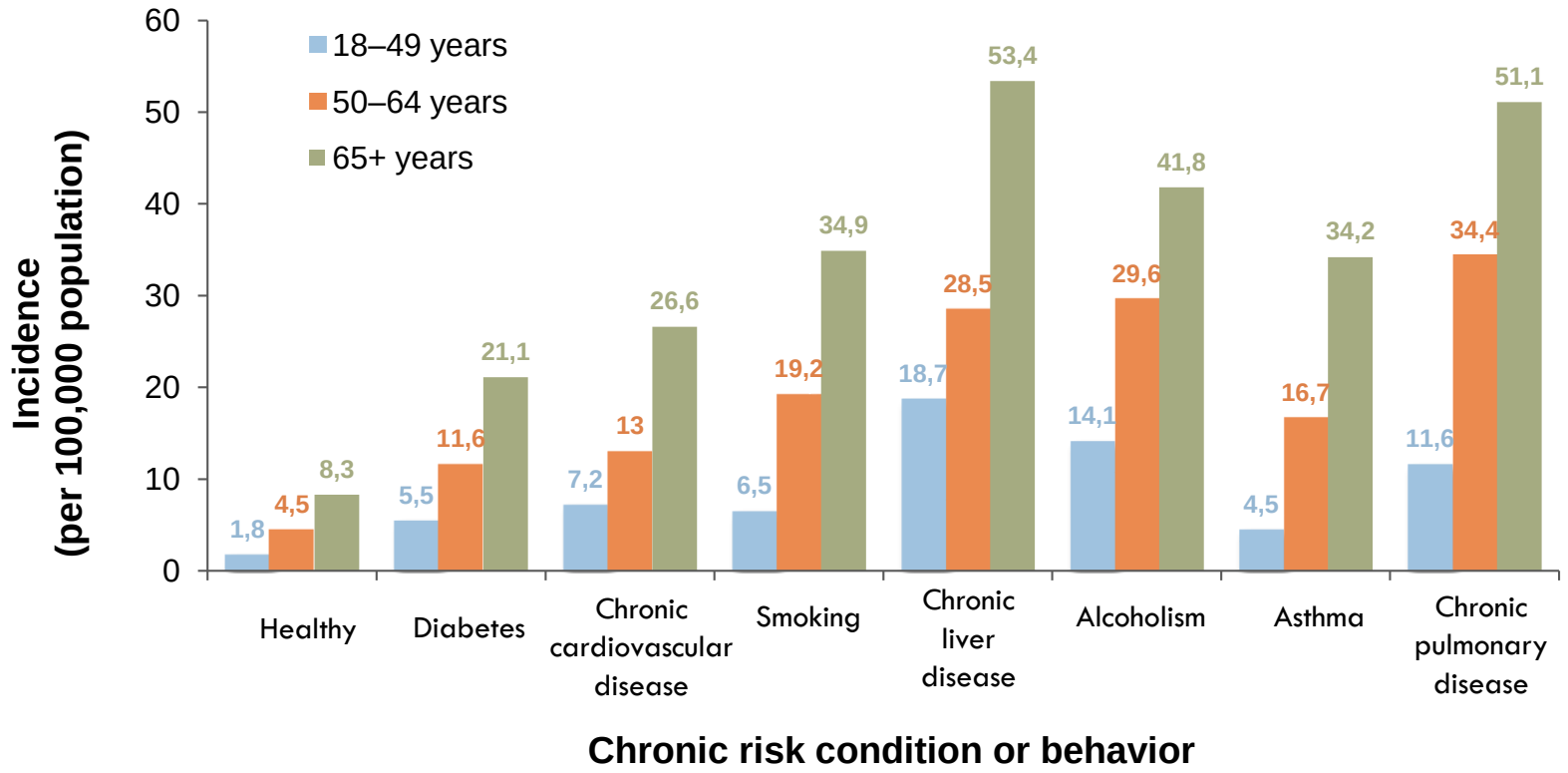
~1 out of 6

Mortality Due to Pneumococcal Meningitis[2]:

~1 out of 6

1. GBD 2015 Mortality and Causes of Death Collaborator. *Lancet*. 2016;388:1459–1544. **2.** CDC. Adults: Protect Yourself with Pneumococcal Vaccines. 2019. www.cdc.gov/features/adult-pneumococcal/index.html. Accessed April 9, 2020.

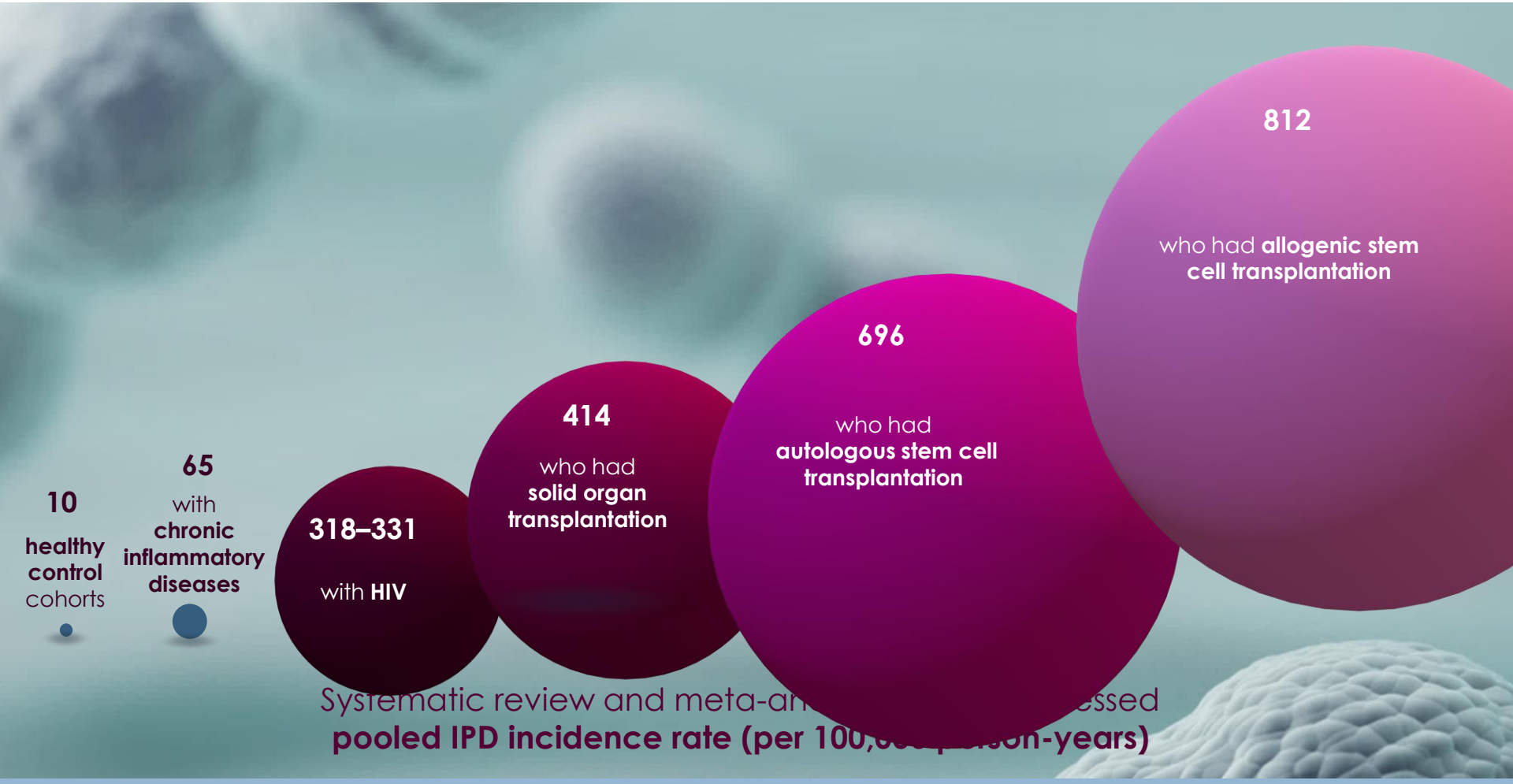
IPD risk, age and comorbidities



Data from a retrospective cohort study from 3 large longitudinal US healthcare databases of medical and outpatient pharmacy claims, 2007–2010

Shea KM, et al. *Open Forum Infect Dis.* 2014;1(1):ofu024.

Risk for IPD in Immunocompromised Adults



HIV = human immunodeficiency virus; IPD = invasive pneumococcal disease.

1. van Aalst M et al. *Travel Med Infect Dis*. 2018;24:89–100.

Risk groups for Pneumococcal disease

TARGET GROUPS:

July 2020, HGR 9562

Adults with high risk for PD

- Immunocompromised
- Asplenia (anatomic or functional)
- Sickle-cell disease and hemoglobinopathia
- CSF leakage or cochlear implant

Adults with comorbidity

- Chronic heart disease
- Chronic lung disease
- Chronic liver disease or ethylism
- Chronic kidney disease
- Chronic neurological conditions with aspiration risk
- Diabetes

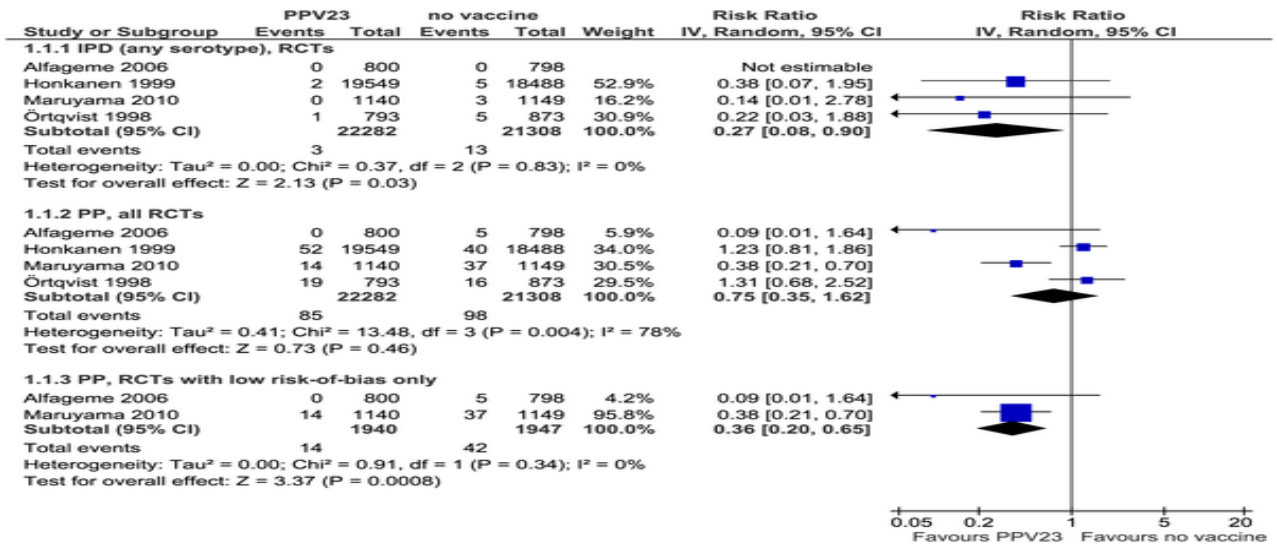
Healthy adults ≥ 65 Y.

Hoge Gezondheidsraad

federale overheidsdienst
VOLKSGEZONDHEID, VEILIGHEID VAN DE VOEDSELKETEN EN LEEFMILIEU

PPV23 effect on **IPD** and **PP** in elderly RCTs

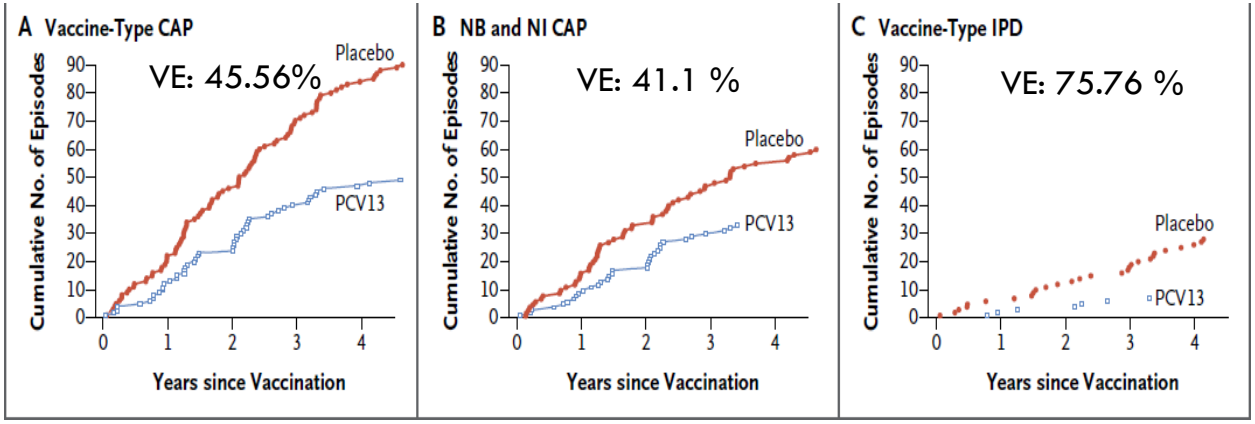
- IPD: 73 % VE
- PP: 64 % VE



Study or Subgroup	PPV23 Events	PPV23 Total	no vaccine Events	no vaccine Total	Weight	Risk Ratio IV, Random, 95% CI
1.1.1 IPD (any serotype), RCTs						
Alfageme 2006	0	800	0	798		Not estimable
Honkanen 1999	2	19549	5	18488	52.9%	0.38 [0.07, 1.95]
Maruyama 2010	0	1140	3	1149	16.2%	0.14 [0.01, 2.78]
Örtqvist 1998	1	793	5	873	30.9%	0.22 [0.03, 1.88]
Subtotal (95% CI)		**22282**		**21308**	**100.0%**	**0.27 [0.08, 0.90]**
Total events	3		13			
Heterogeneity: Tau² = 0.00; Chi² = 0.37, df = 2 (P = 0.83); I² = 0%						
Test for overall effect: Z = 2.13 (P = 0.03)						
1.1.2 PP, all RCTs						
Alfageme 2006	0	800	5	798	5.9%	0.09 [0.01, 1.64]
Honkanen 1999	52	19549	40	18488	34.0%	1.23 [0.81, 1.86]
Maruyama 2010	14	1140	37	1149	30.5%	0.38 [0.21, 0.70]
Örtqvist 1998	19	793	16	873	29.5%	1.31 [0.68, 2.52]
Subtotal (95% CI)		**22282**		**21308**	**100.0%**	**0.75 [0.35, 1.62]**
Total events	85		98			
Heterogeneity: Tau² = 0.41; Chi² = 13.48, df = 3 (P = 0.004); I² = 78%						
Test for overall effect: Z = 0.73 (P = 0.46)						
1.1.3 PP, RCTs with low risk-of-bias only						
Alfageme 2006	0	800	5	798	4.2%	0.09 [0.01, 1.64]
Maruyama 2010	14	1140	37	1149	95.8%	0.38 [0.21, 0.70]
Subtotal (95% CI)		**1940**		**1947**	**100.0%**	**0.36 [0.20, 0.65]**
Total events	14		42			
Heterogeneity: Tau² = 0.00; Chi² = 0.91, df = 1 (P = 0.34); I² = 0%						
Test for overall effect: Z = 3.37 (P = 0.0008)						

Falkenhorst G, Remschmidt C, Harder T, Hummers-Pradier E, Wichmann O, et al. (2017) Effectiveness of the 23-Valent Pneumococcal Polysaccharide Vaccine (PPV23) against Pneumococcal Disease in the Elderly: Systematic Review and Meta-Analysis. PLOS ONE 12(1): e0169368. https://doi.org/10.1371/journal.pone.0169368
http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0169368

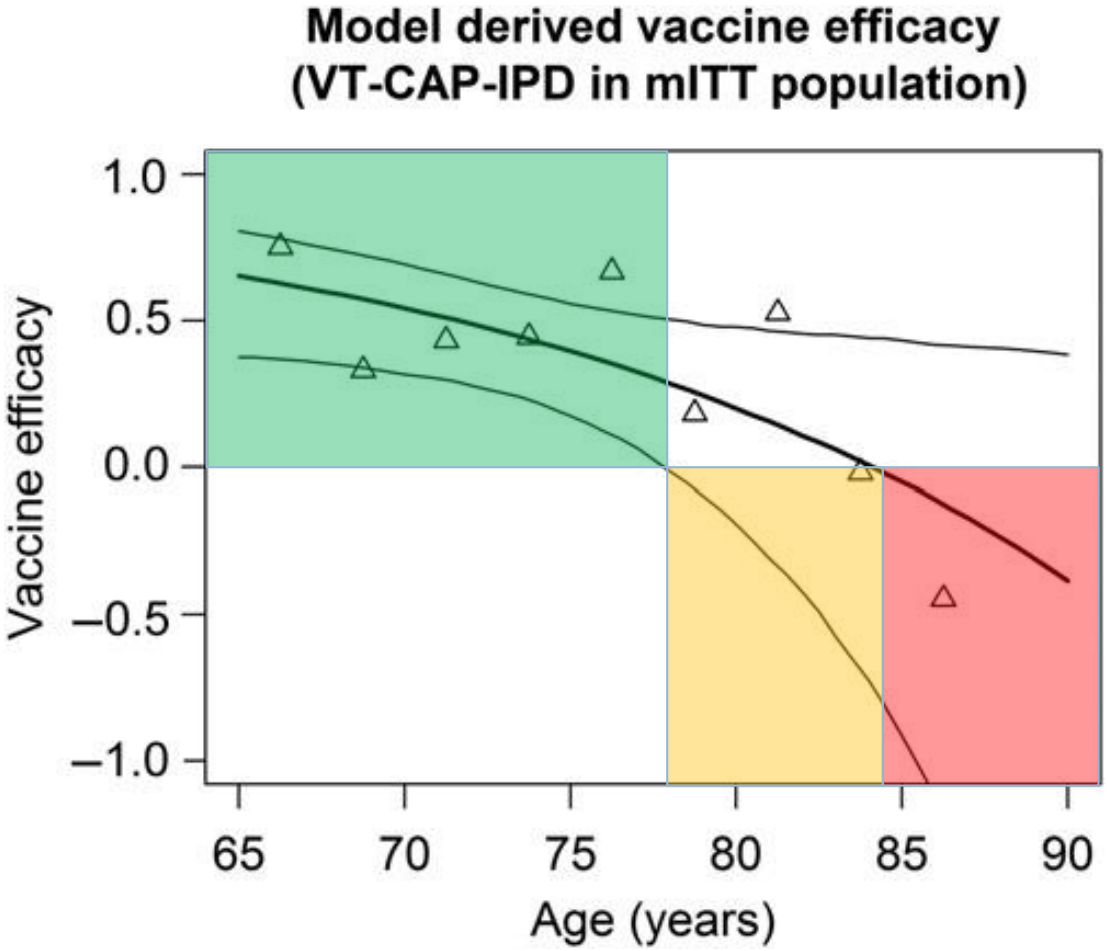
PCV13 in adults: CAPITA



	VE %	95 % CI	*P*
VT CAP (PP)			
Total	45.56	21.82 – 62.49	< 0.001
Age groups			
< 75 y	52.54	24.09 – 70.99	0.001
75 – 84 y	46.43	-4.33 – 73.57	0.07
≥ 85 y	-100	-1156.63 – 57.78	0.51

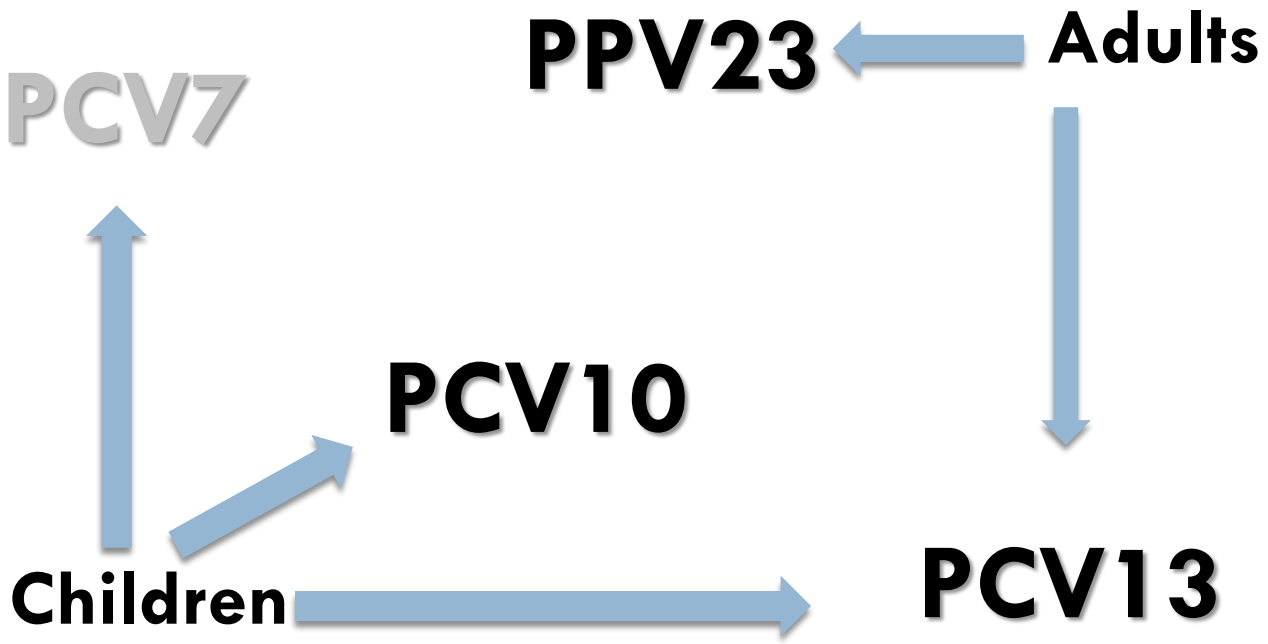
N Engl J Med 2015;372:1114-25.

PCV13 vaccine efficacy and age

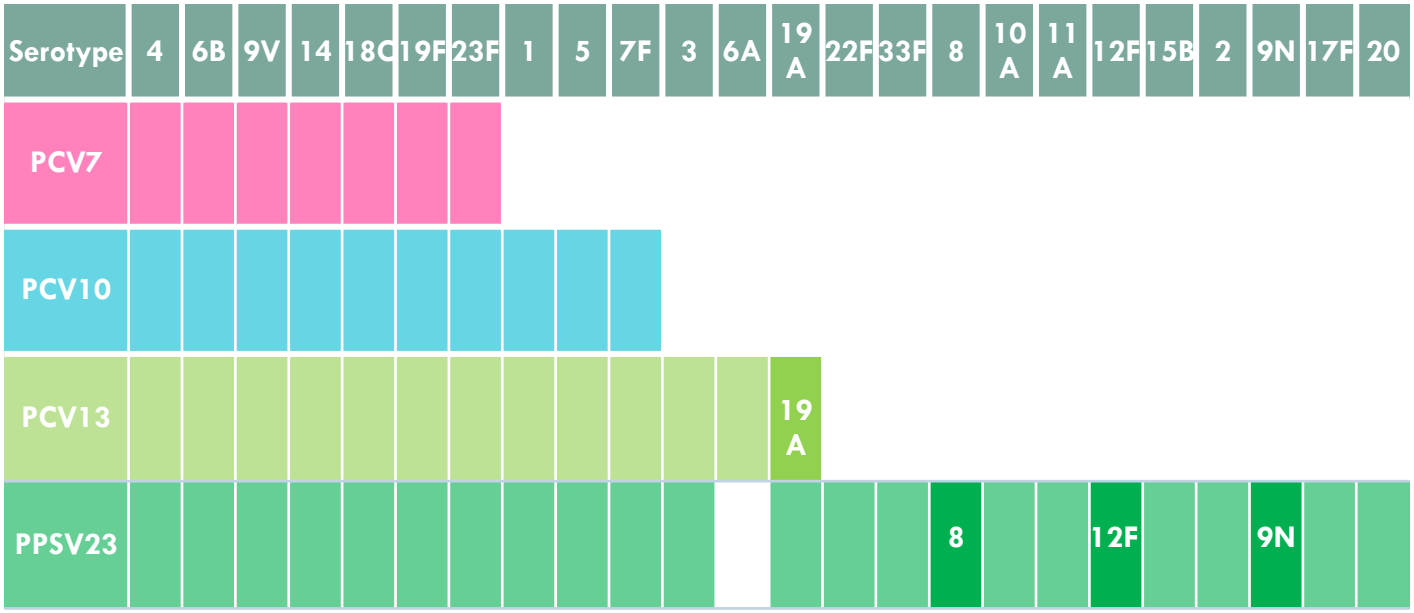


DOI: 10.1093/cid/civ686

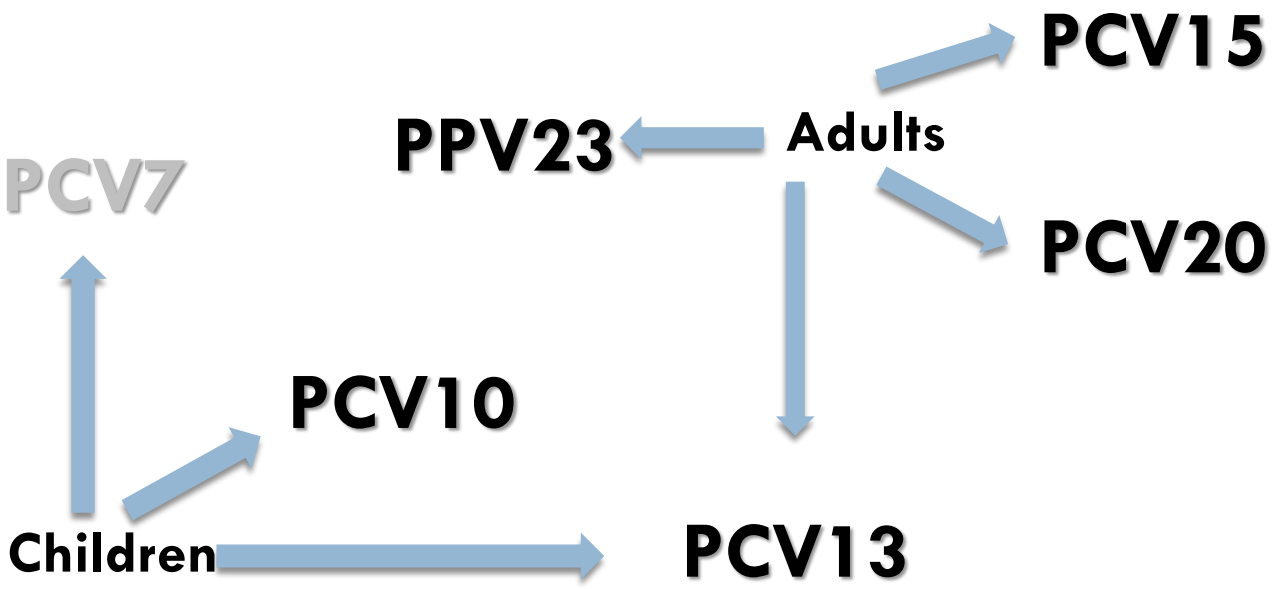
PCV7, PCV10, PCV13, PPV23



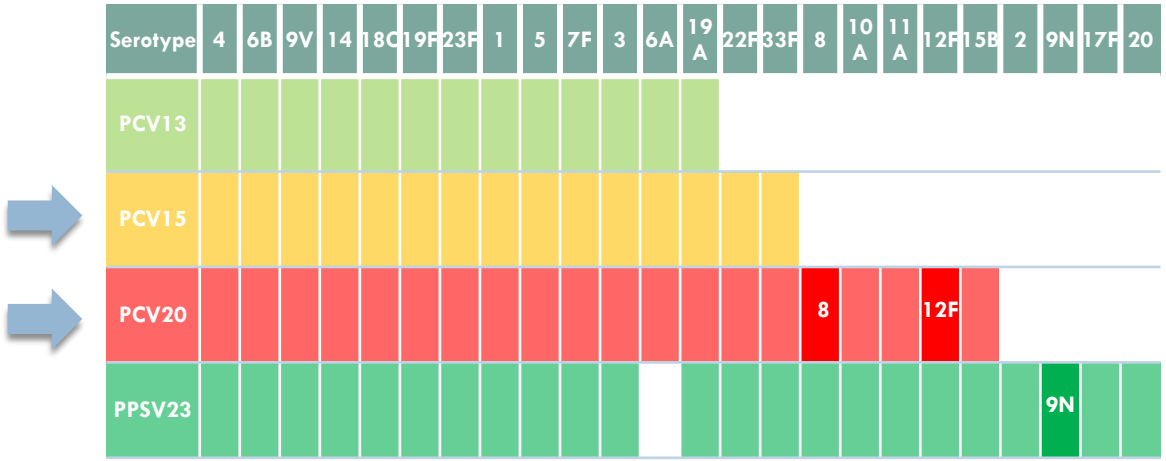
PCV7, PCV10, PCV13, PPV23



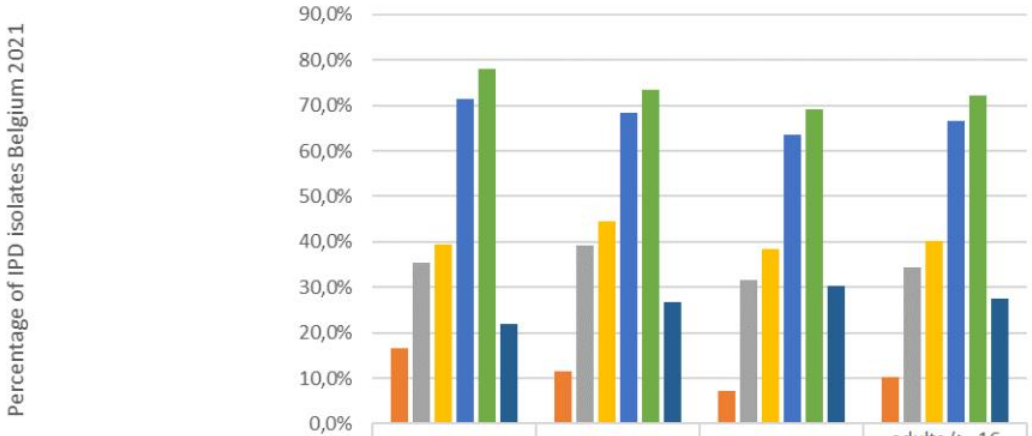
PCV7, PCV10, PCV13, PCV15, PCV20, PPV23



PCV15 and PCV20



IPD serotypes included in PCV10, PCV13, PCV15, PCV20, and PPV23



	16-49 years	50-64 years	>= 65 years	adults (>=16 years)
PCV10 serotypes	16,7%	11,4%	7,1%	10,3%
PCV13 serotypes	35,3%	39,1%	31,7%	34,4%
PCV15 (PCV13 + 22F + 33F) serotypes	39,3%	44,6%	38,5%	40,3%
PCV20 (PCV15 + 8, 10A,11A, 12F, 15B) serotypes	71,3%	68,5%	63,7%	66,6%
PPV23	78,0%	73,4%	69,1%	72,1%
non-vaccine serotypes (NVT)	22,0%	26,6%	30,3%	27,6%

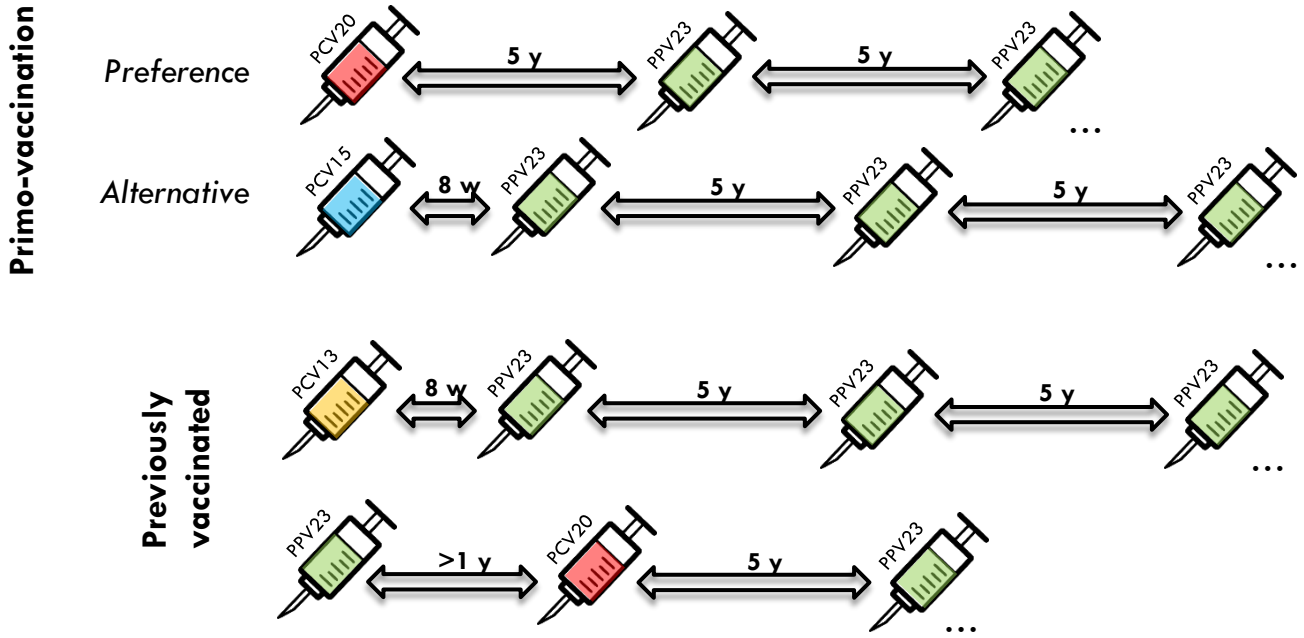
Serotypes in IPD in adults
Belgium, 2021

Serotype	Serotype geïncludeerd in vaccin	16-49 jaar (n=150)	50-64 jaar (n=184)	>= 65 jaar (n=366)
8	PCV20/PPV23	24.7%	17.4%	14.2%
19A	PCV13/PCV15/PCV20/PPV23	8.0%	12.5%	14.2%
3	PCV13/PCV15/PCV20/PPV23	10.7%	15.2%	9.8%
4	PCV13/PCV15/PCV20/PPV23	11.3%	8.2%	1.4%
6C	NVT	1.3%	3.3%	7.7%
9N	PPV23	4.0%	3.8%	4.4%
23B	NVT	4.0%	5.4%	3.0%
22F	PCV15/PCV20/PPV23	1.3%	2.7%	4.4%
15A	NVT	2.7%	3.3%	3.3%
11A	PCV20/PPV23	2.7%	2.2%	3.3%
16F	NVT	2.7%	4.3%	2.2%
10A	PCV20/PPV23	0.0%	2.2%	4.1%
33F	PCV15/PCV20/PPV23	2.7%	2.7%	2.5%
23A	NVT	4.0%	2.2%	2.2%
14	PCV13/PCV15/PCV20/PPV23	1.3%	1.6%	2.5%
12F	PCV20/PPV23	3.3%	1.6%	3.3%
35B	NVT	0.7%	0.5%	2.7%
31	NVT	0.7%	1.1%	1.9%
19F	PCV13/PCV15/PCV20/PPV23	2.0%	0.0%	1.4%
7B	NVT	0.7%	0.5%	1.6%
15B	PCV20/PPV23	1.3%	0.5%	1.1%
Andere serotypes		10.0%	8.7%	9.0%

Pneumococcal vaccination, Belgium

Adults 16-85 y. with high risk for PD

August 2022, HGR 9674



Hoge Gezondheidsraad

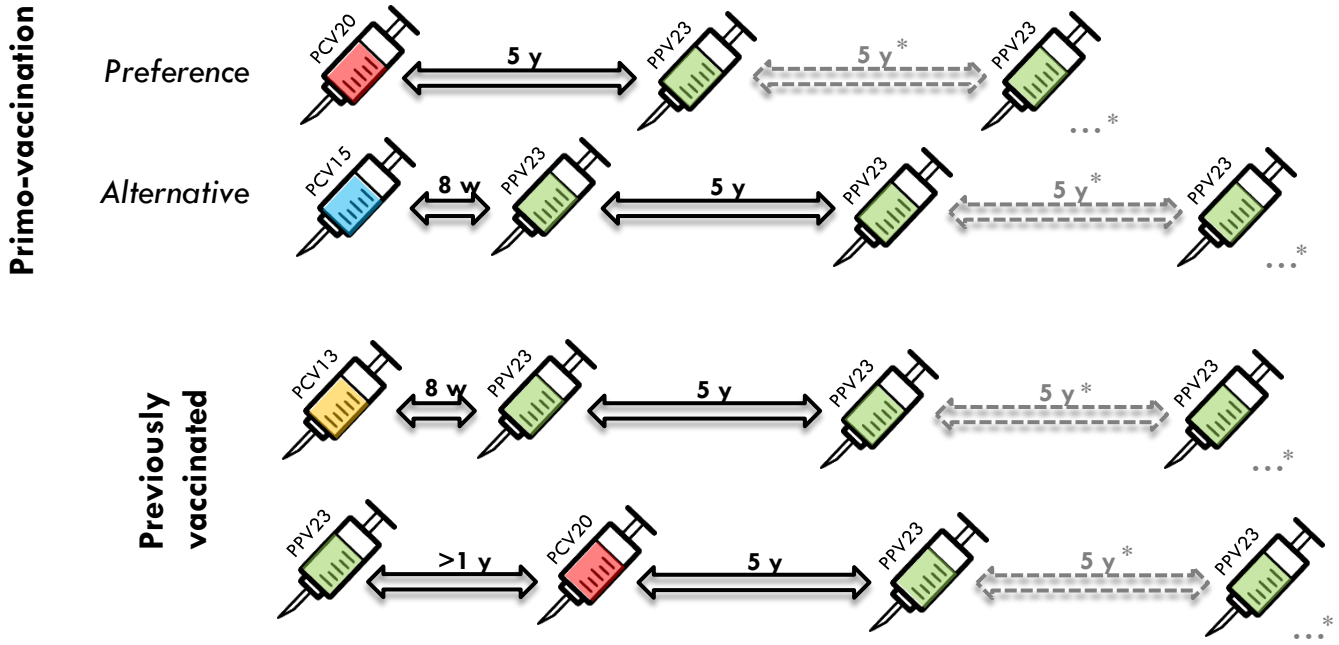
federale overheidsdienst
VOLKSGEZONDHEID, VEILIGHEID VAN DE VOEDSELKETEN EN LEEFMILIEU

https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/20220908_hgr-9674_pneumo_vweb.pdf

Pneumococcal vaccination, Belgium

Adults 50-85 y. with comorbidity

August 2022, HGR 9674



Hoge Gezondheidsraad

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VOLKSGEZONDHEID, VEILIGHEID VAN DE VOEDSELKETEN EN LEEFMILIEU

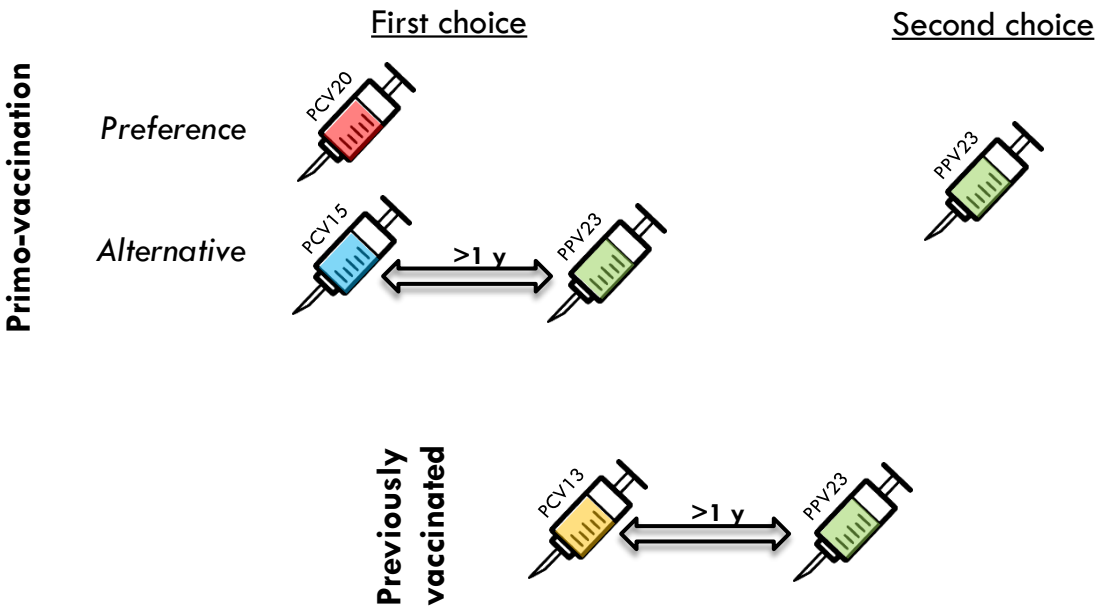
*: in severe disease

https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/20220908_hgr-9674_pneumo_vweb.pdf

Pneumococcal vaccination, Belgium

Healthy adults 65-85 y.

August 2022, HGR 9674



Hoge Gezondheidsraad

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https://www.health.belgium.be/sites/default/files/uploads/fields/fpshealth_theme_file/20220908_hgr-9674_pneumo_vweb.pdf

Cost-effectiveness pneumococcal vaccination

- Pfizer

Conclusions

Reimbursement of PCV13 in moderate/high-risk Belgian adults aged 65–84 years would be cost-effective from the Belgian healthcare perspective.

PLoS ONE 13(7): e0199427. https://doi.org/10.1371/journal. pone.0199427

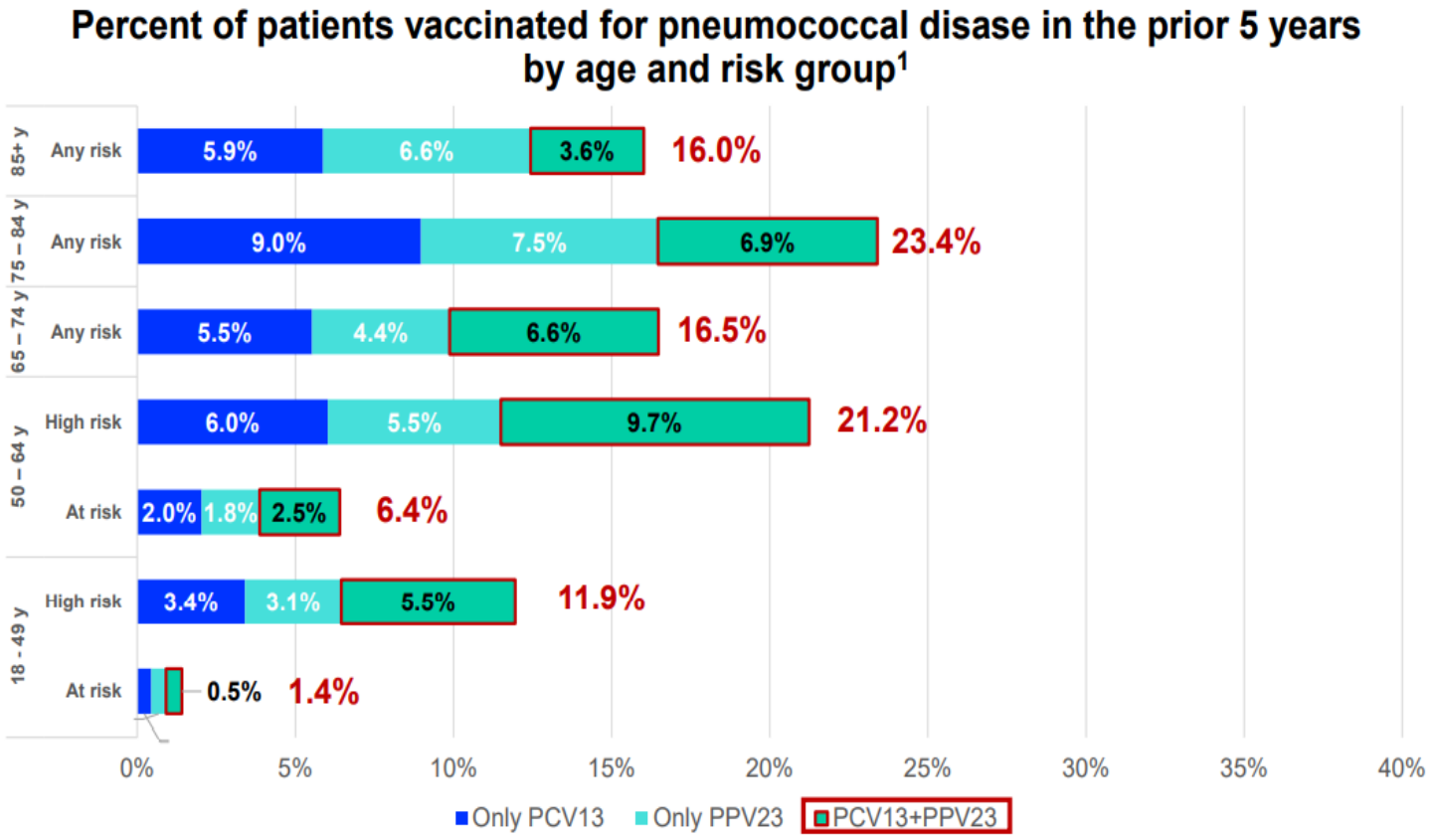
- KCE

pneumococcal pneumonia. Pneumococcal vaccination would be most cost-effective in Belgium, when achieving high uptake with PPV23 in 75–84 year olds, as well as by negotiating a lower market-conform PPV23 price to improve uptake and cost-effectiveness.

HUMAN VACCINES & IMMUNOTHERAPEUTICS 2018, VOL. 14, NO. 5, 1218–1229

Pneumococcal vaccination in Belgium

Implementation of Adult Pneumococcal Vaccination in Belgium – Low Uptake, Poor Adherence to Recommended Schedule



Overview

- Coronavirus in the older prerson
- Influenza in the older person
- Pneumococcal disease in the older person
- **Frailty in older persons**
  - Immunosenescence
- Vaccination strategies for older persons
  - Age based vaccination
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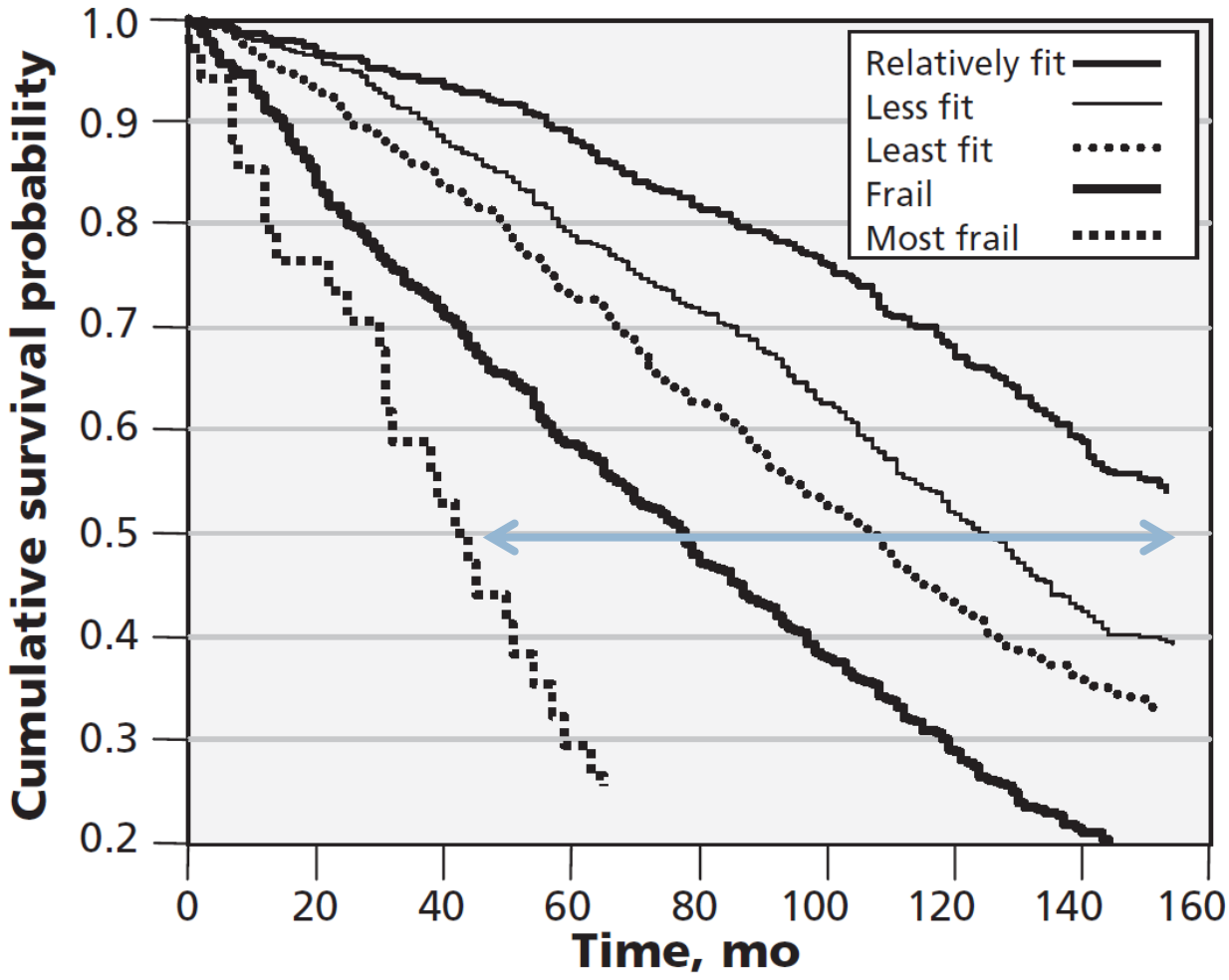
- Immunosenescence and vaccination
- Ex. Herpes Zoster vaccination

Frailty incidence and mortality



CMAJ 2011. DOI:10.1503/cmaj.101271

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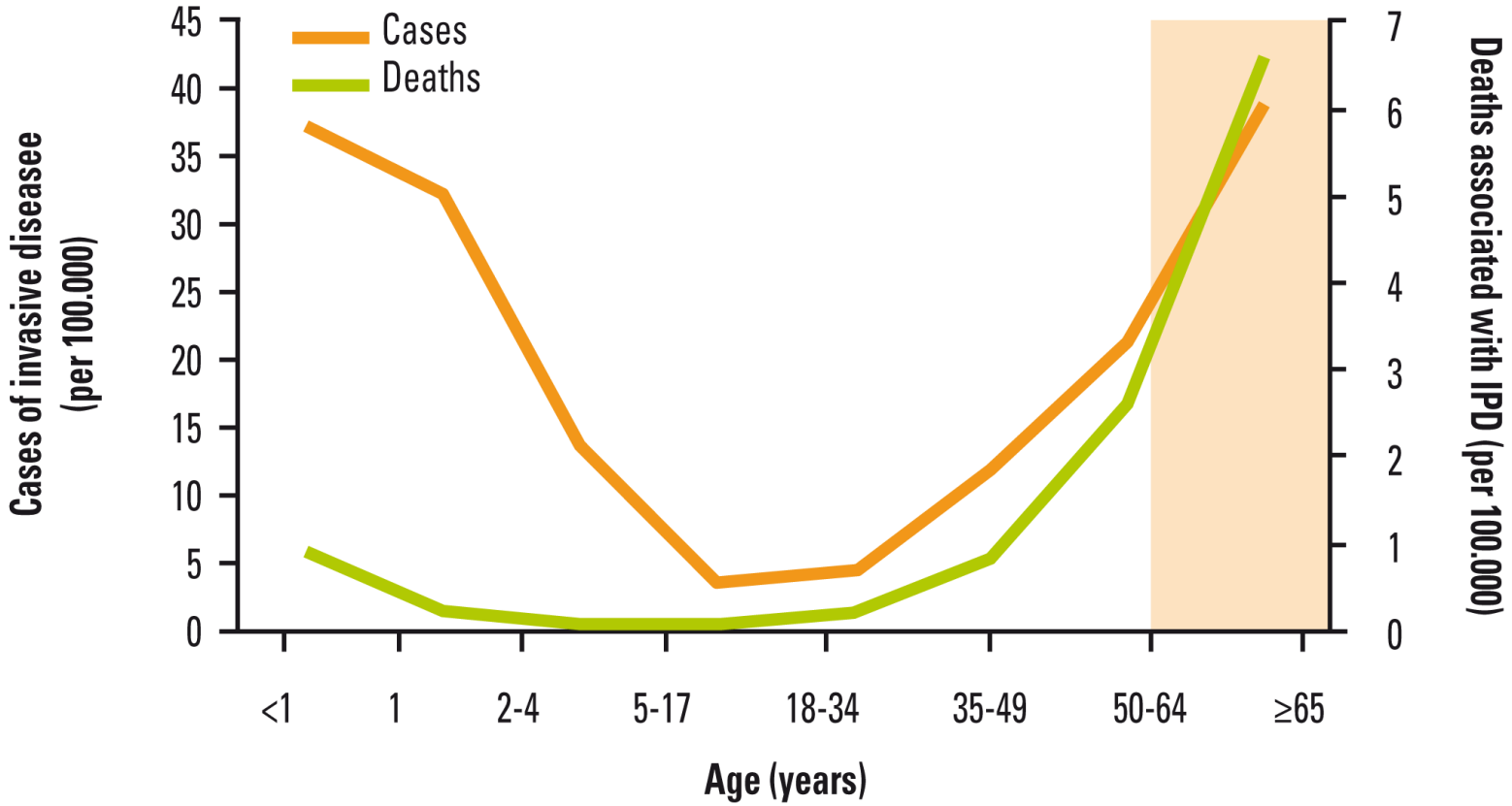
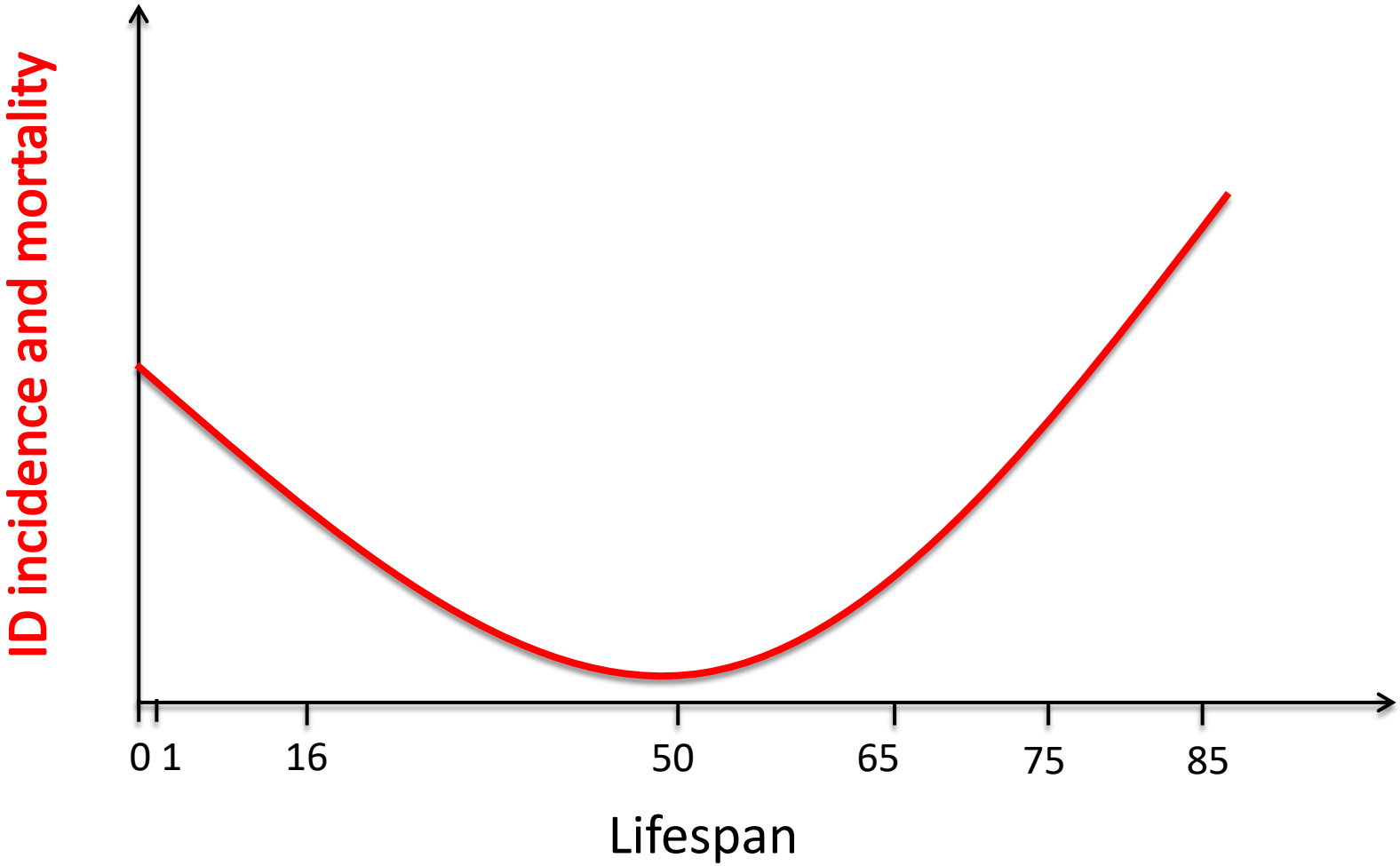
Incidence and mortality of infectious diseases

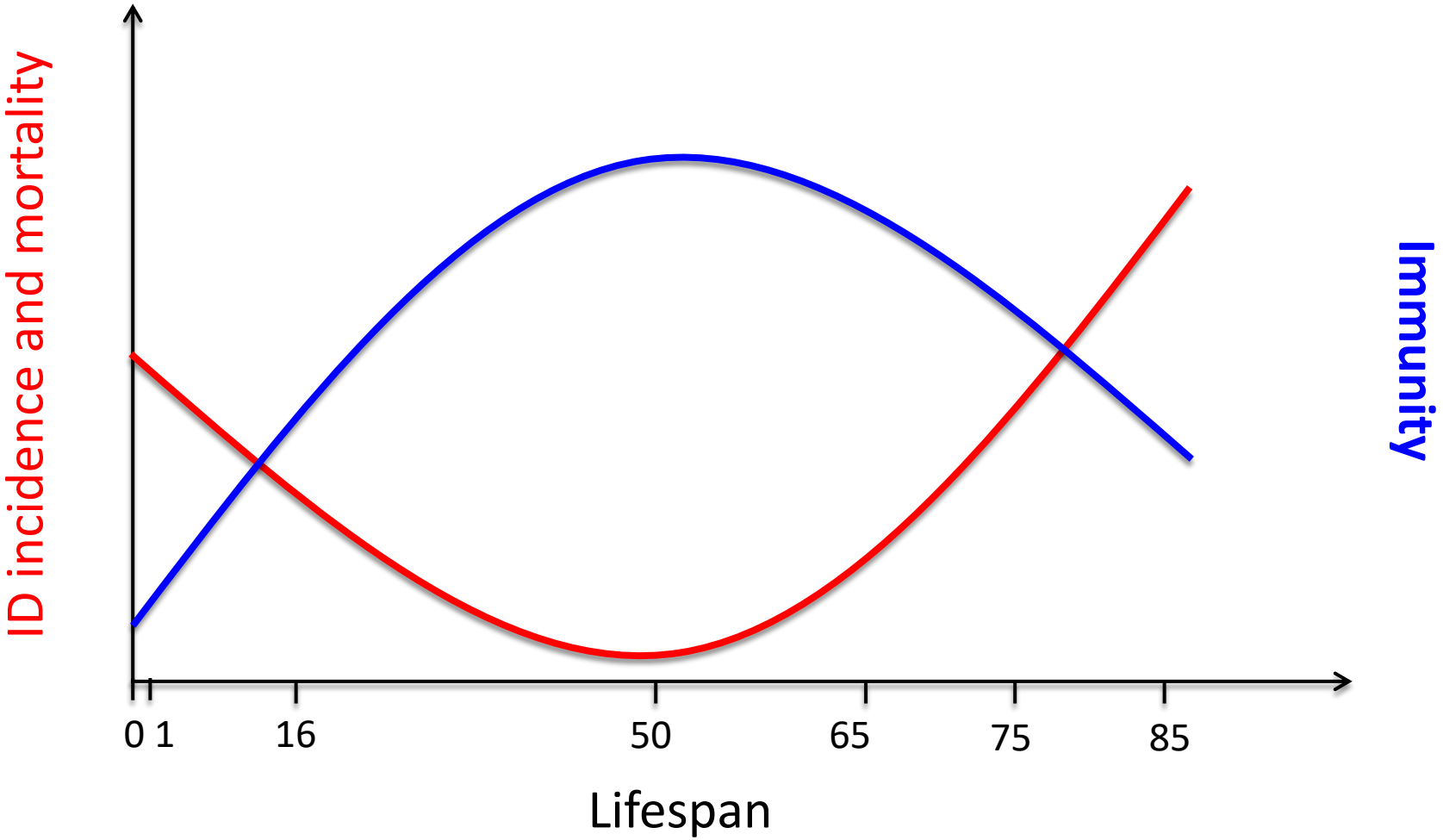


CDC. 2010. ABC Surveillance Report, Emerging Infections Program Network, Streptococcus pneumoniae, 2009.

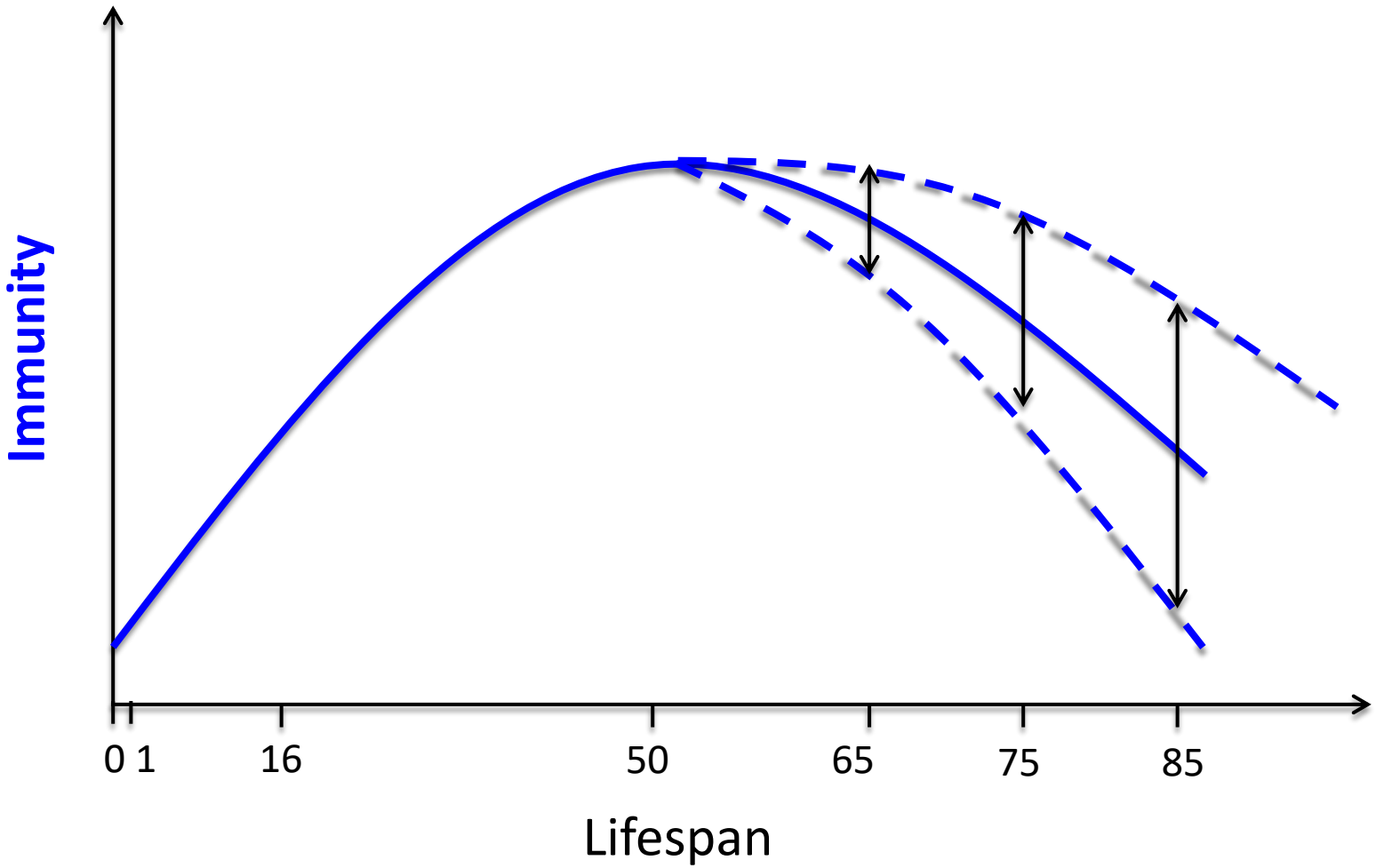
Incidence and mortality of infectious diseases



Infectious diseases and immunity



Immunity and aging



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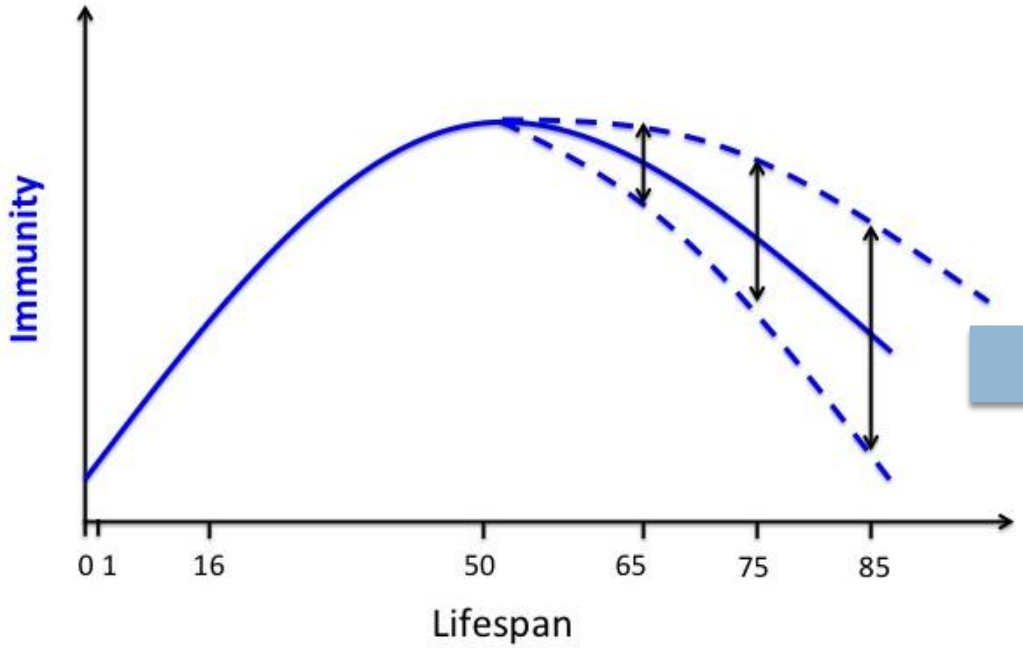
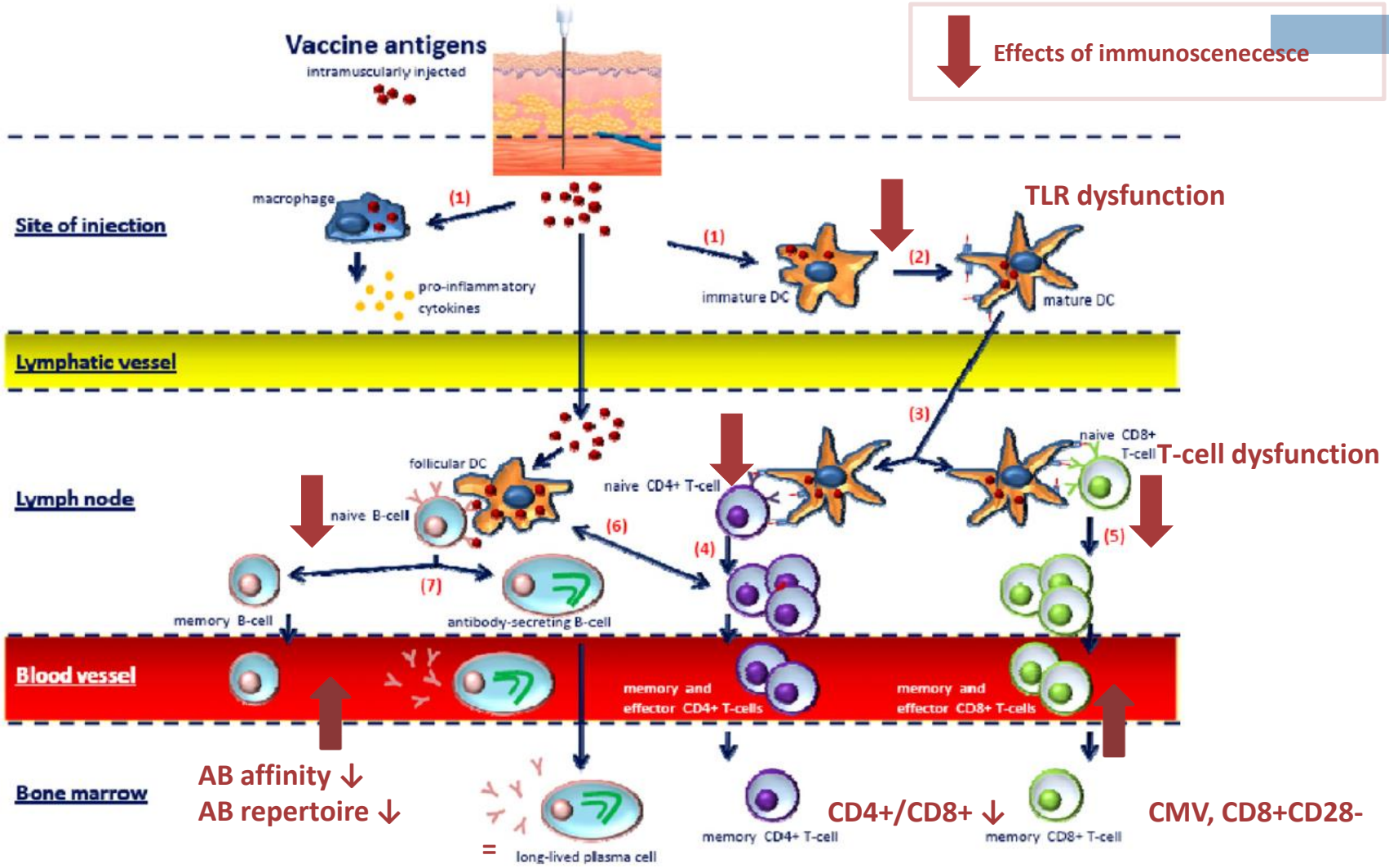


“Immunosenescence”

Poor immunity
Poor vaccine respons
VPD

Good immunity
Good vaccine respons
No/ less VPD

Immunosenescence affects the innate and adaptive immune response



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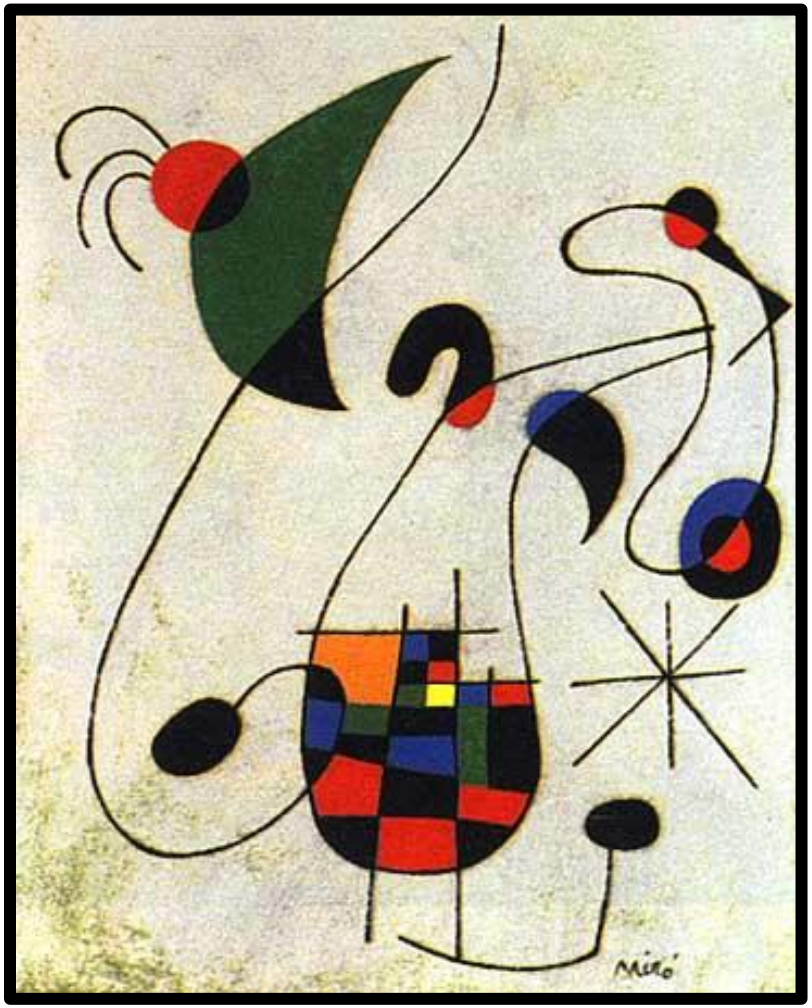
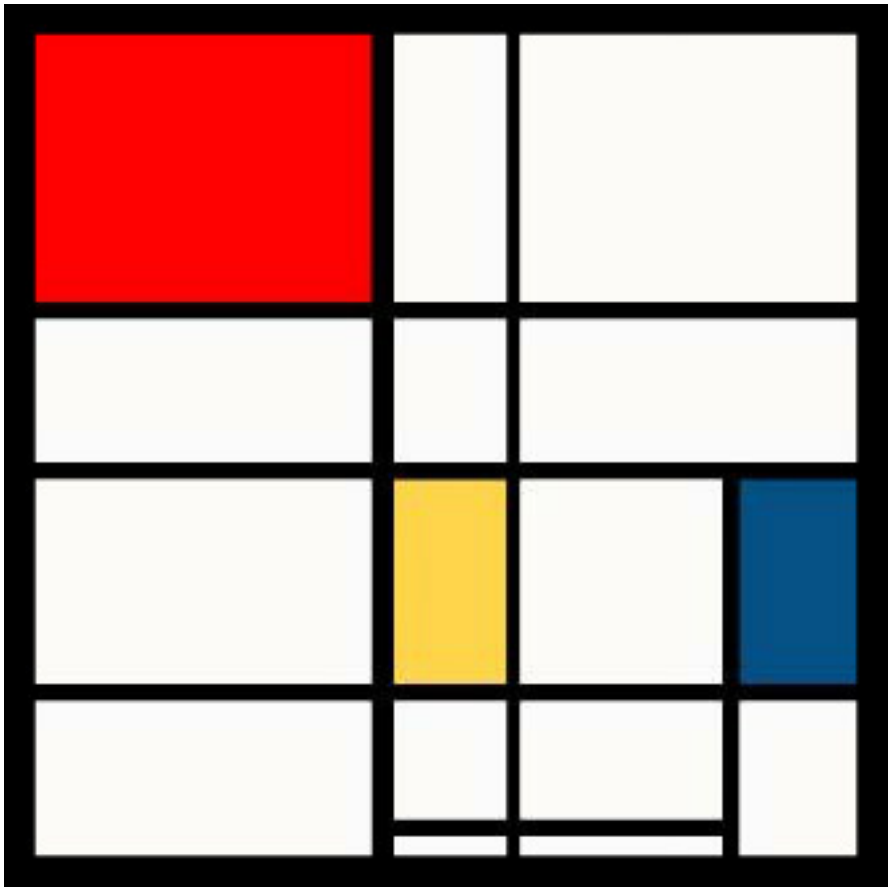
The art: “Vaccination strategies”





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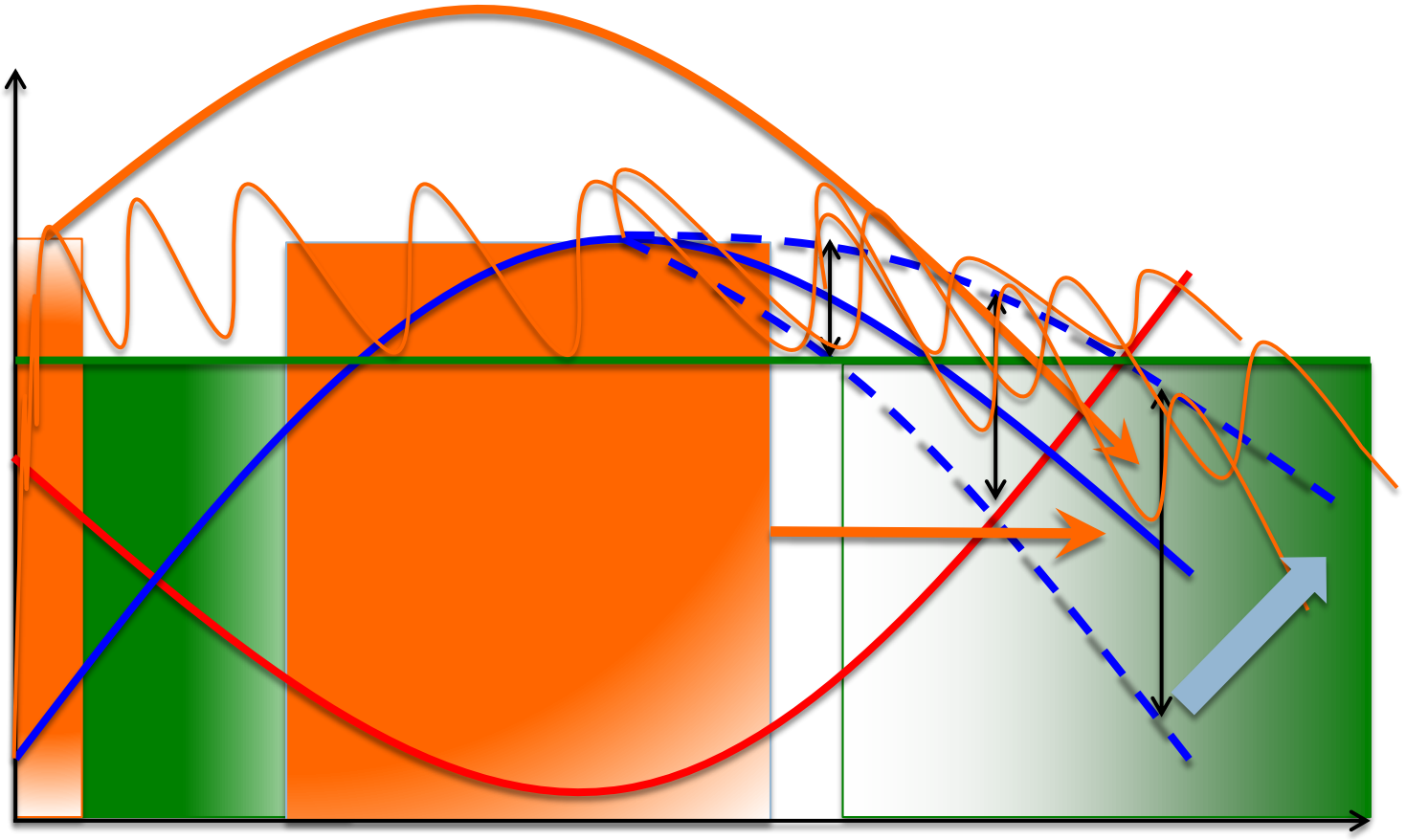
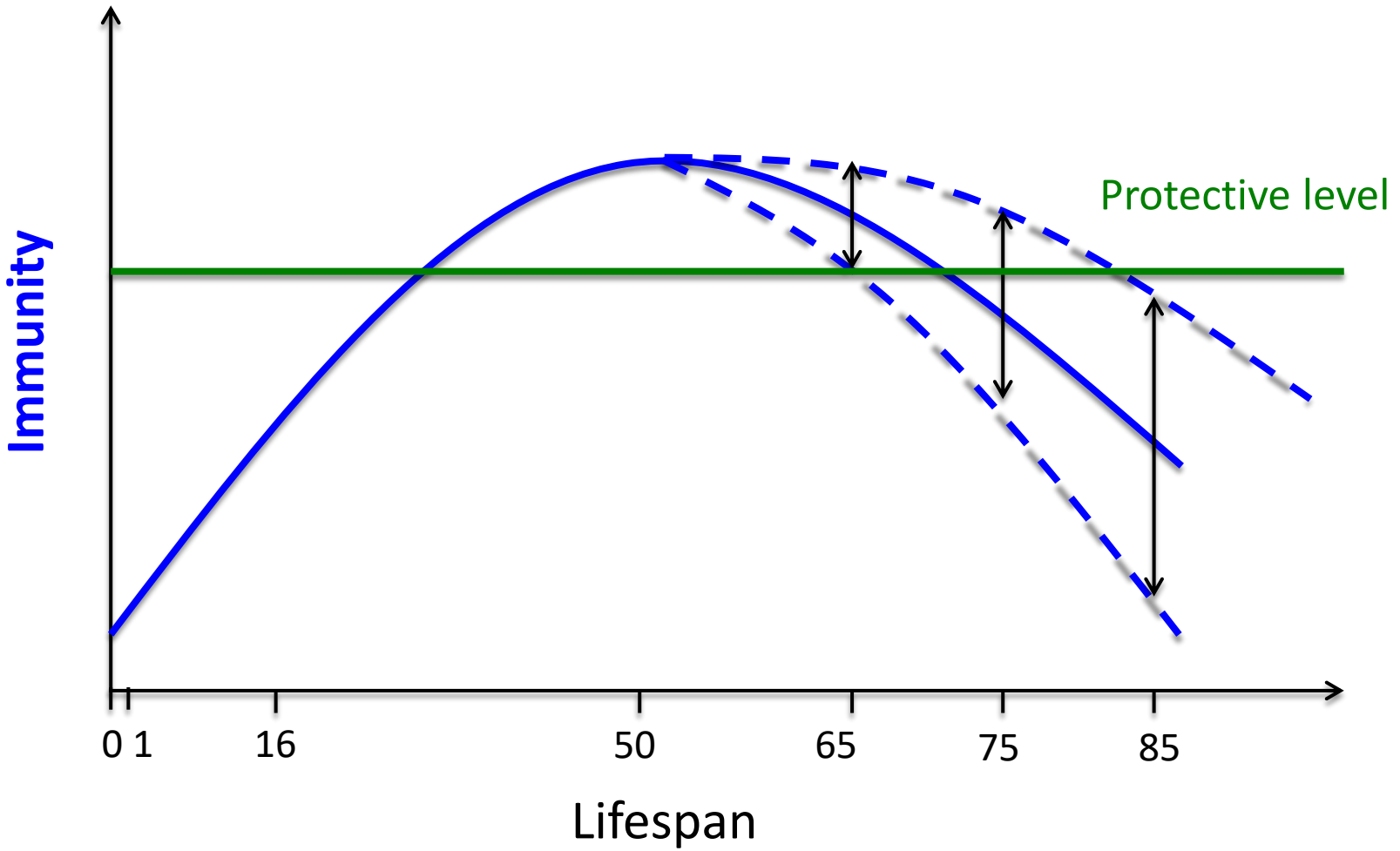


Immunity and VPD protection



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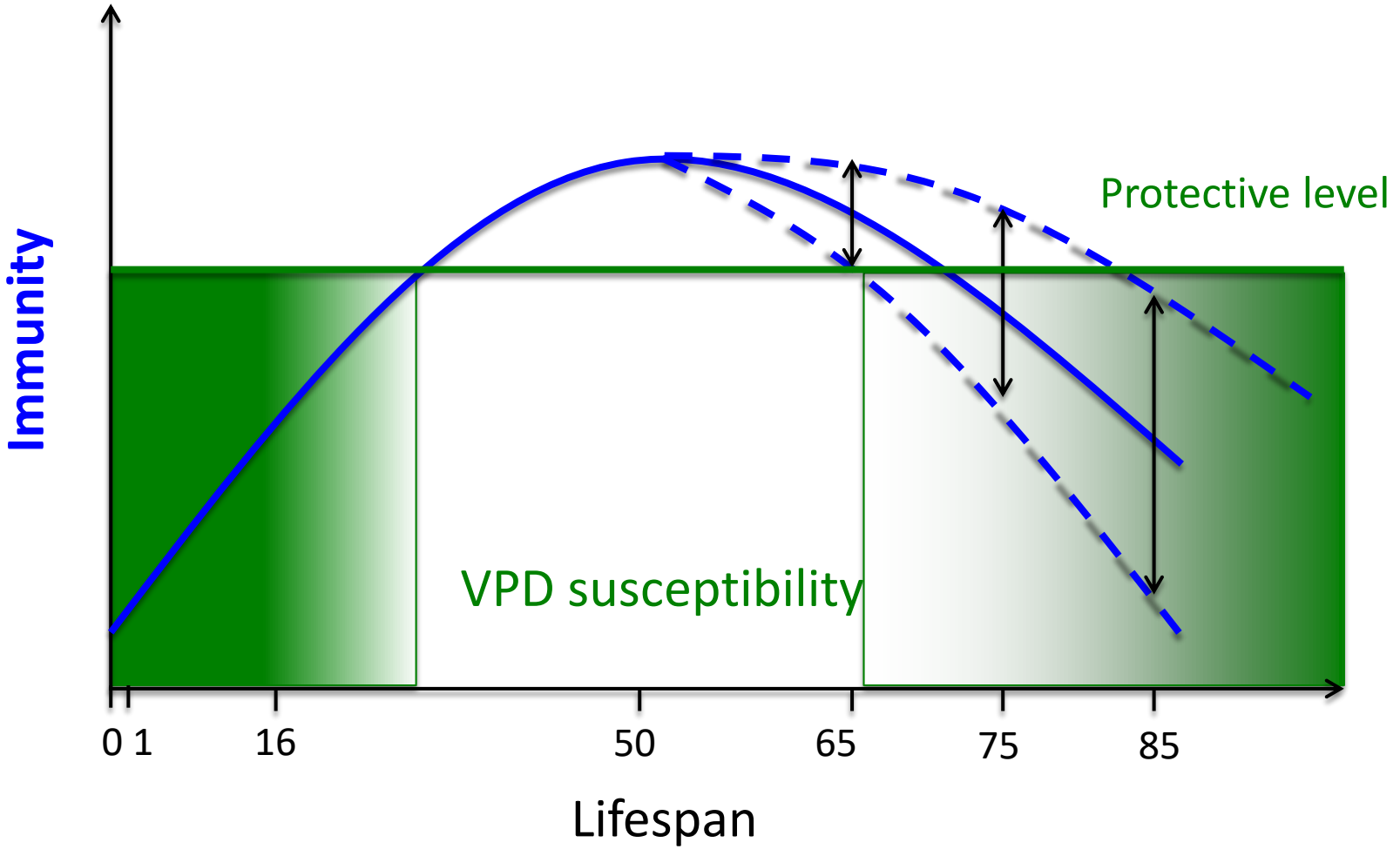

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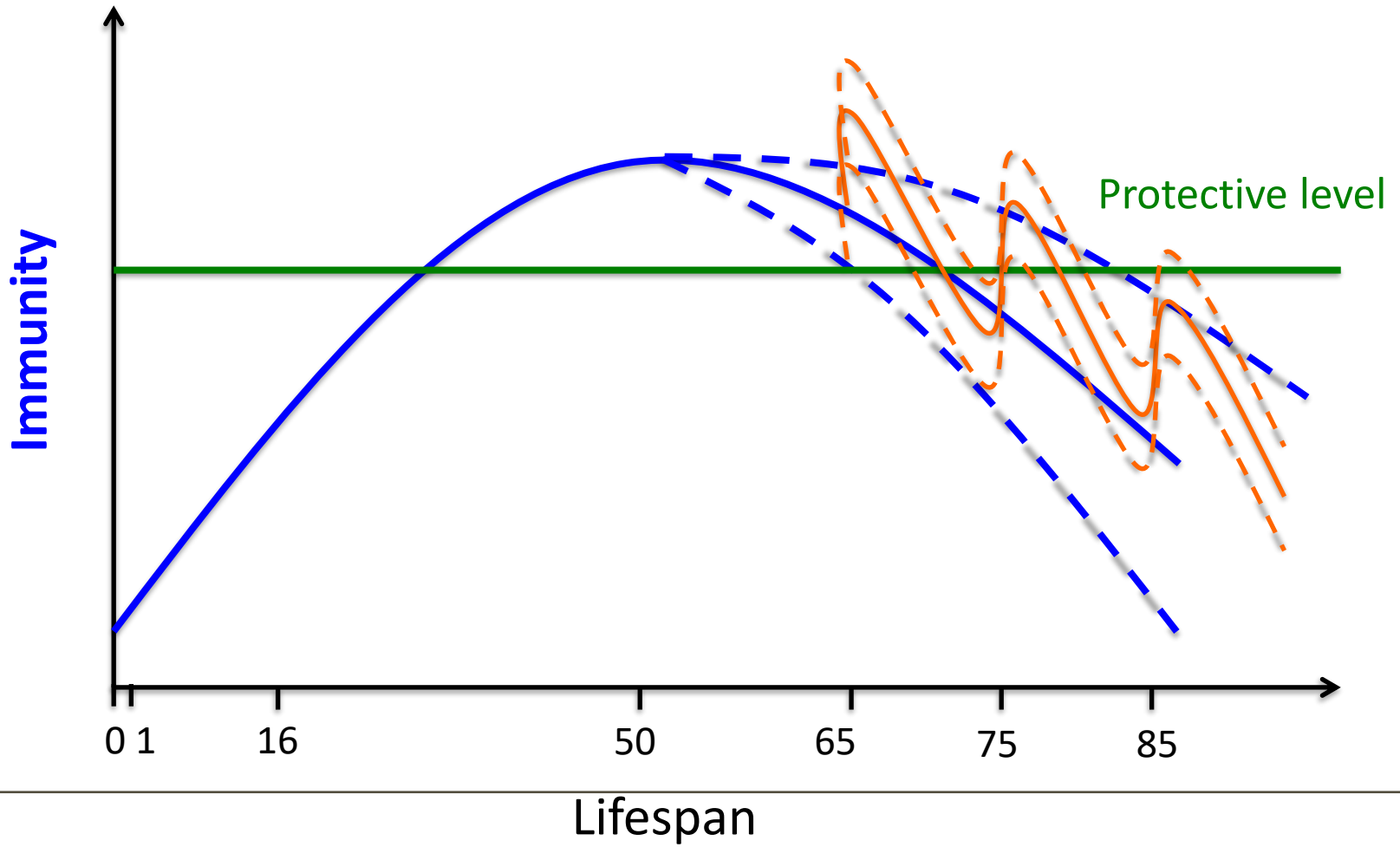
Vaccination strategy ≥ 65 y.



Vaccination strategy: Age based

Table 1 Recommended Adult Immunization Schedule by Age Group, United States, 2021

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Influenza inactivated (IIV) or **Influenza recombinant** (RIV4)	1 dose annually			
or				
Influenza live, attenuated (LAIV4)	1 dose annually			
Tetanus, diphtheria, pertussis (Tdap or Td)	1 dose Tdap each pregnancy; 1 dose Td/Tdap for wound management (see notes)			
	1 dose Tdap, then Td or Tdap booster every 10 years			
Measles, mumps, rubella (MMR)	1 or 2 doses depending on indication (if born in 1957 or later)			
Varicella (VAR)	2 doses (if born in 1980 or later)		2 doses	
Zoster recombinant (RZV)			2 doses	
Human papillomavirus (HPV)	2 or 3 doses depending on age at initial vaccination or condition	27 through 45 years		
Pneumococcal conjugate (PCV13)	1 dose			1 dose
Pneumococcal polysaccharide (PPSV23)	1 or 2 doses depending on indication			1 dose
Hepatitis A (HepA)	2 or 3 doses depending on vaccine			
Hepatitis B (HepB)	2 or 3 doses depending on vaccine			
Meningococcal A, C, W, Y (MenACWY)	1 or 2 doses depending on indication, see notes for booster recommendations			
Meningococcal B (MenB)	2 or 3 doses depending on vaccine and indication, see notes for booster recommendations			
	19 through 23 years			
***Haemophilus influenzae* type b** (Hib)	1 or 3 doses depending on indication			

Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection

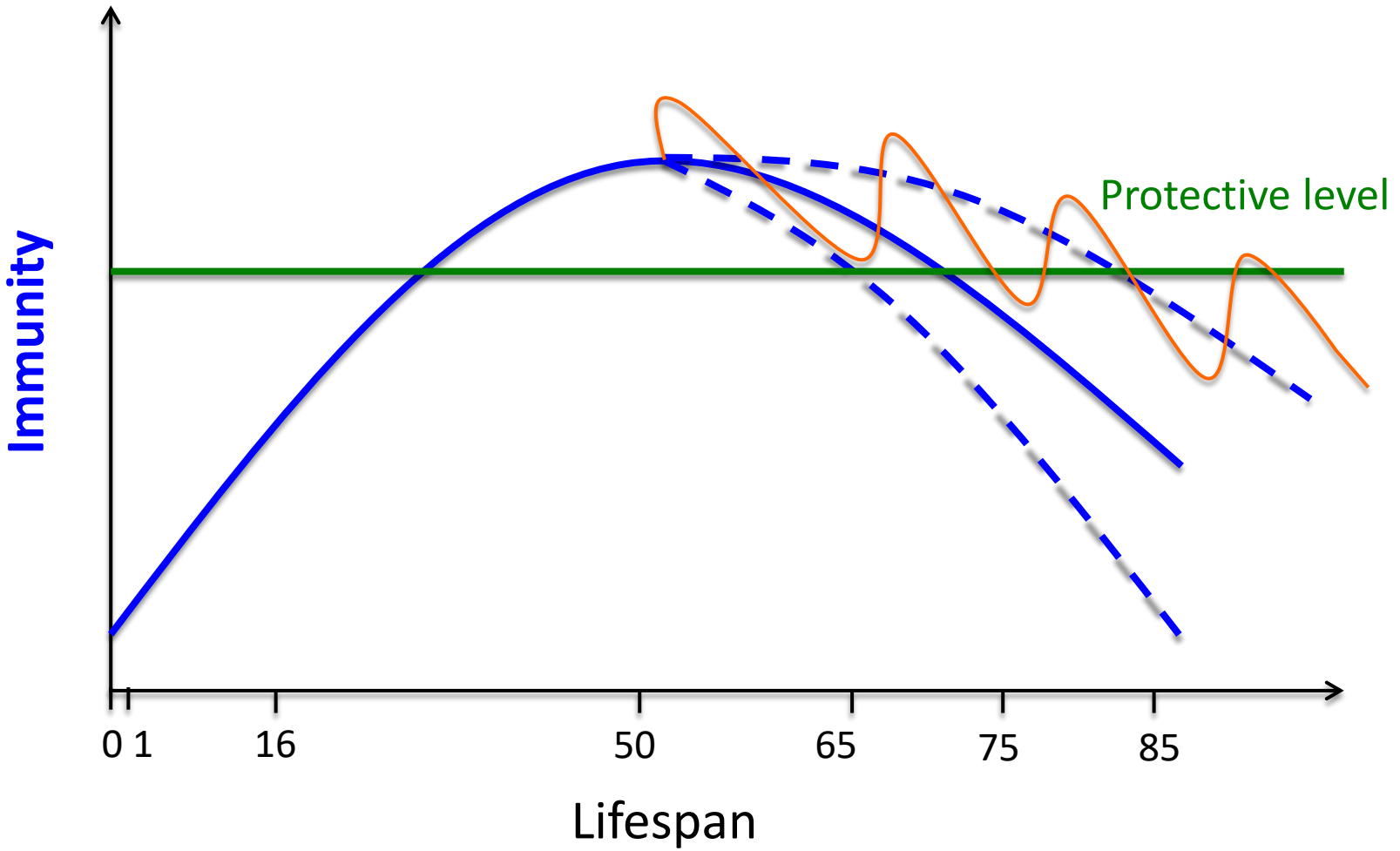
Recommended vaccination for adults with an additional risk factor or another indication

Recommended vaccination based on shared clinical decision-making

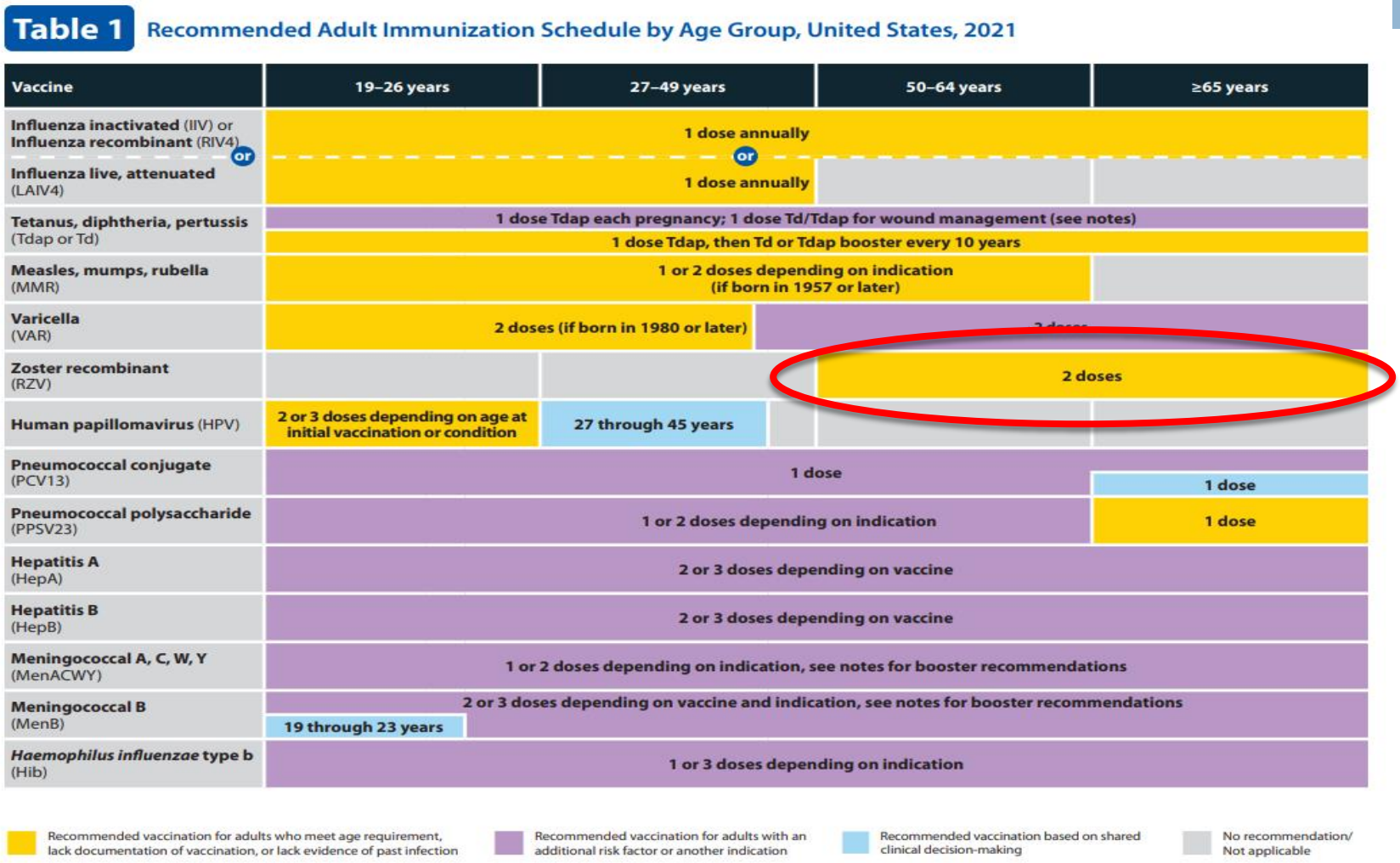
No recommendation/ Not applicable

http://www.cdc.gov/vaccines/schedules/downloads/adult/adult-schedule.pdf

Vaccination strategy ≥ 50 y.



Vaccination strategy: Age based



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Hepatitis B (HepB)	2 or 3 doses depending on vaccine			
Meningococcal A, C, W, Y (MenACWY)	1 or 2 doses depending on indication, see notes for booster recommendations			
Meningococcal B (MenB)	2 or 3 doses depending on vaccine and indication, see notes for booster recommendations			
	19 through 23 years			
***Haemophilus influenzae* type b** (Hib)	1 or 3 doses depending on indication			

Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection

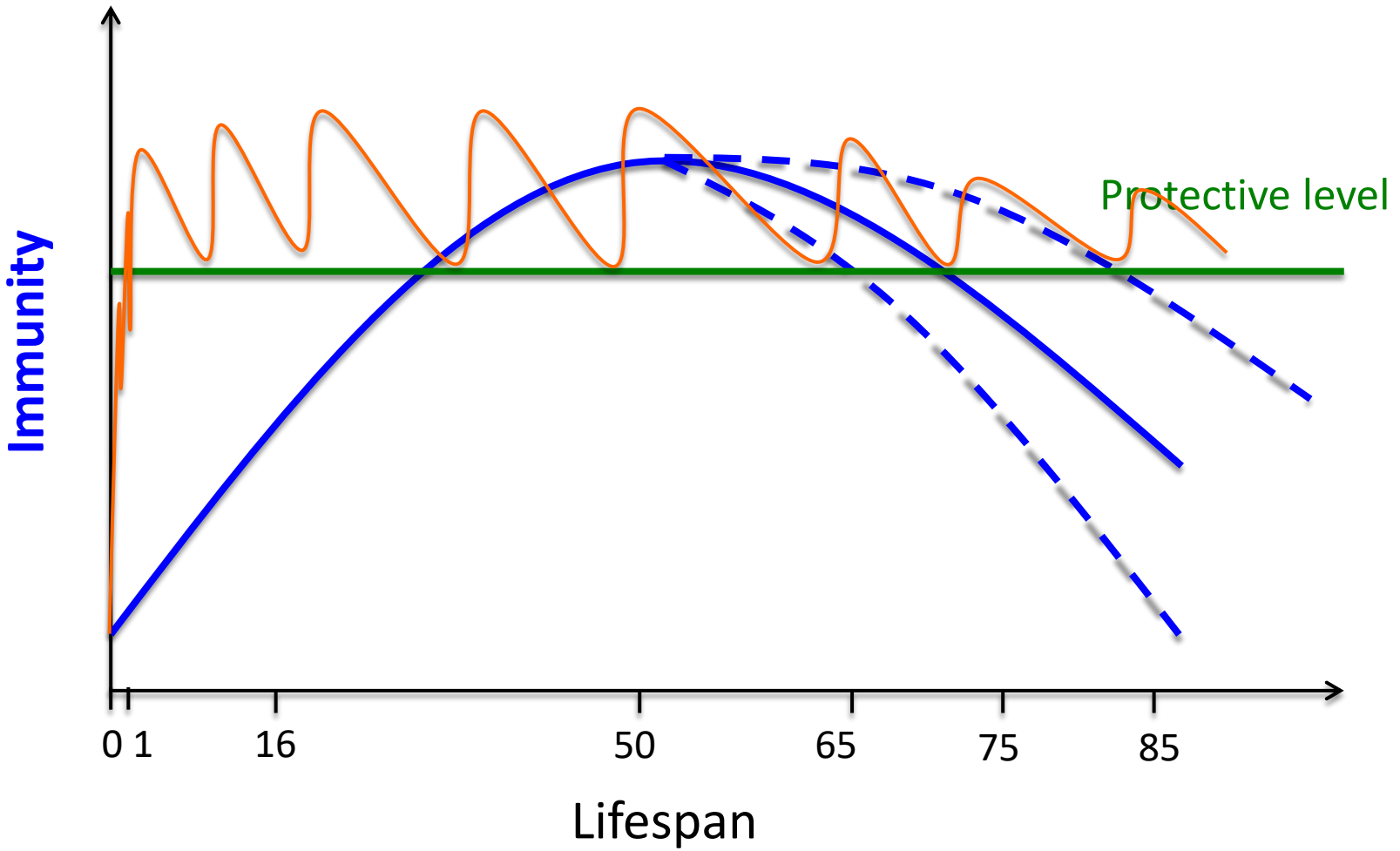
Recommended vaccination for adults with an additional risk factor or another indication

Recommended vaccination based on shared clinical decision-making

No recommendation/ Not applicable

http://www.cdc.gov/vaccines/schedules/downloads/adult/adult-schedule.pdf

Lifelong vaccination strategy



Vaccination strategy: Lifelong vaccination

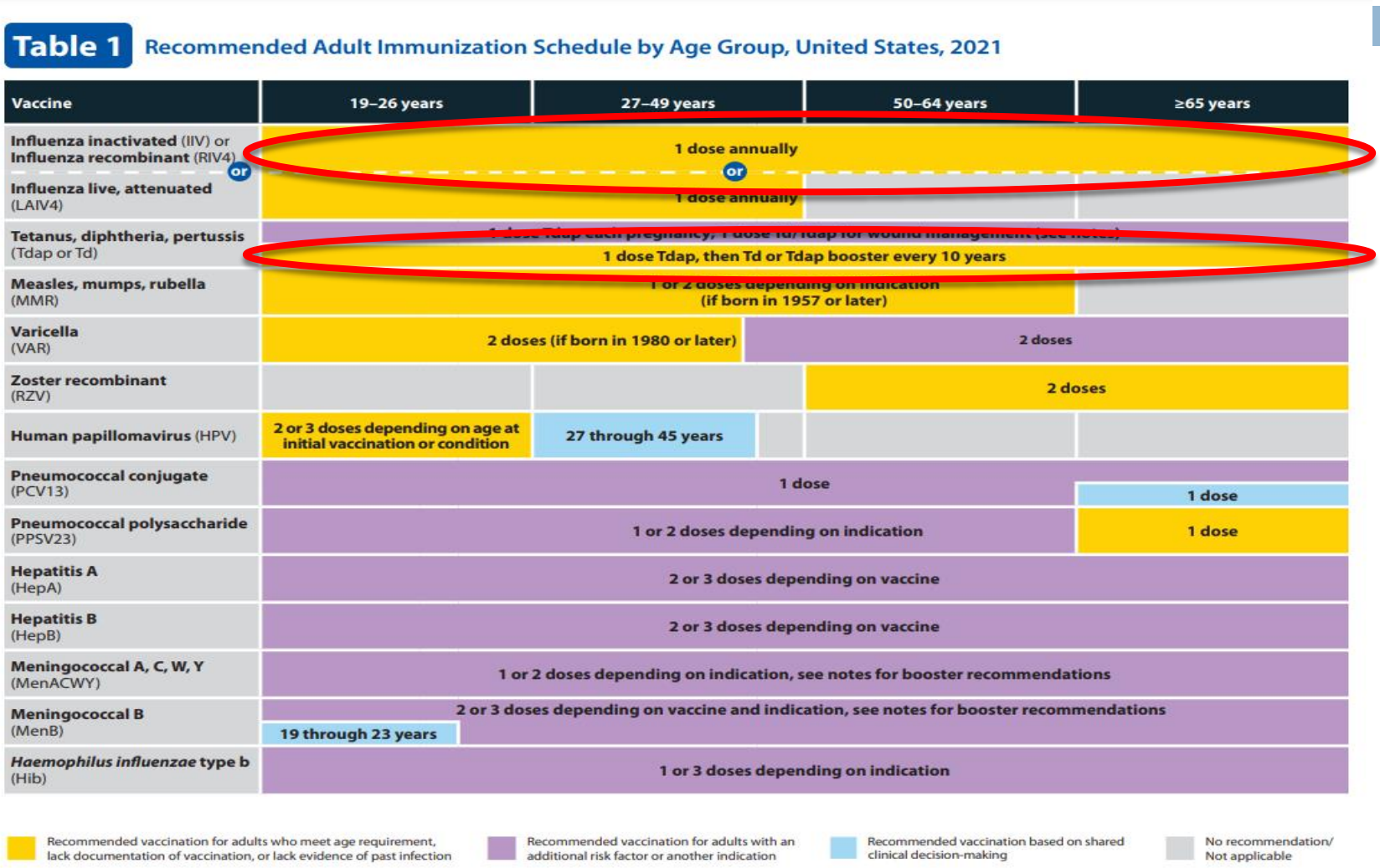


Table 1 Recommended Adult Immunization Schedule by Age Group, United States, 2021

Vaccine	19–26 years	27–49 years	50–64 years	≥65 years
Influenza inactivated (IIV) or **Influenza recombinant** (RIV4)	1 dose annually			
or		or		
Influenza live, attenuated (LAIV4)	1 dose annually			
Tetanus, diphtheria, pertussis (Tdap or Td)	1 dose Tdap, then Td or Tdap booster every 10 years			
Measles, mumps, rubella (MMR)	1 or 2 doses depending on indication (if born in 1957 or later)			
Varicella (VAR)	2 doses (if born in 1980 or later)		2 doses	
Zoster recombinant (RZV)			2 doses	
Human papillomavirus (HPV)	2 or 3 doses depending on age at initial vaccination or condition	27 through 45 years		
Pneumococcal conjugate (PCV13)	1 dose			1 dose
Pneumococcal polysaccharide (PPSV23)	1 or 2 doses depending on indication			1 dose
Hepatitis A (HepA)	2 or 3 doses depending on vaccine			
Hepatitis B (HepB)	2 or 3 doses depending on vaccine			
Meningococcal A, C, W, Y (MenACWY)	1 or 2 doses depending on indication, see notes for booster recommendations			
Meningococcal B (MenB)	2 or 3 doses depending on vaccine and indication, see notes for booster recommendations			
	19 through 23 years			
***Haemophilus influenzae* type b** (Hib)	1 or 3 doses depending on indication			

Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection

Recommended vaccination for adults with an additional risk factor or another indication

Recommended vaccination based on shared clinical decision-making

No recommendation/ Not applicable

http://www.cdc.gov/vaccines/schedules/downloads/adult/adult-schedule.pdf

Overview

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- Influenza in the older person
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  - Age based vaccination
  - **Risk based vaccination**
  - Herd immunity and vaccination
- Immunosenescence and vaccination
- Ex. Herpes Zoster vaccination

Vaccination strategy: Risk based

Table 2 Recommended Adult Immunization Schedule by Medical Condition and Other Indications, United States, 2021

Vaccine	Pregnancy	Immuno-compromised (excluding HIV infection)	HIV infection CD4 count <200 mm³	HIV infection CD4 count ≥200 mm³	Asplenia, complement deficiencies	End-stage renal disease; or on hemodialysis	Heart or lung disease, alcoholism[1]	Chronic liver disease	Diabetes	Health care personnel[2]	Men who have sex with men
IIV or RIV4 (or)	1 dose annually									(or)	
LAIV4	Not Recommended						Precaution			1 dose annually	
Tdap or Td	1 dose Tdap each pregnancy	1 dose Tdap, then Td or Tdap booster every 10 years									
MMR	Not Recommended*	Not Recommended	1 or 2 doses depending on indication								
VAR	Not Recommended*	Not Recommended			2 doses						
RZV					2 doses at age ≥50 years						
HPV	Not Recommended*	3 doses through age 26 years			2 or 3 doses through age 26 years depending on age at initial vaccination or condition						
PCV13		1 dose									
PPSV23		1, 2, or 3 doses depending on age and indication									
HepA					2 or 3 doses depending on vaccine						
HepB					2, 3, or 4 doses depending on vaccine or condition				<60 years ≥60 years		
MenACWY	1 or 2 doses depending on indication, see notes for booster recommendations										
MenB	Precaution	2 or 3 doses depending on vaccine and indication, see notes for booster recommendations									
Hib		3 doses HSCT[3] recipients only			1 dose						

Recommended vaccination for adults who meet age requirement, lack documentation of vaccination, or lack evidence of past infection

Recommended vaccination for adults with an additional risk factor or another indication

Precaution—vaccination might be indicated if benefit of protection outweighs risk of adverse reaction

Recommended vaccination based on shared clinical decision-making

Not recommended/ contraindicated—vaccine should not be administered.

*Vaccinate after pregnancy.

No recommendation/ Not applicable

1. Precaution for LAIV4 does not apply to alcoholism. **2.** See notes for influenza; hepatitis B; measles, mumps, and rubella; and varicella vaccinations. **3.** Hematopoietic stem cell transplant.

http://www.cdc.gov/vaccines/schedules/downloads/adult/adult-schedule.pdf

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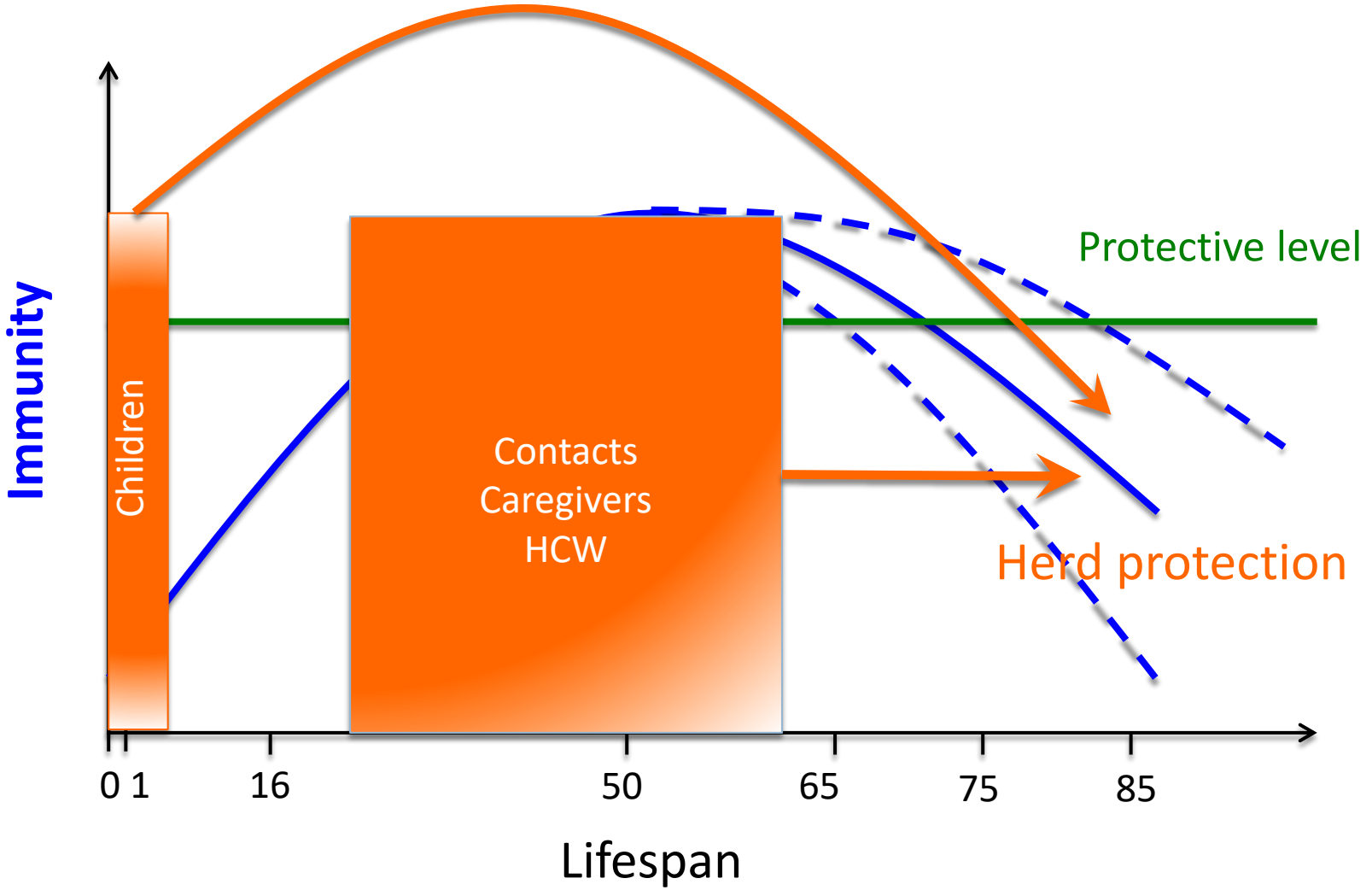
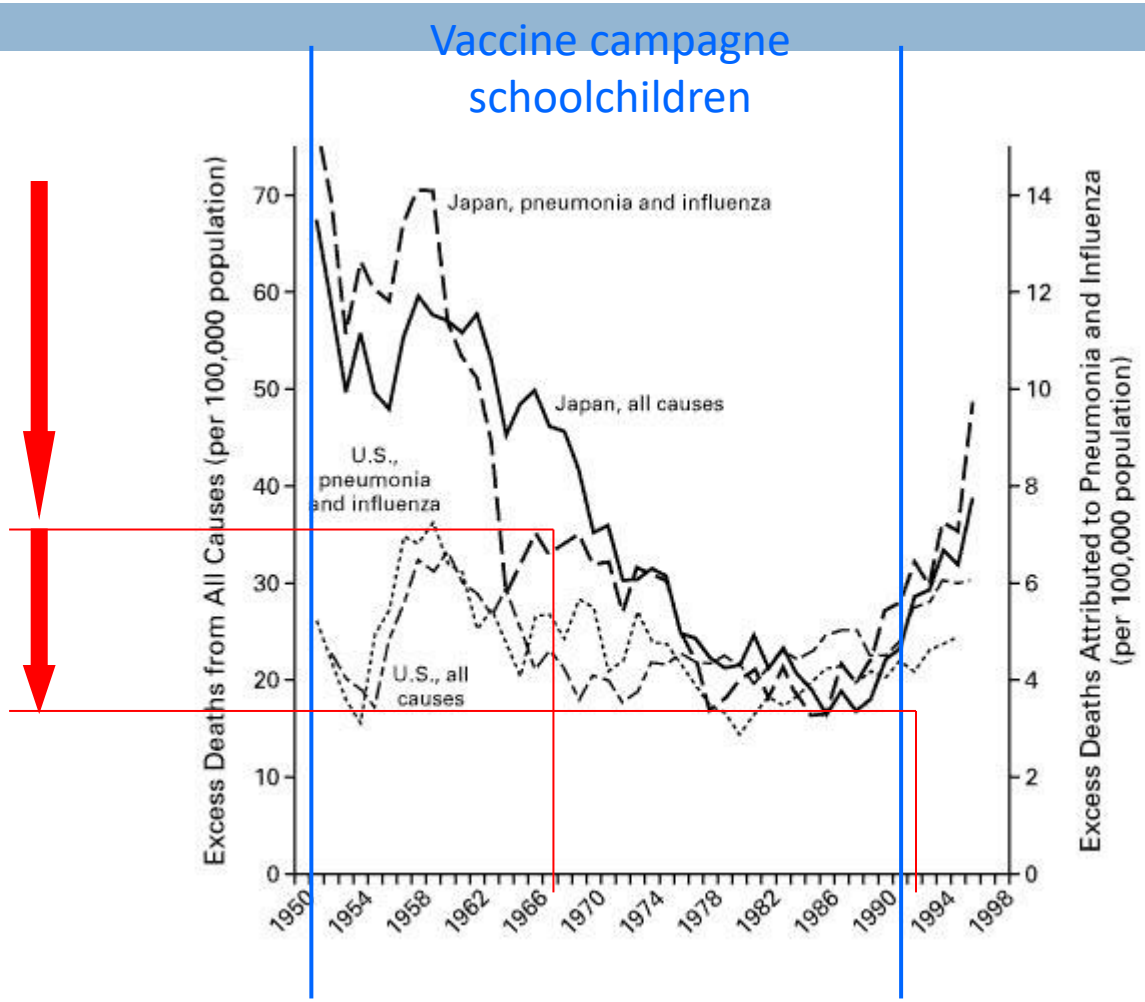
Herd immunity

Herd vaccination strategy

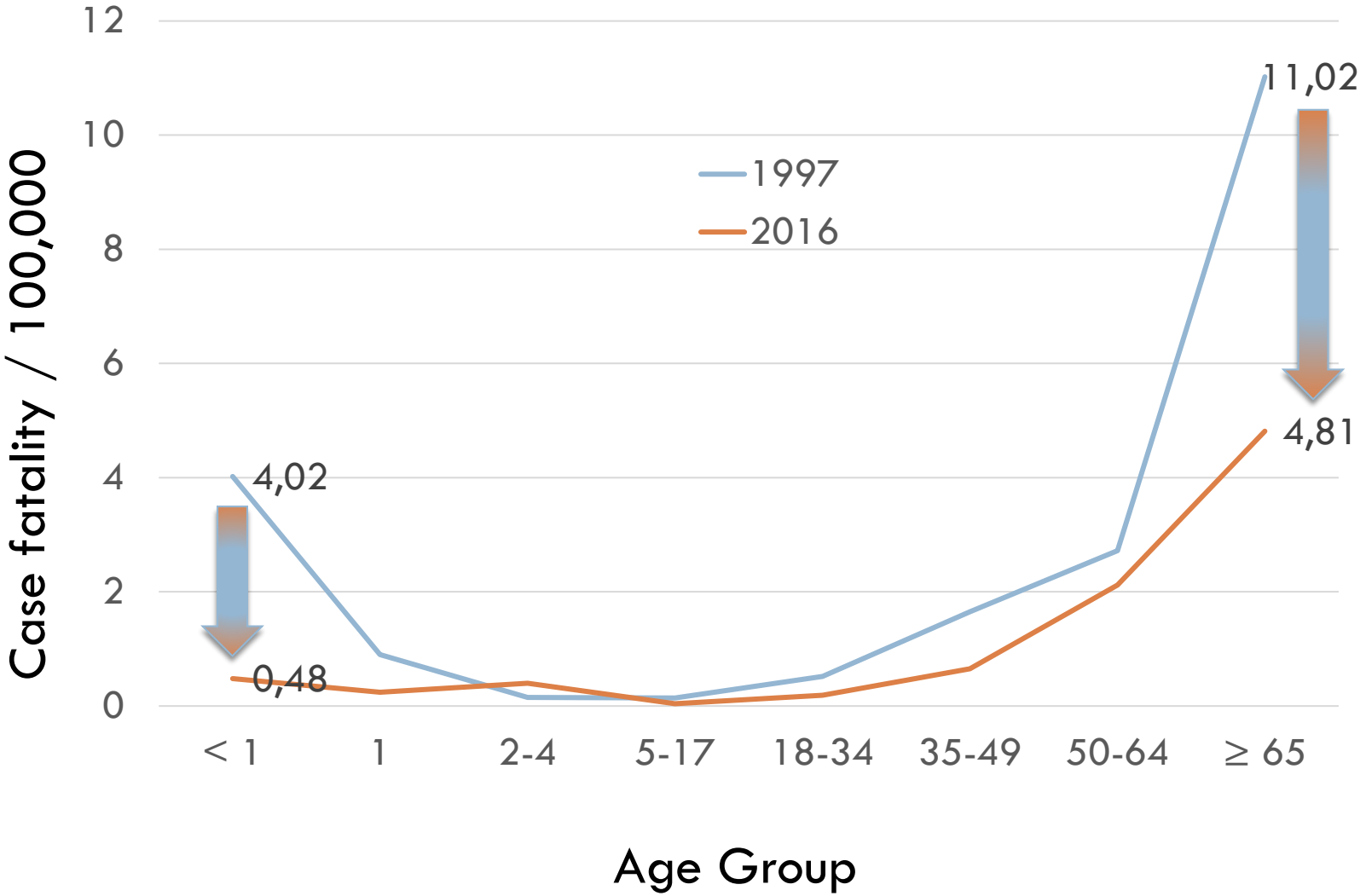


Herd vaccination strategy: Children and Influenza



N Engl J Med 2001;344:889-96

IPD case fatality, USA



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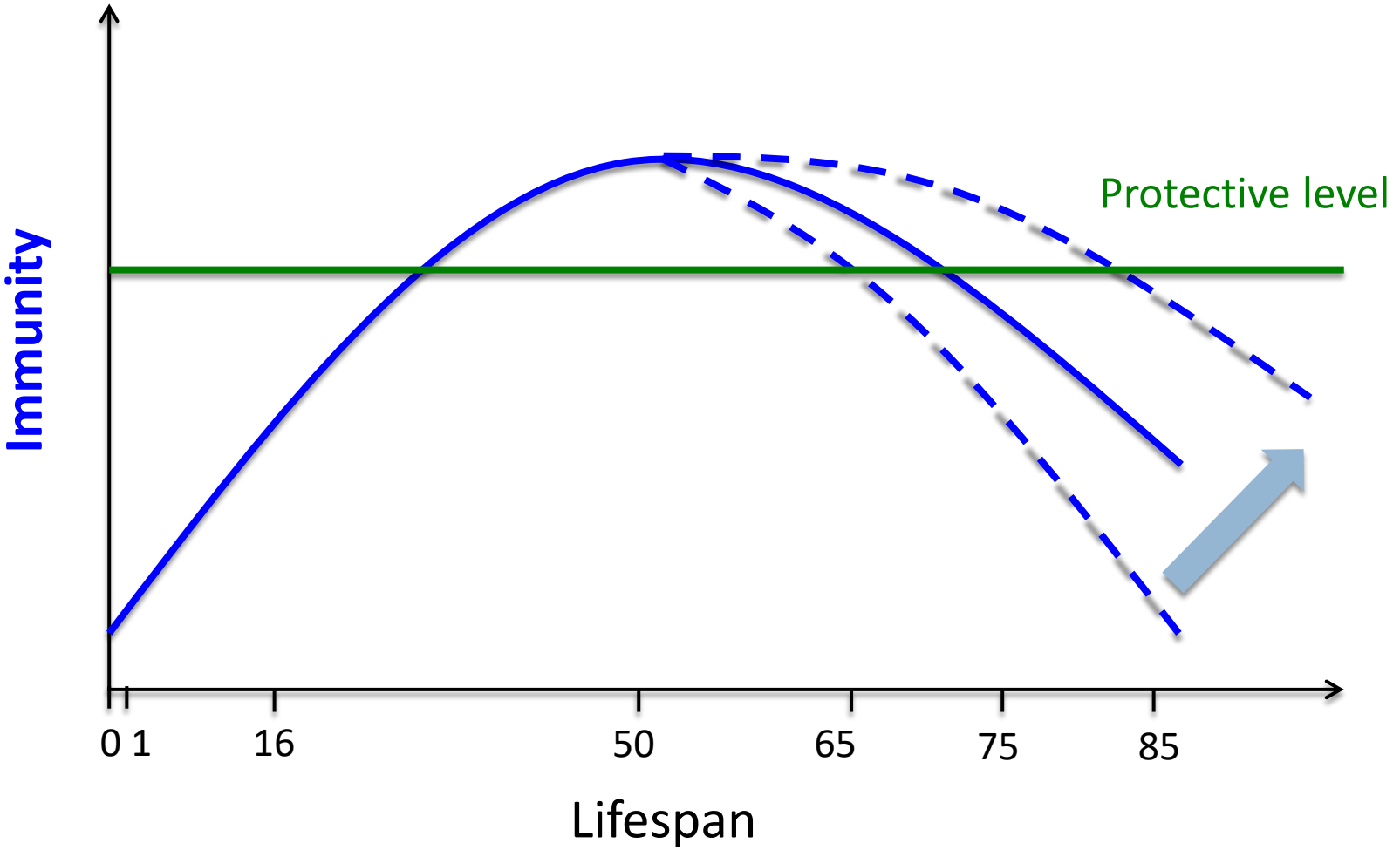
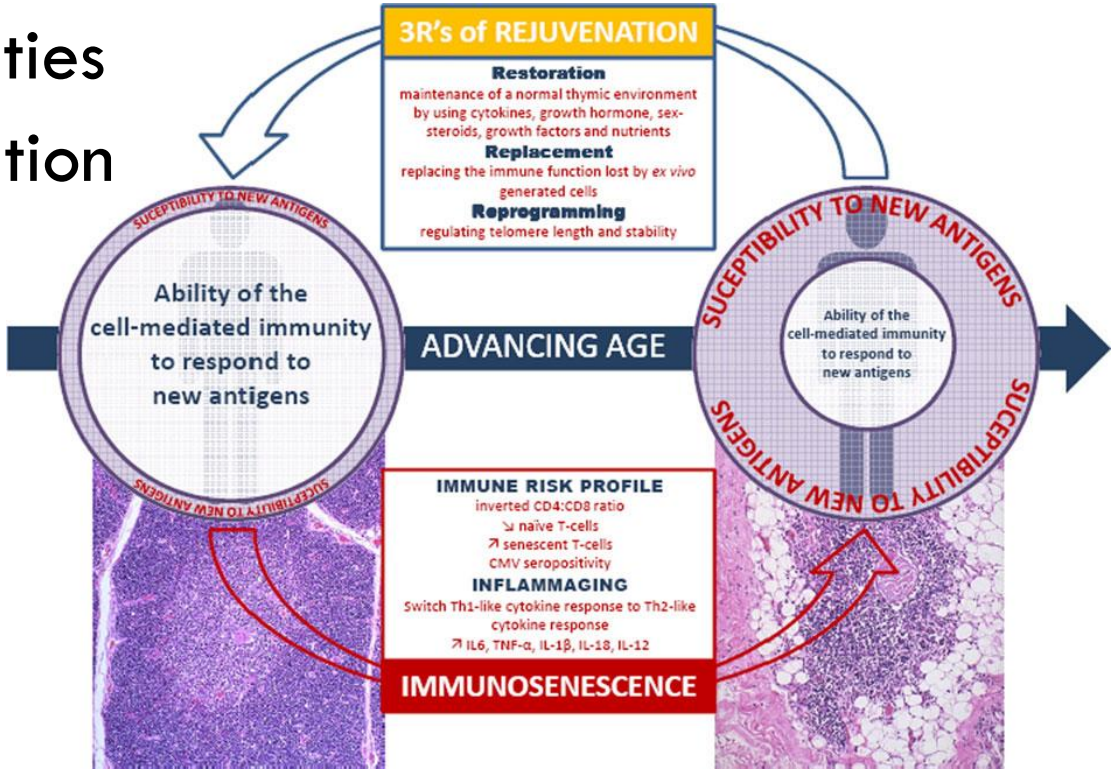
Tackling immunosenescence



Tackling immunosenescence

- Tackling frailty
- Tackling comorbidities
- Immune – rejuvenation



- **Vaccines**

AGE (2013) 35:609–620

Tackling immunosenescence

Enhancing vaccine effect

- Vaccine coverage (epidemiology, valency)
- High dose vaccines
- Adjuvanted vaccines
- Vaccine formulations (virosome, ID, IN + SC/IM, vector, mRNA…)
- Booster vaccines

- More memory B & T cells
- Higher postvaccination Ab titers
- More functional Ab (OPA)
- Higher efficacy - effectiveness

Vaccine coverage ≈ epidemiology

- Influenza vaccination
  - TIIV → QIIV
    - H1N1, H3N2,
    - B victoria, B Yamagata
  - PCV 7 → PCV10 → PCV15 → PCV20 → PPV23
  - Coronavirus vaccine….??

Effectiveness **newer IV** against lab-confirmed influenza

MF-59 TIV vs. no vaccine

≥ 65 y.

Outcomes	Vaccine effectiveness* (95% CI)
Influenza (any)	**VE 44.9%** (22.7 to 60.8)
Influenza A(H1N1)	**VE 61.2%** (43.7 to 73.3)
Influenza A(H3N2)	**VE 10.6%** (-24.5 to 35.7)
Influenza B	**VE 28.5%** (5.4 to 46.0)

HD-IIV vs. IIV

≥ 65 y.

Outcomes	Relative effect (95% CI)
Influenza (any)^	**VE 24.2%** (9.7 to 36.5)

CB-TIV vs. no vaccine

18 - 49 y.

Outcomes	Relative effect (95% CI)
Influenza (any)	**VE 70%** (61% to 77%)
Influenza A(H1N1)	**VE 82%** (71% to 89%)
Influenza A(H3N2)	**VE 72%** (39% to 87%)
Influenza B	**VE 52%** (30% to 68%)

R-IIV vs. IIV

≥ 50 y.

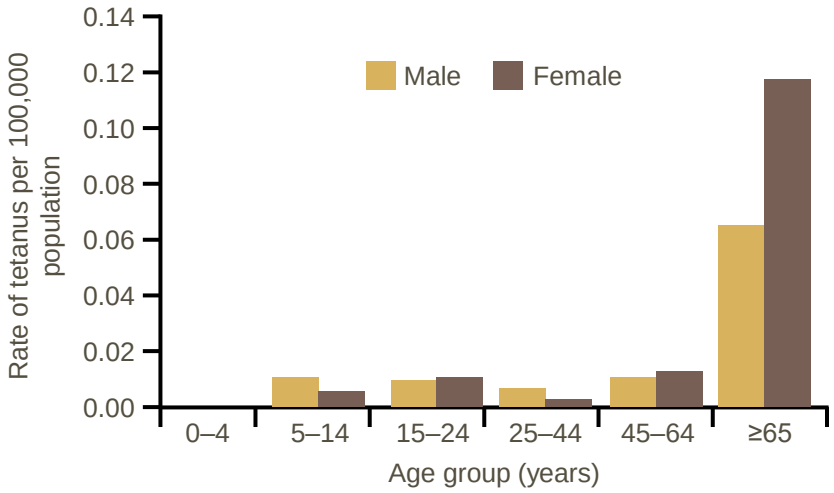
Outcomes¥	Relative effect (95% CI)
Influenza (any)^	**VE 30%** (10 to 47)

ECDC 2020: ISBN 978-92-9498-467-8 doi: 10.2900/751620

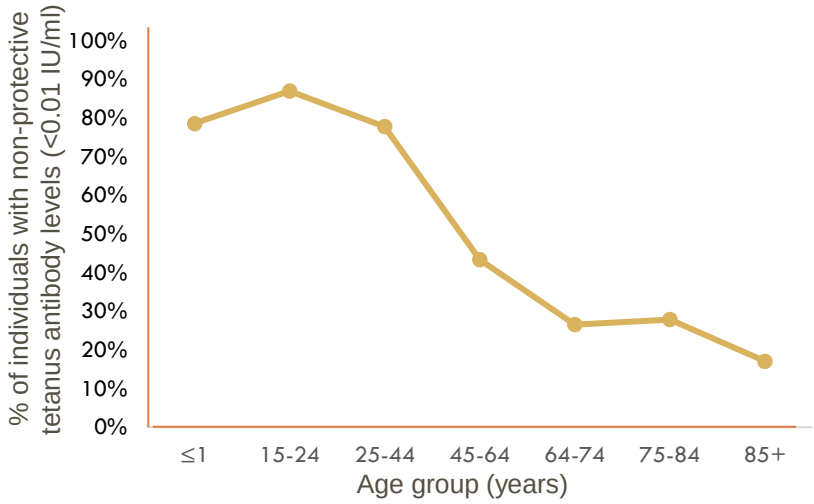
Booster vaccination

Tetanus

Incidence



Seroprotection



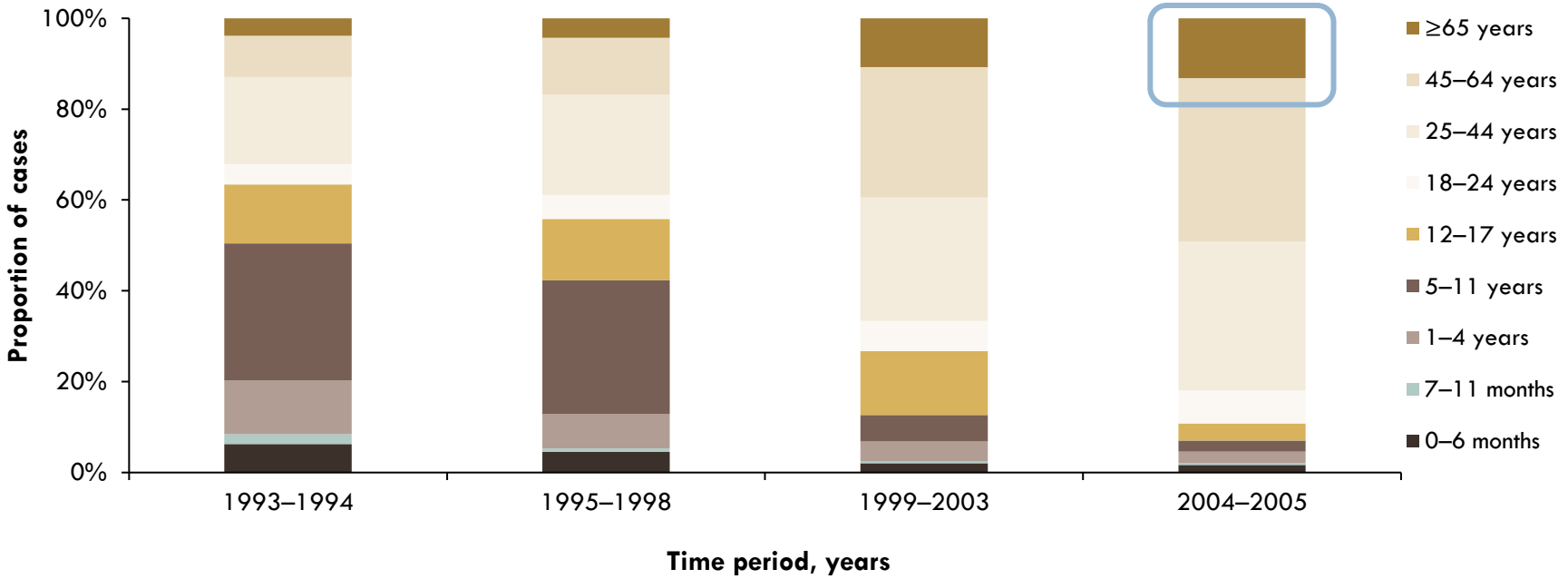
1. EUROHEALTH, 2016. Demographics and diversity in Europe: new solutions for health. http://www.euro.who.int/en/about-us/partners/observatory/publications/eurohealth/full-list-of-past-issues/demographics-and-diversity-in-europe-newsolutions-for-health2 (accessed February 2021); 2. Filia A *et al. Vaccine* 2014;32:639–644; 3. World Health Organization (WHO). *Wkly Epidemiol Rec* 2017;6:53–76; 4. European Centre for Disease Prevention and Control. Annual Epidemiological report 2015. Tetanus. Stockholm: ECDC; 2016

http://ecdc.europa.eu/en/healthtopics/tetanus/Pages/Annual-epidemiological-report-2016.aspx (accessed February 2021)

Booster vaccination

Pertussis

Australia, 1993–2005 (n=35,695)



By 2005, nearly **90%** of notified pertussis cases were in adults

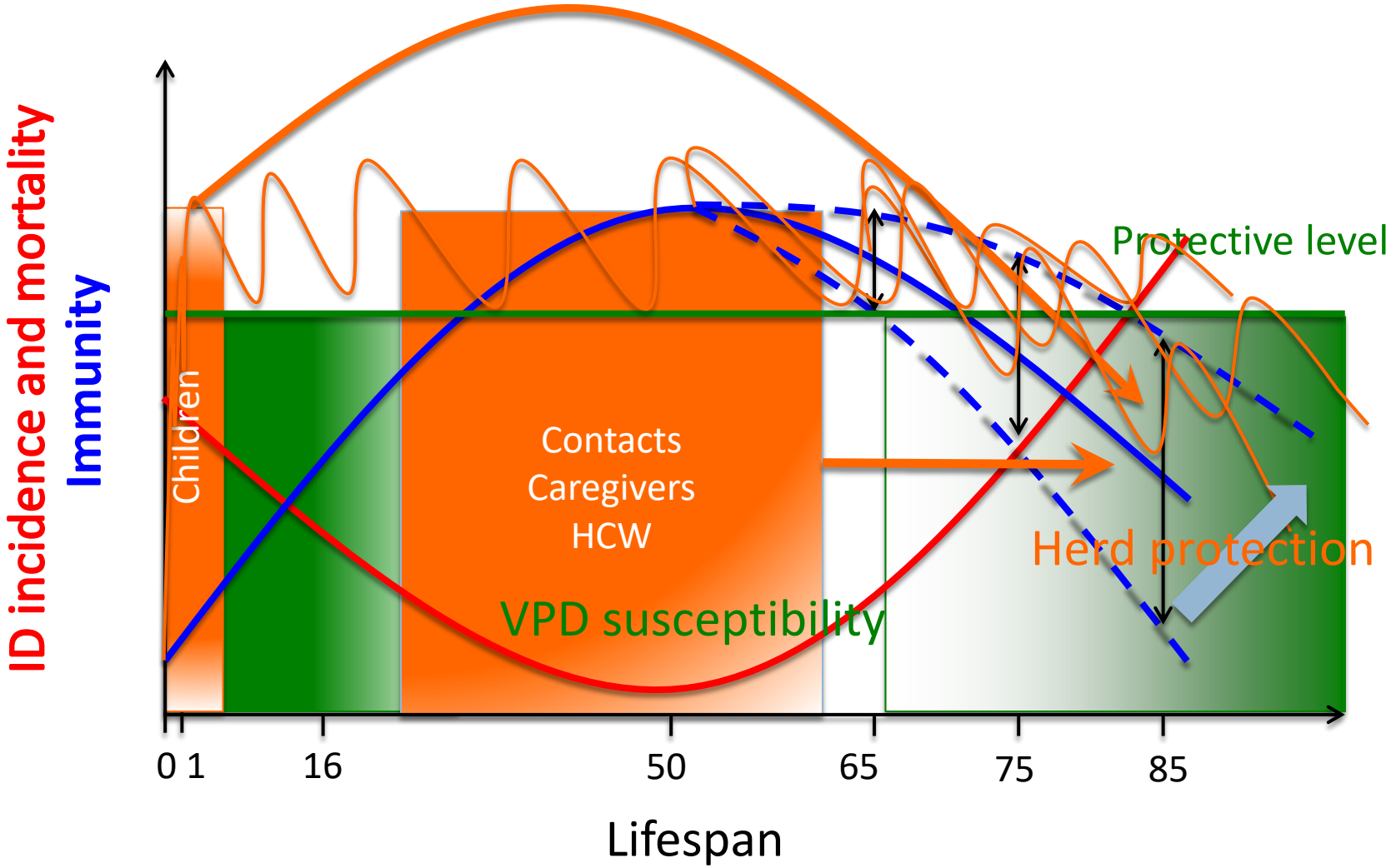
Viney KA *et al. N S W Public Health Bull* 2007;18:55–61

Vaccination strategies in older persons

- Prevent/treat (pre)-frailty and comorbidities
- Vaccinate with most immunogenic vaccines
- Boost
- Vaccinate older (fit) adults
- Vaccinate (grand)(grand)children and contacts
- Vaccinate HCW

- **Lifelong vaccination strategy**

The science: "Vaccination strategies"



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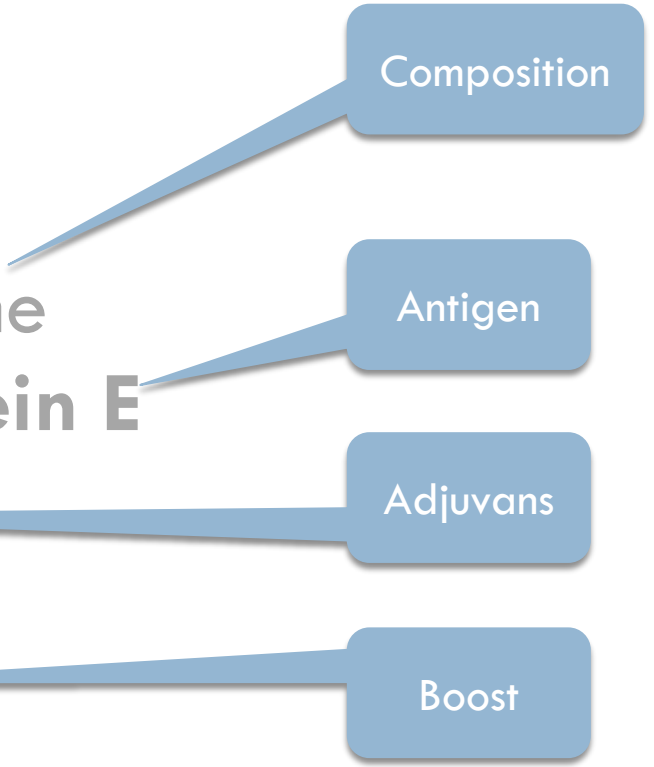
Tackling immunosenescence

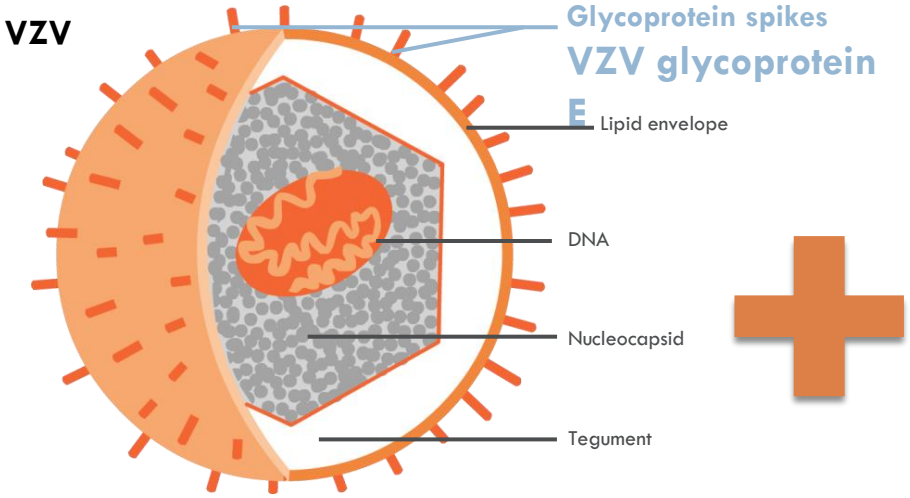
Varicella Zoster Vaccination

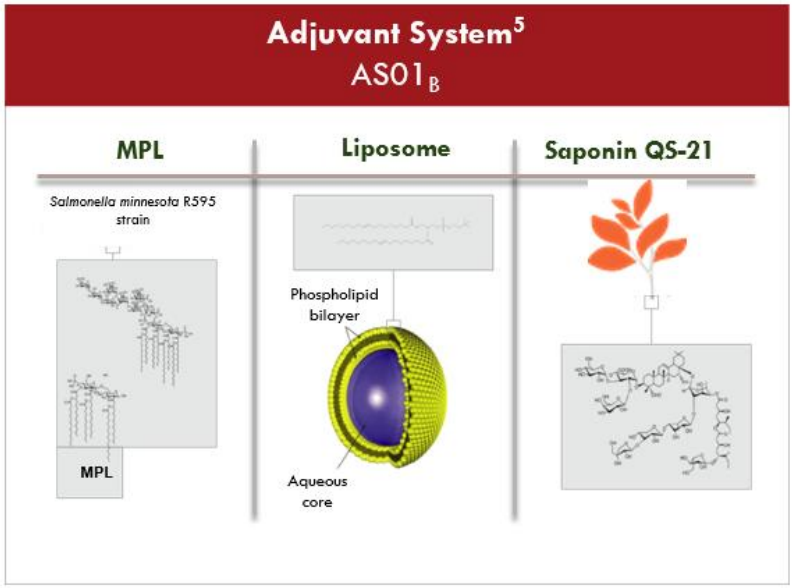
- **Recombinant subunit** vaccine
- VZV recombinant **glycoprotein E**
- **Adjuvant:** $AS01_B$

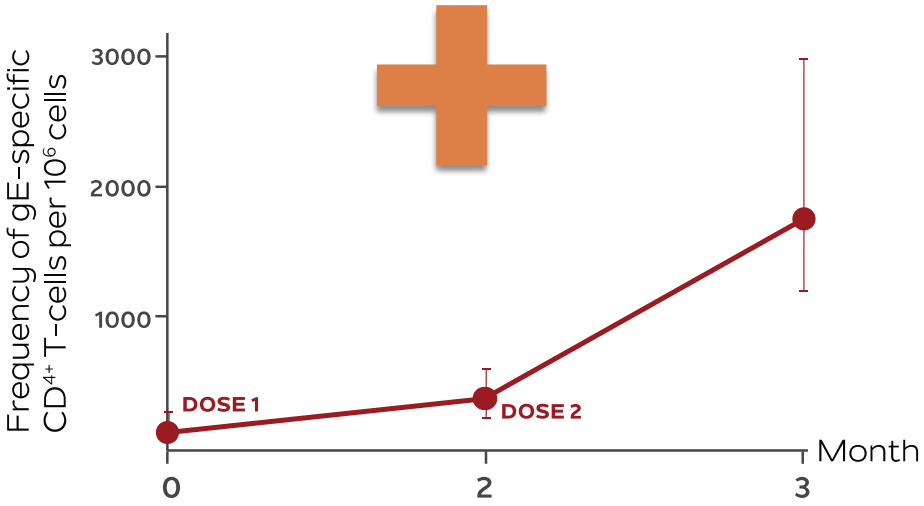
- **2 doses**, 2-6 m apart
- IM



Adjuvanted Recombinant Zoster Vaccine







References: 1. Dendouga N, et al. Vaccine. 2012 Apr;30(20):3126-35. **2.** Lal H, et al. N Engl J Med. 2015 May;372(22):2087-96. **3.** Lecrenier N, et al. Exp Rev Vaccine. 2018 Jun;17(7):619-634.
4. Zerboni L, et al. Nat Rev Microbiol. 2014 Mar;12(3):197-210.

References: 1. Dendouga N, et al. Vaccine. 2012 Apr;30(20):3126-35. **2.** Leroux-Roels G, et al. Clin Immunol. 2016 Aug;169:16-27. **3.** Bharucha T, et al. Hum Vaccin Immunother. 2017 Aug;13(8):1789-97. **4.** GlaxoSmithKline. Shingrix European public assessment report, Annex I: Summary of product characteristics: EMA; [updated August 2020; accessed October 2020]. **5.** Garçon N, et al. Vaccine adjuvants. Amsterdam: Elsevier; 2011.

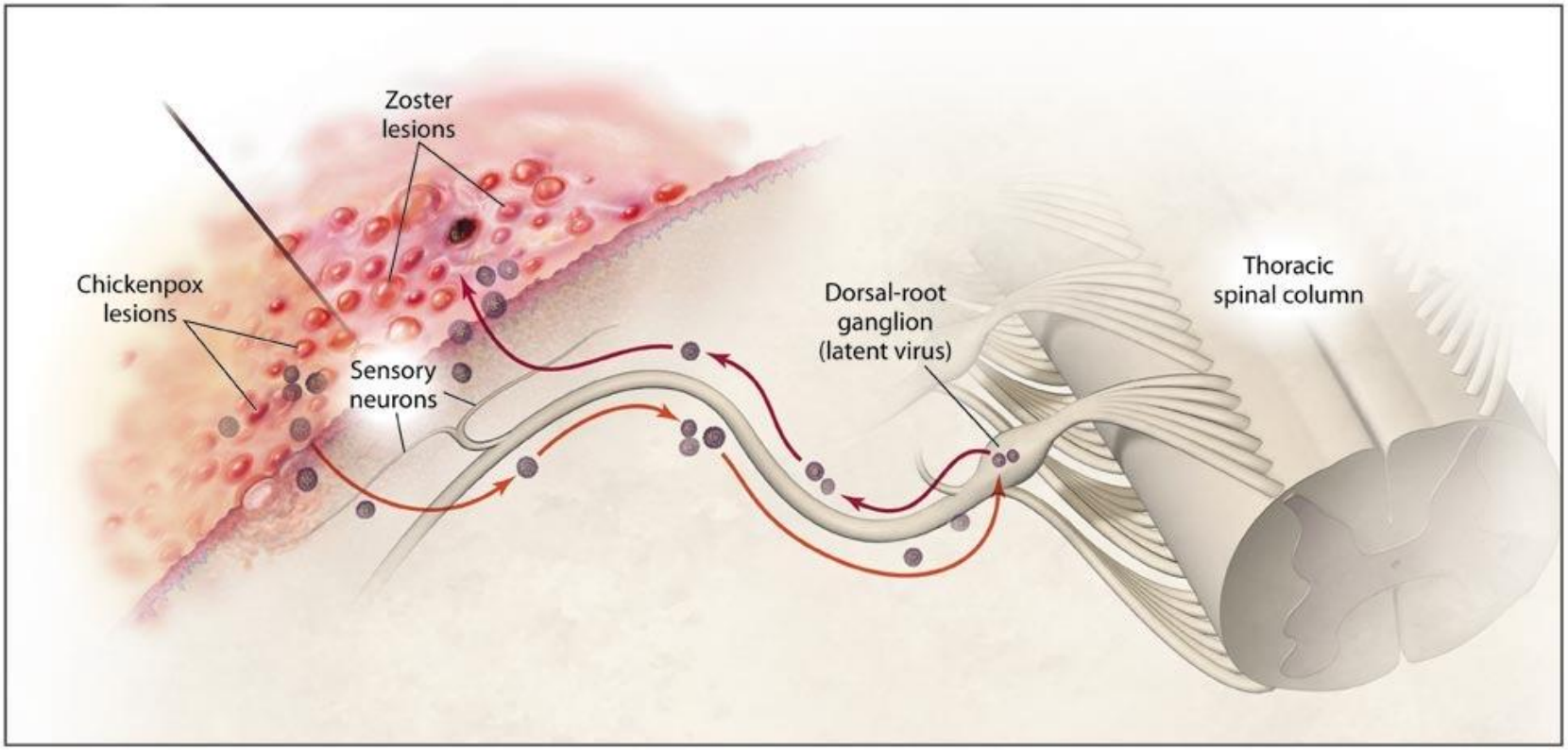
References: 1. Chlibek R, et al. Vaccine. 2014 Mar;32(15):1745-53. **2.** Chlibek R, et al. 2014 Mar;32(15 Suppl):1745-53. **3.** Schwarz TF, et al. Hum Vaccin Immunother. 2018 Jun;14(6):1370-7.

Varicella – Herpes zoster

Windpokken
Waterpokken

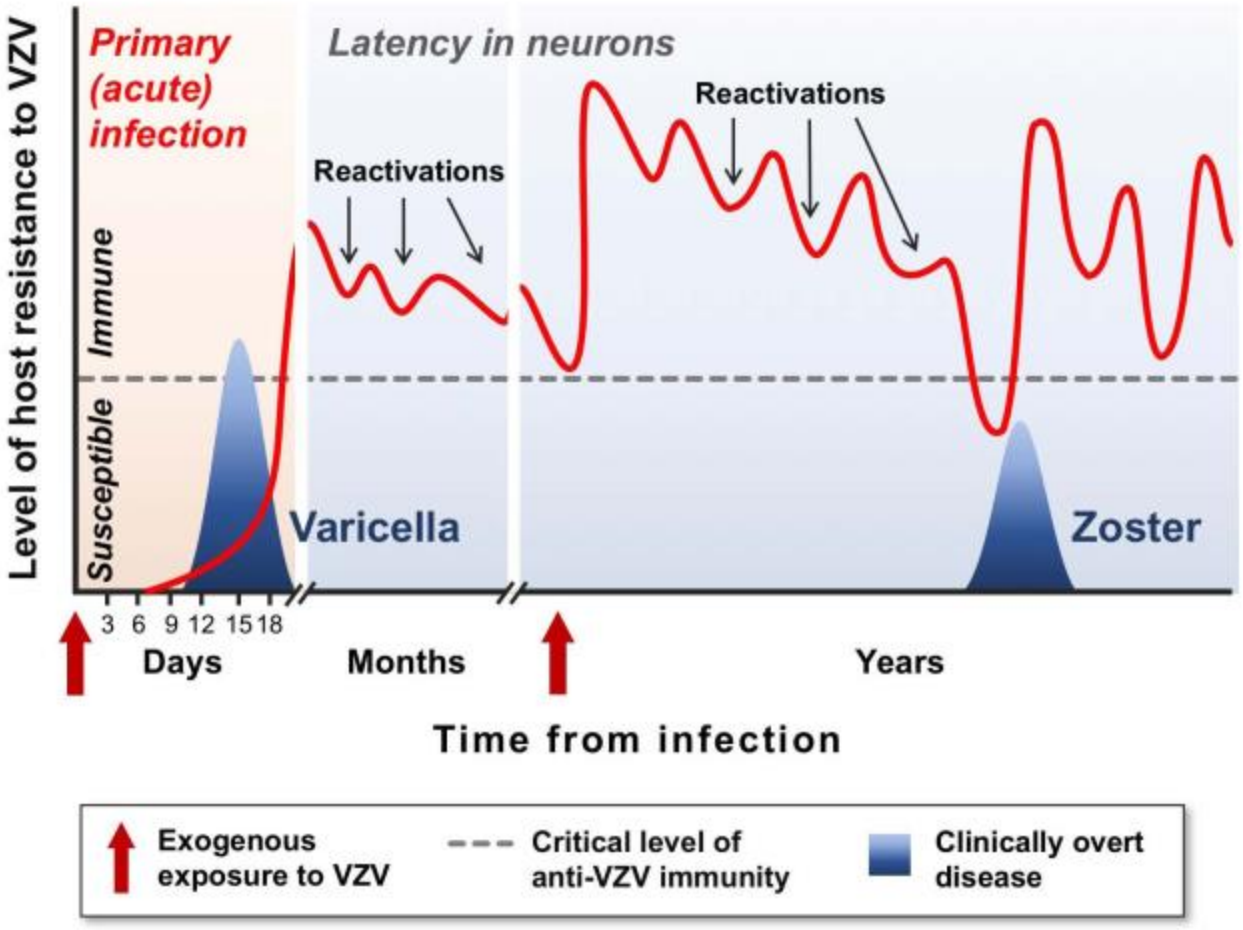
Zona
Gordelroos

Varicella – Herpes zoster



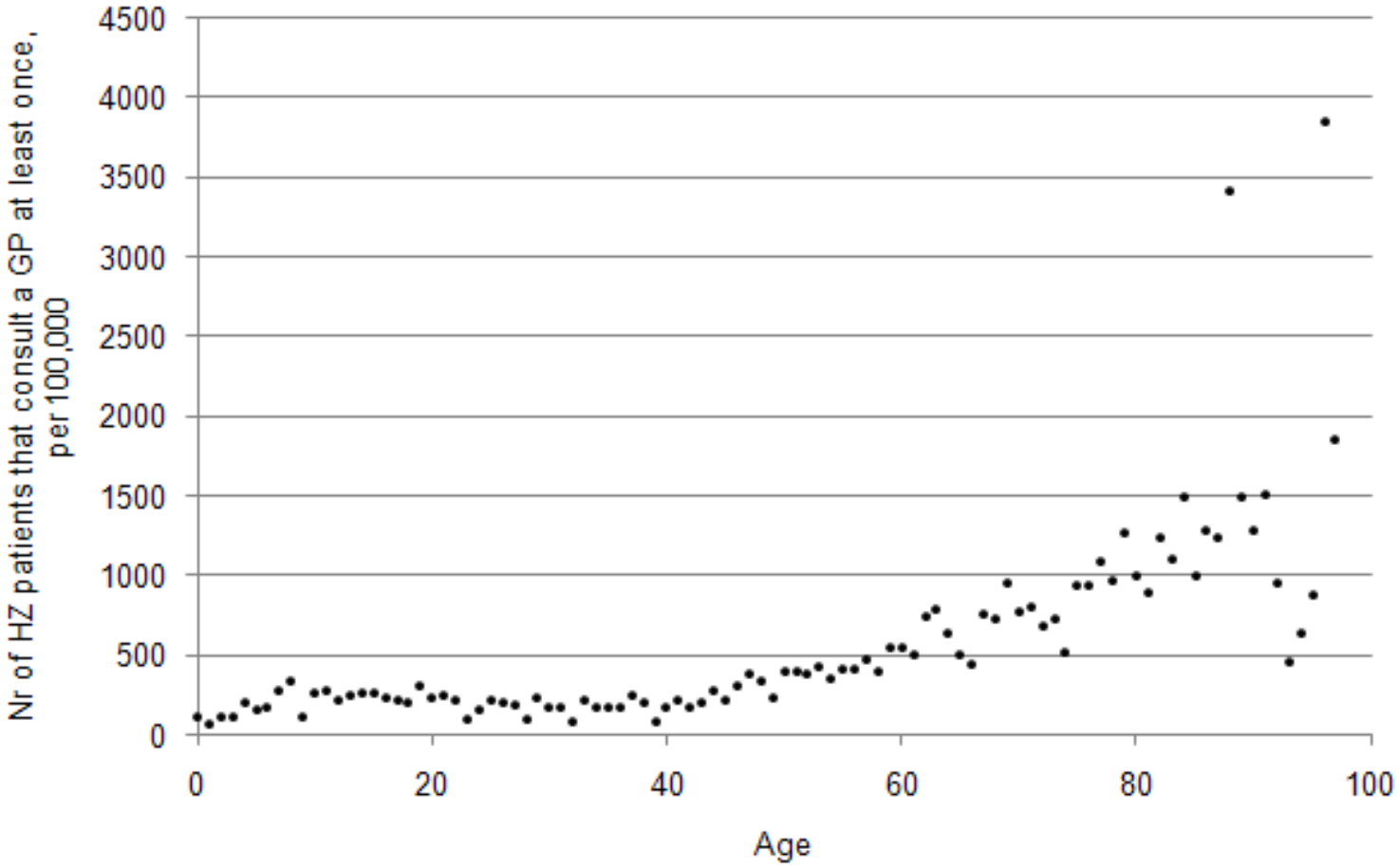
N Engl J Med 2007; 356:1338-1343

VZV reactivation



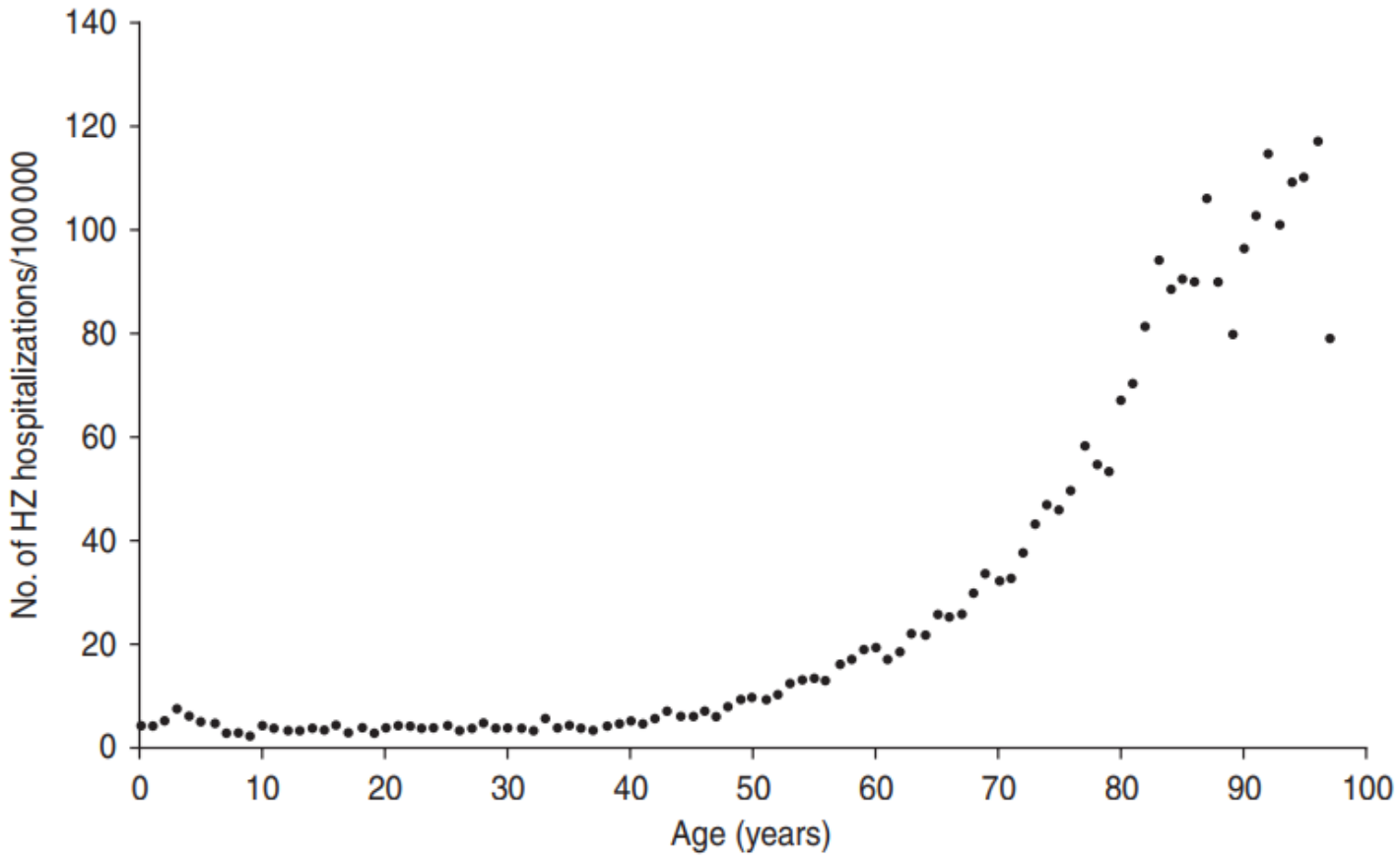
New Microbiologica, 41, 2, 95-105, 2018,

HZ incidence, GP visits (Be)



Bilcke, Ogunjimi et al, Epidem Infect, 2012

HZ incidencee, hospitalisations (Be)



Bilcke, Ogunjimi et al, Epidem Infect, 2012

Risk factors for HZ

Table 1. Common Risk Factors for Herpes Zoster

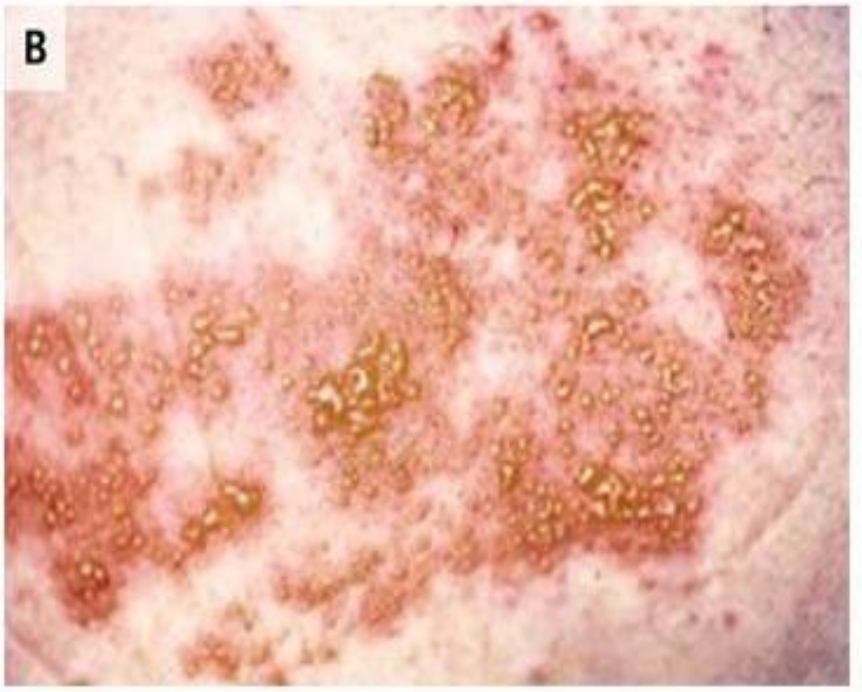
Older age (≥ 50 years of age)
Untreated depression
Inflammatory bowel disease[a]
Rheumatologic disorder (eg, rheumatoid arthritis, SLE, giant cell arteritis, dermatomyositis[a])
Chronic kidney disease and hemodialysis
HIV infection
Dermatologic disorder (eg, psoriasis treated with systemic corticosteroids)[a]
Solid and hematologic malignancy, particularly when undergoing chemotherapy (eg, bortezomib)
PBSCT or SOT
Diabetes mellitus
Treatment with a systemic corticosteroid agent
Micronutrient deficiency

[a]A recent study showed that treatment with anti-tumor necrosis factor agents does not increase the risk for herpes zoster.[12]

Abbreviations: HIV, human immunodeficiency virus; PBSCT, peripheral blood stem cell transplantation; SLE, systemic lupus erythematosus; SOT, solid organ transplantation.

DOI: 10.3810/pgm.2013.09.2703

Cutaneous HZ



Clinical manifestations of HZ

- Cutaneous HZ (localized or disseminated)
- Zoster sine herpete
- HZ ophthalmicus
- Ramsay Hunt syndrome
- Vasculopathy:
  - large vessel unifocal granulomatous arteritis
  - small vessel multifocal vasculopathy
- Meningitis/meningoencephalitis
- Myelopathy
- Focal motor weakness
- Acute retinal necrosis
- Progressive outer retinal necrosis

DOI: 10.3810/pgm.2013.09.2703

Disseminated HZ

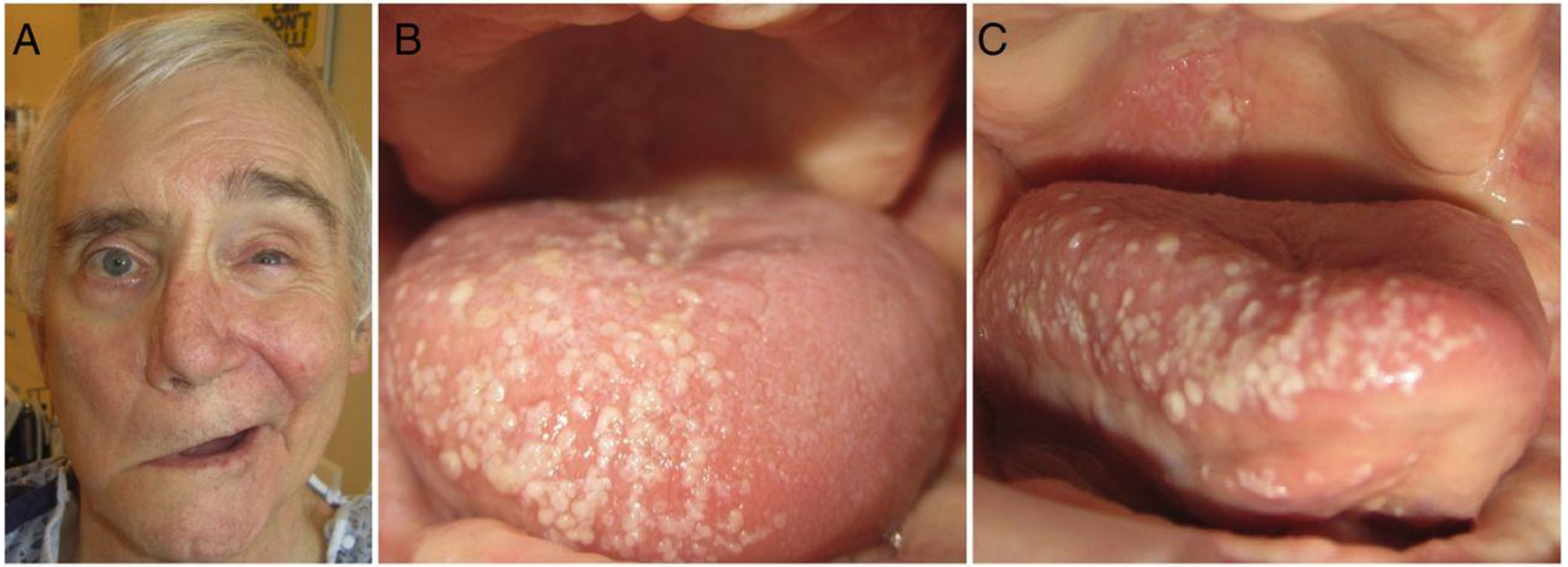
HZ ophthalmicus

Hutchinson's teken

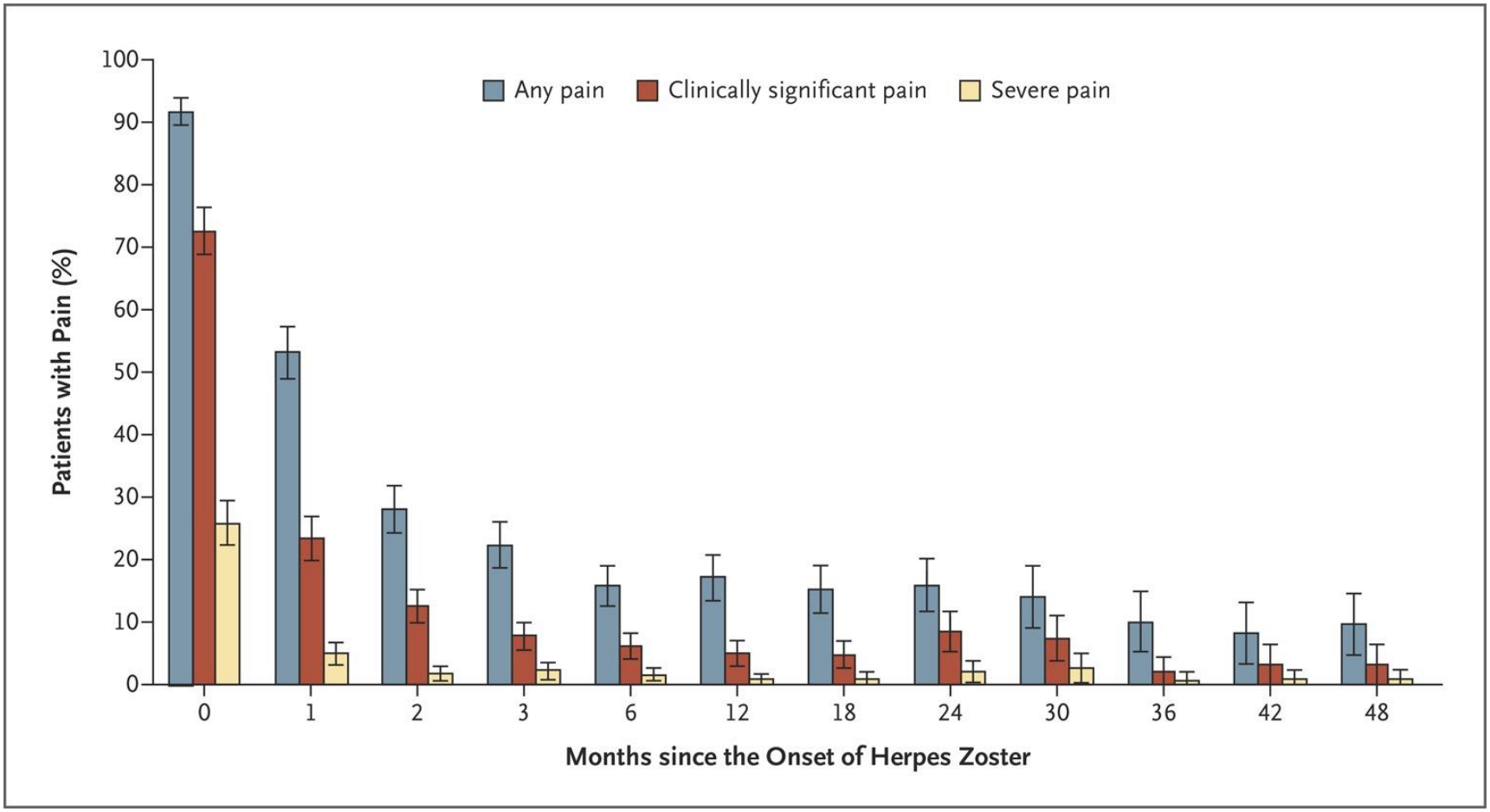
Zona ophthalmica

Ramsay-Hunt

Ramsay-Hunt

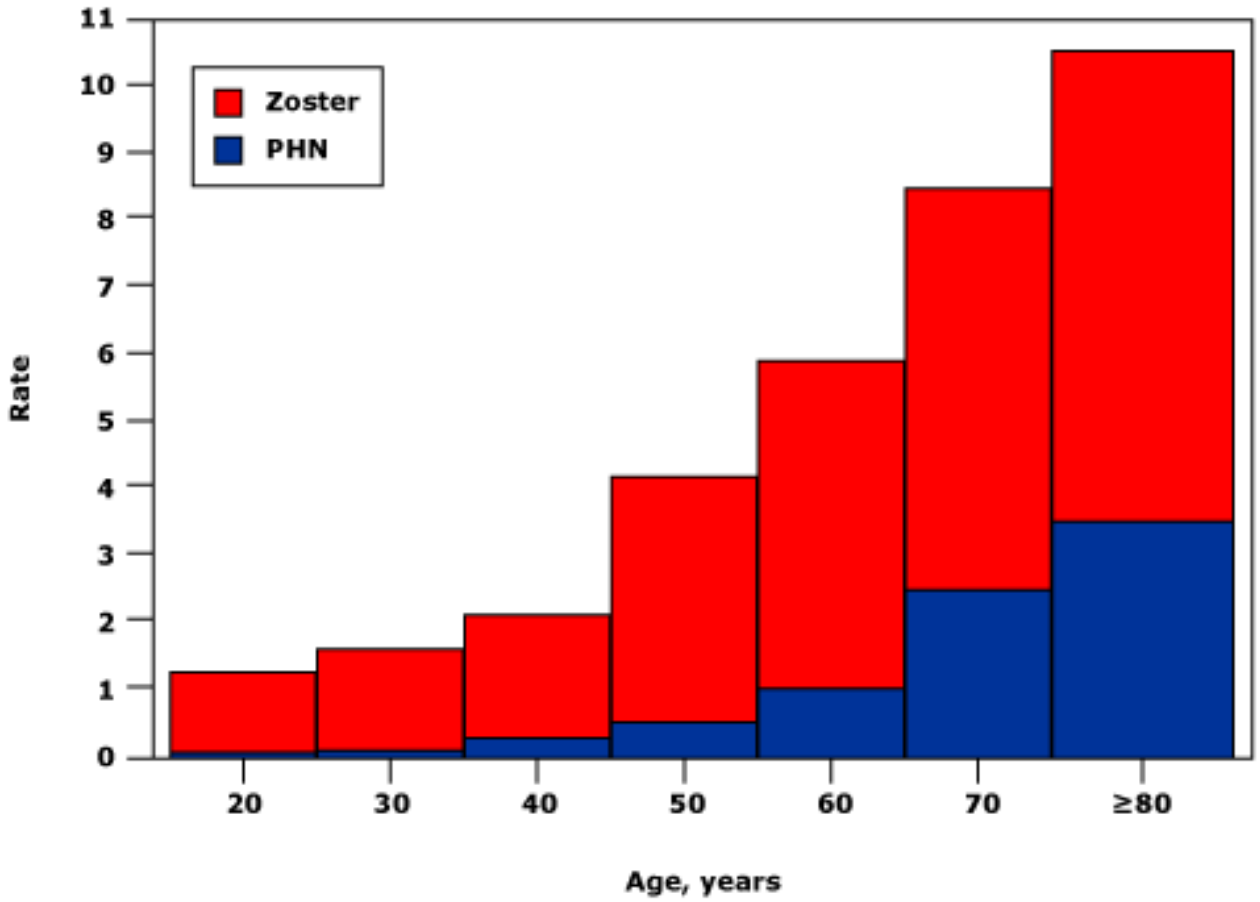


PHN



N Engl J Med 2014; 371:1526-1533

HZ en PHN (USA)



Harpaz R, Ortega-Sanchez IR, Seward JF. MMWR Recomm Rep 2008; 57:1

Risk factors for PHN

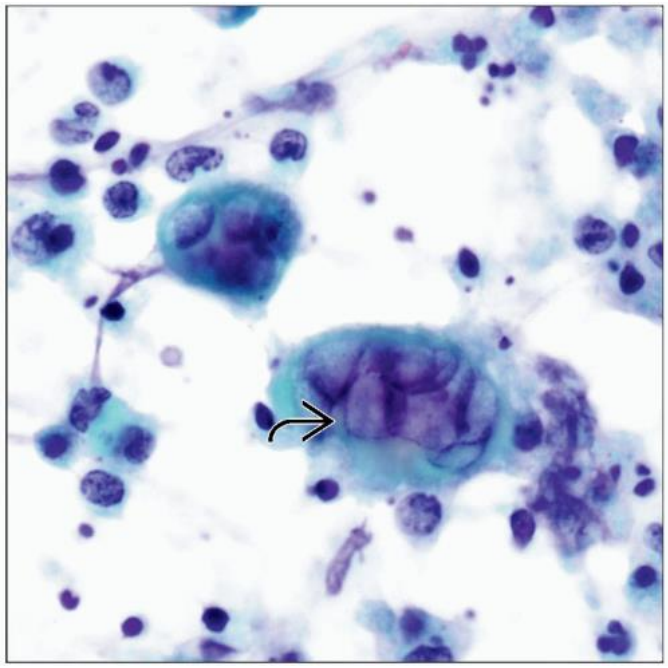
Table 3. Patient Risk Factors for PHN

Older age (≥ 50 years of age)
Immunocompromised
Micronutrient deficiency
Low income
Involvement of trigeminal dermatomes or brachial plexus during the acute episode of Hz
Hz ophthalmicus with keratitis, conjunctivitis, or uveitis
Severe prodromal pain
Acute severe pain
Involvement of larger surface area by skin lesions
Numerous lesions
Not receiving antiviral drugs

Abbreviations: Hz, herpes zoster; PHN, postherpetic neuralgia.

DOI: 10.3810/pgm.2013.09.2703

Dianosis of HZ



- Direct fluorescent antigen assay,
- Viral culture,
- Quantitative **PCR** for the detection of VZV DNA in skin lesion / visceral organ samples, CSF
- Antibody testing (immunoglobulin G)

- CSF and visceral samples: PCR and IgG

DOI: 10.3810/pgm.2013.09.2703

Antiviral treatment of HZ

DOI: 10.3810/pgm.2013.09.2703

- **≤ 72 h of lesion onset**
  - **shorter duration** of viral shedding and new lesion formation,
  - **reduction** of the duration of zoster-associated **acute pain**
  - **acceleration** of cutaneous **healing**

- **> 72 h of lesion onset**
  - older adults (≥ 60 years of age) with severe pain and a large area of skin involvement
  - immunocompromised patients
  - continued new vesicle formation
  - visceral, neurologic, or ocular complications, including HZO

- **Aciclovir, valaciclovir, brivudine**
  - Bio-availability valacicovir (55 %) > acyclovir (10-20 %)

Prevention of PHN

- Acyclovir does **not prevent** PHN
  - 4m RR 0.75, (95% CI 0.51 to 1.11)
  - 6m RR 1.05, 9(5% CI 0.87 to 1.27).
  - 4w ?
- **Prevention** of PHN during acute illness
  - amitriptyline,
  - ganglion blockade with bupivacaine and dexamethasone,
  - repetitive epidural injection of methylprednisolone acetate and bupivacaine
- **Corticosteroids** (10 – 14 d tapering + antiviral)
  - No prevention of PHN
  - Acute neuritis ↓ (pain, activities, sleep)

https://doi.org/10.1002/14651858.CD006866.pub3, **DOI:** 10.3810/pgm.2013.09.2703

PHN pharmacological treatment

N Engl J Med 2014; 371:1526-1533

Table 1. Pharmacologic Therapies for Postherpetic Neuralgia.*

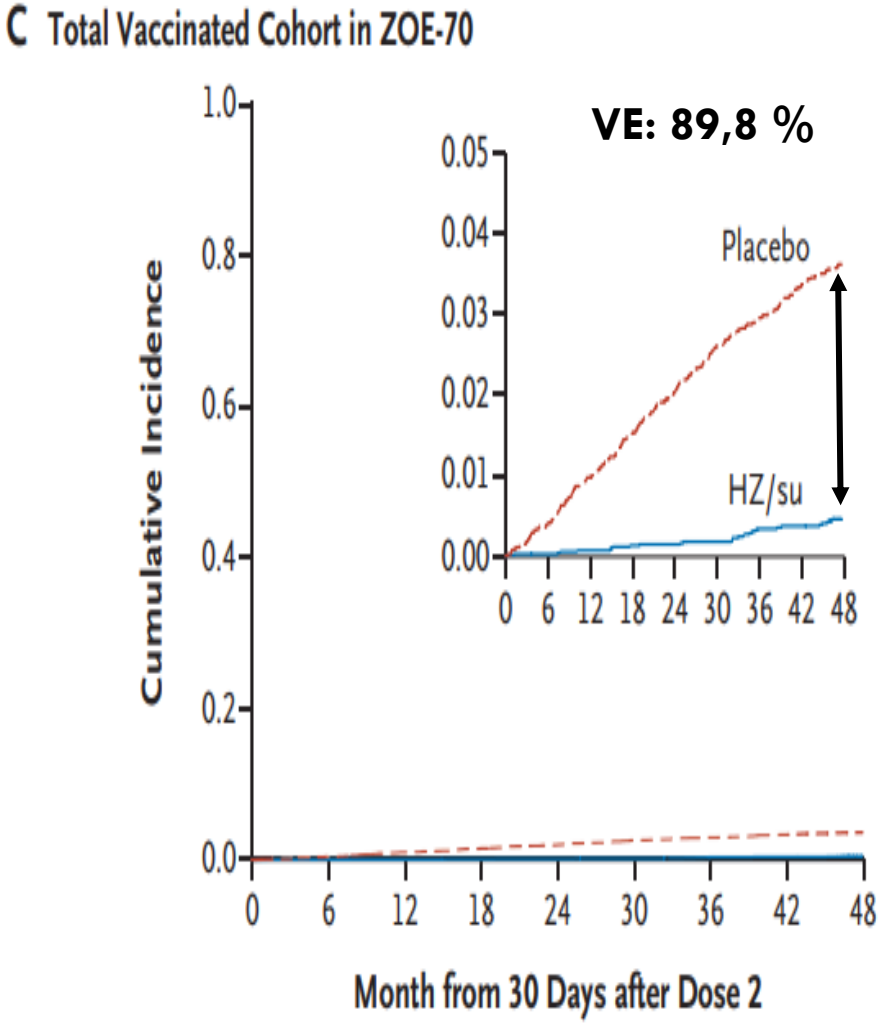
Agent	Average Effective Dose in Clinical Trials	Starting Dose	Dose Adjustment	Number Needed to Treat (95% CI)†	Side Effects	Precautions
Topical treatments						
Lidocaine patch	5%; up to 3 patches/day	Maximum of 3 patches/day for a maximum of 12 hr		2.0 (1.4–3.3)[20]	Local erythema	
Capsaicin cream	0.075%; 4 applications/day	NA		3.3 (2.3–5.8)[20]	Pain on application, local erythema, rash	Avoid eyes and nose
Capsaicin patch	8%; application time of 30–90 min	NA		11.0 (6.1–62.0)[22]	Pain on application, local erythema, rash; systemic adverse events in <5% of study participants‡	
Oral treatments						
Gabapentin	2572 mg/day	100 mg 3 times daily	Increase each of the 3 daily doses by 100–300 mg every 3–7 days as tolerated; maximum dose is 1800 mg/day, but unlicensed dose of up to 3600 mg/day is used by some clinicians	4.4 (3.3–6.1)[20]	Sedation, dizziness, peripheral edema	Avoid in patients with renal insufficiency
Pregabalin	398 mg/day	50–75 mg twice daily	Increase to 300 mg daily after 3–7 days, then by an additional 150 mg daily every 3–7 days as tolerated, to a maximum dose of 600 mg daily	4.2 (3.4–5.4)[20,23]	Same as with gabapentin	Same as with gabapentin
Tricyclic antidepressants (off-label use)	Amitriptyline, 95 mg/day; or nortriptyline, 122 mg/day	10–25 mg at bedtime	Increase by 10–25 mg every 3–7 days as tolerated to 75–150 mg/day with caution as side effects permit; if blood level of active drug and its metabolite is >100 ng/ml, continue dose adjustment very cautiously	2.6 (2.1–3.5)[20]	Sedation, dry mouth, blurred vision, weight gain, urinary retention	Avoid in patients with cardiac disease, glaucoma, or seizure disorder; avoid concomitant use of tramadol
Morphine and oxycodone	Morphine, 90 mg/day; oxycodone, 45 mg/day	5–15 mg every 4 hr as needed	After 1–2 wk, convert total daily dose to long-acting opioid and continue short-acting formulation as rescue medication	Morphine, 2.8 (2.0–4.6)[20]; oxycodone, 2.5 (1.7–4.4)[20]	Nausea, vomiting, constipation, drowsiness, dizziness, mood change, disorientation	There is risk of abuse and uncertainty over long-term effectiveness and safety§
Tramadol	298 mg/day	50 mg every 4–6 hr	Increase by 50–100 mg/day in divided doses every 3–7 days as tolerated, to maximum dose of 400 mg/day (300 mg/day in patients >75 yr of age)	4.8 (2.6–27.0)[20]	Nausea, vomiting, constipation, drowsiness, dizziness, seizures	Same as with morphine and oxycodone; also, avoid concomitant use of SSRIs, SSNRIs, tricyclic antidepressants

* Data are primarily from Hempenstall et al.[20] and Dworkin et al.[21] NA denotes not available, SSNRIs selective serotonin- and norepinephrine-reuptake inhibitors, and SSRIs selective serotonin-reuptake inhibitors.
† This is the number needed to treat for one person to have at least 50% pain relief.
‡ Systemic adverse events include diarrhea, nausea, vomiting, fatigue, infections, musculoskeletal disorders, hypertension, dizziness, and headache.
§ See also national guidelines on opioid use for chronic pain.[24,25]

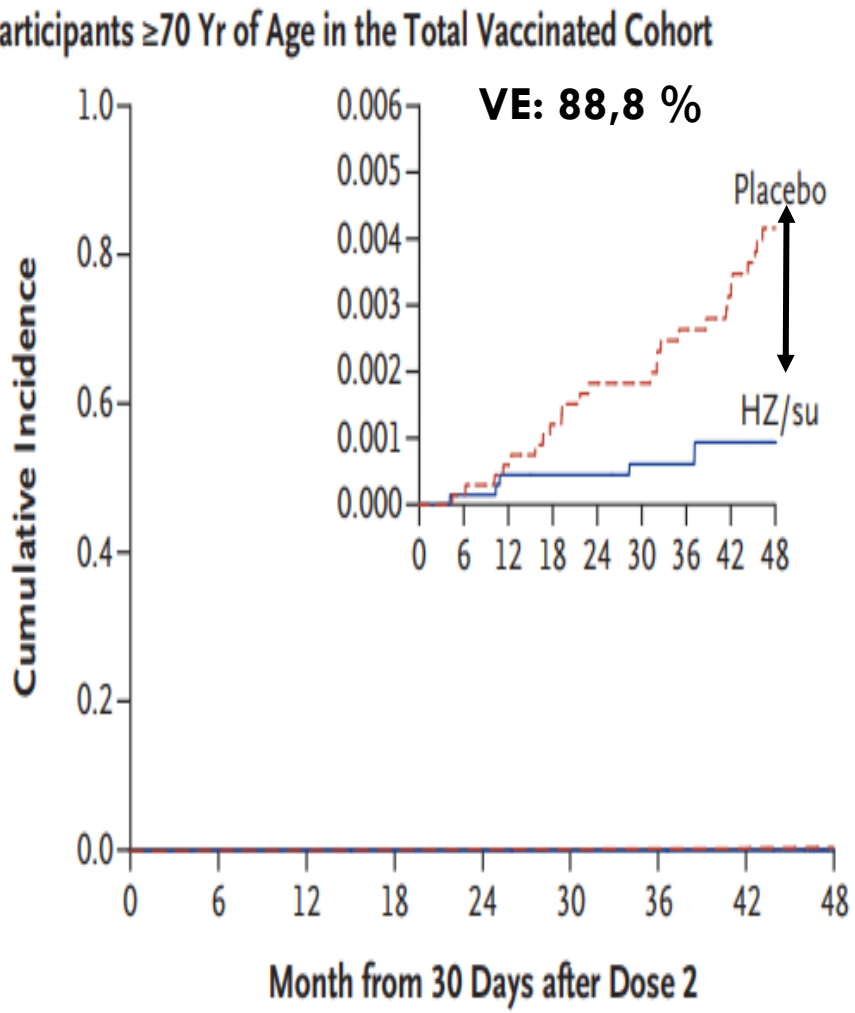
HZ/su (RCT)

N Engl J Med 2016;375:1019-32

Herpes Zoster Incidence



Post-herpetic Neuralgia



HZ/su VE against HZ complications

- ZOE-50 & ZOE-70
- Non-PHN complications
  - Ophtalmic disease
  - Disseminated disease
  - Neurologic disease
  - HZ vasculitis
- **VE ≥ 50 y. 93.7** % (95% CI 59.5-99.9 %)
- **VE ≥ 70 y. 91.6** % (95% CI 43.3-99.8 %)
- 5 HZ related hospitalisations in placebo group
- No HZ related deaths

Vaccine 36 (2018) 1537–1541

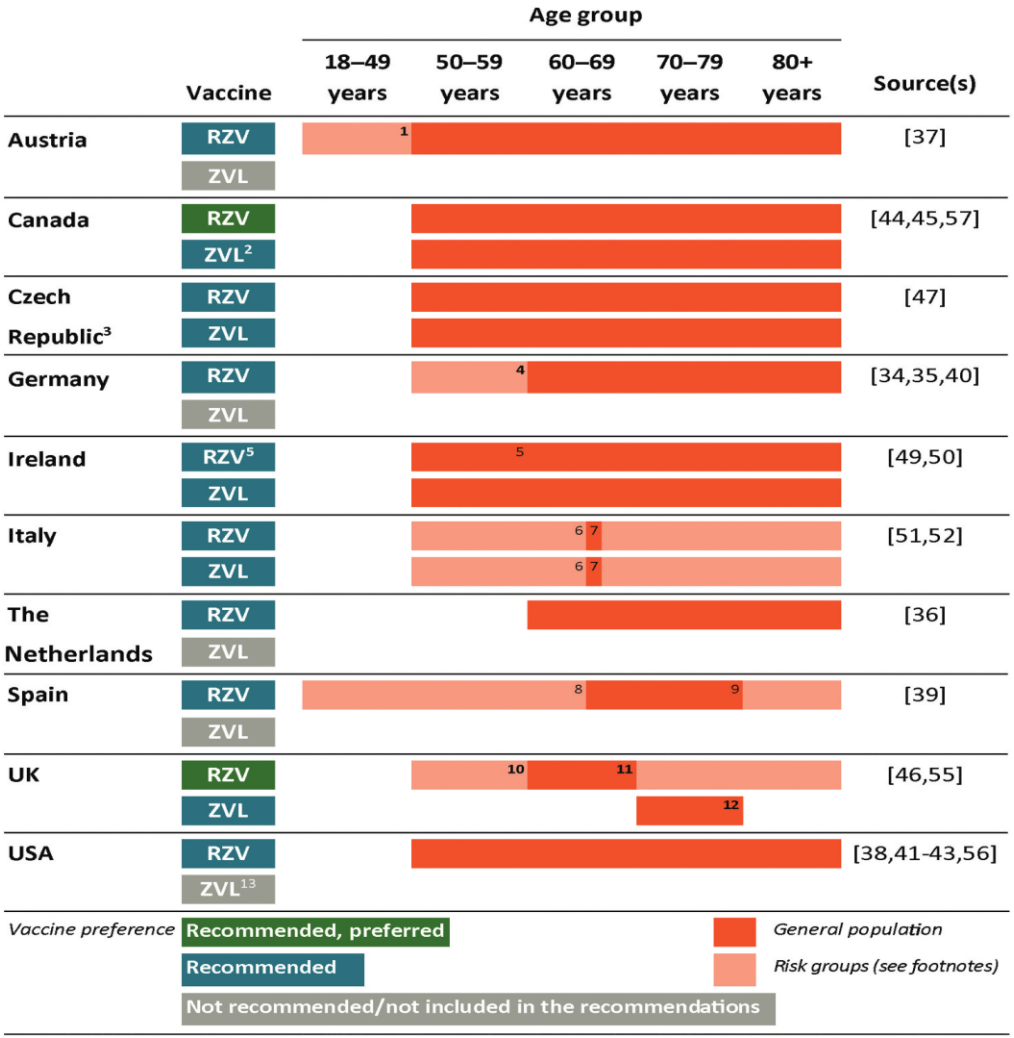
RZV long-term efficacy

Table 2. Vaccine Efficacy in the ZOE-50 and ZOE-70 Studies and the Current Long-Term Follow-up Study After at Least 2 Additional Years of Follow-up

	Adjuvanted Recombinant Zoster Vaccine				Historical Control[a]/Placebo Group in ZOE-50 and ZOE-70[b]				
	N	n	Sum of Follow-up Years	Incidence (per 1000 Person-Years)	N	n	Sum of Follow-up Years	Incidence (per 1000 Person-Years)	Vaccine Efficacy, % (95% Confidence Interval)
Vaccine efficacy in the current follow-up study: primary objective (up to the data lock point for the interim analysis in the current follow-up study)									
Overall[a]	7277	27	19 621.7	1.4	7277	169	19 621.7	8.6	84.0 (75.9–89.8)
Vaccine efficacy from 1 month post-dose 2: secondary objective (up to the data lock point for the interim analysis in the current follow-up study)									
Overall	13 881	59	72 744.6	0.8	13 881	651	72 744.6	8.9	90.9 (88.2–93.2)
Year 1[b]	13 881	3	13 744.5	0.2	14 035	130	13 823.3	9.4	97.7 (93.1–99.5)
Year 2[b]	13 569	10	13 415.6	0.7	13 564	136	13 332.5	10.2	92.7 (86.2–96.6)
Year 3[b]	13 185	9	13 016.1	0.7	13 074	116	12 834.0	9.0	92.4 (85.0–96.6)
Year 4[b]	12 757	10	12 946.7	0.8	12 517	95	12 637.4	7.5	89.8 (80.3–95.2)
Year 6[a]	7277	10	7208.8	1.4	7277	66	7208.8	9.2	84.9 (70.4–93.1)
Year 7[a]	7097	10	6993.1	1.4	7097	68	6993.1	9.7	85.3 (71.3–93.3)
Year 8 [a,c]	6876	7	5160.2	1.4	6876	44	5160.2	8.5	84.1 (64.4–94.0)

Clin Infect Dis. 2021 Jul 20:ciab629. doi: 10.1093/cid/ciab629. Epub ahead of print. PMID: 34283213.

VZV recommendations



EXPERT REVIEW OF VACCINES
https://doi.org/10.1080/14760584.2021.1956906

HGR HZ vaccination recommendation

federale overheidsdienst
VOLKSGEZONDHEID, VEILIGHEID VAN DE VOEDSELKETEN EN LEEFMILIEU

Hoge Gezondheidsraad

- **August 2022**
- **HGR 9684 Vaccination against Herpes Zoster**
- **Recommendation:**
  - **Recombinant HZ subunit vaccine (2 dose regimen) for:**
    - **Immunocompetent adults aged ≥ 60 years.**
    - **Patients under immunosuppressive therapy and JAK-inhibitors aged ≥ 16 * years**
  - **Co-administration** v
    dTpa is safe**

NEW

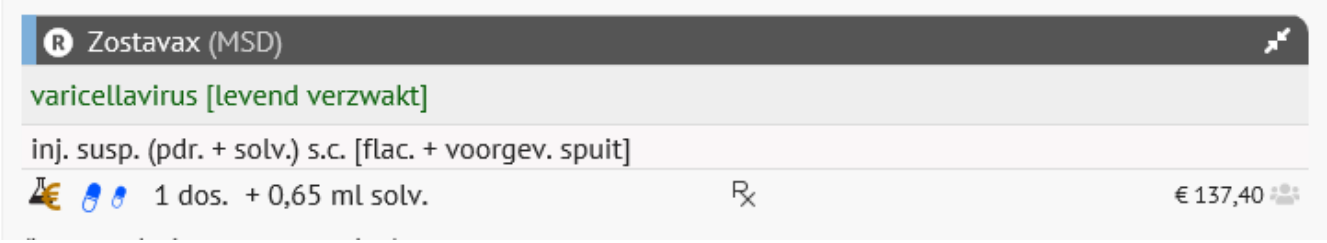
No. 9158 Vaccination of immunocompromised or chronically ill children and/or adults
Chapter 5. LIST OF (POTENTIALLY) IMMUNOSUPPRESSIVE MEDICATIONS

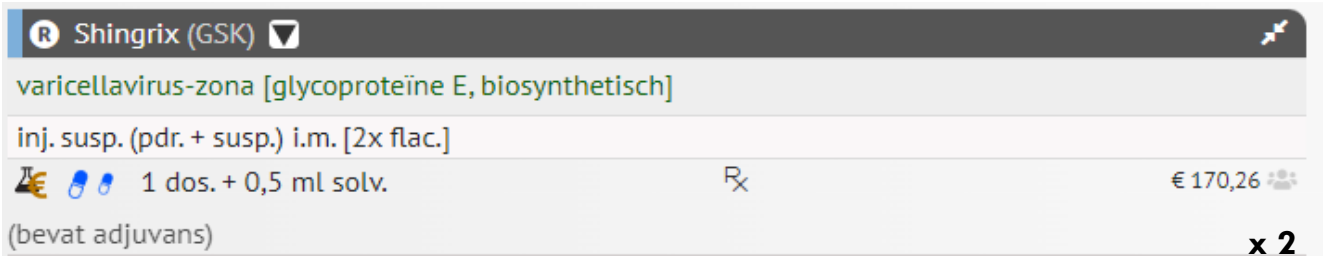
*: *RZV is indicated for prevention of herpes zoster (HZ) and post-herpetic neuralgia (PHN), in:*
- *adults 50 years of age or older;*
- *adults 18 years of age or older at increased risk of HZ.*

The use of Shingrix should be in accordance with official recommendations. (SPC Shingrix)

**: *Shingrix can be given concomitantly with unadjuvanted inactivated seasonal influenza vaccine, 23-valent pneumococcal polysaccharide vaccine (PPV23) or reduced antigen diphtheria-tetanus-acellular pertussis vaccine (dTpa) (SPC Shingrix)*

Costs HZ vaccination (Be)





BCFI.be

Terugbetaling RZV

Het vaccin tegen zona: doeltreffend maar te duur

KCE

25-10-2022

Het Federaal Kenniscentrum voor de Gezondheidszorg (KCE) stelt hierbij zijn resultaten voor: de prijs van dit vaccin is te hoog in vergelijking met het voordeel dat ervan verwacht kan worden. Deze vaccinatie zou bij terugbetaling ongeveer 602 miljoen euro kosten in het eerste jaar, gevolgd door 23 miljoen euro per jaar daarna. Het is de vraag of dergelijke zware uitgaven te verantwoorden zijn voor een ziekte die relatief mild blijft voor de meeste mensen, zeker in een tijd van budgettaire beperkingen.

Varicella zoster vaccine

- HZ burden in older population
- PHN burden in older population
- PHN treatment difficult – unsuccesful
- Highly effective VZV vaccine

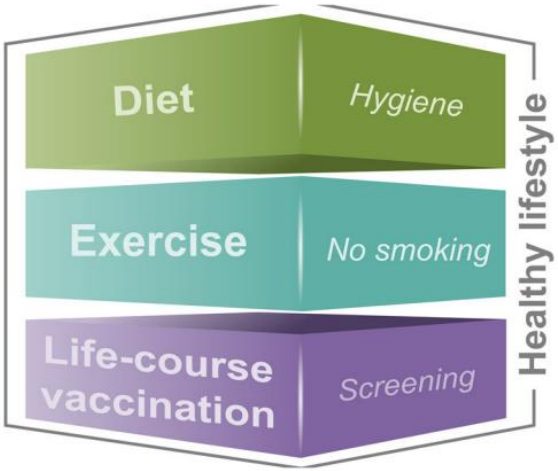
- **The older population stays at risk for HZ and its complications in Belgium**

Pneumococcal vaccination and COVID-19

Table 2. Probability of a SARS-CoV-2 positive nasopharyngeal swab according to influenza and pneumococcal vaccination status.[27]

	All			18 to 64 years of age			65 to 104 years of age		
	OR	95% CI	*p*-Value	OR	95% CI	*p*-Value	OR	95% CI	*p*-Value
(a) Not adjusted model									
Flu vaccine during previous autumn	1.02	0.91–1.15	0.7387	0.86	0.75–0.99	0.0301	0.83	0.60–1.14	0.2440
Pneumococcal vaccination	0.77	0.58–1.02	0.0635	0.67	0.46–0.97	0.0342	0.42	0.26–0.66	0.0002
(b) Adjusted model*									
Flu vaccine during previous autumn	0.89	0.78–1.01	0.1408	0.85	0.74–0.98	0.0235	0.87	0.59–1.28	0.4826
Pneumococcal vaccination in previous 12 months	0.56	0.41–0.75	0.0001	0.61	0.41–0.91	0.0156	0.56	0.33–0.95	0.0313

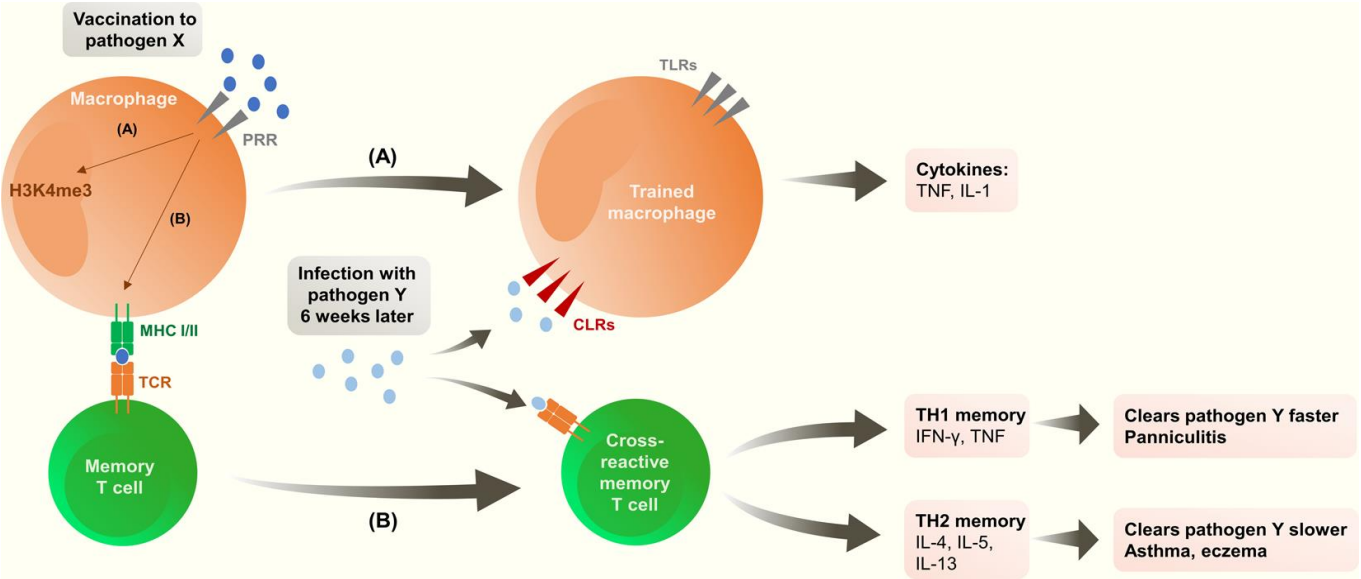
HUMAN VACCINES & IMMUNOTHERAPEUTICS
https://doi.org/10.1080/21645515.2021.1957647



"Immune fitness"

npj Vaccines (2021) 6:93

Immune fitness



npj Vaccines (2021) 6:93 ; https://doi.org/10.1038/s41541-021-00354-z

Exercise and pneumococcal immunity

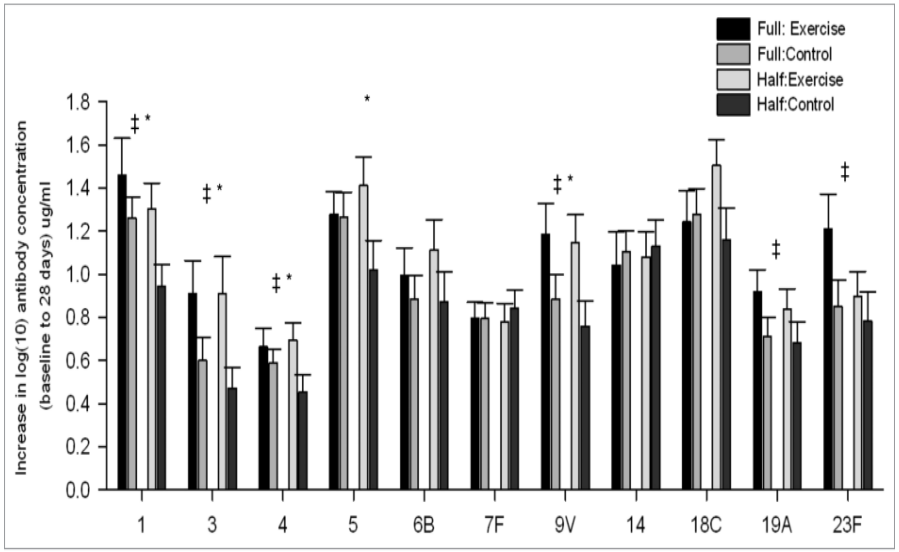
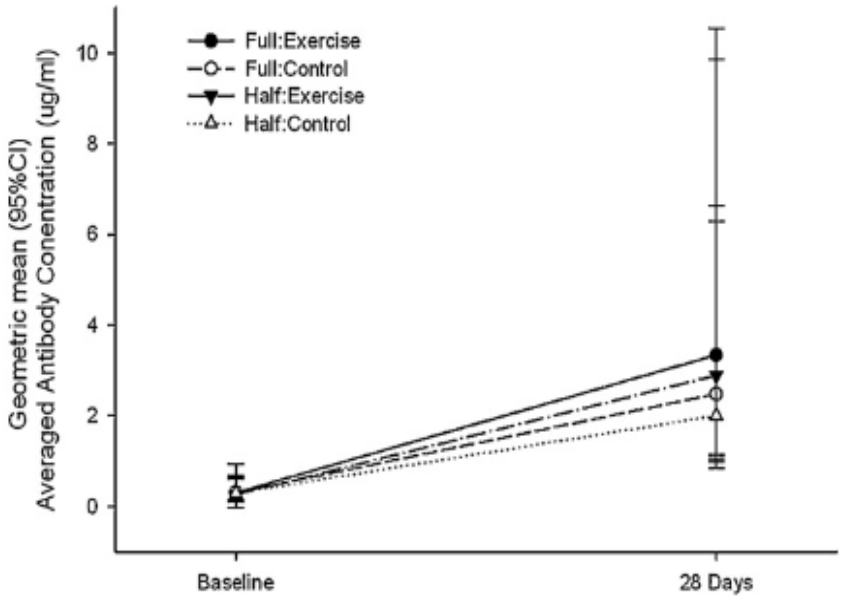
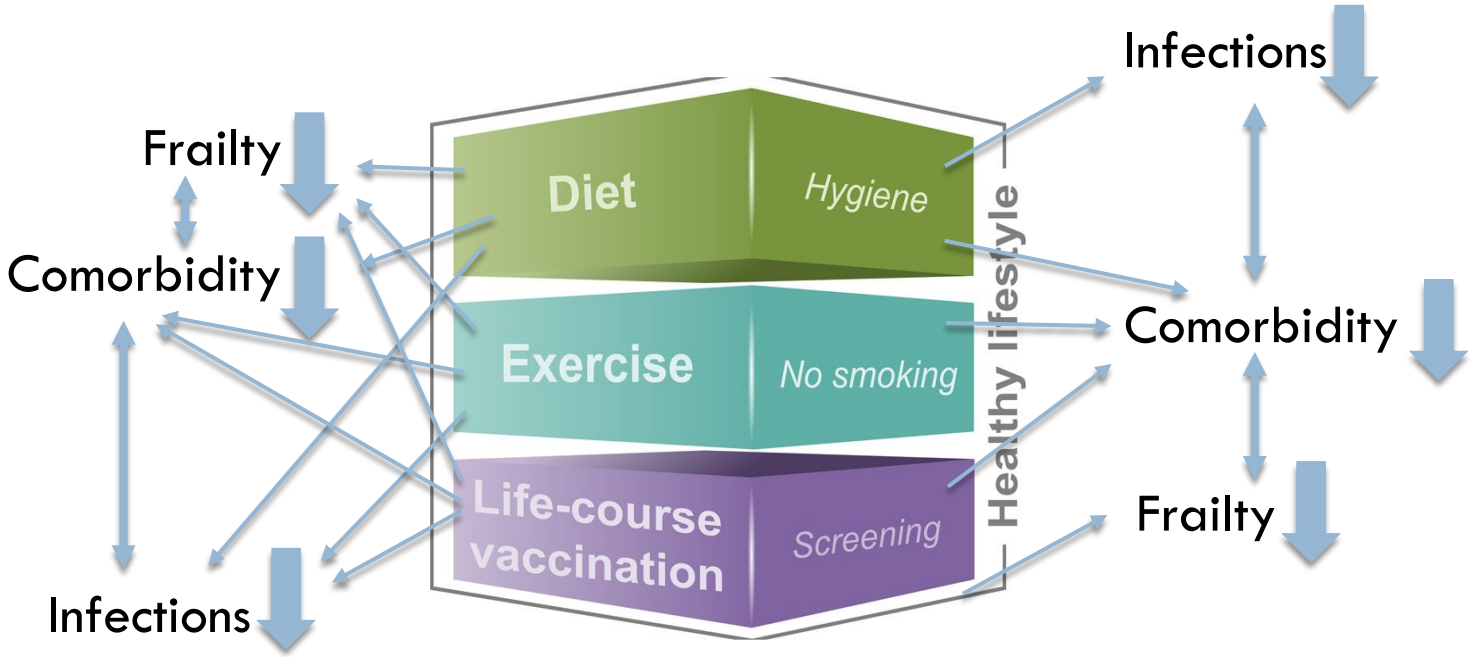


Figure 1. Change scores for pneumococcal strains from baseline to 28 d for all groups. ‡, significant effect of exercise over both full and half dose; *significant effect of exercise within half dose groups.



Vaccine 30 (2012) 6389–6395
Human Vaccines & Immunotherapeutics 2013 9:4, 907-910,

THOM



npj Vaccines (2021) 6:93 ; https://doi.org/10.1038/s41541-021-00354-z

Overview

- Coronavirus in the older prerson
- Influenza in the older person
- Pneumococcal disease in the older person
- Frailty in older persons
  - Immunosenescence
- Vaccination strategies for older persons
  - Age based vaccination
  - Risk based vaccination
  - Herd immunity and vaccination
- Immunosenescence and vaccination
- Ex. Herpes Zoster vaccination
- Addendum: future vaccines for older persons

RSV disease burden

RSV is a major cause of severe respiratory disease in older adults and adults with high-risk medical conditions[1,2]

60+
years old

RSV reinfections occur frequently in adults,[3] and RSV carries an annual disease burden similar to or greater than influenza in those infected[4]

Unmet need

- Despite the high RSV disease burden, **no licensed vaccine is available for prevention of RSV**
- Immunity to RSV following natural infection wanes quickly and re-exposure occurs frequently; thus, an effective vaccine needs to induce a durable immune response

Annual RSV disease burden in the US[5,6]

64 M
ARIs
in adults and children

177 K
Hospitalizations
in adults ≥65 years

14 K
Deaths
in adults ≥65 years

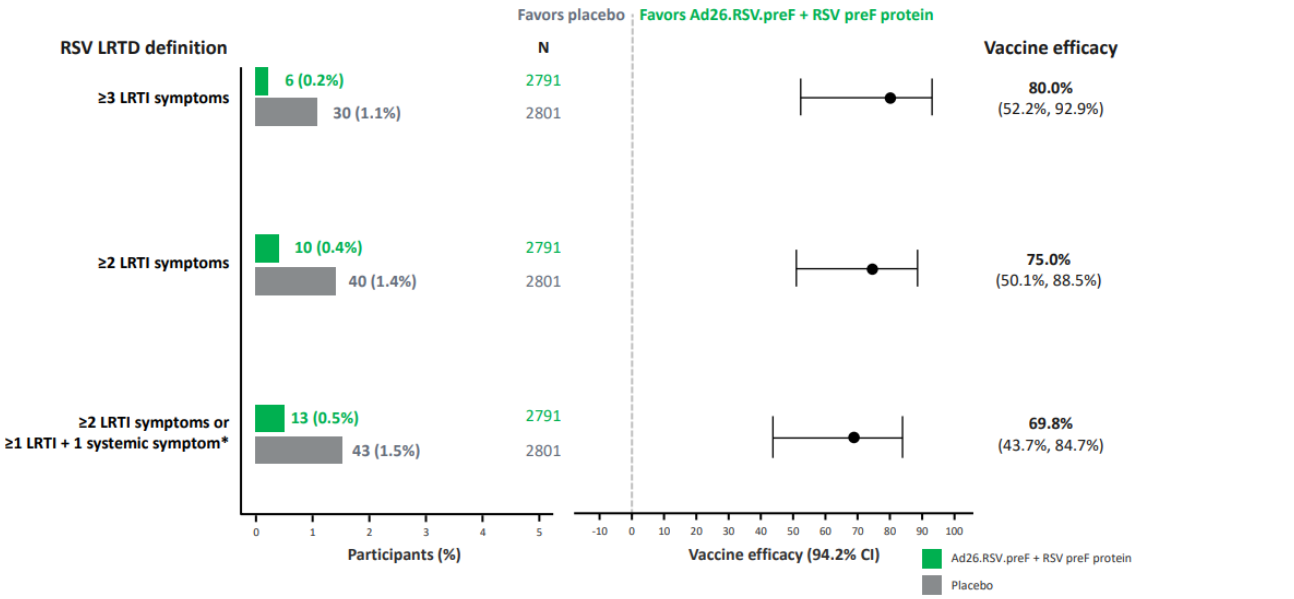
ARI, acute respiratory infection; K, thousand; M, million; RSV, respiratory syncytial virus; US, United States.

1. Nam HH, Ison MG. *BMJ*. 2019;366:l5021. 2. Walsh EE, et al. *J Infect Dis*. 2004;189(2):233-8. 3. Berbers G, et al. *J Infect Dis*. 2021;224(2):269-278. 4. Falsey AR, et al. *Open Forum Infect Dis*. 2021;8(11):ofab491. 5. National Institute of Allergy and Infectious Disease. 2008. (link). 6. CDC. Accessed July 2022. (link).

RSV vaccine - Janssen

Ad26.RSV.preF + RSV preF protein showed high vaccine efficacy against RSV LRTD in the first RSV season[1]

PRE-READ

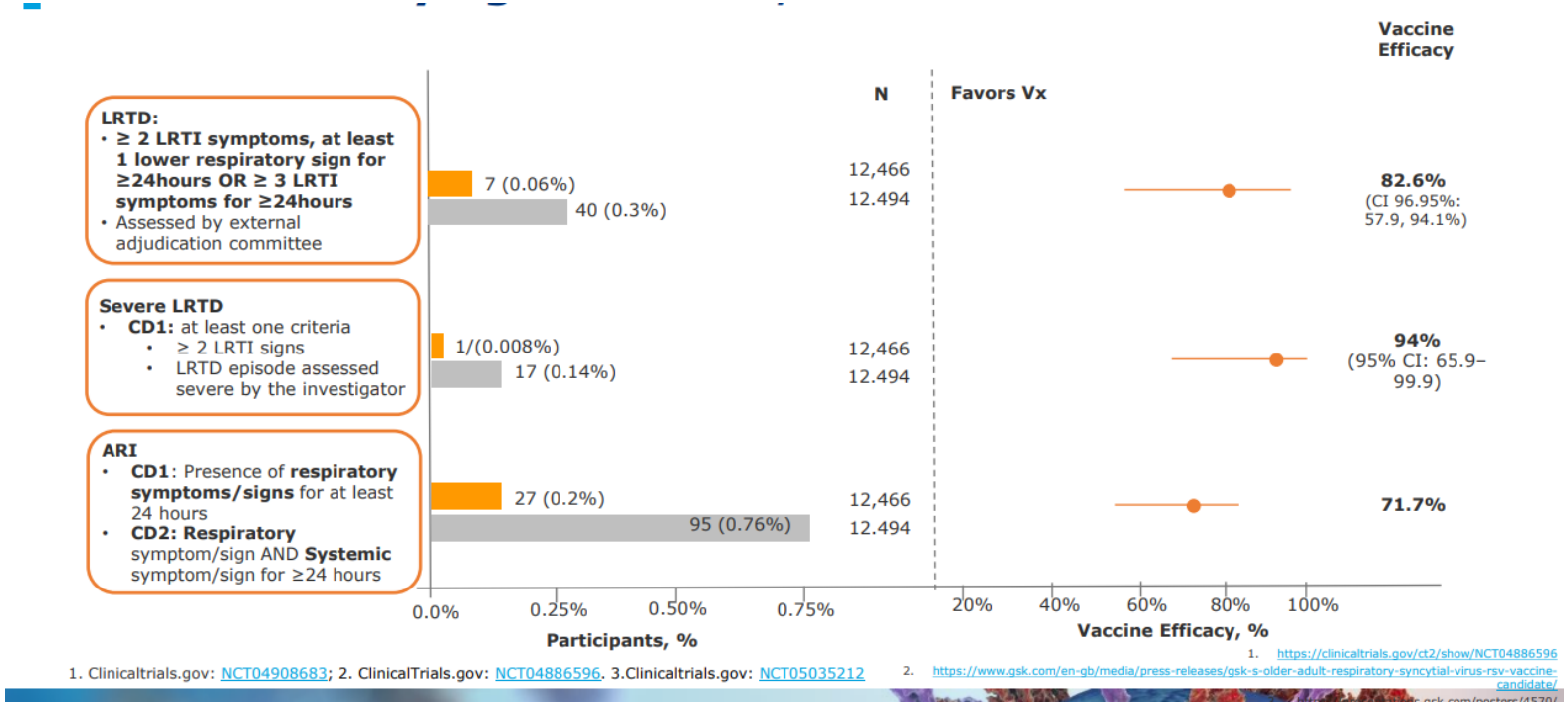


*This definition of RSV LRTD captured all RSV ARIs observed in the study in the first season

VE, vaccine efficacy; CI, confidence Interval

1. Falsey AR, et al. Oral presentation at the IDWeek 2021 Virtual Conference, October 2021.

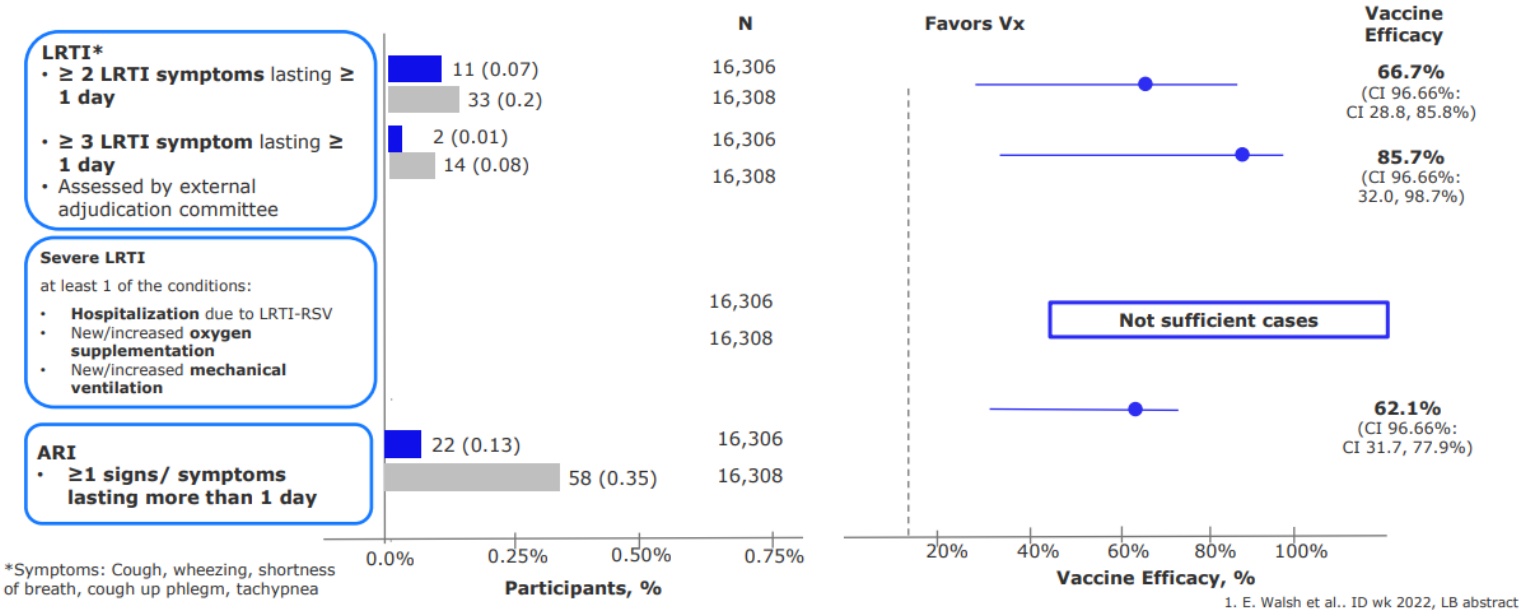
RSV vaccine - GSK



1. Clinicaltrials.gov: NCT04908683; 2. ClinicalTrials.gov: NCT04886596. 3.Clinicaltrials.gov: NCT05035212

1. https://clinicaltrials.gov/ct2/show/NCT04886596
2. https://www.gsk.com/en-gb/media/press-releases/gsk-s-older-adult-respiratory-syncytial-virus-rsv-vaccine-candidate/

RSV vaccine - Pfizer



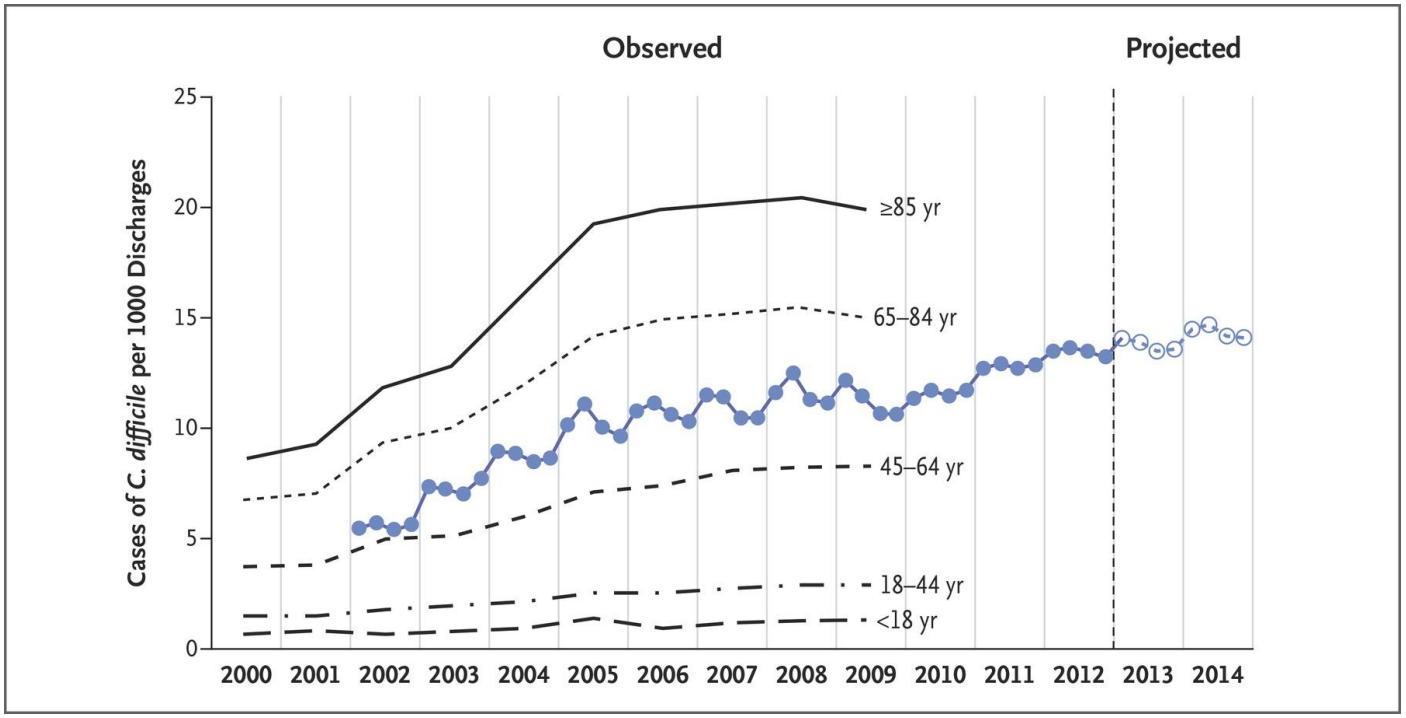
*Symptoms: Cough, wheezing, shortness of breath, cough up phlegm, tachypnea

1. Clinicaltrials.gov: NCT04908683; 2. ClinicalTrials.gov: NCT04886596. 3.Clinicaltrials.gov: NCT05035212

1. E. Walsh et al.. ID wk 2022, LB abstract

2. ://www.cdc.gov/vaccines/acip/meetings/slides-2022-10-19-20.html#RSV-Adults.

C. Difficile



N Engl J Med 2015; 372:1539-1548

Clostridium vaccine trial – CLOVER (Pfizer)

- 3 doses
- Primary efficacy endpoint: prevention of primary CDI
  - 31 % (95 % CI: -38,7 – 66,6) after 3 doses
  - 28,6 % (95 % CI -28,4 – 61) after 2 doses
- Secondary endpoint:
  - No CDI with medical attention in vaccine group

Overview Conclusions

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- Immunosenescence and vaccination
- Ex. Herpes Zoster vaccination

Vaccine development: include older persons!

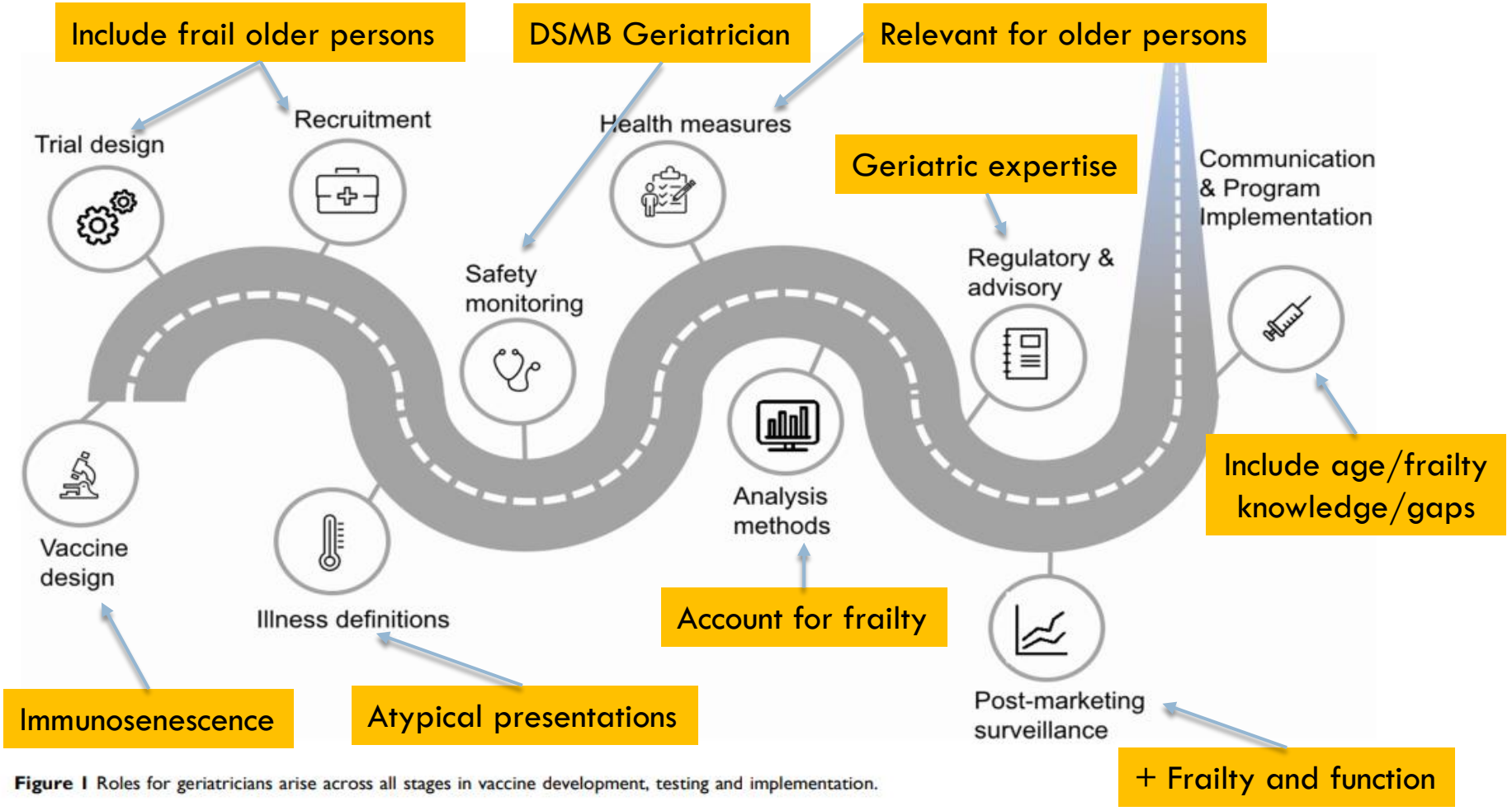
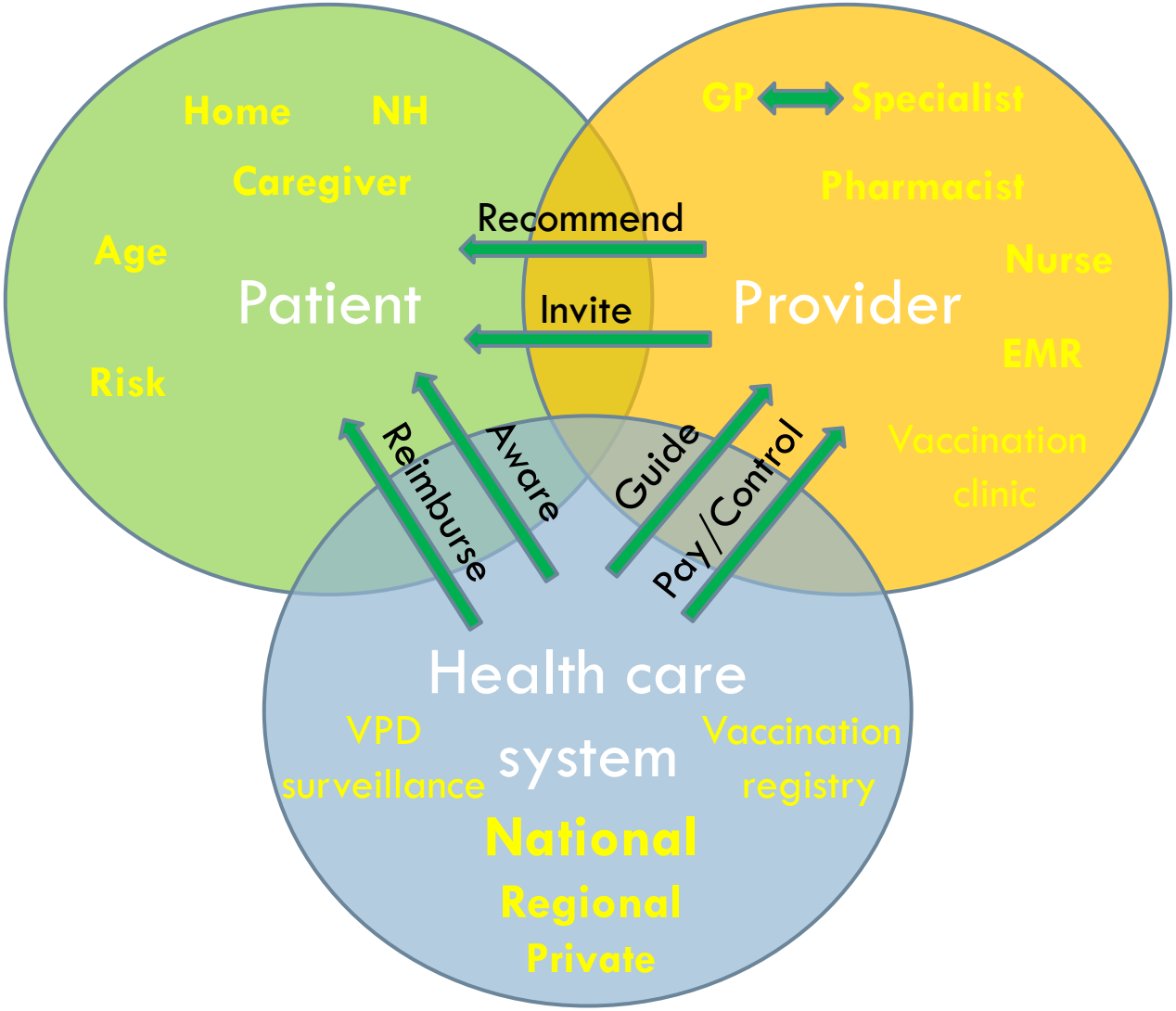


Figure 1 Roles for geriatricians arise across all stages in vaccine development, testing and implementation.

Clinical Interventions in Aging 2021:16 731–738

Multicomponent interventions to improve vaccine uptake



Vaccinate!

Tiende editie Rimpelrock lokt 30.000 bezoekers, GVA

To celebrate!