



State of Israel
Ministry of Health
משרד הבריאות

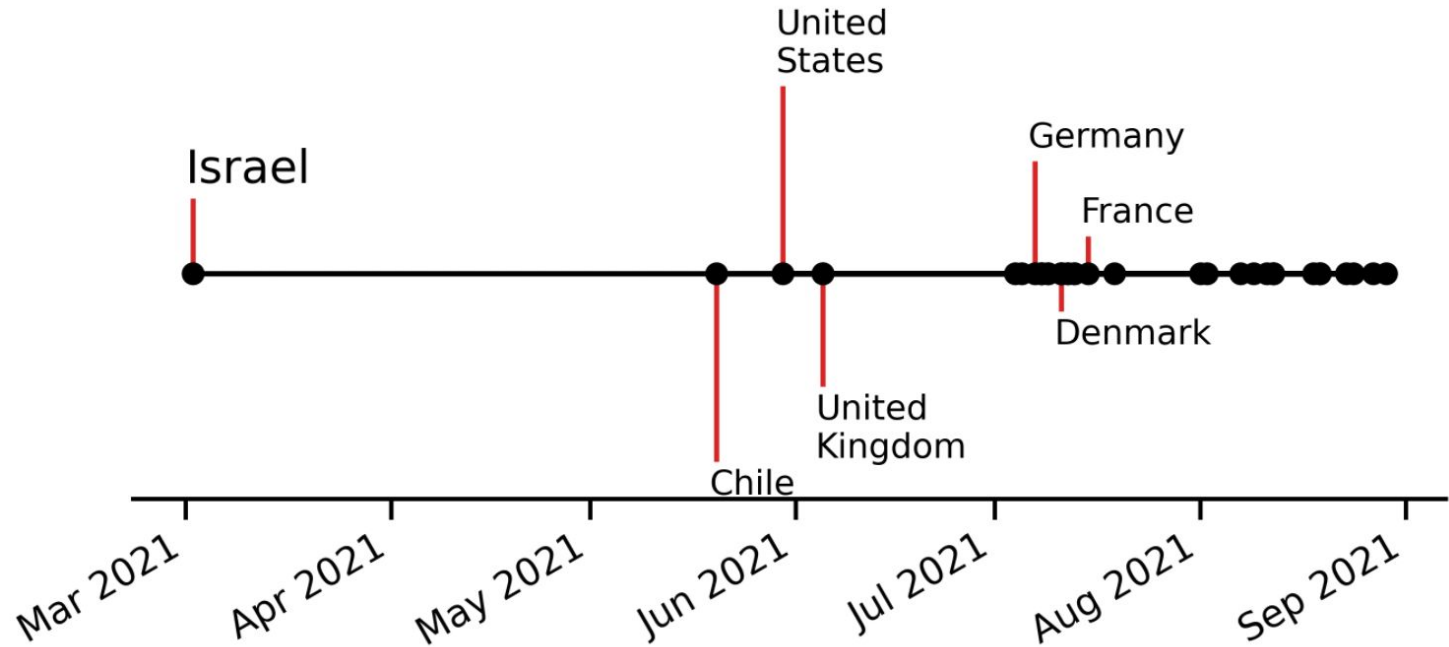


Informed Policies in Covid Protection - Data, Analysis and implications of the third ("booster") Vaccine

Israeli MOH, Weizmann Institute of Science,
Gertner Institute, Hebrew University & Technion

Oct. 28th, 2021

Israel reached high levels of population-wide immunization ≈3 months before most countries



Israel has large testing capacity (16,000 daily tests per million) & comprehensive electronic COVID19 records for the entire population

Israel experienced its **highest levels of infection** (delta variant) in spite of **widespread (>60%) 2nd dose** vaccination

Daily new confirmed COVID-19 cases per million people

Shown is the rolling 7-day average. The number of confirmed cases is lower than the number of actual cases; the main reason for that is limited testing.

Our World in Data

LINEAR

LOG

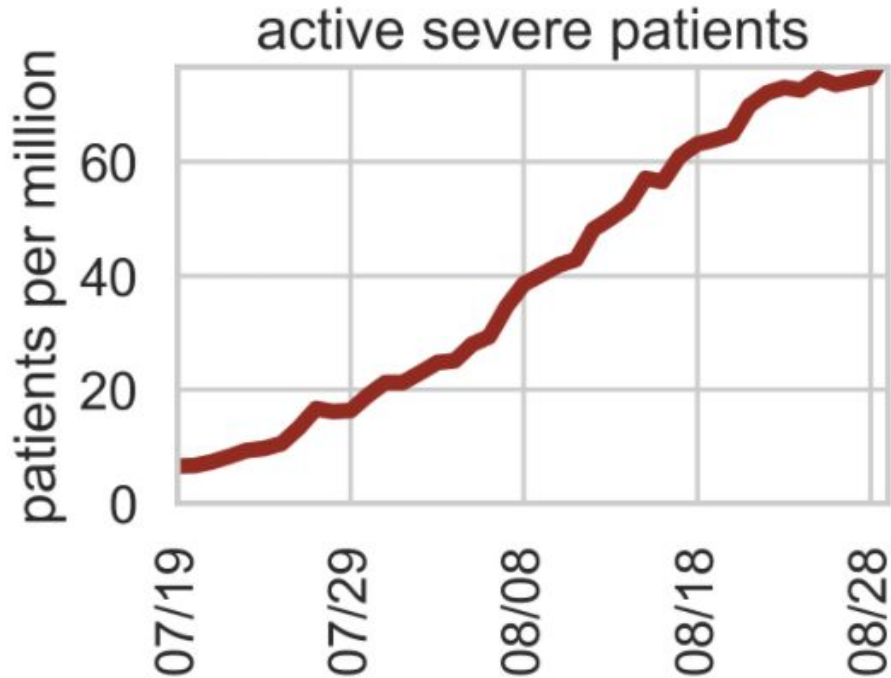


Source: Johns Hopkins University CSSE COVID-19 Data

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Severe active cases increased >10-fold in a month

Severe disease: resting respiratory rate >30 breaths per minute, or oxygen saturation <94%, or PaO₂/FiO₂ <300

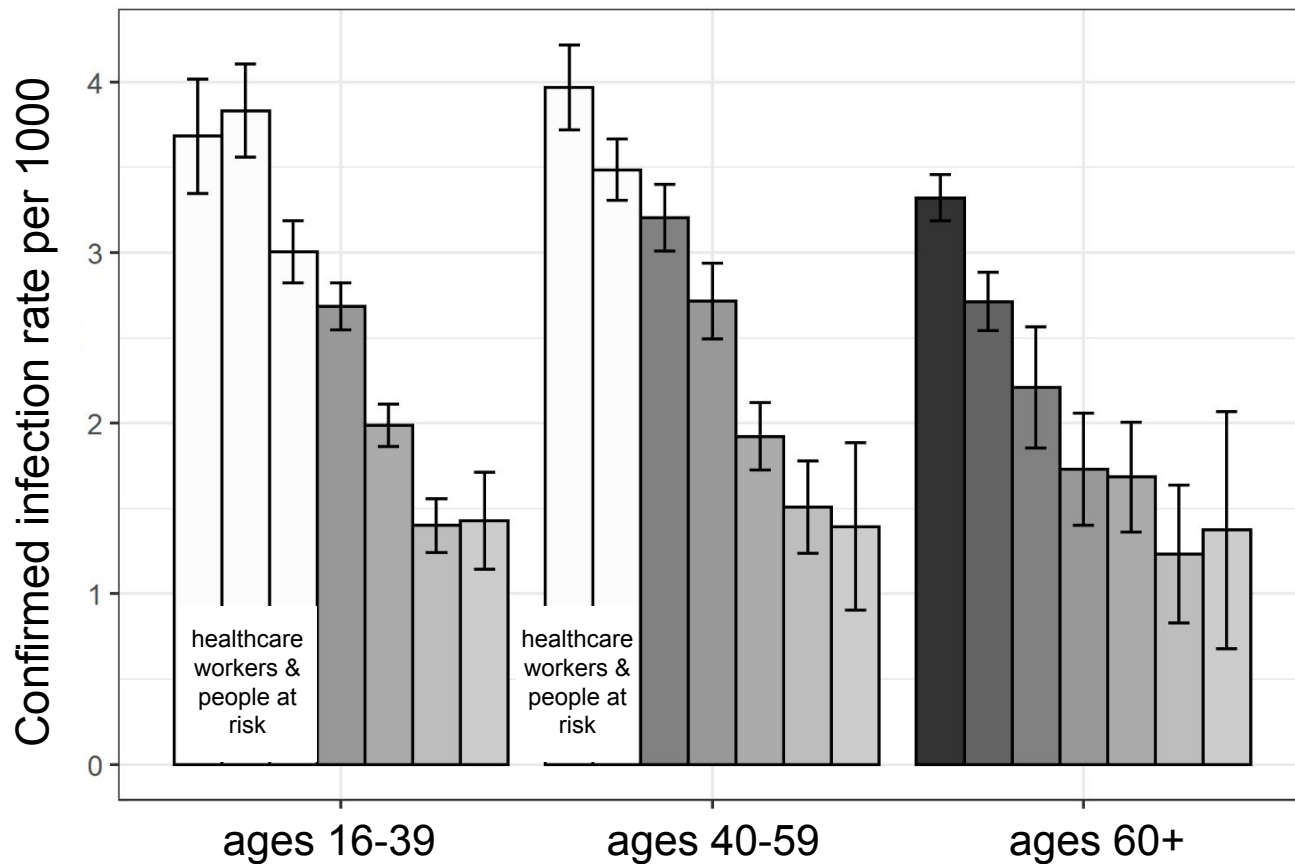


During July-early August:
60% vaccinated with 2 doses
40% unvaccinated

Waning immunity was observed across age groups

Rate of confirmed **SARS-CoV-2 infections** stratified by vaccination period and age group

Per 1000 persons, during July 11, 2021 and July 31, 2021



Goldberg et al.,

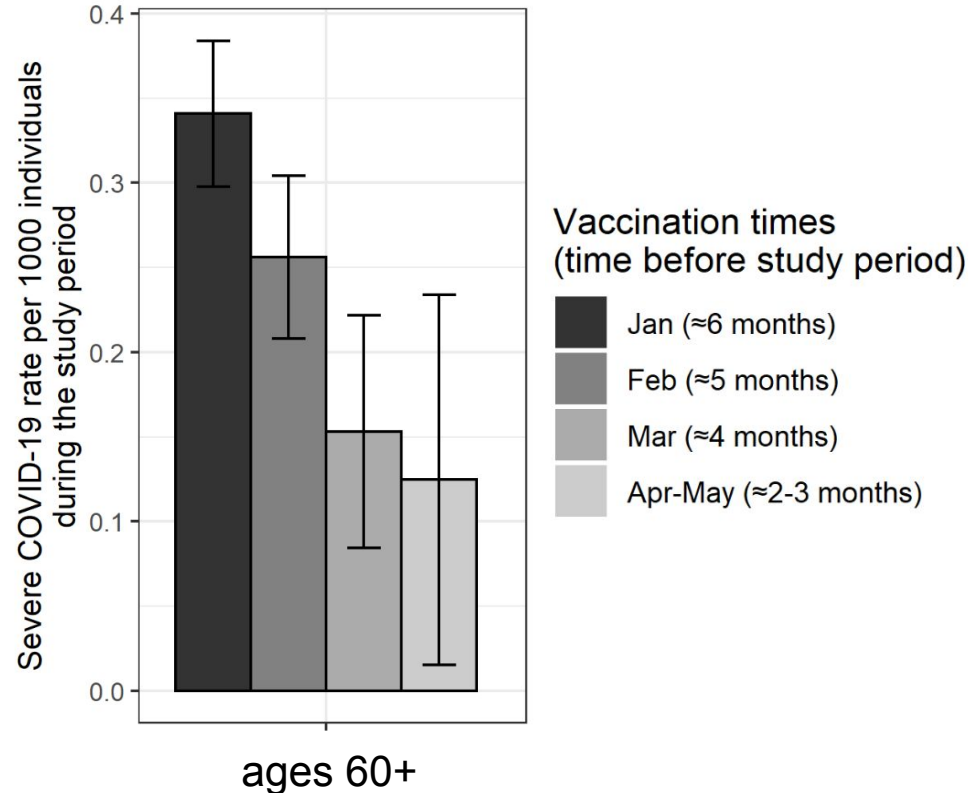
<https://www.medrxiv.org/content/10.1101/2021.08.24.21262423v1>

Vaccination times
(time before study period)



Waning immunity also observed for severe disease in 60+ group

Per 1000 persons, during July 11, 2021 and July 31, 2021

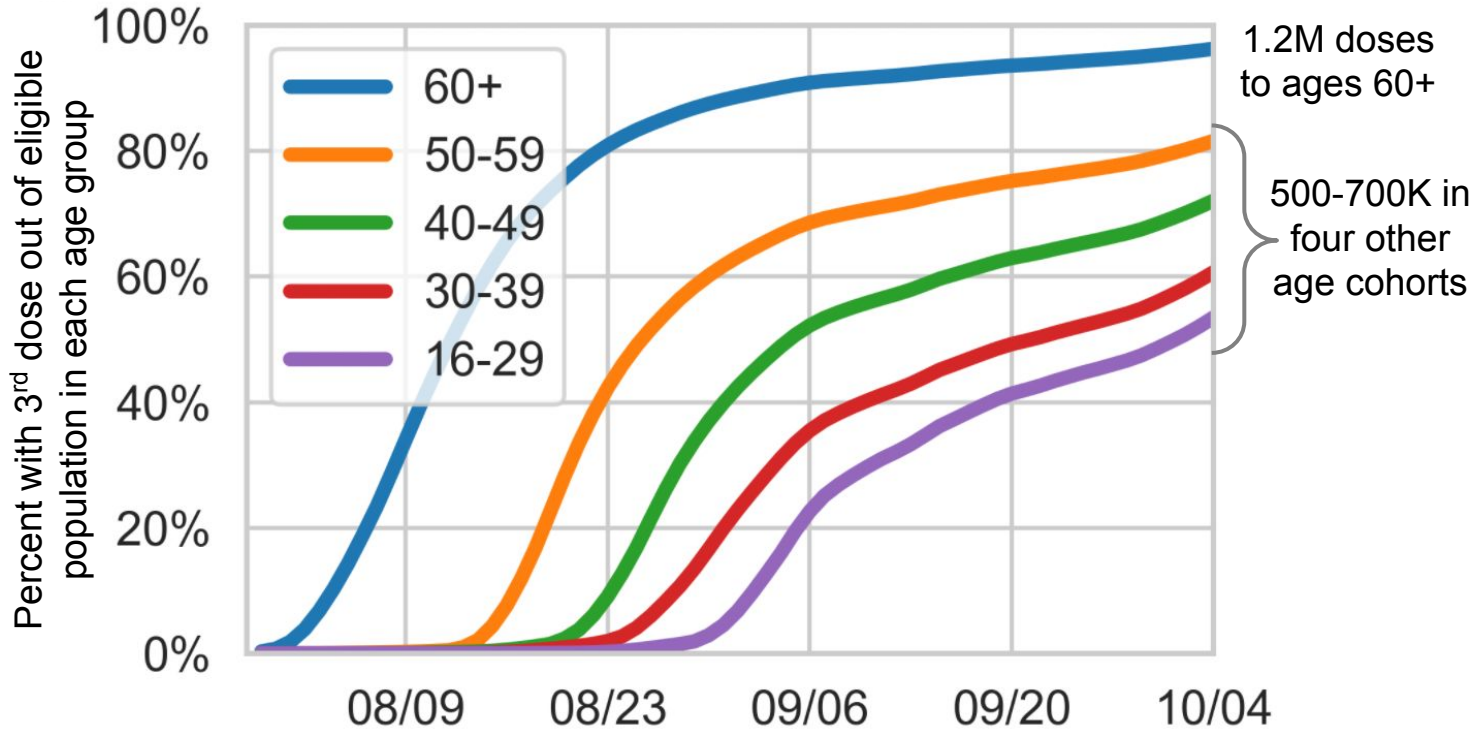


Goldberg et al.,
<https://www.medrxiv.org/content/10.1101/2021.08.24.21262423v1>

Based on evidence for waning in Israel, and the trajectory towards exceeding national hospitalization capacity given the rapid rise in severe cases, Israel decided to begin a 3rd vaccination campaign on July 30th, starting with the elderly.

Large majority of elderly population received a 3rd dose

Overall
3.7 million
booster doses
to date

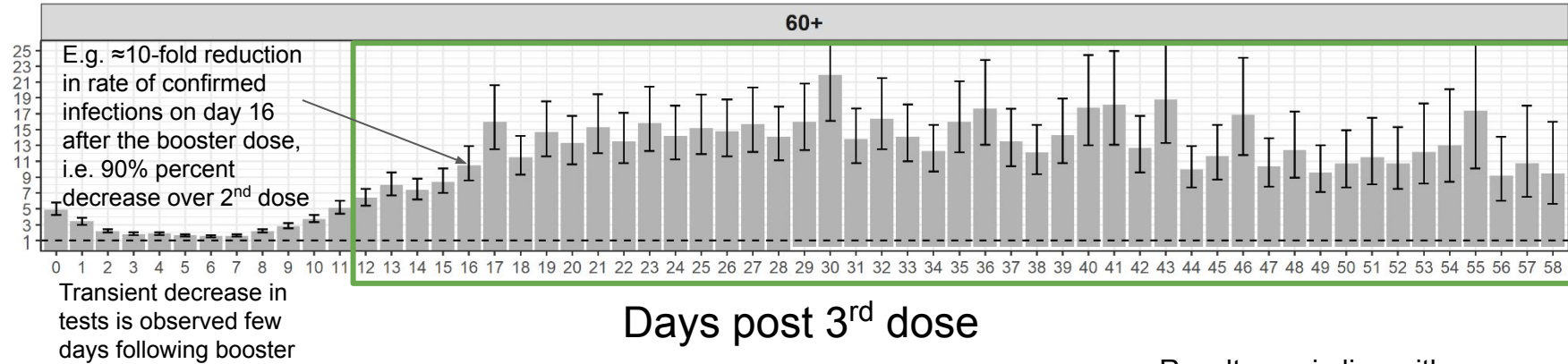


Booster campaign began
on July 30th

Protection against **confirmed infection** with booster versus 2nd dose only as a function of time post vaccination **ages 60+**

Poisson regression adjusted for age, gender, demographic group, 2nd dose period and incidence in area of residence. Based on data from July 30 to October 6

Fold reduction in rate compared to two doses

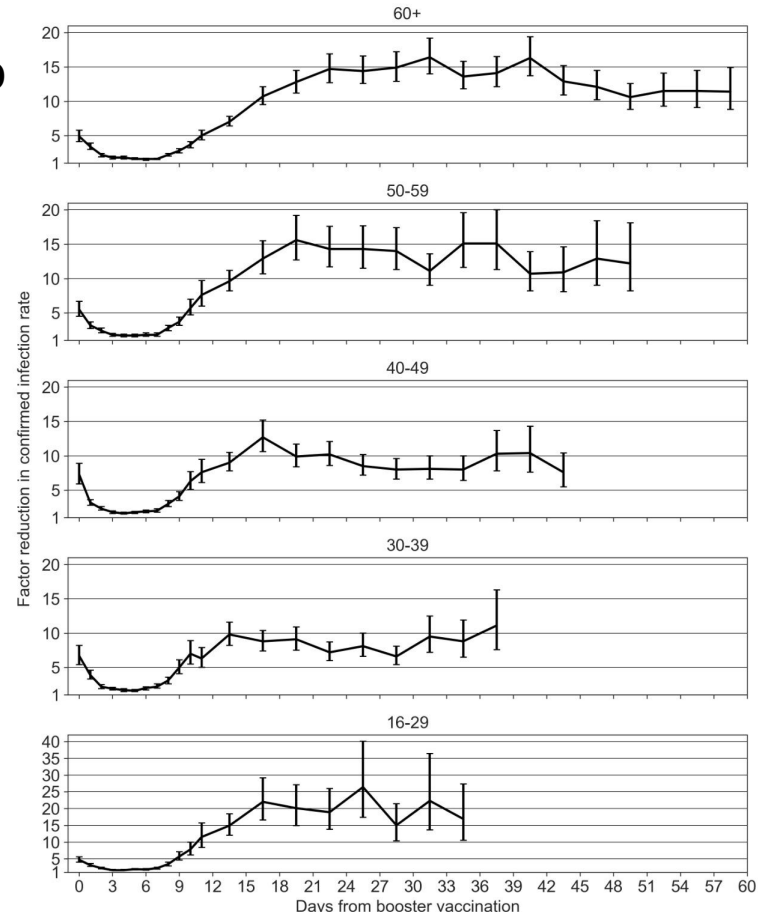


Results are in line with previous report: Bar-on et al., <https://www.nejm.org/doi/full/10.1056/NEJMoa2114255>

Protection with booster versus 2nd dose only as a function of time post vaccination **by age group**

Poisson regression adjusted for age, gender, demographic group,
2nd dose period and incidence in area of residence

Age	Non-booster group infections (person-days at risk)	Booster group infections - day 12+ (person-days at risk)	Rate ratio day 12+ relative to non-booster [95% CI]
60+	12,225 (21,660,770)	2,694 (46,201,515)	12.4 [11.9, 12.9]
50-59	9,912 (11,887,725)	935 (14,204,942)	12.2 [11.4, 13.1]
40-49	16,378 (15,416,326)	1,054 (11,409,730)	9.7 [9.2, 10.4]
30-39	20,736 (17,757,731)	758 (7,228,945)	8.8 [8.2, 9.5]
16-29	21,649 (23,985,406)	267 (7,060,384)	17.6 [15.6, 19.9]



Bar-on et al.,

<https://www.medrxiv.org/content/10.1101/2021.10.07.21264626v1.full.pdf>

Similar patterns across age groups in terms of timing and magnitude (though not identical)

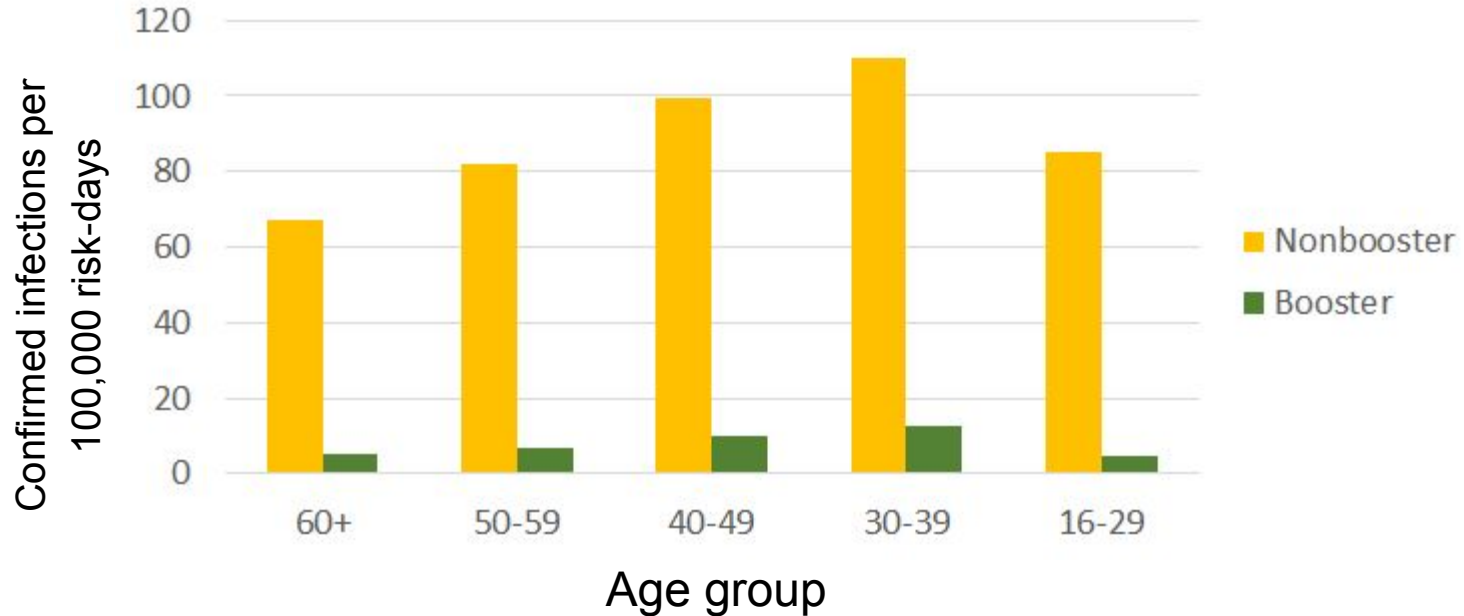


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Absolute rates of confirmed infections per 100,000 risk-days

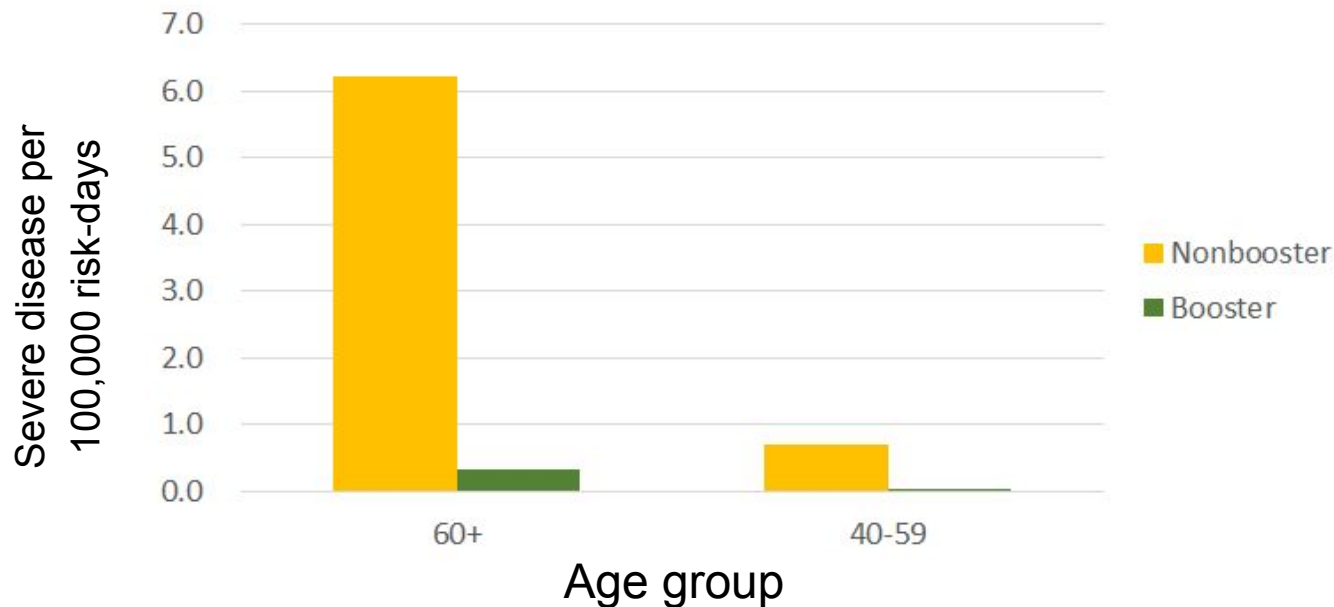
12+ days following booster versus 2nd dose only. Based on data from July 30 to October 6



Absolute rates of **severe disease** per 100,000 risk-days

*Severe disease (NIH definition):
resting respiratory rate
>30 breaths per minute,
or O2 saturation <94%,
or PaO₂/FiO₂ <300

12+ days following booster versus 2nd dose only. Based on data from July 30 to October 6



Booster reduces the rate ratio of death in 60+ age group

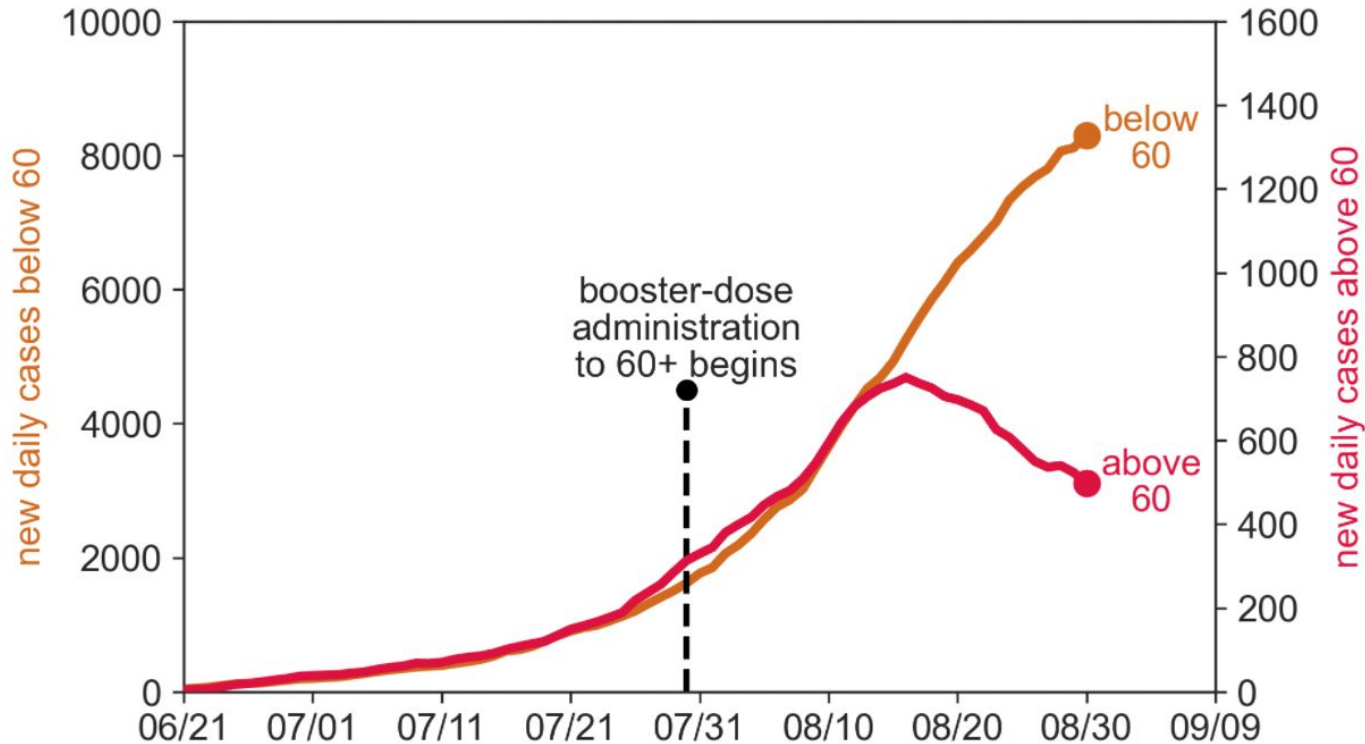
(Poisson regression controlling for age, gender, demographic group, 2nd dose period, and incidence in area of residence)

Age	Non-booster deaths (person-days at risk)	Booster group deaths - day 12+ (person-days at risk)	Booster control group deaths - day 3-7 (person-days at risk)	Rate ratio for death day 12+ relative to non-booster [95% CI]	Rate ratio for death day 12+ relative to day 3-7 [95% CI]
60+	270 (16,395,473)	23 (10,600,038)	46 (5,074,461)	14.7 [9.4, 23.1]	4.8 [2.8, 8.2]

Not enough cases to compare the rate ratio of death in ages 16-59 (7 in the nonbooster; none in the 12+ days post booster and alternative control groups).

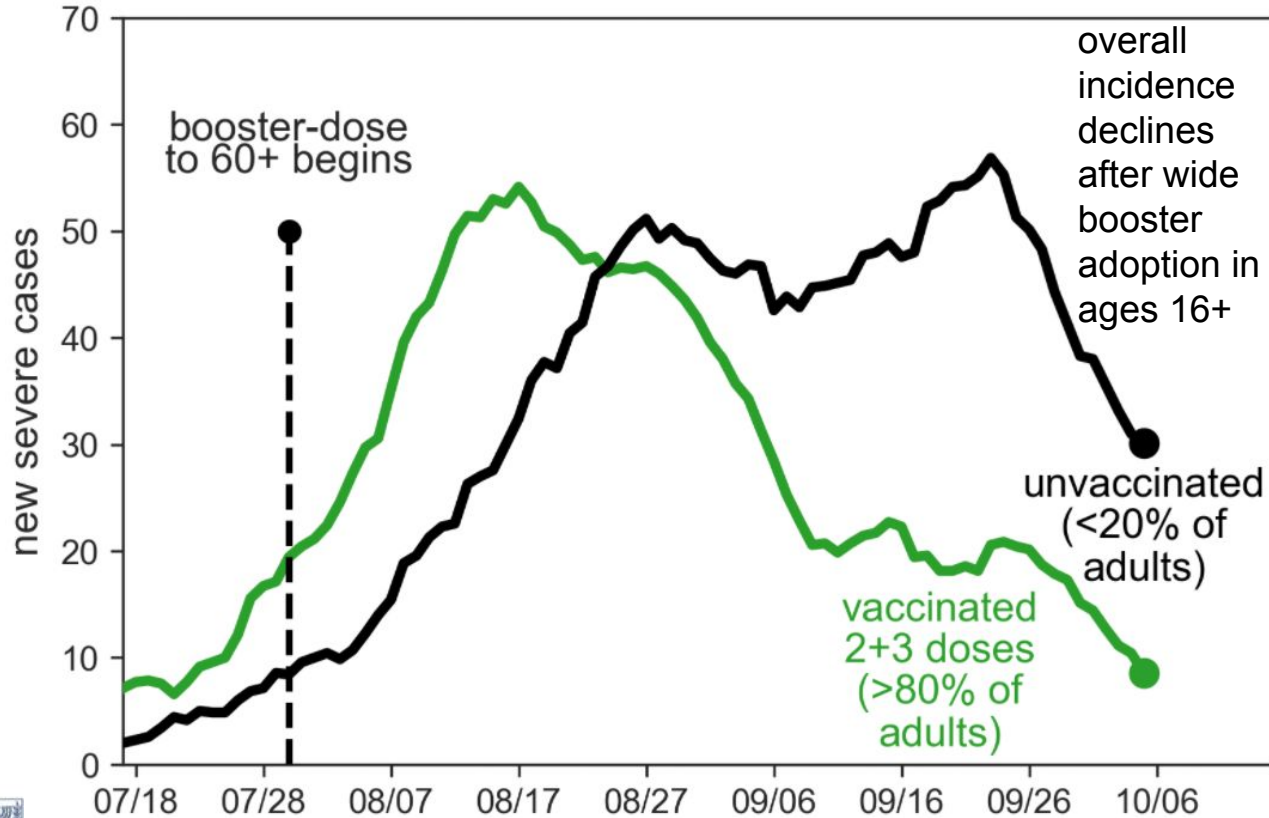
Nationwide observations following booster campaign

Following the booster a decrease in confirmed infections was observed among people aged 60+

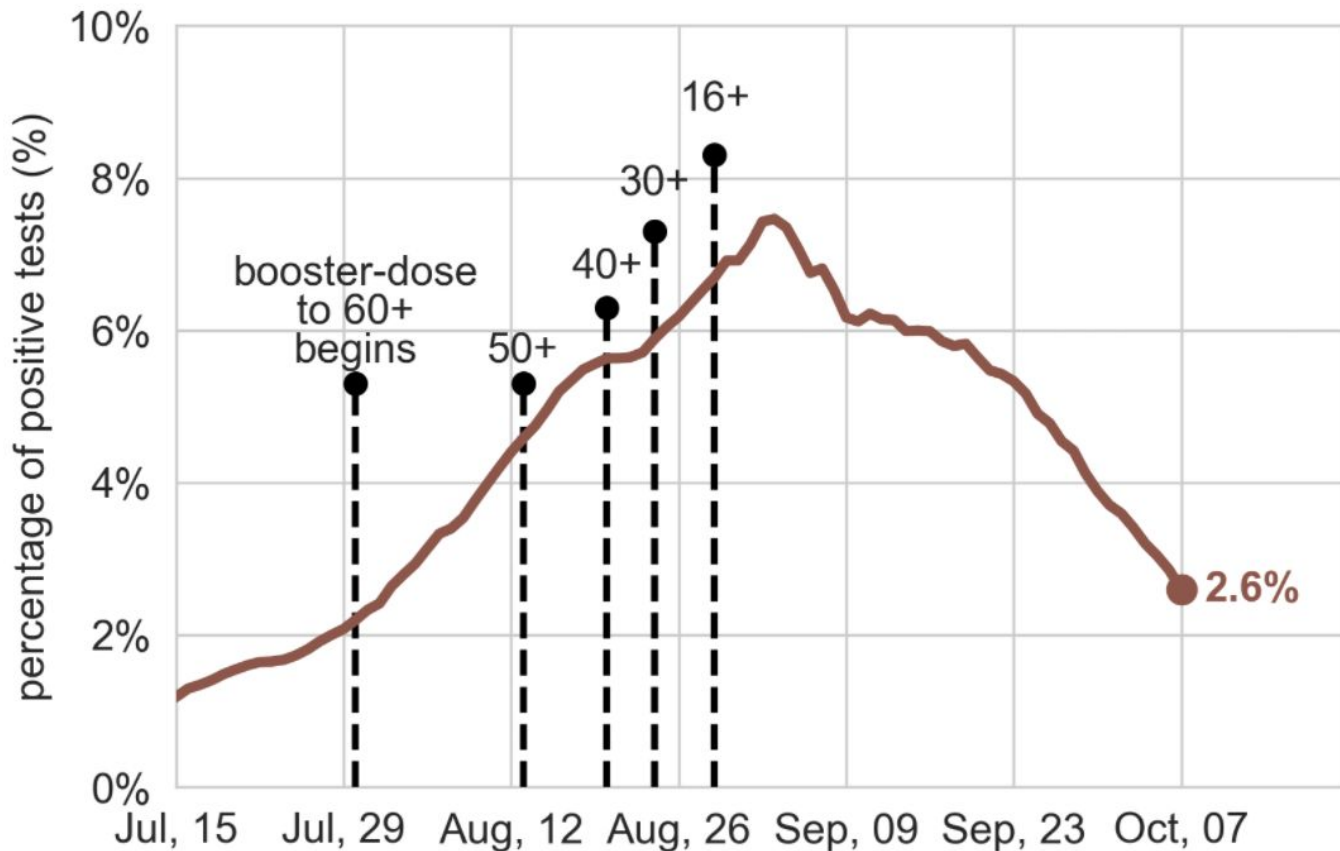


In sept. effects of booster at ages below 60

Following the third dose, severe cases among vaccinated decreased sharply

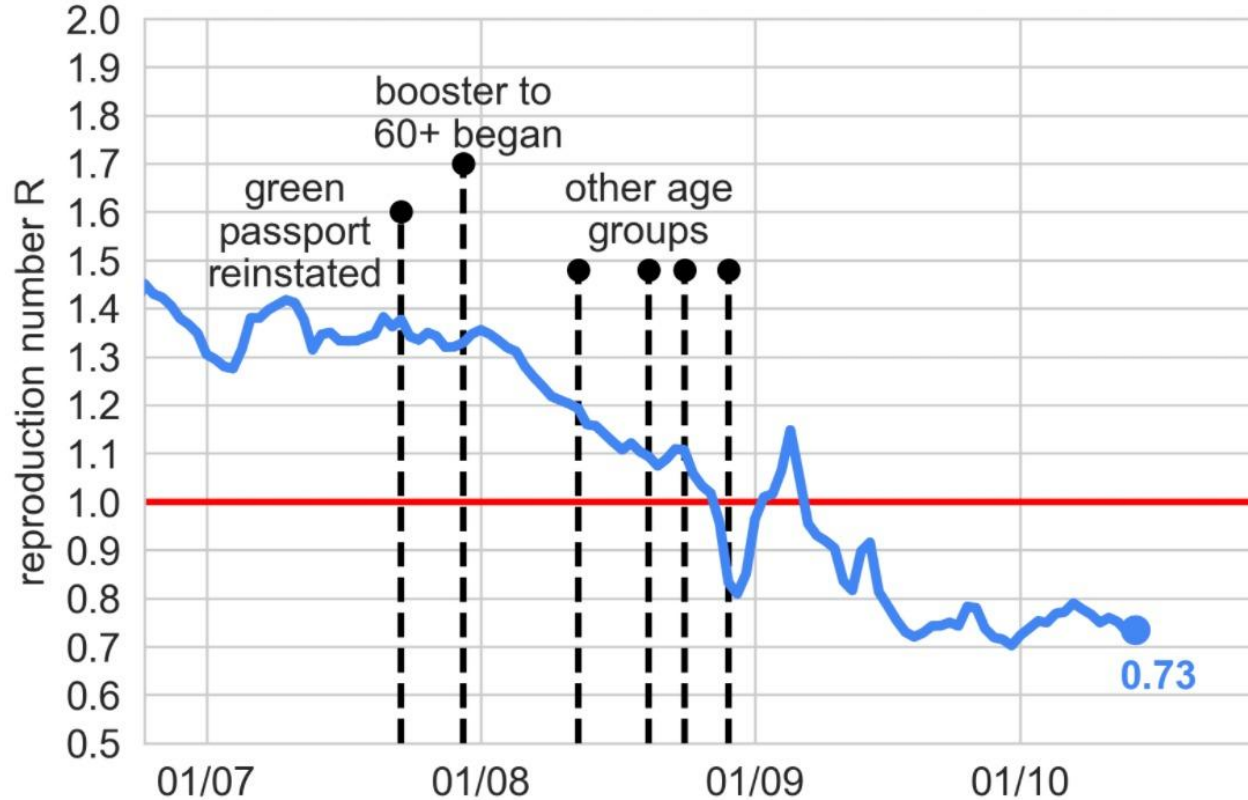


Nationwide decrease in percentage of positive tests began only after boosters were administered to most age groups



Percentage of positive tests is more reliable than number of cases due to high-holidays in Israel during Sept.

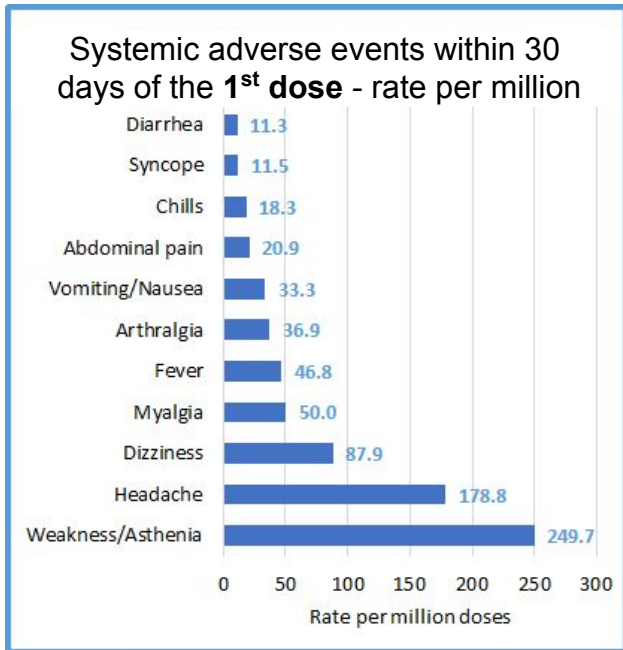
R decreases below 1 following the booster campaign



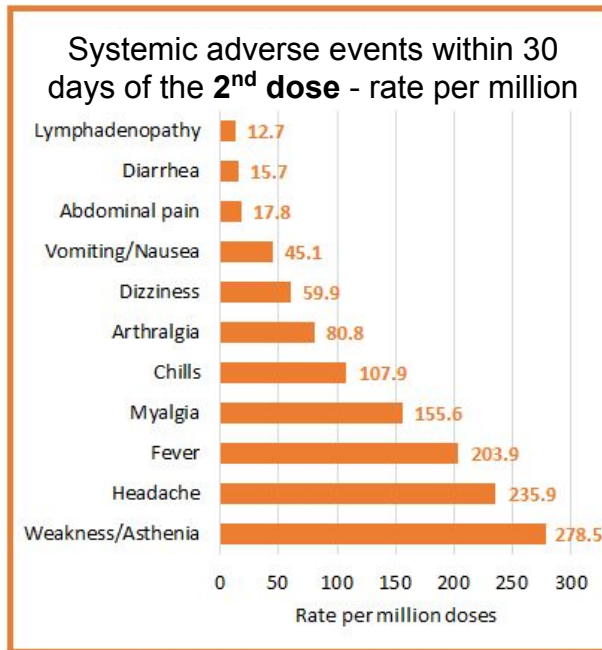
Safety results from nationwide booster campaign

Rate of systemic adverse events by dose

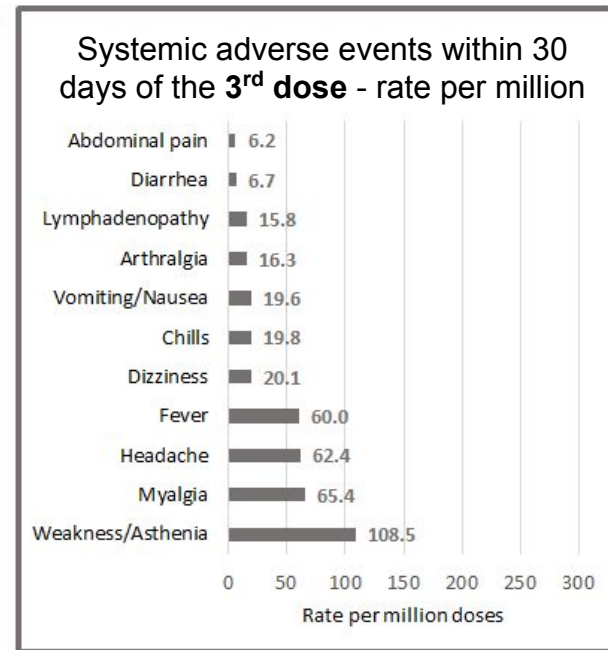
Limitation: Reporting based on passive surveillance, and therefore subject to underreporting



1st dose – 6,178,847 vaccinees



2nd dose – 5,679,655 vaccinees



3rd dose – 3,732,923 vaccinees

Adverse events reported following 3rd dose (3.7 million booster doses administered)

Non serious reports	Serious reports
2,394	44

Serious Adverse event (SAE) definition*

Any adverse event that:

- Results in death
- Is life-threatening
- Requires hospitalization or prolongation of existing hospitalization
- Results in persistent or significant disability or incapacity
- Results in congenital anomaly
- Other important medical events which required intervention

*<https://www.fda.gov/safety/reporting-serious-problems-fda/what-serious-adverse-event>

Hospitalization and death reports following vaccination are examined by an independent clinical work group using available clinical data

Myocarditis & perimyocarditis cases and number of vaccinees by age group and sex

Proactive surveillance. All cases reported in Israel Dec. 2020 - Oct. 10th, 2021

Sex	Age group	1 st dose		2 nd dose		3 rd dose*	
		(0-21 days following vaccination)		(0-30 days following vaccination)		(0-30 days following vaccination; For ages 30+, 80% with 30 days; For ages 16-29, 48% with 30 days)	
		Number of vaccinees	Number of cases reported	Number of vaccinees	Number of cases reported	Number of vaccinees	Number of cases reported
Female	12-15	204,729	0	162,297	1	279	0
	16-19	248,881	0	222,067	2	97,807	0
	20-24	263,845	1	242,697	6	141,910	0
	25-29	247,365	0	229,189	1	130,283	0
	+30	2,127,538	3	2,029,074	7	1,542,142	0
Male	12-15	192,014	1	151,081	10	292	0
	16-19	254,497	3	223,079	36**	96,238	5
	20-24	275,235	6	251,672	26	139,015	5
	25-29	257,713	3	239,319	20	133,650	1
	+30	1,983,230	10	1,897,067	32	1,448,745	6

Summary: Booster dose in Israel was effective and so far had safety profile similar to the other doses

- Booster dose shows improved protection against confirmed infection in all age groups tested.
- Booster dose shows improved protection against severe disease in ages 40 and above.
- Booster dose adverse events not more acute than first or second dose.
- Administration of booster dose helped Israel dampen infections and severe cases in the 4th wave.