



European Union

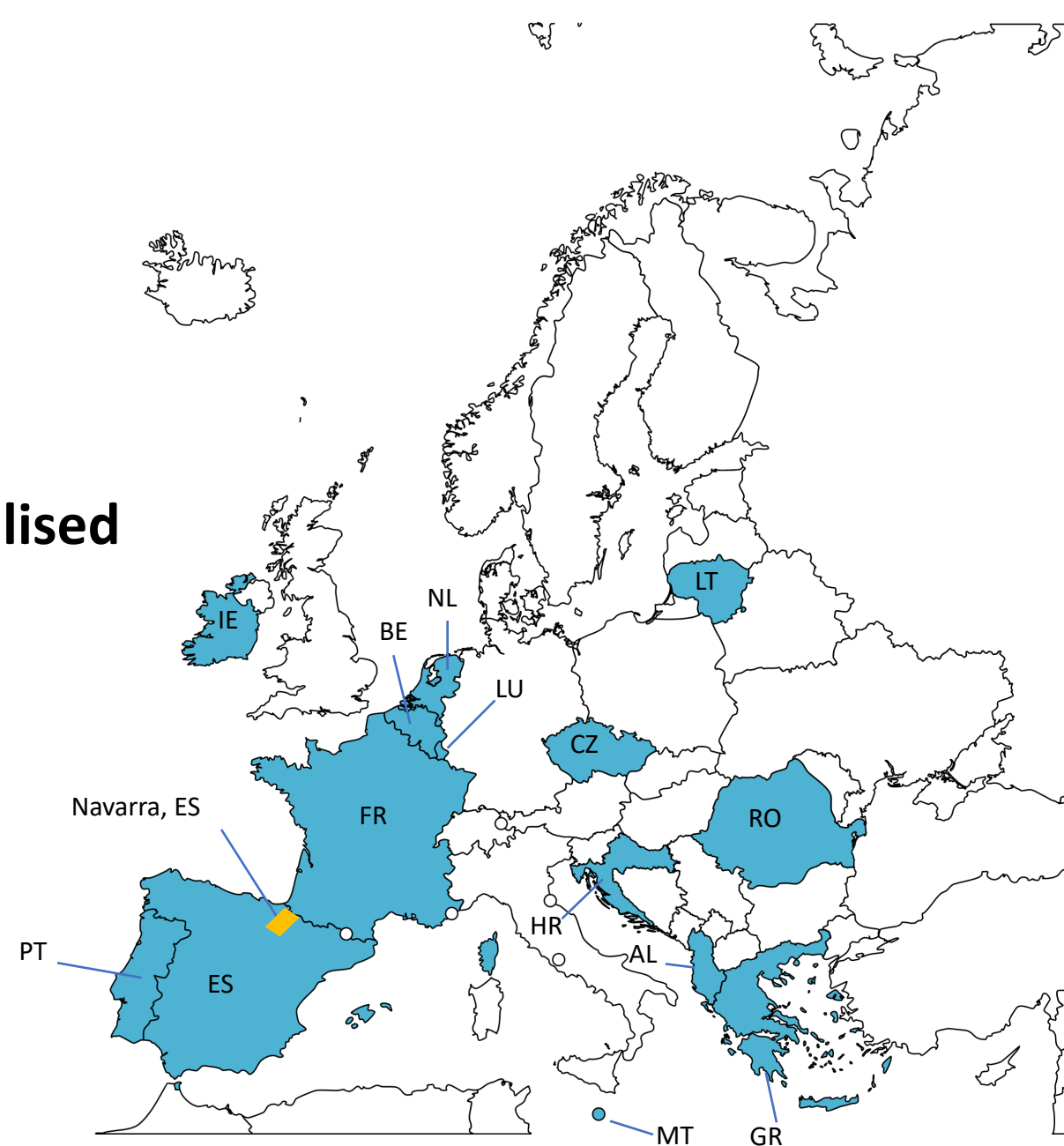
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003673

**2021 COVID-19 vaccine effectiveness against hospitalisation due to laboratory-confirmed SARS-CoV-2 infection in older adults: pre-Delta and Delta periods
Pooled results from nine European countries**

15 December 2021

ECDC & I-MOVE-COVID-19 hospital VE networks

- **15** European study sites in COVID-19 VE*
 - 48 hospitals collecting information
- Aim to **measure COVID-19 VE among hospitalised SARI patients** in vaccine target group overall and by vaccine product
 - among those **aged 60+** for this analysis
- Secondary objectives
 - VE against variants
 - VE by **age group**, risk group, **doses**
 - VE by delay between doses, over time



*Draft generic protocols available online:

<https://www.ecdc.europa.eu/sites/default/files/documents/Core-protocol-for-ECDC-studies-of-COVID-19-vaccine-effectiveness-against-hospitalisation-with-SARI.pdf>

https://www.imoveflu.org/wp-content/uploads/2021/03/08feb2021_draft_generic_VE_protocol_hospital-based_COVID-19_v07.pdf

Methods

- Test-negative design
 - SARI patients* are swabbed
 - **case**: SARS-CoV-2 positive; **control**: SARS-CoV-2 negative
- **PCR** test only
 - swabbed within 10 days of symptom onset
- Restriction to **target group** for **vaccination** at time of **swab**
- Vaccination definitions
 - **one** dose only: receipt of **only 1 dose** of 2-dose vaccines ≥ 14 days before onset
 - **at least one** dose: receipt of ≥ 1 dose ≥ 14 days before symptom onset
 - **completely** vaccinated: receipt of **2 doses (1 dose if Janssen)** ≥ 14 days before onset
 - **booster** dose: not included in this analysis

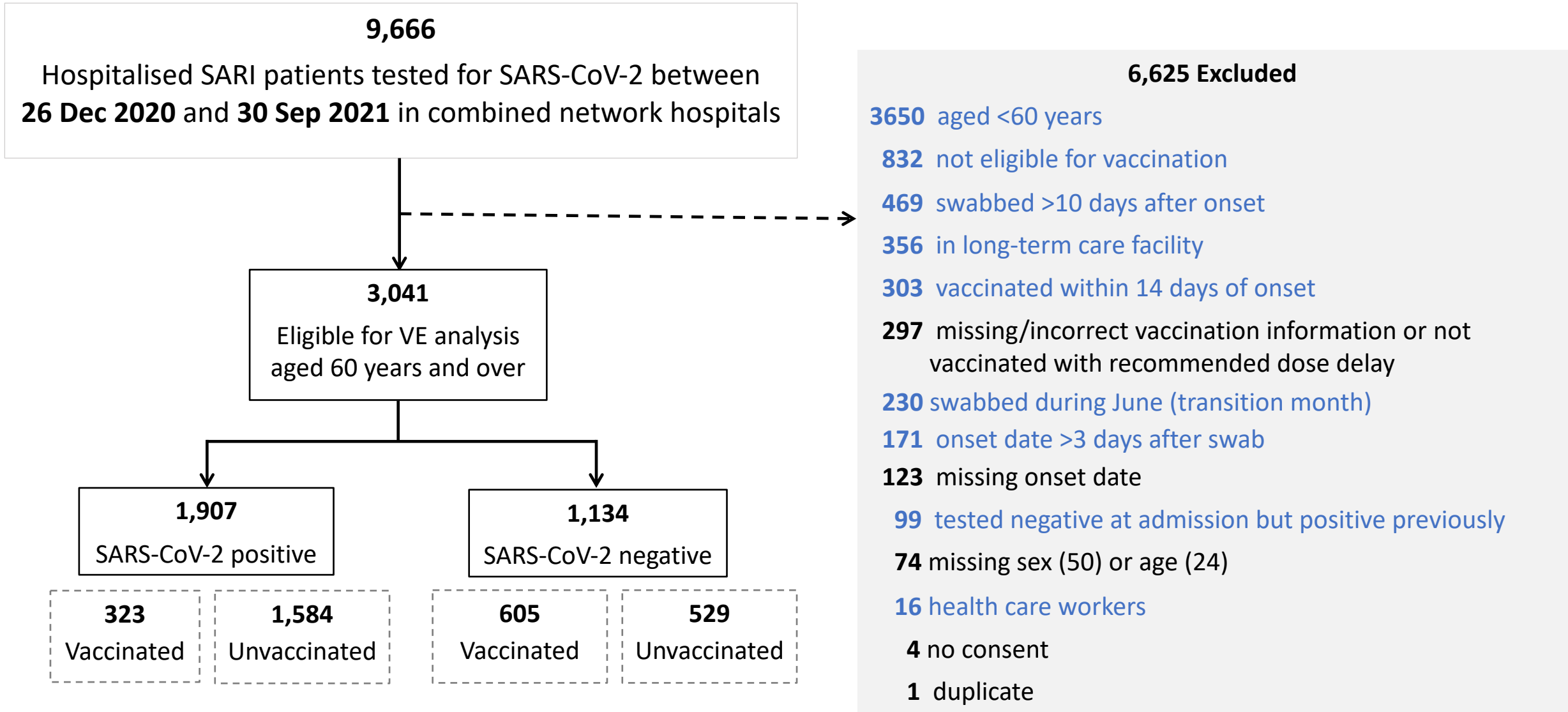
*ECDC possible COVID-19: hospital 24 hrs + fever/cough/shortness of breath/sudden onset anosmia/ageusia/dysgeusia;
WHO SARI: ARI + hospital + fever+cough + onset ≤ 10 days

Methods

- Study periods: pre-Delta and Delta dominated
 - 26 Dec 2020–31 May 2021 (June excluded as transition)
 - 01 July 2020–30 Sep 2021
- Logistic regression, study site as fixed effect
 - adjusted for age, date of swab, sex, presence of any common chronic conditions*
- VE: $(1-OR)*100$
- Stratified by age-groups
 - overall and product-specific analyses: 60–79, 80+ years
- Complete vaccination with primary course (no boosters)
- Analytic exclusions
 - sites dropped from analysis if <5 eligible cases and controls
 - VE estimated using penalised logistic regression (Firth's method) to check for sparse data bias
 - VE point estimates not shown if <20 vaccinated cases and controls

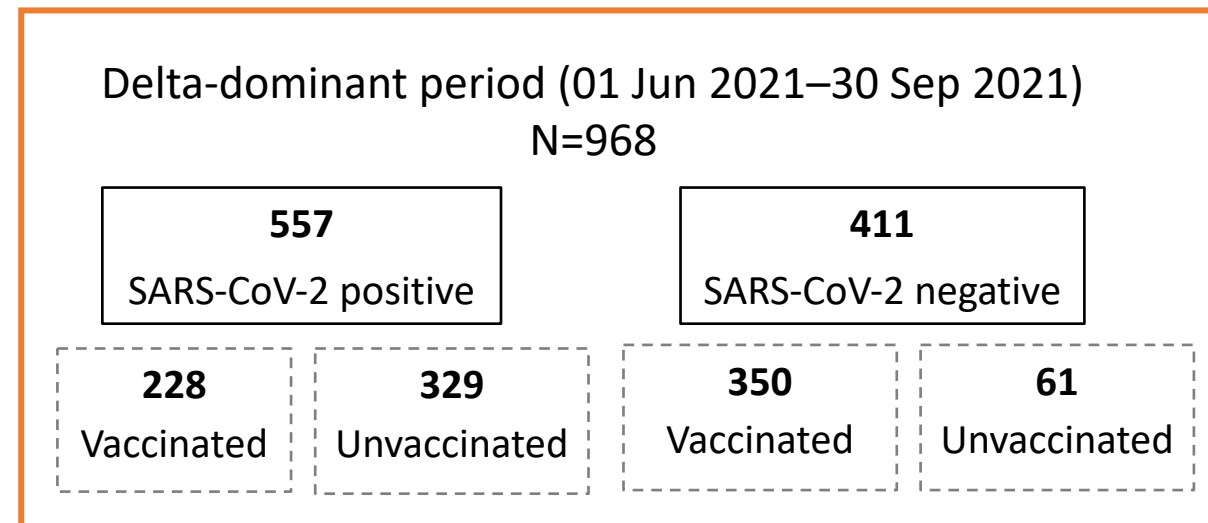
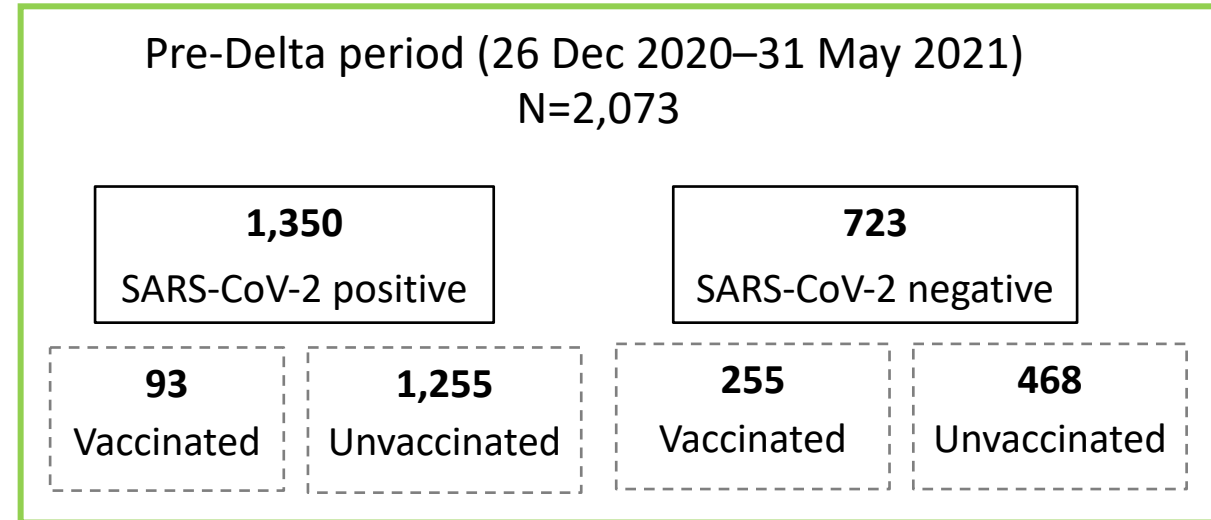
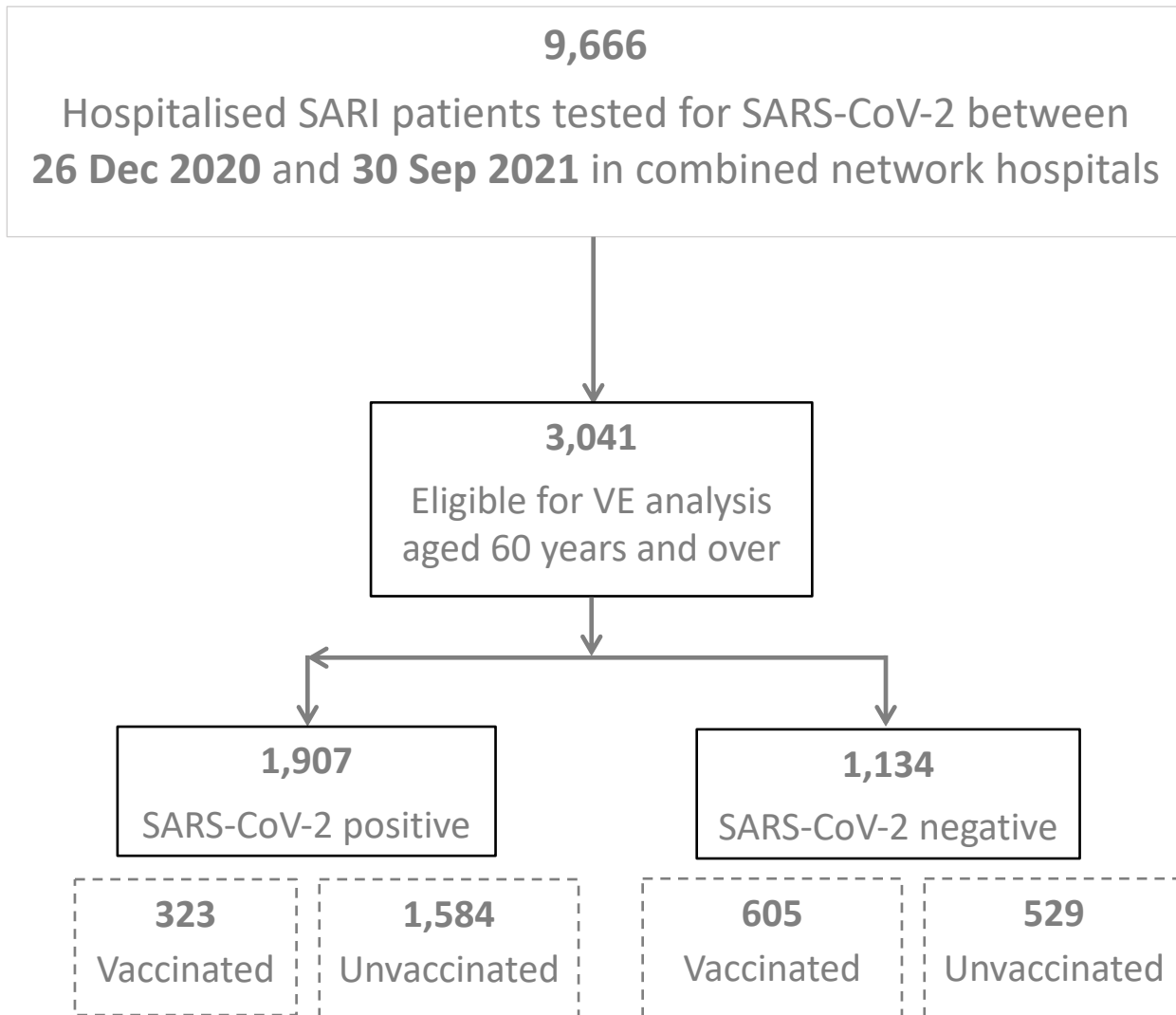
*Four chronic conditions common to all sites: diabetes (metabolic syndrome in ES), heart disease, lung disease, asthma (last two combined for ES)

Recruitment and exclusions (data from 12 sites*)



*Data from 44 hospitals

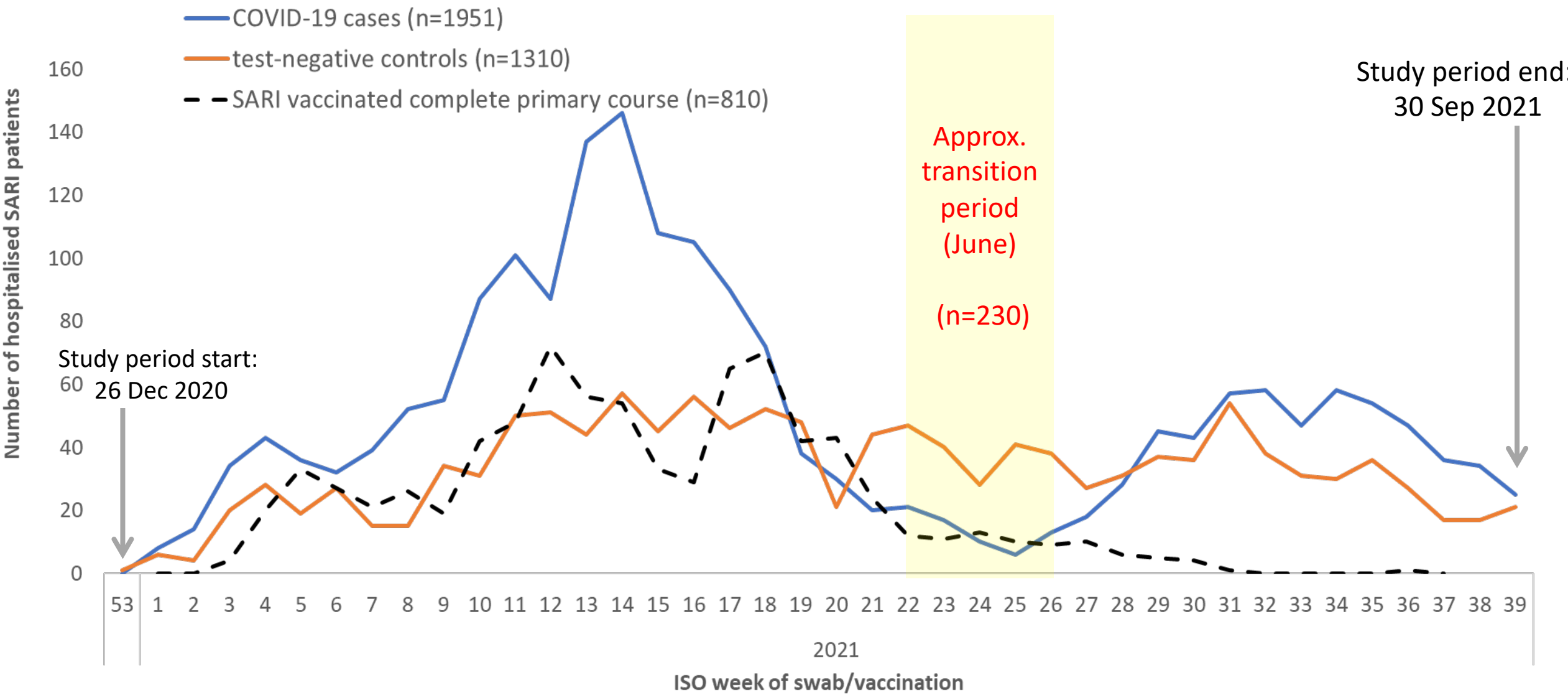
Recruitment and exclusions (data from 12 sites*)



*Data from 44 hospitals

Cases and controls by week of swab, and first dose of COVID-19 vaccine

ECDC & I-MOVE COVID-19 VE hospital studies, Europe, 26 Dec 2020–30 Sep 2021 (N=3,271)



Patient characteristics: age, sex and chronic conditions

ECDC & I-MOVE COVID-19 VE hospital studies, Europe, 26 Dec 2020–31 May 2021
(N=2,073) *pre-Delta period*

		Cases (N=1,350)		Controls (N=723)	
		N	%	N	%
Median age (years)		75 yrs		80 yrs	
Age groups	60–79	853	63	342	47
	80+	497	37	381	53
Sex	Male	751	56	394	54
	Female	599	44	329	46
Chronic conditions*	Yes	946	63	556	77
	No	496	37	167	23

*Any one of diabetes, heart disease, lung disease, asthma.

Patient characteristics: age, sex and chronic conditions

ECDC & I-MOVE COVID-19 VE hospital studies, Europe, 01 Jul–30 Sep 2021
(N=968) *Delta period*

		Cases (N=557)		Controls (N=411)	
		N	%	N	%
Median age (years)		74 yrs		79 yrs	
Age groups	60–79	369	66	211	51
	80+	188	34	200	49
Sex	Male	286	51	239	58
	Female	271	49	172	42
Chronic conditions*	Yes	319	57	309	75
	No	238	43	102	25

*Any one of diabetes, heart disease, lung disease, asthma.

Patient characteristics: vaccination status

ECDC & I-MOVE COVID-19 VE hospital studies, Europe, 26 Dec 2020–31 May 2021 (N=2,071) *pre-Delta period*

		Cases (n=1,348)		Controls (n=723)	
		No.	%	No.	%
COVID vaccination:					
any	No	1,255	93	468	65
	Yes	93	7	255	35
COVID vaccination:					
doses	None	1,255	93	468	65
	One	77	6	123	17
	Two	16	1	132	18
	Three	0	0	0	0

Patient characteristics: vaccination status

ECDC & I-MOVE COVID-19 VE hospital studies, Europe, 01 Jul–30 Sep 2021
(N=968) *Delta period*

		Cases (n=557)		Controls (n=411)	
		No.	%	No.	%
COVID vaccination:					
any	No	329	59	61	15
	Yes	228	41	350	85
COVID vaccination:					
doses	None	329	59	61	15
	One	45	8	21	5
	Two	183	33	329	80
	Three	0	0	0	0

Patient characteristics: vaccine product

ECDC & I-MOVE COVID-19 VE hospital study, Europe, 26 Dec 2020–31 May 2021
(N=348) *pre-Delta period*

		Vaccinated cases (n=93)		Vaccinated controls (n=255)	
		No.	%	No.	%
First dose	Comirnaty	60	65	205	80
	Vaxzevria	25	27	33	13
	Spikevax	7	8	13	5
	Curevac	0	0	0	0
	Janssen	0	0	1	<1
	Unknown	1	1	3	1
Second dose	Comirnaty	15	94	129	98
	Vaxzevria	0	0	0	0
	Spikevax	1	6	3	2
	Curevac	0	0	0	0
	Unknown	0	0	0	0

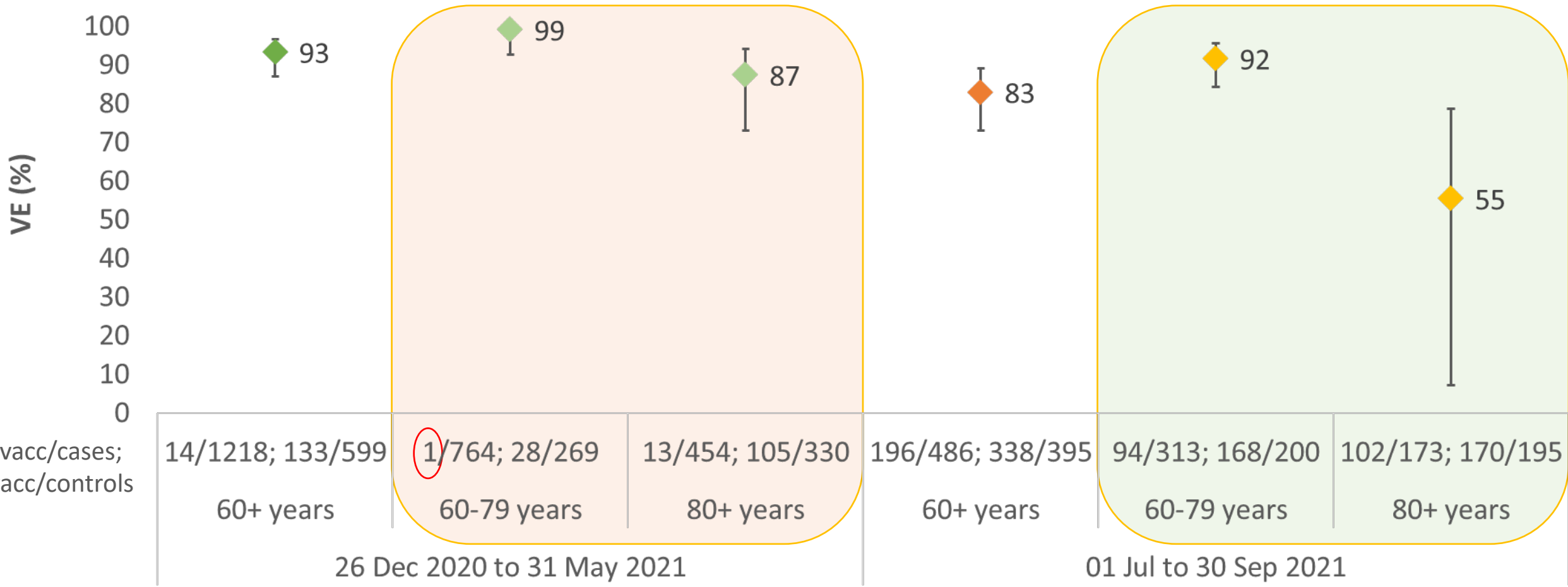
Patient characteristics: vaccine product

ECDC & I-MOVE COVID-19 VE hospital study, Europe, 01 Jul–30 Sep 2021 (N=578)

Delta period

		Vaccinated cases (n=228)		Vaccinated controls (n=350)	
		No.	%	No.	%
First dose	Comirnaty	155	68	270	77
	Vaxzevria	31	14	35	10
	Spikevax	7	3	19	5
	Janssen	19	8	9	3
	Curevac	1	<1	1	<1
	Unknown	15	7	16	5
Second dose	Comirnaty	147	80	263	80
	Vaxzevria	19	10	31	9
	Spikevax	6	3	18	5
	CVnCoV	0	0	1	<1
	Unknown	11	6	16	5

COVID-19 vaccine effectiveness among hospitalised patients (all vaccine types) in target group for vaccination aged 60+ at swab date by age-group, complete primary dose ECDC & I-MOVE COVID-19 VE hospital study, Europe, 27 Dec 2020–30 Sep 2021*

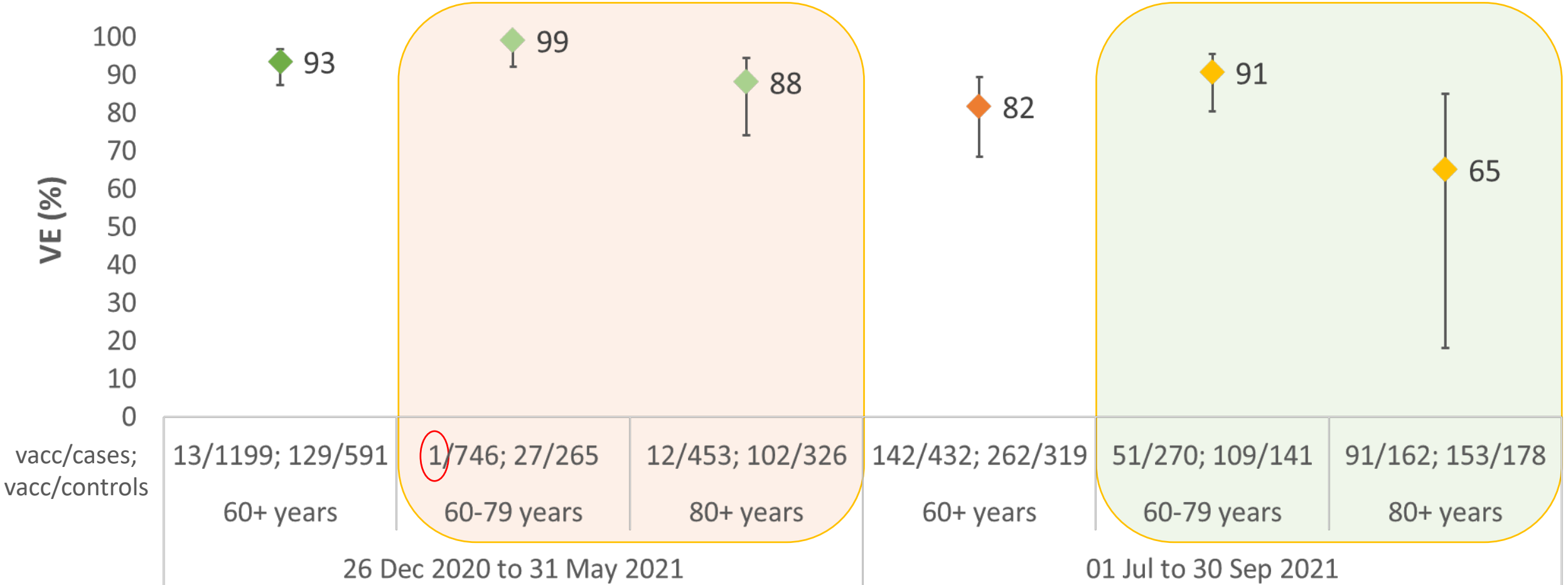


Period of swab for SARI patients overall and by age group

8 sites: BE, ES, FR, HR, LT, MT, NA, NL (26 Dec 2020-31 May 2021); BE, ES, FR, HR, LT, MT, NA, PT (01 Jul-30 Sep 2021)

*Adjusted by site, sex, age, month of swab, ≥ 1/4 common chronic conditions

COVID-19 vaccine effectiveness among hospitalised patients (**Comirnaty vaccine**)
 in target group for vaccination aged 60+ at swab date **by age-group, complete primary dose**
 ECDC & I-MOVE COVID-19 VE hospital study, Europe, 27 Dec 2020–30 Sep 2021*



Period of swab for SARI patients overall and by age group

7 sites: BE, ES, FR, HR, MT, NA, NL (26 Dec 2020-31 May 2021); 8 sites: BE, ES, FR, HR, LT, MT, NA, PT (01 Jul-30 Sep 2021)

*Adjusted by site, sex, age, month of swab, ≥ 1/4 common chronic conditions

Discussion

- VE >80% observed in both periods of 2021 for 60+ years
- Lower VE in later (Delta-dominant) than pre-Delta period for 60+ years
 - 83% (95%CI 73–89) vs 93% (95%CI 87–97)
 - higher vaccine coverage during Delta than pre-Delta period
- 60–79 year olds have higher VE than 80+
 - note: **only one vaccinated case** among 60–79 year olds in pre-Delta period
- Particularly lower VE in Delta period for the oldest age group (80+)
 - 87% (95%CI 73–94) vs **55%** (95%CI 7–79: **very wide CIs**)
 - clinically extremely vulnerable?
 - waning of primary course of vaccination greater/faster in older individuals?
 - very high vaccine coverage in 80+ (targeted first for vaccination)
 - are unvaccinated representative ?

Conclusion

- COVID-19 vaccination provides significant protection at hospital level among those aged 60+
 - 9 in 10 persons aged 60+ could avoid hospitalisation in pre-Delta period by having completed a primary vaccine course (8 in 10 for Delta period)
 - this remains true even in the Delta dominant period *for those aged 60–79*

Challenges

- Only Comirnaty with enough sample size for product-specific
- Limited sequencing
- Representativeness of unvaccinated as vaccination coverage increases
- Site challenges with sample size
 - very few/no controls in some sites
 - case numbers declining with increased vaccination (vaccinated case numbers very low)
 - suggests that vaccination is working against hospitalisation

Next steps

- Study ongoing → in future analyses: VE over time and by
 - booster dose(s)
 - time since vaccination
 - delay between doses
 - other vaccine products
 - variant(s)
 - other outcomes (ICU admission, death)
- Pooling with other TND VE networks

Thank you especially to all participants, hospital staff, and study sites

- **Study participants**
- **Study sites ECDC & I-MOVE COVID-19 hospital VE networks**
 - **Albania, IPH:** S Bino, I Hasibra, A Simaku, V Adela, E Nelaj, I Preza
 - **Belgium, UZB:** L Seyler, T Demuyser E Van Nedervelde
 - **Belgium, Sciensano:** N Bossuyt, I Thomas, B Lissoir, K Magerman, M Bourgeois, N Fischer, N Dauby, M Reynders, S Denayer
 - **France, REIVAC:** O Launay, F Laine, A Pini, F Galtier, P Vanhems, Z Lesieur, N Lenzi, LB Luong, Y Saidi, S Amour, LB Luong
 - **France, SPF:** D Levy-Bruhl, A Pini, A Maisa, S Bernard-Stoecklin
 - **Greece, NIPH (EODY):** S Michelaki, M Amerali
 - **Croatia, NIPH:** G Petrović, Z Lovrić Makarić, I Pem Novosel, P Smoljo
 - **Czechia, PHI:** H Orliková
 - **Czechia, UH Brno:** P Husa, L Součková
 - **Ireland, HPSC:** L Domegan, A Cotter, N Petty Saphon, M Brady
 - **Lithuania, UnL:** G Gefenaite, I Jonikaite, M Kuliese, A Mickiene
 - **Luxembourg, MoH:** N Aouali, G Fagherazzi, A Al Kerwi, F Berthet, M Alexandre
 - **Malta, HPDPD:** J Baruch, JP Cauchi, M-L Borg, A Dziugyte, T Melillo
 - **Netherlands:** A Niessen, M Knol
 - **Portugal, INSA:** B Nunes, A Machado, R Guiomar, A Rodrigues, V Gomez, I Kislaya, V Gaio
 - **Romania, Cantacuzino:** M Lazar, I Loghin, A Marin, E Duca
 - **Spain, ISPL, Navarra:** J Castilla, C Burgui Alcaide, I Casado Buesa
 - **Spain, National Centre for Epidemiology (CNE), ISCIII:** A Larrauri, C Mazagatos Ateca
 - **Spain, National Centre for Microbiology (CNM), ISCIII:** F Pozo, V Sandonis, I Casas
- **Epiconcept:** M Valenciano, A Moren, A Nardone, E Kissling, V Nancey, D Marques, K Voy
- **ECDC:** S Bacci, C Carstairs, N Nicolay
- **EC:** S Sowinski, C Pereira, E Depoortere
- **WHO/EURO:** R Pebody, M Katz, P Jorgensen