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RSV, COVID-19, and Influenza: Preventing Respiratory Disease, Hospitalization, and Death in Older Adults in the 21st Century

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Disclosures

Gregory Poland, M.D., faculty for this educational activity, is a consultant for AiZtech, Emergent Biosolutions, GlaxoSmithKline, Invivyd, Janssen GS, Merck, Moderna, Novavax, Sanofi, Syneos Health, Valneva, and an adviser for GlaxoSmithKline, Moderna, Novavax, Sanofi and Syneos Health. He receives research support from ICW Ventures. He has indicated that the presentation or discussion will not include off-label or unapproved product usage.

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Learning Objectives

- Describe the importance of the burden of RSV, COVID-19, and Influenza in older adults
- Describe the new RSV vaccines
- Recognize the limitations of all these vaccines
- Model appropriate data-driven thinking

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Continuing Cognitive Biases

- We (the medical profession + public) have cognitive biases that prevent us from responding rationally and consistently to viral respiratory diseases:
  - We don't "see" the true morbidity and mortality of respiratory viruses…
  - Hence, we think viral respiratory diseases are "not that bad"…
  - Therefore, vaccination not a critical priority…
- Our highest focus must be on protecting the health and well-being of the patient

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Respiratory Infections in Adults in the United States

SARS-CoV-2[a]

Since March 2020, > 1 million COVID-19-related deaths

Influenza[b]

During 2010-2020, 12,000 to 52,000 influenza-related deaths yearly

Pneumococcus[c]

~25,000 pneumococcus-related deaths reported annually in individuals aged > 50 y

RSV[d]

~14,000 in-hospital RSV deaths were estimated to be reported annually in older adults

- a. Our World in Data. 2022. Accessed November 2, 2022. https://ourworldindata.org/covid-deaths; b. CDC. 2022. Accessed November 2, 2022. https://www.cdc.gov/flu/about/burden/index.html; c. Weinberger B. Immun Ageing. 2021;18:38; d. Havers F. 2022. Accessed November 2, 2022. https://www.cdc.gov/vaccines/acip/meetings/downloads/slides-2022-06-22-23/04-rsv-havers-508.pdf

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RSV, COVID-19, Flu Vaccine Efficacy

- A Decreasing Gradient of Protection
  - Prevention of death
  - Prevention of severe disease
  - Prevention of hospitalization
  - Prevention of complications
  - Prevention of mild-moderate disease
  - Prevention of asymptomatic infection
  - Prevention of transmission

Disease blocking >>> Infection blocking

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COVID-19 Vaccines

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Presuppositions and Biases

- The risk of COVID-19 is ”over”
- We understand SARS-CoV-2 viral behavior
- SARS-CoV-2 virus is now “seasonal”
- Simplification is paramount
- Therefore, we can move to an annual dose of vaccine to protect the population and prevent surge demand on the medical system…

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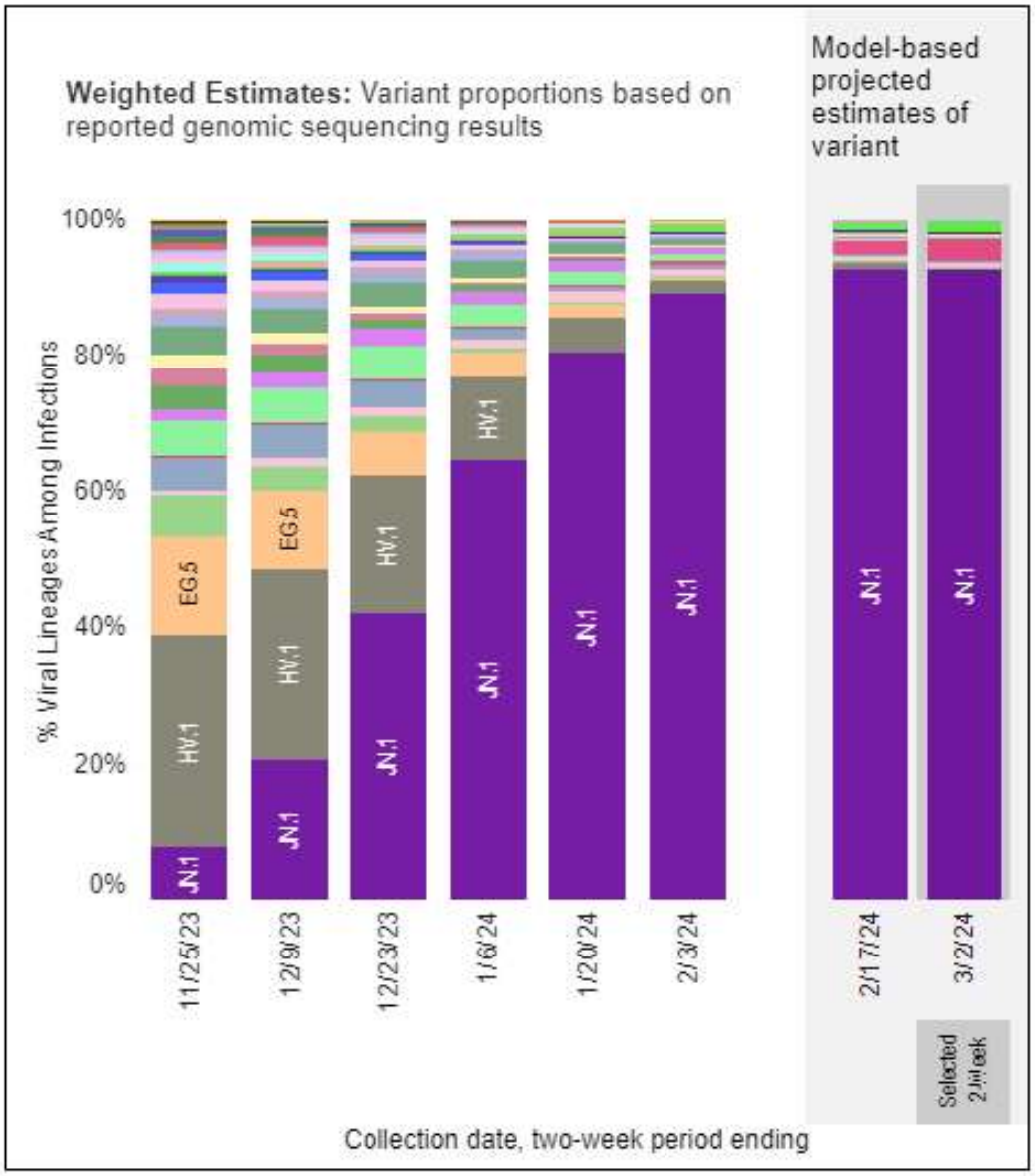
Myths of Normalization

- SARS-CoV-2 is alive and well
- Now characterized as repeated waves of multiple and increasingly immune-evasive variants – "variant soup"
- COVID-19 continues to cost lives, lead to complications, and place pressure on the medical system
  - CDC: 18 million Americans currently struggling with Long COVID
  - Long-term effects of repeated infections?

Weighted and Nowcast Estimates in United States for 2-Week Periods in 11/12/2023 – 3/2/2024

Hover over (or tap in mobile) any lineage of interest to see the amount of uncertainty in that lineage's estimate.



Nowcast Estimates in United States for 2/18/2024 – 3/2/2024

USA

WHO label	Lineage #	%Total	95%PI
Omicron	JN.1	92.3%	90.5-93.8%
	JN.1.13	3.3%	1.8-5.7%
	JN.1.18	1.8%	1.1-2.9%
	HV.1	0.4%	0.3-0.5%
	BA.2.86	0.3%	0.2-0.5%
	JG.3	0.2%	0.1-0.2%
	BA.2	0.2%	0.0-0.7%
	JD.1.1	0.1%	0.1-0.2%
	HK.3	0.1%	0.0-0.1%
	EG.5	0.0%	0.0-0.0%
	XBB	0.0%	0.0-0.0%
	GE.1	0.0%	0.0-0.1%
	EG.5.1.8	0.0%	0.0-0.0%
	JF.1	0.0%	0.0-0.0%
	XBB.1.9.1	0.0%	0.0-0.0%
	FL.1.5.1	0.0%	0.0-0.0%
	XBB.1.16.15	0.0%	0.0-0.0%
	XBB.1.5.70	0.0%	0.0-0.0%
	XBB.2.3	0.0%	0.0-0.0%
	XBB.1.16.6	0.0%	0.0-0.0%
	XBB.1.16.11	0.0%	0.0-0.0%
	HF.1	0.0%	0.0-0.0%
	GK.1.1	0.0%	0.0-0.0%
	XBB.1.16	0.0%	0.0-0.0%
	GK.2	0.0%	0.0-0.0%
	XBB.1.9.2	0.0%	0.0-0.0%
	XBB.1.5	0.0%	0.0-0.0%
	XBB.1.42.2	0.0%	0.0-0.0%
	XBB.1.16.1	0.0%	0.0-0.0%
	EG.6.1	0.0%	0.0-0.0%
Other	Other*	1.1%	0.6-2.0%

CDC, 2024

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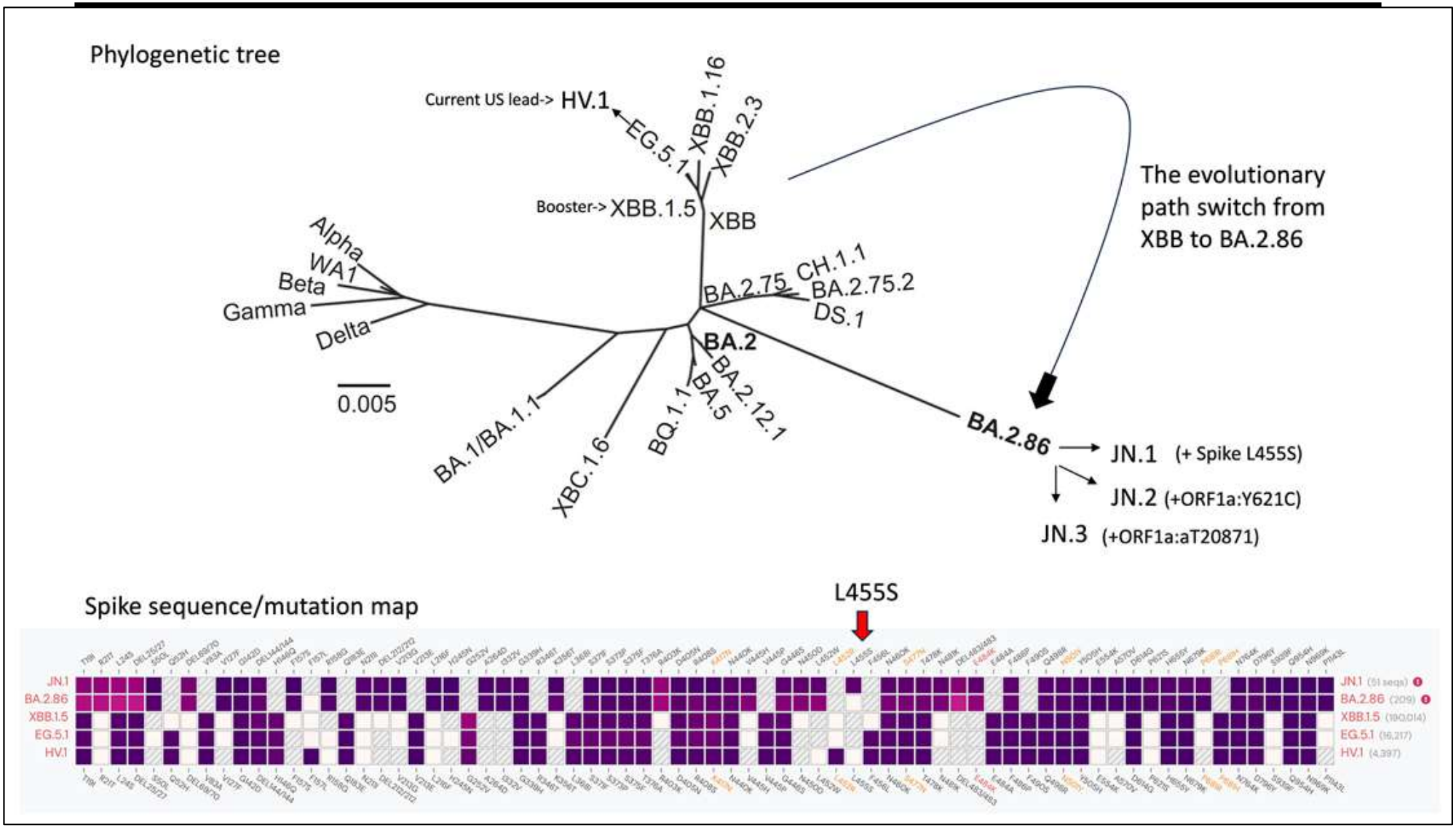

Topol, Ground Truths, October 2023

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BIG Issues, continued

- We do not understand SARS-CoV-2 viral behavior and cannot predict
  - Mutational change
  - Lethality
  - Immune evasion
  - Susceptibility to antivirals and mAbs
  - Transmissibility
  - Diagnostic assay fidelity
- We undervalue COVID-19 complications and “Long COVID” – and therefore fail to rationally deploy vaccines, antivirals, masks, and proper ventilation

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Brutal Reality: COVID-19 in the US

- As of last week:
  - 1,217,093 US deaths due to COVID-19
  - 1:269 Americans now dead of COVID-19
  - Last week in the US: 5,000 hospitalizations and 1,000 COVID-19 deaths
- Only 69% of eligible Americans ever completed a primary series of COVID vaccines
  - < 17% fully vaxed and received a bivalent booster
  - < 22% have received the MV-XBB.1.5 vaccine

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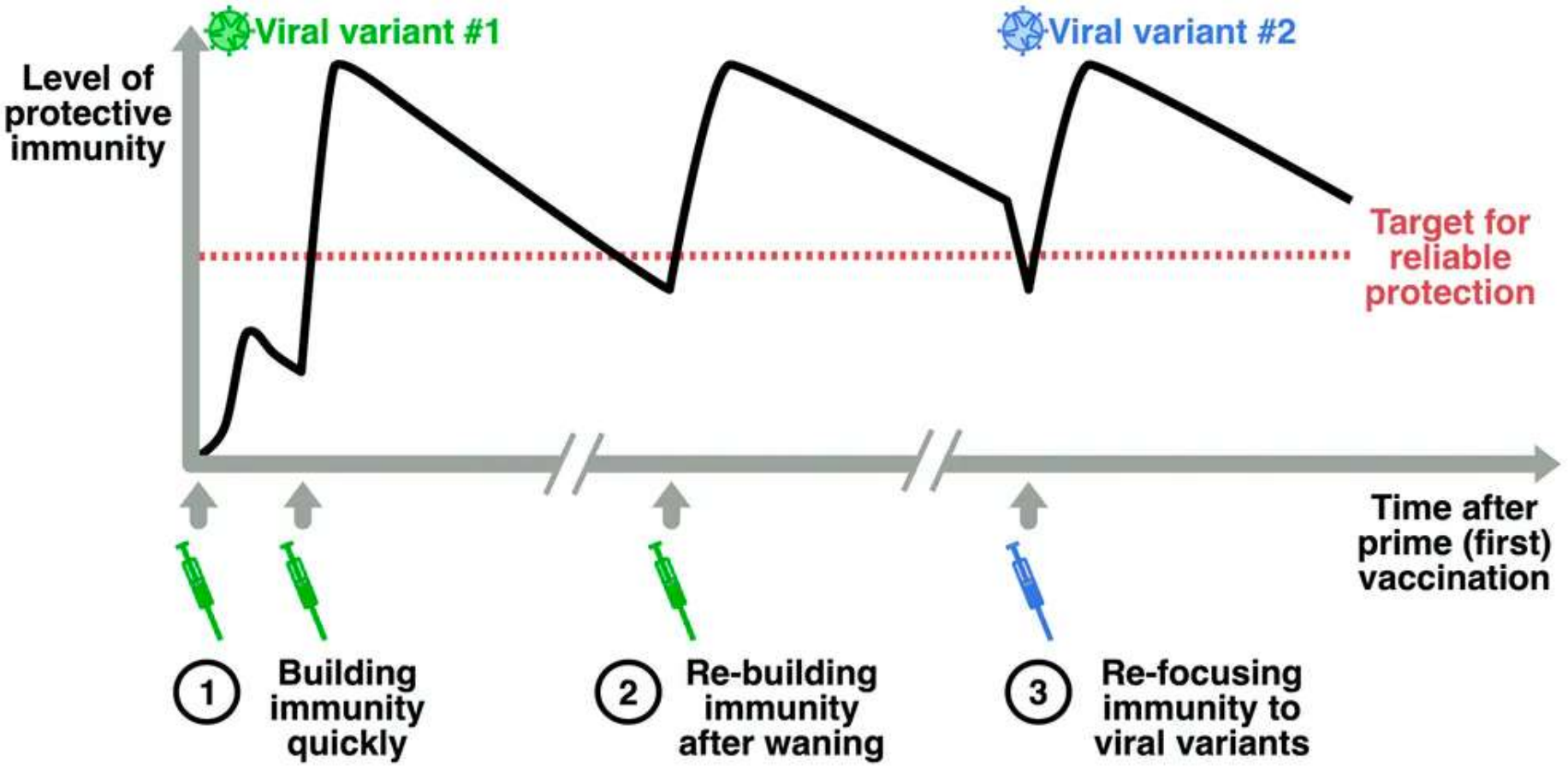
Theoretical Construct – Boosters



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Issues with Current COVID-19 Vaccines

- Do not induce portal of entry (mucosal) immunity
- Induces neutralizing antibody that *rapidly* wanes with time, age, and variant – leading to susceptibility
  - Waning occurs over weeks-months
- mRNA vaccines are reactogenic
- Public mistrust resulting in very, very low uptake of current monovalent XBB.1.5 vaccine

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The COVID-19 Complications We Don’t Want To Face…

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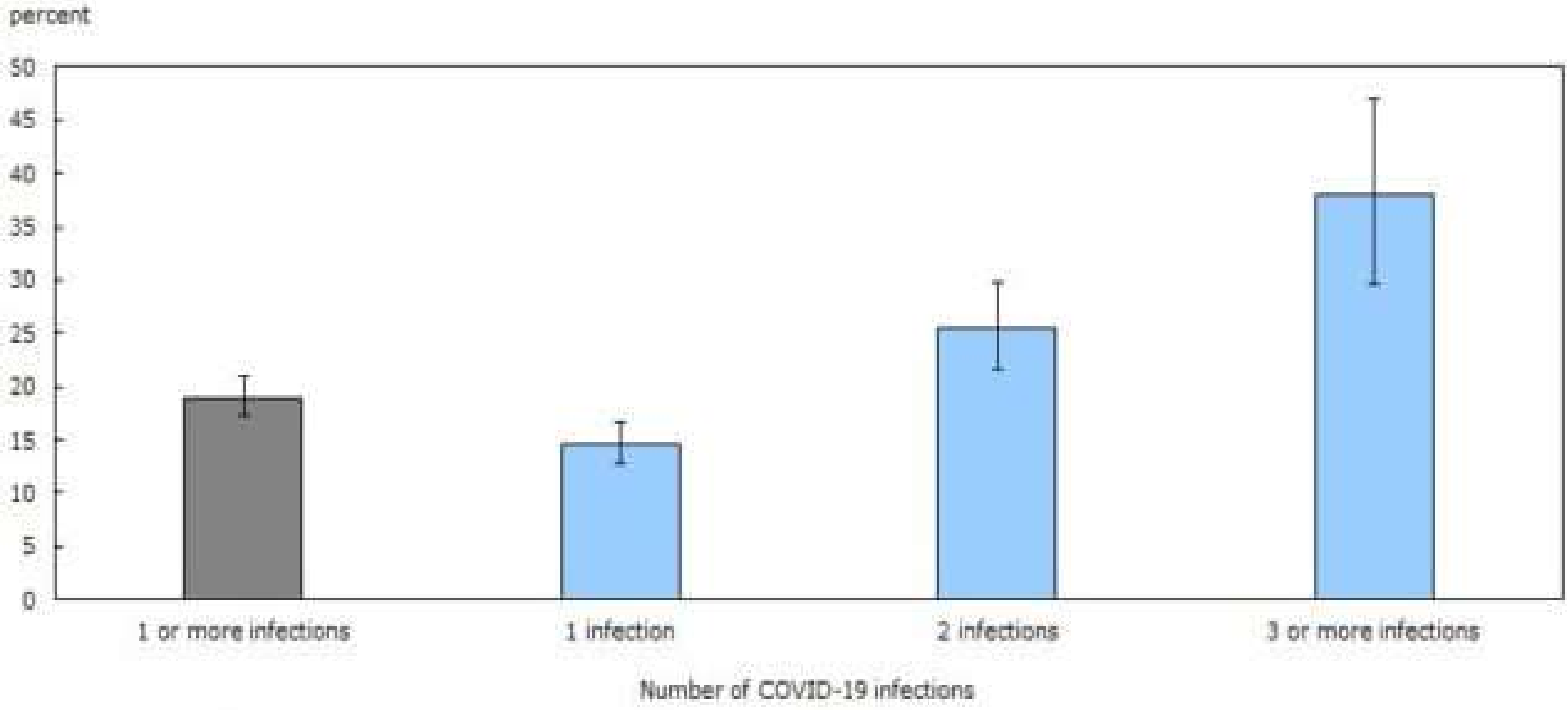
Long COVID and Number of Infections

Chart 2
Percentage of Canadian adults with long-term symptoms, by number of self-reported COVID-19 infections, June 2023



Source: Statistics Canada, Canadian COVID-19 Antibody and Health Survey - Follow-up Questionnaire, 2023.

Kuang et. al.. Statistics Canada, Dec 8, 2023

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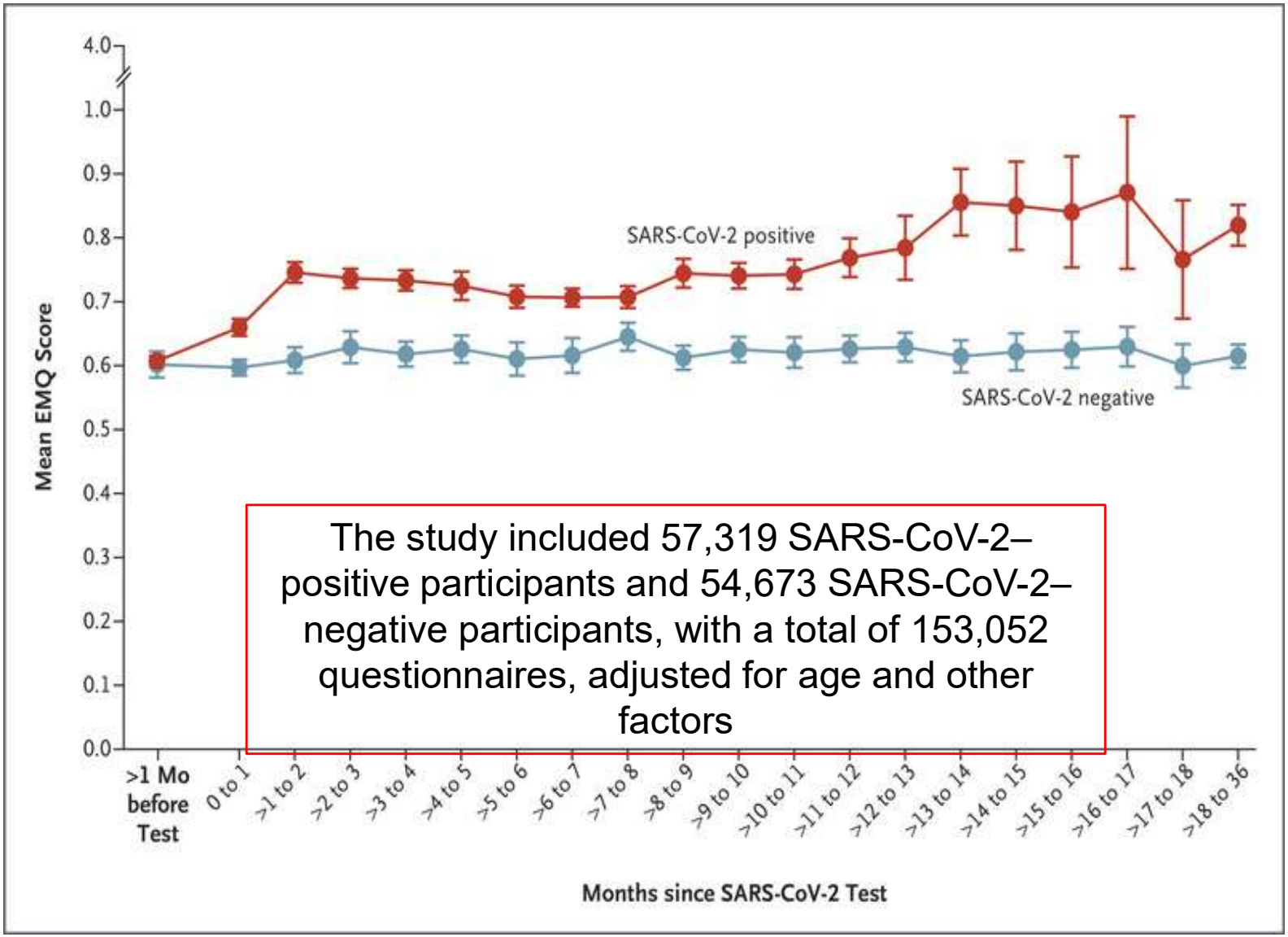
Norwegian Memory Study



Everyday Memory Questionnaire (EMQ) Higher EMQ scores indicate worse memory problems – f/u 3 yrs

Ellingjord-Dale, et al. N Engl J Med 2024; 390:863-865

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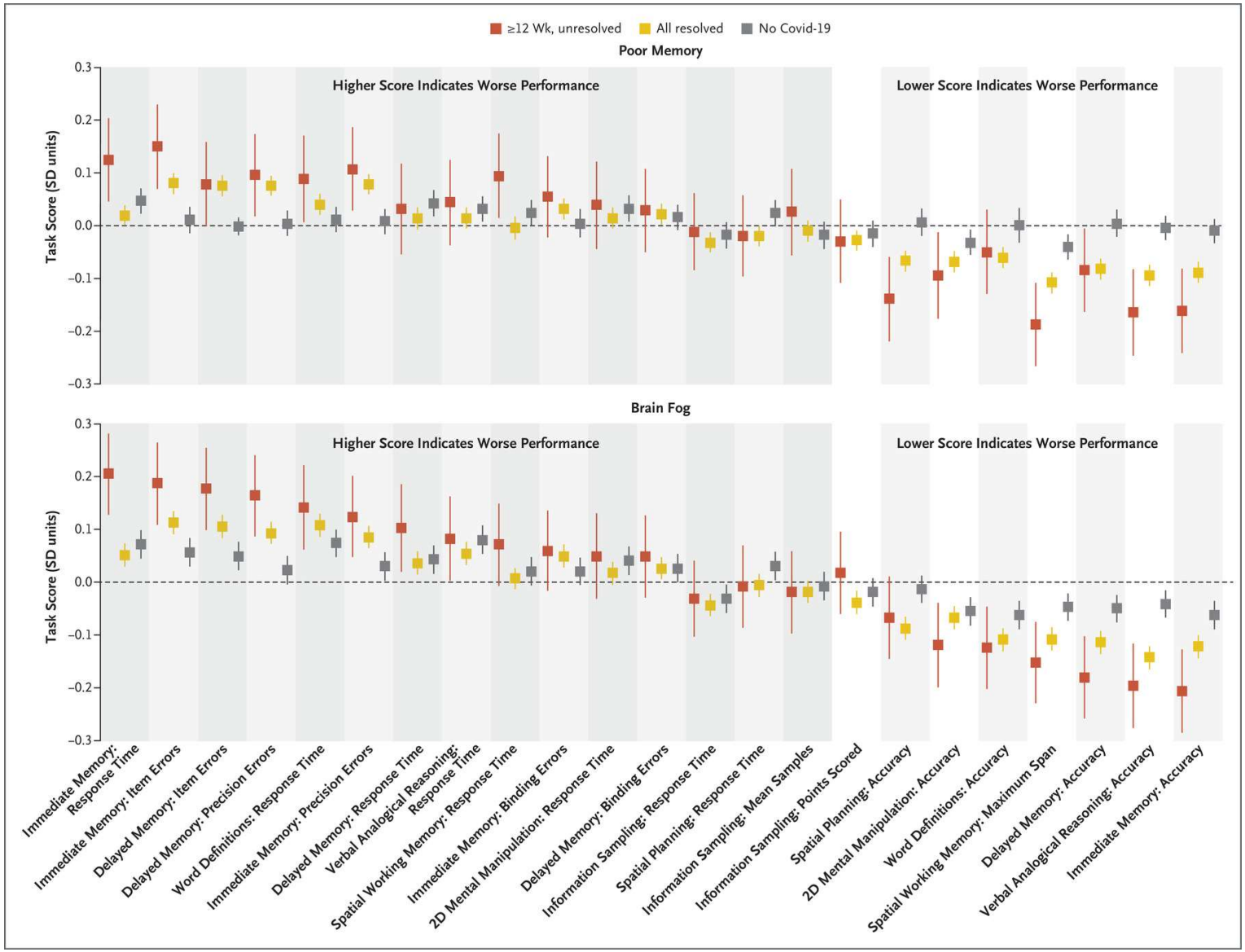
England Study



112,964 participants who completed an online cognitive assessment

Hampshire et al. N Engl J Med 2024; 390:806-818

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Cognitive Decline After COVID-19

In regard to the English Study (Hampshire et al.):

"Modest cognitive decline occurred with the original virus and with each viral variant, including B.1.1.529 (omicron).

As compared with uninfected participants (control), cognitive deficit — commensurate with a 3-point loss in IQ — was evident even in participants who had had mild Covid-19 with resolved symptoms.

Participants with unresolved persistent symptoms had the equivalent of a 6-point loss in IQ, and those who had been admitted to the intensive care unit had the equivalent of a 9-point loss in IQ."

Al-Aly and Rosen. N Engl J Med 2024; 390:858-860

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Bottom Line

- The XBB.1.5 vaccine provided high-level protection against more *severe outcomes* with Omicron variants
- Provides incomplete and temporary protection against *infection* with Omicron variants
- BA.2.86, JN.1, and BA.2.87.1 are warnings, once again, that SARS-CoV-2 is continuing to mutate into variants that *will* evade vaccine- and infection-induced immunity

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XBB.1.5 Recommendations – Adults

- Healthy adults: single dose of MV updated vaccine
  - Add'l dose now for adults > 65 y/o
  - Fall dose coming…
- ICH (mod-severe) and not vaccinated: 3 doses of vaccine, with at least one dose being updated MV vaccine – possible additional doses later this year
- Recently vaccinated: wait 2+ months before updated MV vaccine
- Recently infected: wait 3+ months, or once recovered

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RSV Vaccines

(RSV - the forgotten virus among internists…)

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Adult RSV in United States

Falsey AR, et al. Cell 2023; 186(15):3137-3137.e1

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RSV in Adults

- Seasonally – infects 3-7% of older adults
- Re-infection the rule
- Annual rates of RSV hosp and death in older adults
  - 25-50% of those attributed to A/H3N2
  - Similar to annual rates of A/H1N1 and B
- Among older adults hospitalized with RSV:
  - 18% admitted to ICU
  - 31% require home health
  - 26% die within 1 year

Ackerson et al. CID 2019;69:197-203; Matias et al. BMC Pub Health 2017;17:271

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Annual RSV-Hospitalization Rates by Age

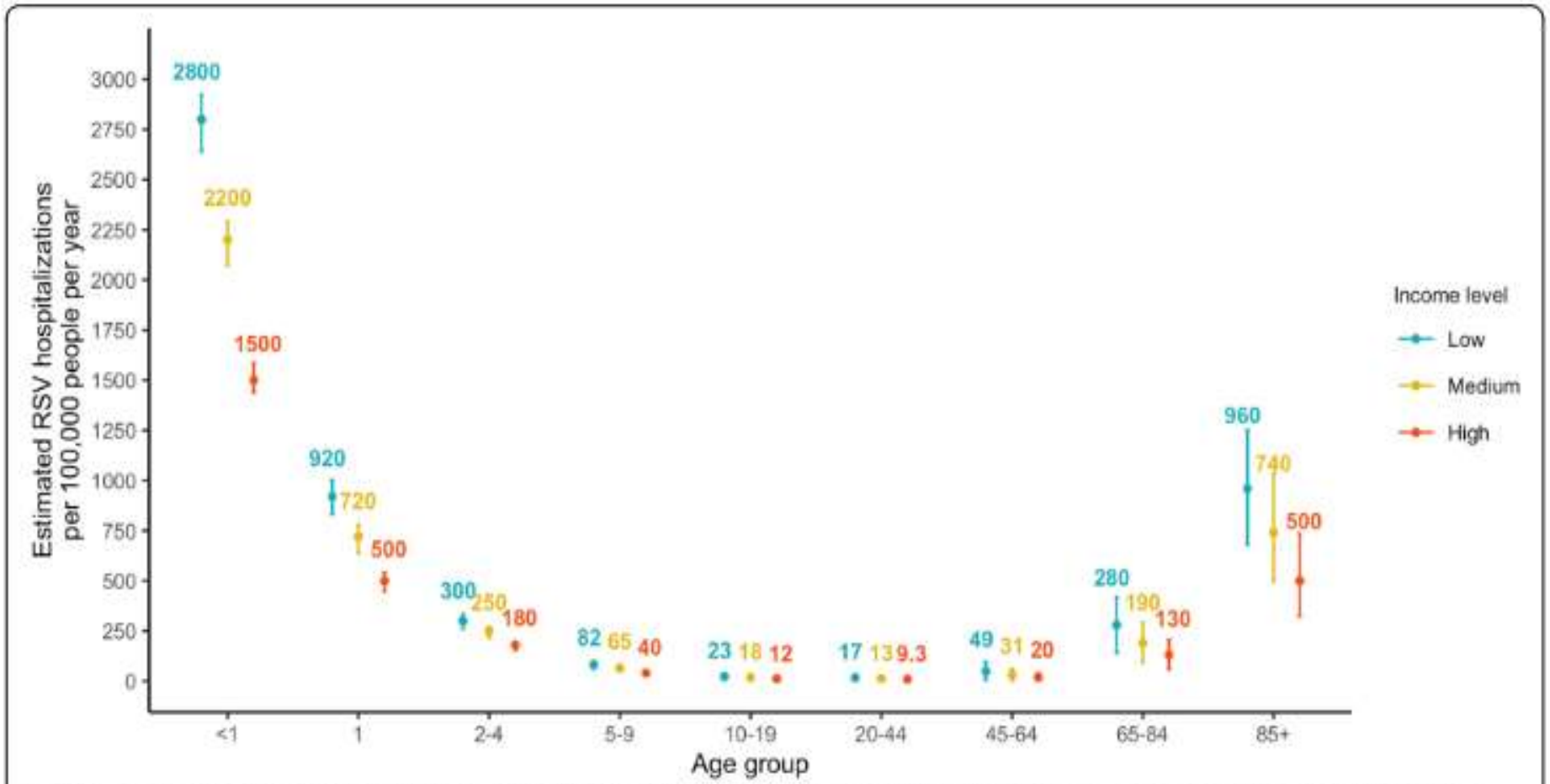

Fig. 1 Estimated annual RSV-attributable respiratory hospitalization rates by age and SES group, July 2005—June 2014. The color texts show the mean estimates of RSV-attributable respiratory hospitalization rates per year in each age and SES group. The error bars indicate the 95% credible intervals of the estimated RSV-attributable respiratory hospitalization rates. Color blue, yellow, and red correspond to the estimates in populations from low, medium, and high SES ZIP codes, respectively

Zhang Z, et al. Pneumonia. 2022;14:6.

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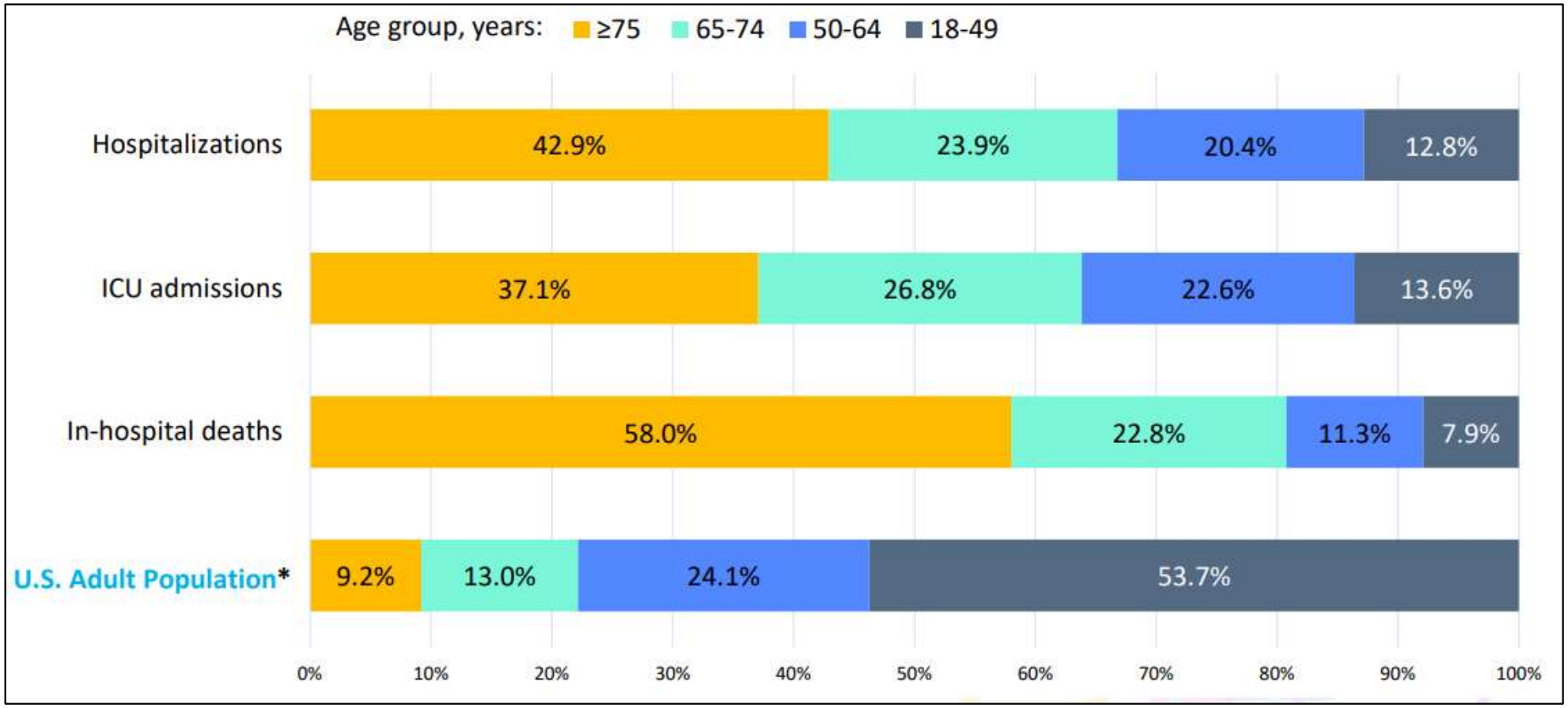
Estimated Age Distribution of National RSV-associated Hospitalizations, ICU Admissions, and In-hospital Deaths Among Adults ≥18 Years, RSV-NET, 2022–2023



CDC, ACIP Meeting Feb, 2024

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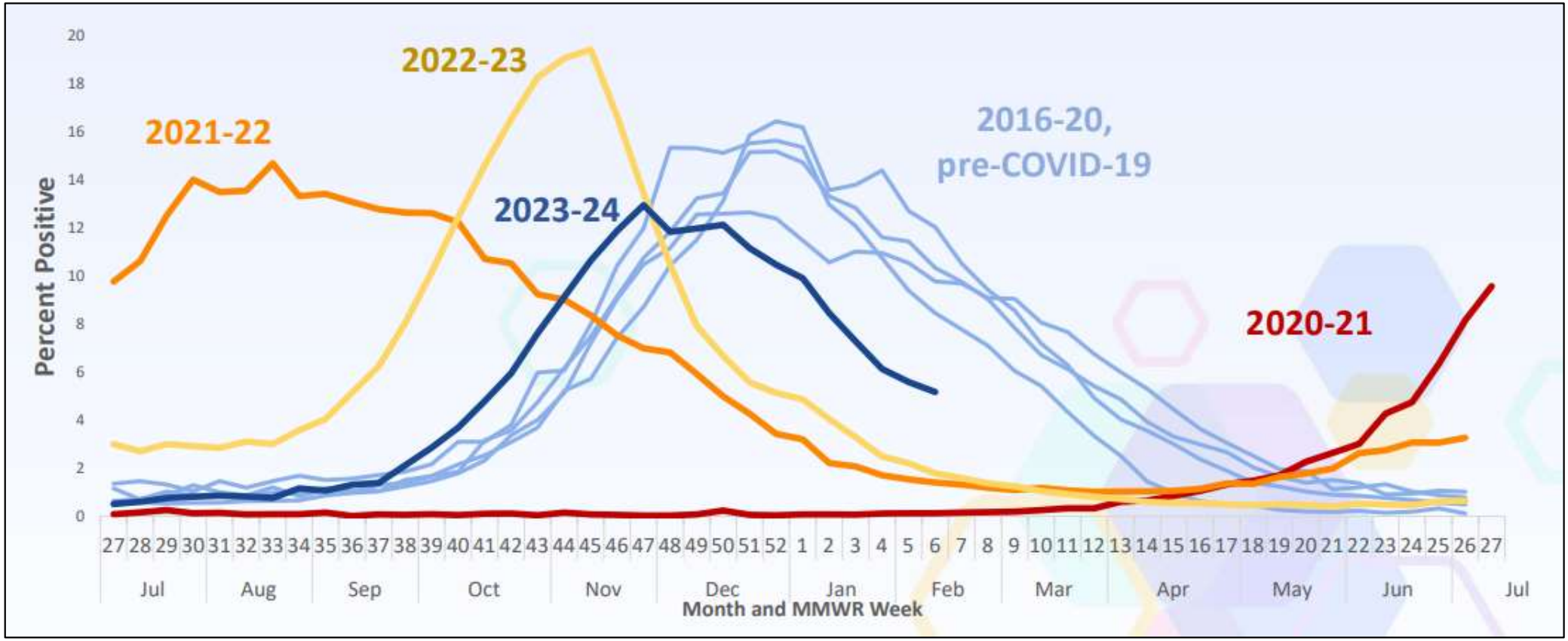
National Weekly RSV Positivity of PCR Results, NREVSS July 2016–February 2024



CDC, ACIP Meeting Feb, 2024

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Underlying Medical Conditions Associated with Increased Risk for Severe RSV

- Lung disease (such as chronic obstructive pulmonary disease and asthma)
- Cardiovascular diseases (such as congestive heart failure and coronary artery disease)
- Moderate or severe immune compromise
- Diabetes mellitus
- Neurologic or neuromuscular conditions
- Kidney disorders
- Liver disorders
- Hematologic disorders
- Frailty
- Advanced age - residence in a nursing home or LTC facility

Melgar M, Britton A, Roper LE, et al. Use of Respiratory Syncytial Virus Vaccines in Older Adults: Recommendations of the Advisory Committee on Immunization Practices — United States, 2023. MMWR Morb Mortal Wkly Rep 2023;72:793–801.

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RSV Vaccines

- GSK – Arexvy
  - MV-A PreF3 (trimeric F) 120 mcg + $ASO1_E$
- Pfizer – Abrysvo
  - BV A+B PreF 120 mcg (unadjuvanted)
- Moderna – mRNA-1345
  - MV-A (50 mcg)
  - Completed phase 3 trial (n=37,000)
- J&J – phase 3 trial discontinued even it demonstrated similar efficacy

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GSK Vaccine
AReSVi Study
RSV PreF3 OA

MV trimeric A preF protein + adjuvant ($ASO1_E$)

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GSK RSV Vaccine

- N= 24,966, mean F/U = 6.7 months)
  - 12,467 vaccine
  - 12,499 placebo
- Single IM 120 mcg MV-A dose + $ASO1_E$ adjuvant
- Infection RT-PCR-confirmed, 6 month f/u
- Vaccine Efficacy: (Season 1)
  - RSV-related acute resp infection = 71.7%
  - RSV-related LRTD = 82.6%
  - Severe RSV-related LRTD = 94.1%
  - VE for RSV-related LRTD: A=84.6%, B=80.9%

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AREXVY Produces Durable Vaccine Efficacy Against RSV-LRTD Over 2 Full Seasons

	Median Follow-Up (months)	AREXVY	Placebo	VE (95% CI)	VE (95% CI)
		Number of events			
Single Dose				*W/o season as covariate#*	*W/ season as covariate¶*
Season 1* VE 1	**6.7**	**7** / 12,466	**40** / 12,494	**82.6%** (57.9, 94.1)	82.6% (57.9, 94.1)
Mid Season 2 Post dose 1	**14**	**15** / 12,469	**85** / 12,498	**80.9%#** (66.7, 89.8)	77.3%¶ (60.2, 87.9)
Season 2 Only Post dose 2	**6.4**	**20** / 4,991	**91** / 10,031	**56.1%** (28.2, 74.4)	56.1% (28.2, 74.4)
Season 1 + 2**	**18**	**30** / 12,469	**139** / 12,498	**74.5%#** (60.0, 84.5)	67.2%¶ (48.2, 80.0)
Annual (2 doses, ~12 months apart)					
Season 2 Only Post dose 2	**6.4**	**20** / 4,966	**91** / 10,031	**55.9%** (27.9, 74.3)	55.9% (27.9, 74.3)
Seasons 1 + 2**	**18**	**30** / 12,469	**139** / 12,498	**74.5%#** (60.0, 84.4)	67.1%¶ (48.1, 80.0)

Ison et. al. CID 22 Jan 2024; GSK, ACIP, June 2023

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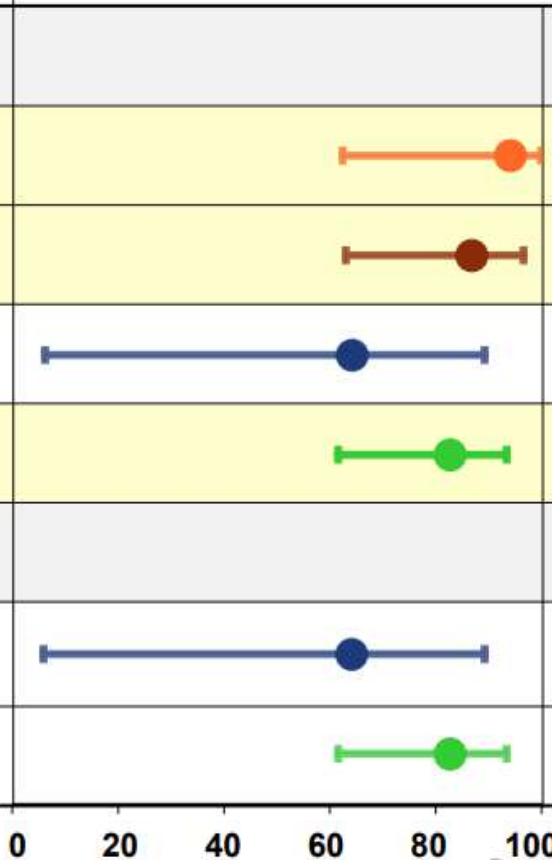
AREXVY - Durable Vaccine Efficacy Against *Severe* LRTD Over 2 Seasons

	Median Follow-Up (months)	AREXVY	Placebo	VE (95% CI)	VE (95% CI)
		Number of events			
Single Dose				*W/o season as covariate#*	*W/ season as covariate¶*
Season 1* VE 1	6.7	**1** / 12,466	**17** / 12,494	**94.1%** (62.4, 99.9)	94.1% (62.4, 99.9)
Mid Season 2 Post dose 1	14	**4** / 12,469	**33** / 12,498	**86.8%#** (63.0, 96.6)	84.6%¶ (56.4, 96.1)
Season 2 Only Post dose 2	6.4	**5** / 4,991	**28** / 10,031	**64.2%** (6.2, 89.2)	64.2% (6.2, 89.2)
Season 1 + 2**	18	**7** / 12,469	**48** / 12,498	**82.7%#** (61.6, 93.4)	78.8%¶ (52.6, 92.0)
Annual (2 doses, ~12 months apart)					
Season 2 Only Post dose 2	6.4	**5** / 4,966	**28** / 10,031	**64.1%** (5.9, 89.2)	64.1% (5.9, 89.2)
Seasons 1 + 2**	18	**7** /12,469	**48** / 12,498	**82.7%#** (61.6, 93.4)	78.8%¶ (52.5, 92.0)



GSK, ACIP, June 2023

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GSK – Neuroinflammatory

- Across all GSK vaccine clinical trials in older adults, inflammatory neurologic events were reported in three of 17,922 participants within 42 days after receipt of the GSK vaccine
- Reported cases included: (none in the phase 3 clinical trial)
  - One case of GBS with symptom onset 9 days postvaccination
  - Two cases of ADEM among participants in a randomized phase 3 coadministration study. The two ADEM cases were reported in:
    - Participants aged 71 years from the same site in South Africa after concomitant receipt of the GSK vaccine and standard dose seasonal influenza vaccine; symptom onset occurred 7 and 22 days postvaccination, and one case was fatal
    - In both ADEM cases, the diagnosis was based on symptoms and clinical findings only; diagnostic testing (including brain imaging, cerebrospinal fluid testing, and nerve conduction studies) was not performed, leading to uncertainty in the diagnoses. The investigator in the fatal case later revised the diagnosis from ADEM to hypoglycemia and dementia

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Pfizer Vaccines
RENOIR Trial
Bivalent A+B preF protein

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Pfizer Bivalent (A+B) RSV Vaccine

- Phase 3 (RENOIR) study
  - N=37,000 > 60 y/o; 34,284 enrolled
  - Single IM 120 mcg dose (60 mcg A + 60 mcg B) or placebo
  - Infection RT-PCR confirmed, f/u 7 months
- Vaccine Efficacy (Season 1)
  - RSV-related acute resp illness = 62.1%
  - RSV-related resp tract illness (at least 2 sx) = 66.7%
  - RSV-related resp tract illness (at least 3 sx) = 85.7%

Walsh, et al. N Engl J Med 2023; 388:1465-1477

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Updated Efficacy – Pfizer

- Efficacy findings were based on analyses of data collected during August 2021–January 2023
  - One complete RSV season for Northern and Southern Hemisphere participants
  - Partial second season for Northern Hemisphere participants only
  - Efficacy analyses for season one spanned August 2021–October 2022
  - Efficacy analyses for season two spanned July 2022–January 2023
  - Mean F/U = 12 months

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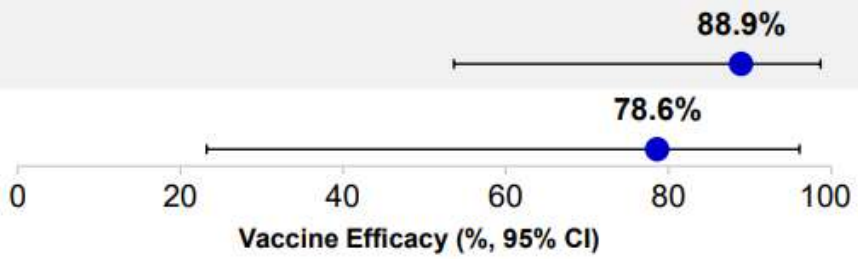
Efficacy Against RSV-LRTD –Through Mid-Season 2 Analysis (Pfizer)

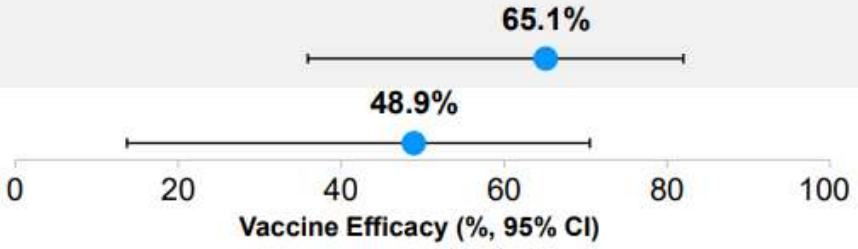
RSV-LRTD with ≥ 3 symptoms

	Number of Events	
	RSVpreF	Placebo
Season 1 (N = 36,127)	2	18
Mid-Season 2 (n = 20,019)	3	14



RSV-LRTD with ≥ 2 symptoms

	Number of Events	
	RSVpreF	Placebo
Season 1 (N = 36,127)	15	43
Mid-Season 2 (n = 20,019)	23	45



Pfizer, WRDM, 2023

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Pfizer – Neuroinflammatory

- Across Pfizer vaccine clinical trials among older adults, inflammatory neurologic events were reported in 3 of 20,255 subjects within 42 days after vaccine
  - GBS in a participant – onset 14 days after vax
    - Phase 3 clinical trial
  - Miller Fisher syndrome (a GBS variant) with symptom onset 10 days postvaccination
    - Phase 3 clinical trial
  - An undifferentiated motor-sensory

  axonal polyneuropathy – worsening of preexisting symptoms 21 days postvaccination (not phase 3 trial)

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Moderna
RENOIR Trial
mRNA MV-A preF protein

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Moderna mRNA MV-A RSV Vaccine

- Phase 2/3 (ConquerRSV) study
  - N=35,541 > 60 y/o
  - Single IM 50 mcg dose (A strain) or placebo
  - Infection RT-PCR confirmed, f/u 112 days
- Vaccine Efficacy – Season 1
  - RSV-related acute resp illness = 68.4%
    - A = 78.5%
    - B = 51.7%
  - RSV-related LRTD (at least 2 sx) = 83.7%
    - A = 91.7%
    - B = 68.5%
  - RSV-related LRTD (3 sx) = 82.4%
    - A = 90%
    - B = 71.5% (-37 to 94)

Wilson, et. Al. NEJM 389;24:Dec 14, 2023

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Moderna mRNA MV-A RSV Vaccine

- Phase 2/3 (ConquerRSV) study
  - N=35,541 > 60 y/o
  - Single IM 50 mcg dose or placebo
  - Infection RT-PCR confirmed, f/u 112 days
- Vaccine Efficacy – Season 2
  - RSV-related acute resp illness = 53.9%
    - A = 59.7%
    - B = 47.9%
  - RSV-related LRTD (at least 2 sx) = 63.3%
    - A = 69.4%
    - B = 56.3%
  - RSV-related LRTD (3 sx) = 63%
    - A = 66.9%
    - B = 59.3%

Wilson, et. Al. NEJM 389;24:Dec 14, 2023

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Moderna mRNA MV-A RSV Vaccine

- Clinical Trial Concerns
  - IC excluded, 76% were “fit” – only 6% “frail”
  - Only 8% age > 80 yrs
  - Only 7% with COPD/CHF
  - In the vulnerable/frail subgroup VE = 46.5% (95% CI -20 to 76%)
  - Reactogenicity (same LNP as COVID-19 vax)
  - Cost?
  - Cold chain
  - Durability?

* No GBS or Afib AEs

Wilson, et. Al. NEJM 389;24:Dec 14, 2023

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Overview of RSV Vaccine VE

	Type	Age	Phase	GMT-rise in RSV Ab	Vaccine Efficacy for ≥ 3 LRTI Symptoms	Durability
Pfizer	Bivalent **pre-F** protein	60+	3	9-13	**86% (2 vs. 12)**	At least two years
GSK	RSV **pre-F** protein + AS01 adjuvant	60+	4	--	**82% (7 vs. 40)**	At least two years
Moderna	RSV **pre-F** mRNA	60+	3	10-17 (RSV A) 5-13 (RSV B)	**82.4% (3 vs. 17)**	--

- Similar and high efficacy against LRTI and ARI
- Well tolerated with low reactogenicity
- Good immunogenicity when co-administered with FLU vaccine
- Likely at least 2 years protection against severe disease

- Few or no severe outcomes such as hospitalization and death
- "Relatively" healthy populations
- Few persons over age 80 and none in LTCF
- Safety signal of neuroinflammatory side effects with the protein subunit vaccines which may be higher than the background rate , ? a fib signal?

Papi et al, NEJM 2023; 388:595-608; Walsh et al, NEJM, April 2023, DOI: 10.1056/NEJMoa2213836; Falsey et al, NEJM 2023; 388:609-620; Wilson, et. Al. NEJM 389;24:Dec 14, 2023

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Season 1 vs Season 2 (Severe LRTD)

	Season 1 VE	Season 2 VE
Pfizer	88.9%	77.8%
GSK	94.1%	64.2%
Moderna	84%	63%

Note: Combined VE for A + B, asymmetric clinical dz definitions and seasons

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RSV Clinical Trial Concerns – 1

- During the phase 3 clinical trials the first RSV season occurred *very early*, and the second season occurred *early*
  - 66% of cases were type B – most unusual!
- Fewer RSV cases than anticipated – underpowered to estimate efficacy against RSV-associated hospitalization and death
  - Masking and physical distancing

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RSV Clinical Trial Concerns – 2

- Safety signals – A fib and neuroinflamm dz
- No long-term efficacy data – hence unclear if/when boosters may be needed
- Too few subjects (no data on efficacy or safety)
  - > 80 years old
  - Frail subjects
- Immunocompromised pts were excluded
- Not powered to estimate efficacy against hospitalization, death, or severe illness requiring respiratory support

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GBS and Vaccines

- VAERS, VSD, FDA-CMS datasets: "there is an increased potential risk of RSV-vaccine associated GBS"
- Influenza: 1-2 cases/million doses
- RZV: 3-6 cases/million doses
- RSV:
  - GSK: 10 cases/million doses (range 2-18)
  - Pfizer: 25 cases/million doses (range 7-43)

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Bottom Line

- RSV causes significant morbidity and mortality in older adults
- Vaccination with a single RSV vaccine dose demonstrated moderate to high efficacy in preventing symptomatic RSV-associated LRTD among adults aged ≥60 years in season 1…dropped in season 2
- On June 21, 2023, the ACIP recommended that persons age ≥60 years may receive a single dose of RSV vaccine, using shared clinical decision-making

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Influenza Vaccines

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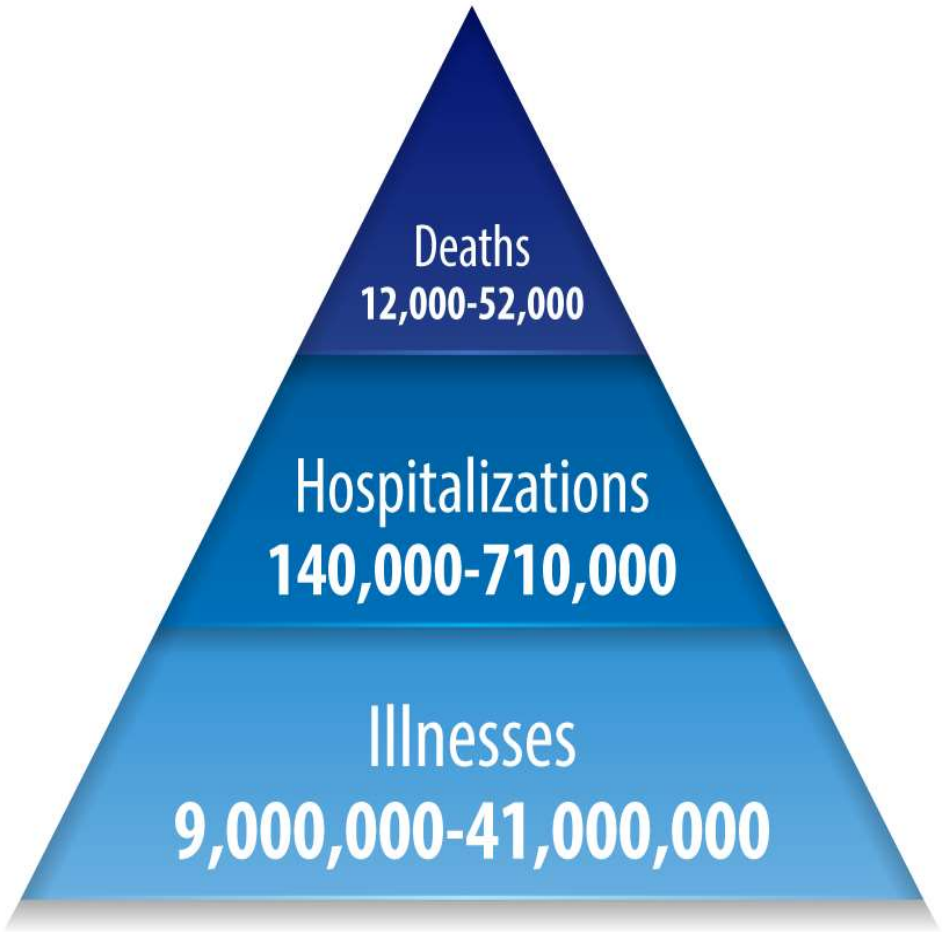
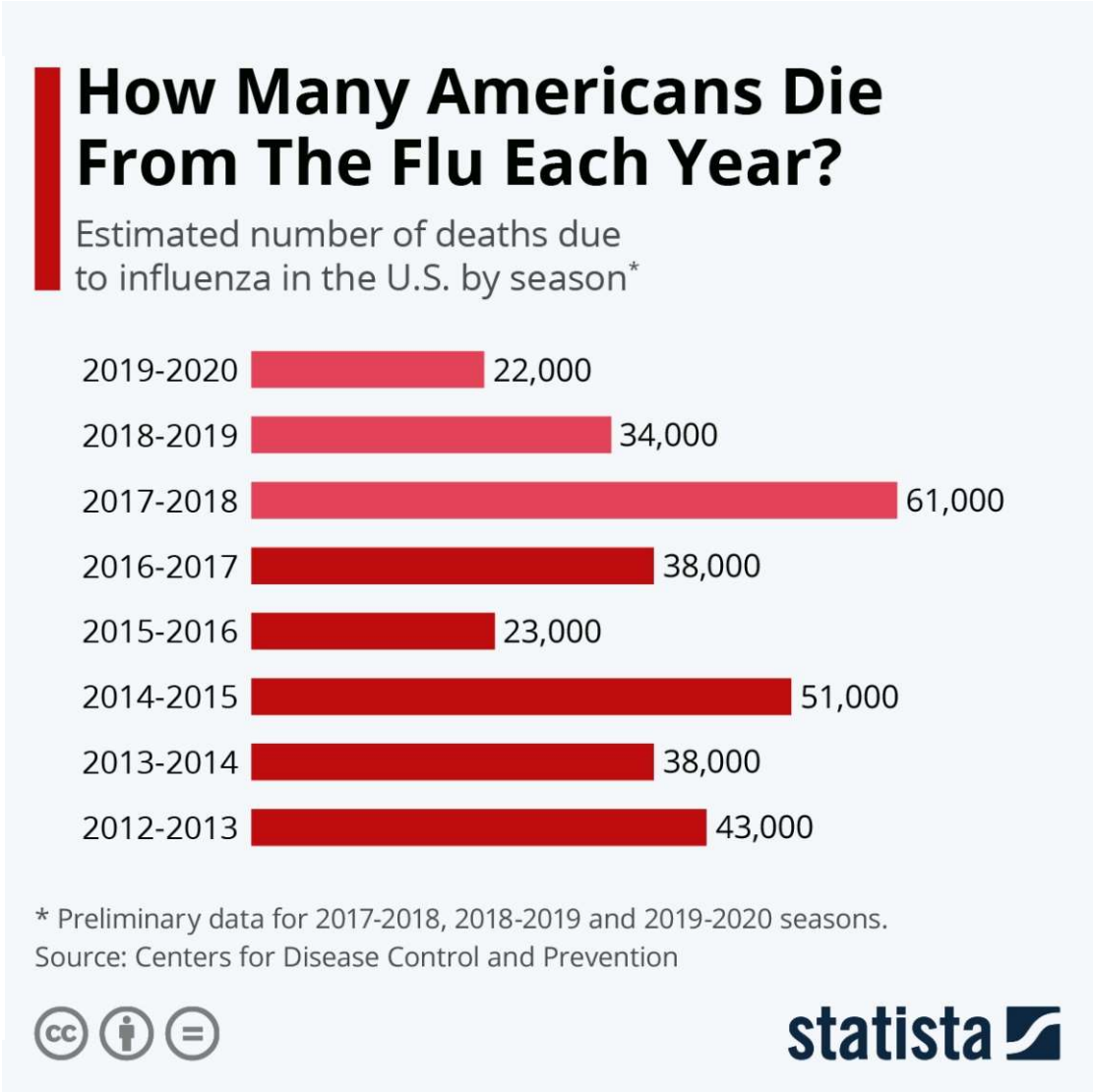
Burden of Disease – US





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Vaccine Effectiveness

- Jan 1, 2017 – Dec 31, 2022
- Efficacy depends on the match between the vaccine viruses and circulating viruses
- Preliminary estimates 2022–2023 season, people who were vaccinated against flu were **40% to 70% less likely to be hospitalized** because of flu illness or related complications

Influenza Strain	VE
Pooled (all strains)	41.4%
A/H1N1	55.4%
A/H3N2	26.8%
B/Victoria	40.6%
B/Yamagata	47.2%
Pooled VE	
Against outpt visit	39.2%
Against hospitalization	43.7%

Guo, et al. Vaccine Feb 28, 2024 Real-world effectiveness of seasonal influenza vaccination and age as effect modifier: A systematic review, meta-analysis and meta-regression of test-negative design studies

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Influenza Vaccine Effectiveness

- During the severe 2017–18 season (unusually long duration of widespread high influenza activity) vaccination prevented an estimated:
  - 7.1 million illnesses
  - 3.7 million medical visits
  - 109,000 hospitalizations
  - 8,000 deaths
  - The vaccine had an overall estimated vaccine effectiveness of _____ ?

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Influenza Vaccine Effectiveness

- During the severe 2017–18 season (unusually long duration of widespread high influenza activity) vaccination prevented an estimated:
  - 7.1 million illnesses
  - 3.7 million medical visits
  - 109,000 hospitalizations
  - 8,000 deaths
  - **Despite an overall estimated vaccine effectiveness of 38% (62% against influenza A[H1N1]pdm09 viruses, 22% against influenza A[H3N2] viruses, and 50% against influenza B viruses)**

Rolfes MA, Flannery B, Chung JR, et al. Effects of influenza vaccination in the United States during the 2017–2018 influenza season. Clin Infect Dis 2019;69:1845–53. https://doi.org/10.1093/cid/ciz075

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Wait…What?

- The influenza B/Yamagata strain has disappeared…B/Victoria may too?
- The reason is likely because during the pandemic high numbers of individuals wore masks, and B has no avian reservoir
- We will return to trivalent vaccines in the next year or two…
- A reminder that we know very, very little of the rules that govern viral behavior, mutations, and other changes

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Why Get Influenza Vaccines?

- Decrease illness, disability, dementia, hospitalization, medical costs, life disruptions, complications, death
- Prevention of secondary complications (MI, CVA, DM, dementia, Long COVID, etc.) including loss of independent living…
- Protect others – particularly the vulnerable
- Health care providers – a moral duty
  - In the case of highly transmissible respiratory infections

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My Assessment

- The SARS-CoV-2 virus will continue to develop immune evading mutations, leading to significantly enhanced transmission
  - This will occur irregularly and unpredictably over time
- Absent very highly effective, broadly neutralizing, nearly non-reactogenic vaccines (nasal, oral, transdermal), taken by a very high percent of the population, periodic surges will continue
- Therefore, your great, great grandchildren will be getting COVID-19 vaccines…

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Q & A

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US HCPs 2022-2023 Season

Influenza Vaccine				
	Acute Care Facilities	Number of HCPs	NH Facilities	Number of HCPs
Number	4,057	8,400,000	13,794	2,000,000
Percent Up to Date	81%		47.1%	
COVID-19 Vaccine				
Number	4,057	7,700,000	13,794	1,600,000
Percent Up to Date	17.2%		22.8%	

MMWR 11-2023

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Flu Vaccines – US

Vaccine Type	Dose	Products Available
Standard Dose, egg-based		
IIV4	15 mcg/virus	3
Standard Dose, cell-based		
ccIIV4	15 mcg	1
High Dose, egg-based		
HDIIV4	60 mcg	1
Standard Dose, egg-based, adjuvanted		
aIIV4	15	1
Recombinant		
RIV4	45	1
Live attenuated, egg-based		
LAIV	$10^{6.5-7.5}$ units	1

Personalized Vaccinology:

- 6 vaccine types
- 8 products