## Vaccini: speranze e risultati concreti

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### **Disclosures**

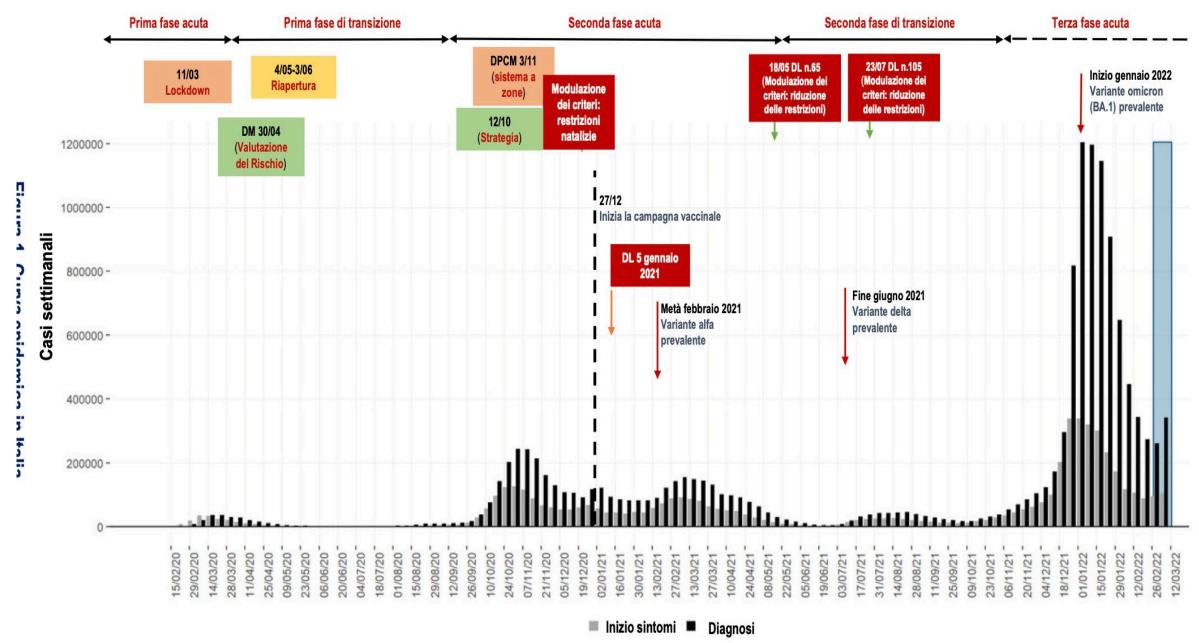
- I have participated in Advisory boards for ViiV Healthcare, Gilead Sciences, Janssen Cilag, Abbvie, MSD.
- I have received research grants from ViiV Healthcare and Gilead Sciences



Illustrazione di James Gillray del 1802 che ironizza sugli antivaccinisti che credevano che il vaccino contro il vaiolo trasformasse i vaccinati in mucche

## Punti di discussione

- Risultati concreti
- Speranze



## Global impact of the first year of COVID-19 vaccination: a mathematical modelling study



Oliver J Watson\*, Gregory Barnsley\*, Jaspreet Toor, Alexandra B Hogan, Peter Winskill, Azra C Ghani



#### **Summary**

Background The first COVID-19 vaccine outside a clinical trial setting was administered on Dec 8, 2020. To ensure Lancet Infect Dis 2022

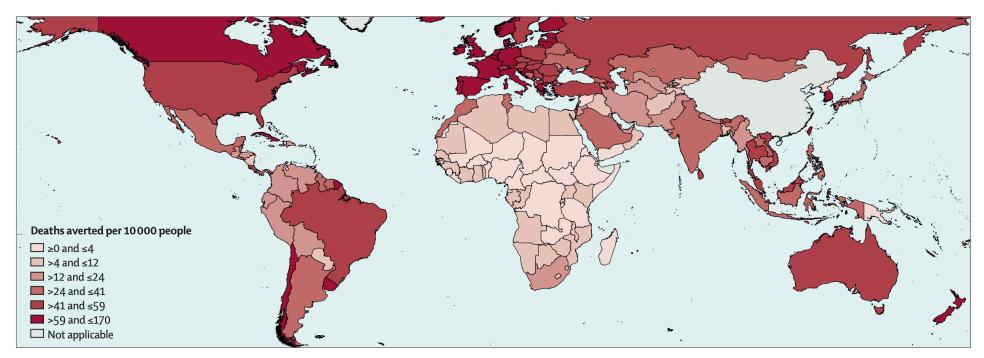


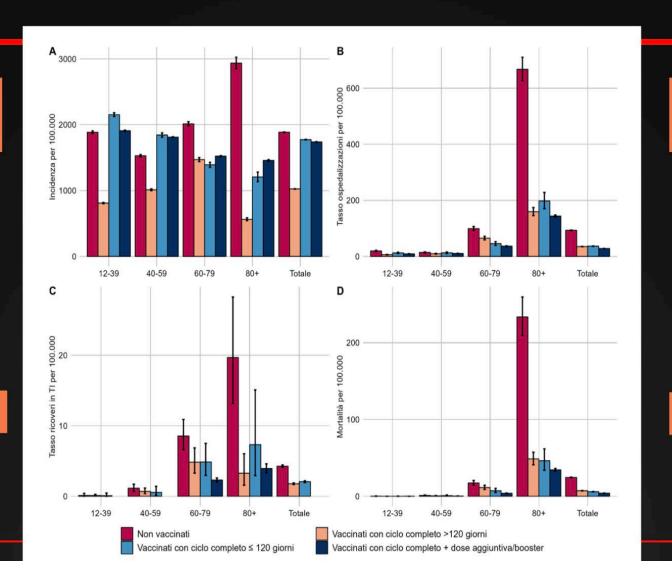
Figure 2: Median deaths averted by vaccinations per 10 000 people by country in the first year of COVID-19 vaccination

Estimates of deaths averted were based on model fits to excess mortality and were binned within seven equal quantiles starting at 0 deaths averted. Deaths averted listed as not applicable for China because of its exclusion from our analysis, due to its unique position as the origin of the detected epidemic and large influence on estimates of deaths averted stemming from its population size.

#### Tasso di incidenza per 100000 per stato vaccinale e fascia

Casi COVID-19 segnalati

**COVID-19 ICU** 



COVID-19 ospedalizzati

**Decessi COVID-19** 

### Tasso mensile di incidenza di SARS-COV-2

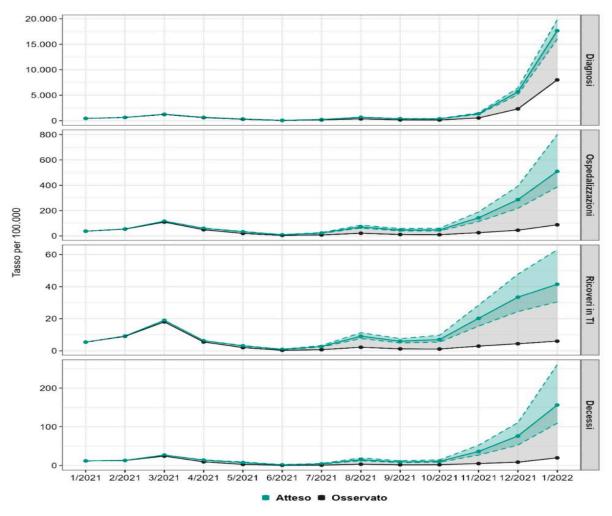


Figura 7. Tasso mensile di incidenza di infezione da SARS-CoV-2, ospedalizzazione, ricovero in terapia intensiva e mortalità per 100.000 osservato e atteso (range ±5% VE)

## Vaccini anti SARS-CoV-2

Tabella 1. Data di autorizzazione, fasce di età e inizio somministrazione dei vaccini autorizzati in Italia

Vaccino	Data di autorizzazione	Fasce di età (in anni)	Data di inizio somministrazione
Comirnaty (Pfizer-BioNtech)	22/12/2020	12+	27/12/2020
Spikevax (Moderna)	07/01/2021	12+	14/01/2021
Vaxzevria (AstraZeneca)	29/01/2021	18+	11/02/2021
COVID-19 Vaccine Janssen (Johnson&Johnson)	11/03/2021	18+	22/04/2021
Comirnaty pediatrico (Pfizer-BioNtech) *	01/12/2021	5-11	15/12/2021
Nuvaxovid (Novovax)	22/12/2021	18+	28/02/2022

<sup>\*</sup>Comirnaty pediatrico ha le stesse caratteristiche di Comirnaty per adulti, ma un dosaggio minore (10 µg vs. 30 µg)

### Table 1 Vaccine list and efficacy (as of August 2022)

From: COVID-19 vaccine update: vaccine effectiveness, SARS-CoV-2 variants, boosters, adverse effects, and immune correlates of protection

	Manufacturer	Vaccine	Platform	No. of Countries in Use	Efficacy* (Infection)	Efficacy* (Severe)	References
1	Moderna	Spikevac (mRNA-1273)	RNA	87	93.2%	98.2%	[19]
2	Pfizer/BioNTech	Comirnaty (BNT162b2)	RNA	146	91.3%	96.7%	[11]
3	Janssen (Johnson & Johnson)	Ad26.COV2.S	Non Replicating Viral Vector	111	52.4%	74.6%	[29]
4	Oxford/AstraZeneca	Vaxzevria (ChAdOx1 nCoV-19, AZD1222)	Non Replicating Viral Vector	141	74.0%	100%	[269]
5	Serum Institute of India	Covishield (Oxford/AstraZeneca formulation)	Non Replicating Viral Vector	49			
6	Bharat Biotech	Covaxin (BBV152)	Inactivated	14	77.8% (symptomatic), 63.6% (asymp)	93.4%	[47]
7	Beijing Institute of Biological Products/Sinopharm	Covilo (BBIBP-CorV)	Inactivated	91	78.1%	100%	[36]
8	Sinovac Biotech	CoronaVac (PiCoVacc)	Inactivated	56	50.7% (Brazil) 65.3% (Indonesia) 83.5% (Turkey)	100% (Brazil)	[39,40,41]
9	Novavax	Nuvaxovid (NVX-CoV2373)	Protein subunit	38	89.7 (UK) 90.4% (US&Mexico)	100%	[ <u>48</u> , <u>49</u> ]
10	Serum Institute of India	COVOVAX (Novavax formulation)	Protein subunit	5			
11	CanSino Biologics	Convidecia (AD5-nCoV)	Non Replicating Viral Vector	10	57.5%	91.7%	[33]

<sup>\*</sup>Efficacy represents performance under ideal and controlled trials

# FDA Authorized or Approved COVID-19 Vaccine Boosters

Homologous or Heterologous Booster Dose*	Authorization Date <sup>†</sup>
BNT162b2 (aged ≥12 yr)	September 22, 2021, and January 3, 2022
BNT162b2 (aged 5-11 yr)	May 17, 2022
mRNA-1273 (aged ≥18 yr)	October 20, 2021, and January 7, 2022
Ad26.COV2.S (not preferred)	October 20, 2021

Second Booster Dose <sup>‡</sup>	Authorization Date
BNT162b2 (aged >50 yr, immunocompromised aged ≥12 yr, or prior Ad26.COV2.S vaccine)	March 29, 2022
mRNA-1273 (aged >50 yr, immunocompromised aged ≥18 yr, or prior Ad26.COV2.S vaccine)	March 29, 2022

<sup>\*&</sup>gt;5 mo after primary mRNA series (or >3 mo if immunocompromised) or >2 mo after Janssen (J&J); †Date for homologous booster authorization;

<sup>&</sup>lt;sup>‡</sup>>4 mo after last booster

# L'importanza della 4 dose, richiamo vaccinale

## Da Alfa ad Omicron

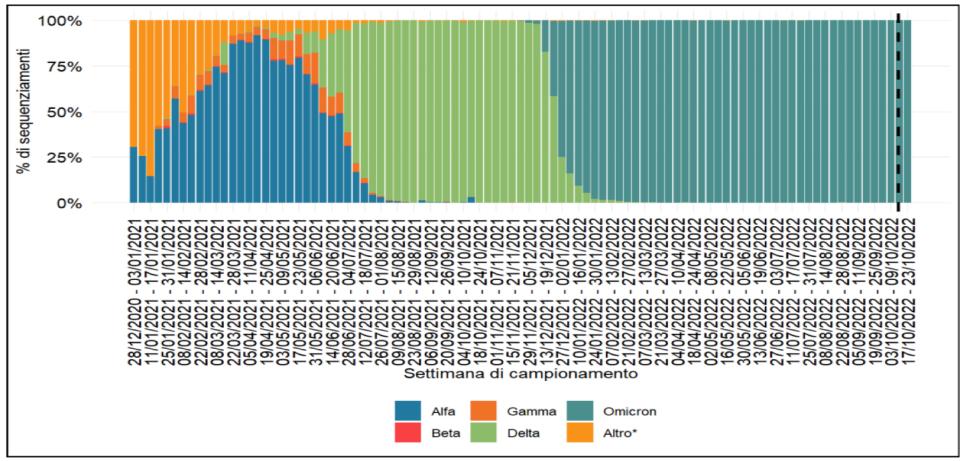


Figura 3 - Andamento delle principali varianti identificate mediante sequenziamento dal software della piattaforma I-Co-Gen, per settimana di campionamento, 28 dicembre 2020 – 23 ottobre 2022. Il dato relativo alle ultime due settimane di campionamento - linea tratteggiata nel grafico - è da considerarsi non ancora consolidato. L'assegnazione dei lignaggi/varianti è quella ottenuta con la versione 4.1.3 di Pangolin - PUSHER-v1.15.1 e 2.8.0 di NextClade. Sono escluse da questa aggregazione le sequenze Sanger della sola regione del gene S ed i sequenziamenti genomici di scarsa qualità.

\*Altro: include i sequenziamenti associati ad altri lignaggi / varianti ed i sequenziamenti non classificabili.

### **Omicron: Vaccine Protection**

- Immunity against omicron infection conferred by vaccination or previous infection is less than with delta
  - Omicron neutralization following 2 mRNA vaccine doses is low compared with other variants
- People who received vaccine booster and/or have been previously infected likely have stronger protection against infection with omicron; however:
  - Even boosted, vaccination efficacy against symptomatic infection is
     4-fold to 6-fold less than against the wild-type virus
- Vaccines remain effective at preventing hospitalization and death

## Copertura 4 dose, Novembre 2022

• Italia 6,63%

- Fascia di età con più persone vaccinate:
  - Over 80aa: 29.83%
  - Over 80 Piemonte (61,74%) vs Calabria 15,49%
  - Over 60-79 aa: 12,93%

#### 1 Hospitalized patients with severe COVID-19 during the Omicron wave in Israel – benefits of a

#### fourth vaccine dose

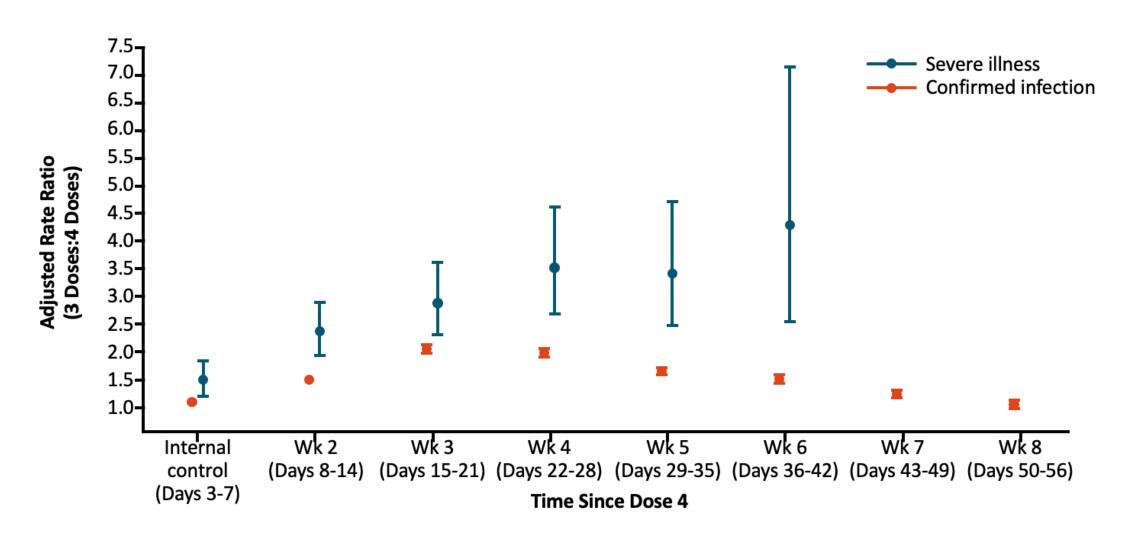
Risk factors for a poor outcome

Received 4 doses, OR=0.51 (0.3-0.87), p=0.01
Remdesivir treatment, OR=0.65 (0.44-0.96), p=0.03
Chronic lung disease, OR=0.6 (0.38-0.93), p=0.02
Chronic renal failure, OR=1.74 (1.12-2.68), p=0.01
Immunosuppression, OR=1.58 (0.98-2.68), p=0.06
Dementia, OR=2.2 (1.39-3.49), p=0.01
Male sex, OR=1.59 (1.09-2.34), p=0.02
Age, OR=0.99 (0.98-1.01), p=0.24

Figure 2 147x60 mm (.96 x DPI)

Odds ratio

## Fourth Dose of BNT162b2 Vaccine: Real-World Effectiveness



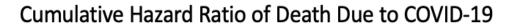
# Effectiveness of Second mRNA Vaccine Booster in Patients Aged ≥60 Yrs

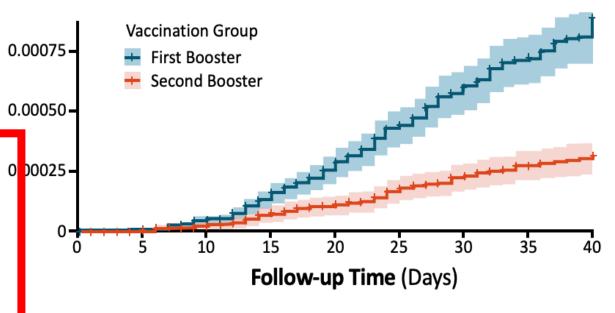
Cumulat

 1.1 million Israeli adults aged ≥60 vrs eligible for a second booster (4<sup>th</sup> vaccine dose)

Results in 4-dose vs 3-dose group:

- 2-fold reduction in new infections
- 4.3-fold reduction in severe disease
- 2.5-fold reduction in death due to COVID-19
- 4<sup>th</sup> dose effective in Israeli long-term care residents

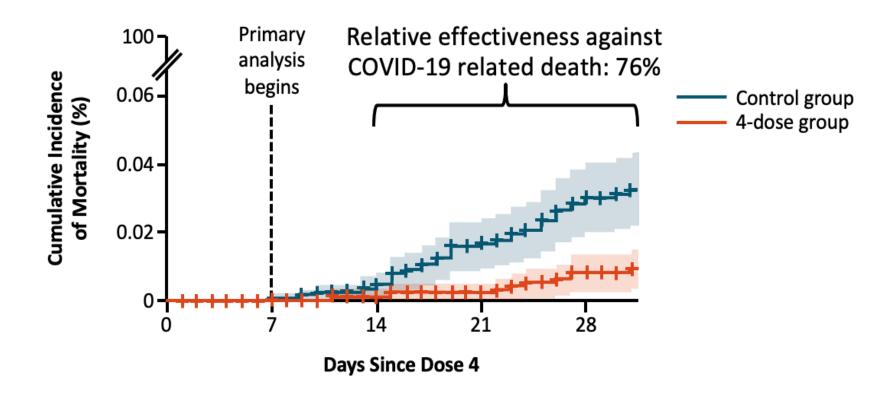




- Expected duration of efficacy is 4-5 mos
  - Unclear implications for regular or annual COVID-19 vaccine boosters

# Decreased Risk of Death With Fourth BNT162b2 Vaccine Dose

 Data from 182,122 patients who received a fourth BNT162b2 vaccine dose compared with 182,122 matched controls



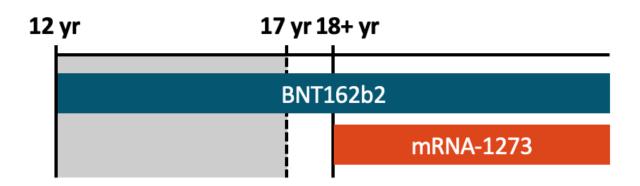
### **Rationale for Second Vaccine Booster Dose**

- Continued virus evolution
- Waning of neutralizing antibody levels
- Risk of severe disease in key populations
  - Older patients
  - Aged >50 yr with multiple underlying conditions

- Evidence that first booster improved immune response against earlier variants
  - During omicron surge in US, those with first booster vs those unvaccinated were:
    - 21 times less likely to die from COVID-19
    - 7 times less likely to be hospitalized

### **Second Booster Doses: Which Vaccine and When?**

Which vaccine?



Ad26.COV2.S may be considered in some situations

#### When?

- Wait until at least 4 mo
   after your first COVID-19
   vaccine booster before
   receiving a second booster
- If COVID-19 infection in the past 3 mo, consider delaying second booster dose

### **CDC Eligibility for Second Booster Dose**

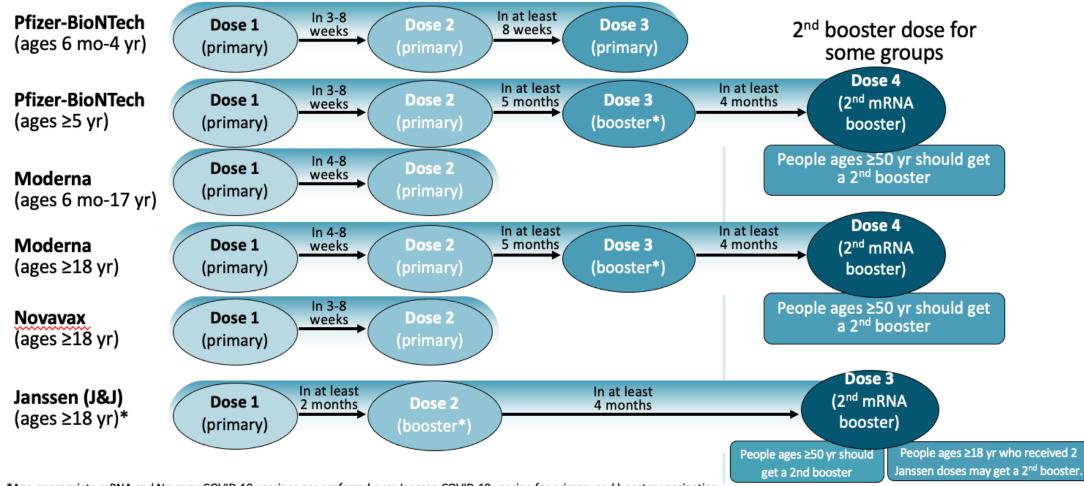
#### **Primary eligibility**

- Adults ≥50 yr of age
- People ≥12 yr of age with moderate or severe immunocompromise
- People who received 2 doses of the Janssen (J&J) vaccine

## Secondary considerations for those eligible but unsure if want booster

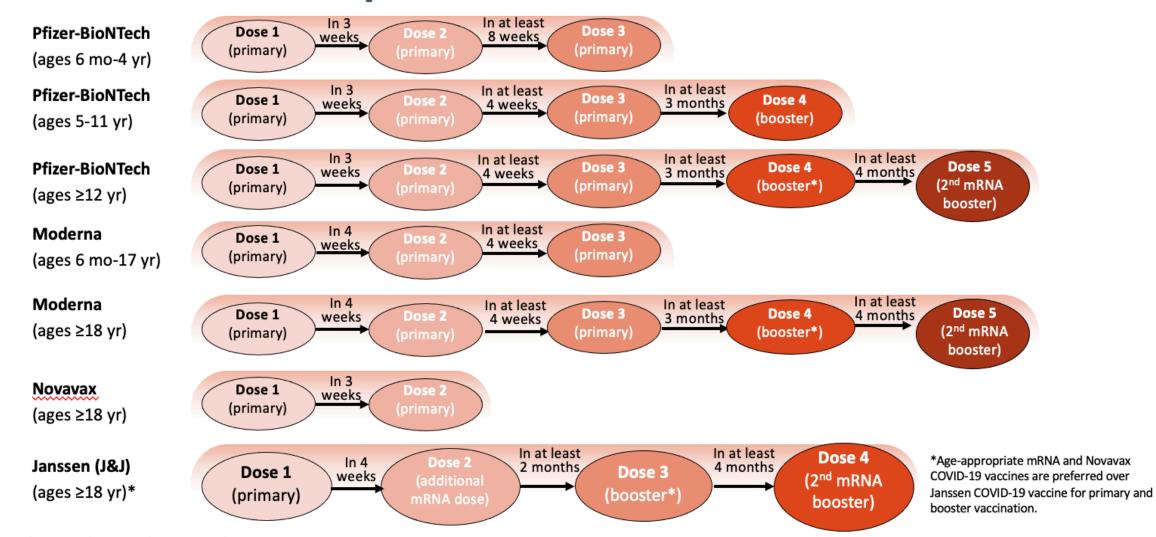
- If you are or someone you live with is:
  - Moderately or severely immunocompromised
  - At high risk of getting very ill from COVID-19
  - More likely to be exposed to COVID-19 based on occupation, residence, or other factors
  - In an area with medium to high COVID-19 community levels
  - Unvaccinated (someone you live with)

# CDC: US COVID-19 Vaccine Schedules for Patients Without Immune Compromise



<sup>\*</sup>Age-appropriate mRNA and Novavax COVID-19 vaccines are preferred over Janssen COVID-19 vaccine for primary and booster vaccination.

# CDC: US COVID-19 Vaccine Schedules for Patients With Immune Compromise



## **SPERANZE**

#### **HEALTH AND SCIENCE**

# Moderna says new Covid booster better against omicron BA.5, triggers immune response against BQ.1.1

PUBLISHED MON, NOV 14 2022-10:40 AM EST | UPDATED 6 HOURS AGO

#### KEY POINTS

- Moderna found that its new booster triggered five times more antibodies against omicron BA.5 than the old vaccines in people with prior Covid infections.
- The boosters triggered more than six times more antibodies against BA.5 in people without prior infections.
- Moderna said it also found the new booster triggered robust immune response against omicron BQ.1.1, an emerging Covid subvariant in the U.S.



## The Anti-Vaccination Society of America

OTHERWISE

An Association of "half-mad", "misguided" people, who write, and toil, and dream, of a time to come, when it shall be lawful to retain intact, the pure body Mother Nature gave, sends greeting to a "suspect". "Liberty cannot be given, it must be taken."

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