

SHINE: Scaleable Health Intervention Evaluation

An integrated epidemiologic and economic model to assess optimal COVID-19 pandemic policy

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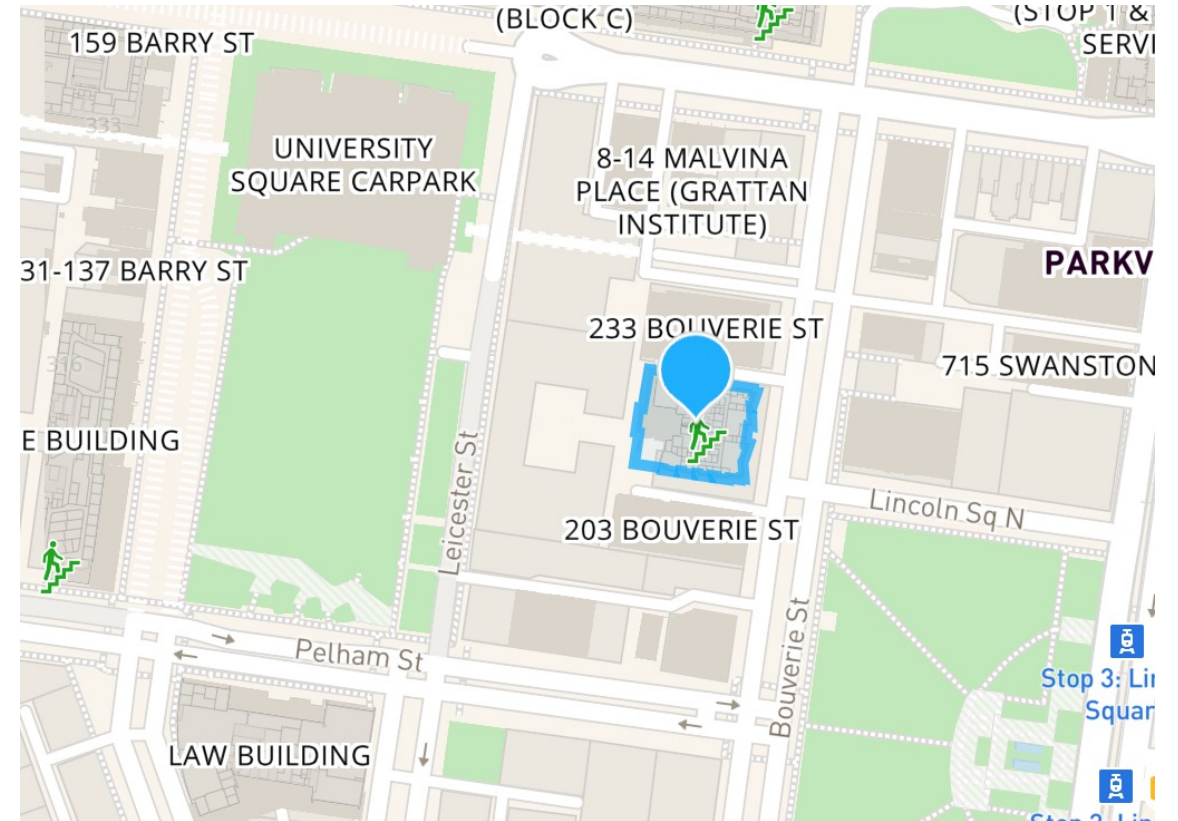
Population Interventions Unit

Aim

We seek to quantify the health, health equity and cost impacts of population interventions

Our work

- Population intervention modelling
 - COVID-19 modelling
 - Denicotinising tobacco in New Zealand
 - Eradicating cold housing in Australia
- SHINE: Scaleable health Intervention Evaluation



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Background

- Ongoing pandemic planning is critical, but the future is very uncertain
 - Ongoing SARS-CoV-2 evolution and emergence of variants of concern
 - Growing, dynamic population immunity (from vaccination and infection)
 - Expanding options for managing outbreaks and associated clinical disease
 - Political factors, population behavioural factors
- Policy decisions cannot be made based solely on the state of the pandemic today
- Benefits and costs of interventions should be assessed and compared explicitly, transparently, and systematically (including from the point of view of cost effectiveness) given they have broad implications beyond public health



Background

- We developed an agent-based model to evaluate 2,816 future scenarios over 18 months from April 2022:
 - Policy options (44): (a) PHSMs (higher/lower stringency), (b) respiratory policy (stockpile/no stockpile), (c) vaccination schedules (11, with current and next-generation vaccines [including nil further vaccination])
 - SARS-CoV-2 variant scenarios (64): (a) timing (4 dates), (b) antigenic similarity to Omicron, (c) immune escape (nil/moderate/high), (d) innate infectiousness (R_0 11/14) and (e) virulence (low [similar to Omicron]/high)

Policy scenarios (44 scenarios)

Public Health and social measures (2 scenarios)

Vaccine schedule (11 scenarios)

Mask policy (2 scenarios)

Known-unknown scenarios (64 scenarios)

Variant incursion timing (4 scenarios)

Variant antigenic composition (2 scenarios)

Variant immune escape capacity (2 scenarios)

Variant infectivity (2 scenarios)

Variant virulence (2 scenarios)



Agent-based model

- Daily cycle length, 18 months
- 2,500 agents scaled to represent the Victorian population (6.6 million people)
- Infection informed by parameters that influence viral transmission, including agent infectivity, compliance with isolation, age-stratified susceptibility to infection, etc.
- Each scenario (2,816) run 400 times (100 iterations of separate draws of input parameters, each run 4 times to dampen stochastic variation)
- Three types of uncertainty:
 - Stochastic uncertainty
 - Input parameter uncertainty
 - Scenario uncertainty



Policy options

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Policy scenarios: PHSMs

Escalation and de-escalation from stages of lockdown based on projected fortnightly hospitalisations.

We model two policy scenarios:

1. High stringency PHSMs; and
2. Low stringency PHSMs

PHSM policies	Low	High
0 hosp. per million	Stage 1	Stage 1
> 90 hosp. per million		Stage 2
> 130 hosp. per million		Stage 3
> 180 hosp. per million	Stage 2	Stage 4
> 200 hosp. per million		
> 270 hosp. per million	Stage 3	Stage 5
> 300 hosp. per million		
> 400 hosp. per million	Stage 4	
> 600 hosp. per million	Stage 5	

Policy scenarios: PHSMs

Proportion of people who try to avoid contact with others (excluding their household)

Stage 1

Stage 2

Stage 3

Stage 4

Stage 5

35%

53%

63%

75%

85%

Proportion of time spent trying to avoid contacts, for those that attempt to do so

45%

63%

73%

83%

90%

Proportion of workers attending work in person

70%

51%

35%

20%

10%

Schools open (disable contact avoiding behaviour among students)

Yes

Yes

Yes

No

No

Proportion of people that wear masks outside the home

- ≥ 20 -year-olds
- 10- to 19-year-olds
- < 10 -year-olds

20%

35%

60%

80%

90%

16.7%

26.67%

40%

53.3%

60%

11.1%

17.78%

26.67%

35.6%

40%

Proportion of mask wearing that is with a respirator

- No government supply
- Government supply policy active

20%

20%

20%

20%

20%

20%

20%

80%

80%

80%

Proportion of people that engage in super spreading behaviour each day (move to a random gathering location)

5%

3.5%

2.2%

1.6%

1%

Underlying frequency of visiting a random nearby gather location each day (e.g., a supermarket)

14.28%

14.28%

13%

7.5%

5%

Radius for determining whether a gather location counts as nearby

8.8

6.7

6

5

3.6

Maximum distance moved by an agent each day

12

9

7.5

6

5



Policy options: vaccination schedule

- 11 schedules:
 - Nil
 - 5 combinations of current and next-generation vaccines (Omicron-targeted, multivalent)
 - General population v. ≥ 60 years
- Vaccine effectiveness (VE):
 - Based on previously published model of VE waning
 - Multivalent vaccine: twice the VE (on an odds scale) of current mRNA vaccines against all variants
 - Omicron-targeted vaccine: twice the VE for variants antigenically like Omicron
 - VE interacts with variant immune escape characteristics
- Costs:
 - Omicron-targeted 25% more and multivalent 50% more than current generation. Costs include transportation, administration (GPs, pharmacies), health promotion, overheads

Policy options: vaccination schedule

Scenario	Apr – Jun '22	Jul – Sep '22	Oct – Dec '22	Jan – Mar '23	Apr – Jun '23	Jul – Sep '23
A. Nil further						
B. 3 CG (all)		CG		CG		CG
C. 1 CG, then 2 OT (all)		CG		OT		OT
D. 2 OT (all)			OT		OT	
E. 1 CG then 2 MV (all)		CG		M		M
F. 2 MV (all)			M		M	
G. 3 CG (≥ 60 years)		CG		CG		CG
H. 1 CG then 2 OT (≥ 60 years)		CG		OT		OT
I. 2 OT (≥ 60 years)			OT		OT	
J. 1 CG then 2 MV (≥ 60 years)		CG		M		M
K. MV only (≥ 60 years)			M		M	



Policy options: respirators

- Respirators (e.g., N95 or P2 masks) reduce infection risk by approximately 80%¹
- Effectiveness estimates used in our model:
 - Cloth/surgical masks: OR 0.468
 - N95 respirators: OR 0.204
- 2 policy options:
 - No government supply of respirators. Respirator use remains at 20% of mask-wearers at all stages.
 - Government stockpile and supply of respirators to all people ≥ 10 years for use in stages ≥ 3 . Respirator use changes from 20% to 80% accordingly. Costs include respirators, warehouse storage, distribution, health promotion, overheads.



Variant scenarios

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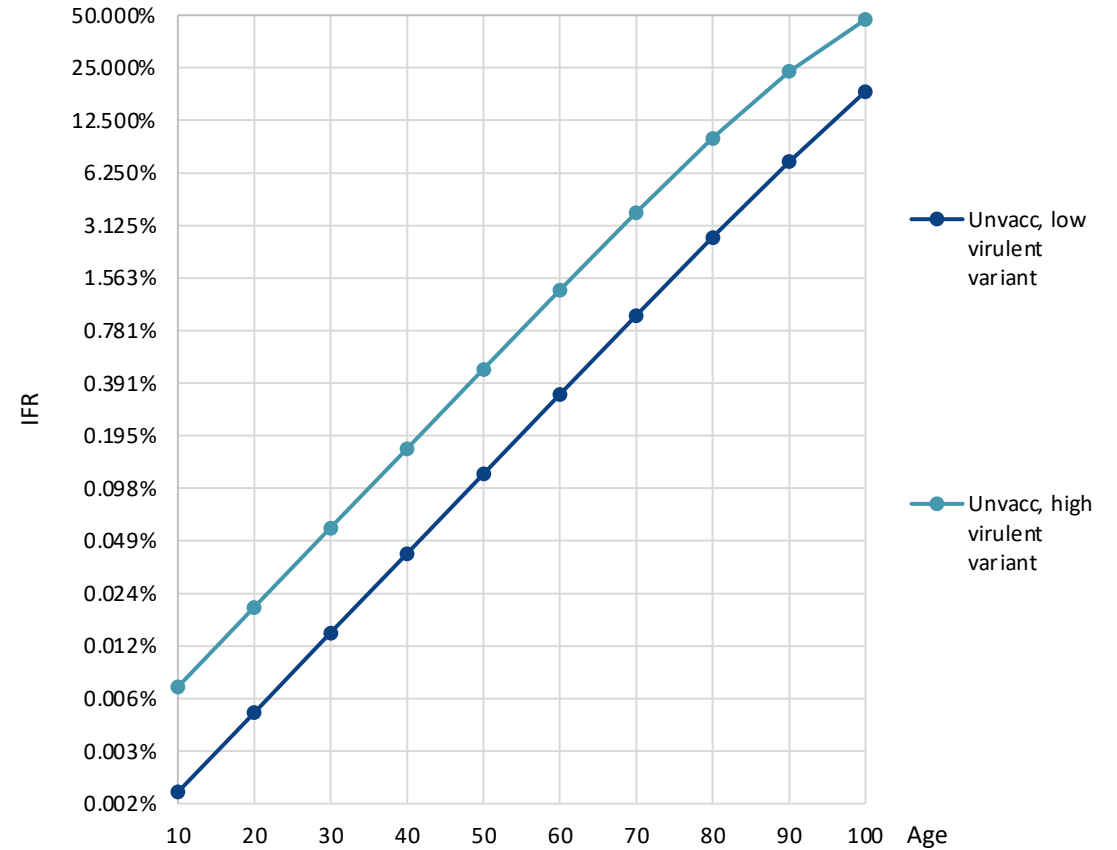


Variant scenarios: virulence

We don't know how virulent a new variant might be

We model two scenarios:

1. Low virulence (like omicron)
2. High virulence (doubled in OR terms)





Variant scenarios – innate transmissibility

We don't know how infective a new variant might be

We model two w R_0 scenarios:

- $R_0 = 11$ (approximating Omicron BA.2; uniform distribution: 10 to 12)
- $R_0 = 14$ (more infective than Omicron BA.2 14; uniform distribution: 13 to 15)

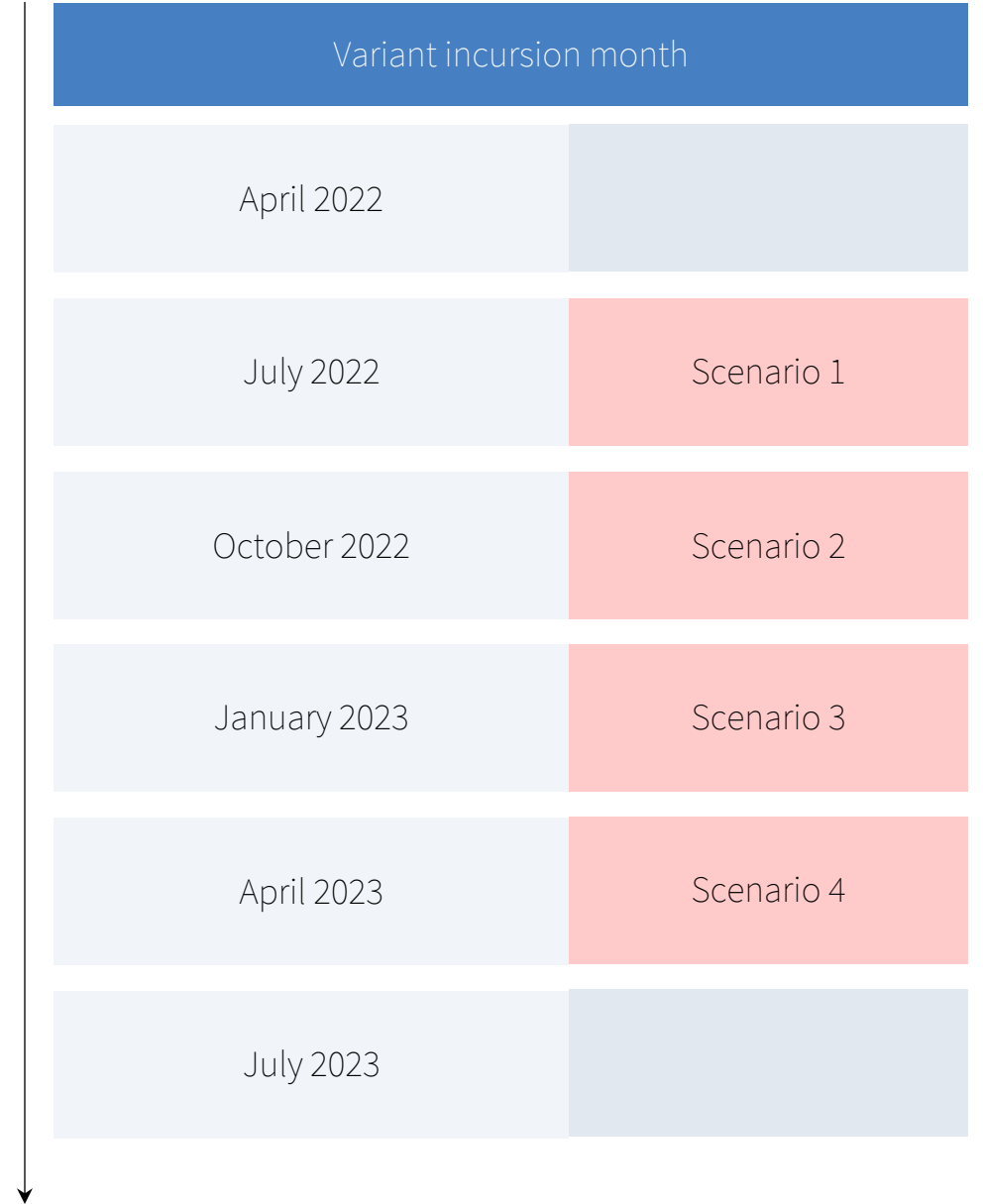


Variant scenarios: timing

We don't know when a new variant might arrive

We model four scenarios:

1. July 2022
2. October 2022
3. January 2023
4. April 2023



Variant scenarios – immune escape as odds ratios applied to VE at any point in time

		Current generation double dose	Current generation 3+ doses	Next-gen Omicron-targeted 1+ doses	Next-gen multivalent 1+ doses
	Current Omicron (BA.2)	1 (ref) [†]	1 (ref) [‡]	2	2
New variants with same innate infectiousness as Omicron BA.2 ($R_0 = 11$, range 10 to 12)	Omicron-like variant	<i>0.707, 0.5</i>	<i>0.707, 0.5</i>	<i>1.414, 1</i>	<i>1.414, 1</i>
	Novel variant	<i>0.707, 0.5</i>	<i>0.707, 0.5</i>	<i>1, 0.707</i>	<i>1.414, 1</i>
New variants with higher innate infectiousness than Omicron BA.2 ($R_0 = 14$, range 13 to 15)	Omicron-like variant	<i>1, 0.707</i>	<i>1, 0.707</i>	<i>2, 1.414</i>	<i>2, 1.414</i>
	Novel variant	<i>1, 0.707</i>	<i>1, 0.707</i>	<i>1.414, 1</i>	<i>2, 1.414</i>

[†]Reference for the current generation double dose column.

[‡]Reference for the current generation triple dose, next-generation omicron-targeted and next-generation multivalent columns. These ORs apply at any point in time, with waning post last dose also in effect. All italicized ORs are drawn from a range of 0.841 to 1.189 of their stated values, with 100% correlation (including the OR of 2 for next-generation vaccines against current Omicron) uniformly on the log OR scale. For each combination of vaccine and variant, 2 levels of possible immune escape are modelled.

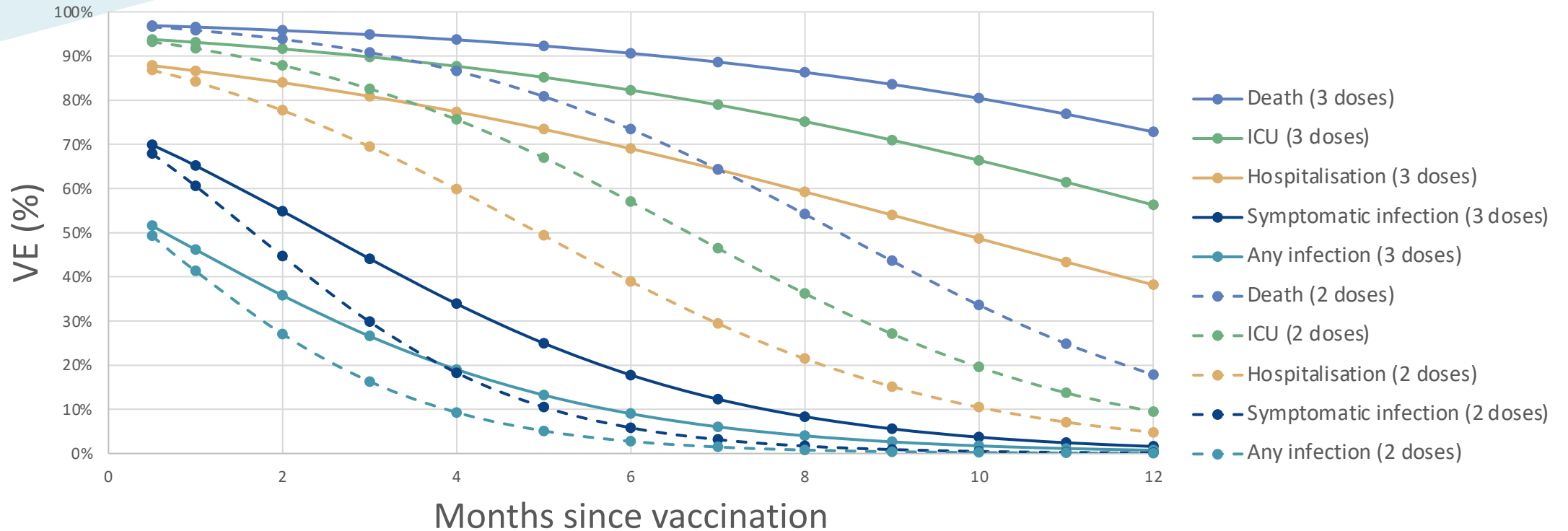


Immunity and waning

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Immunity and waning - VE

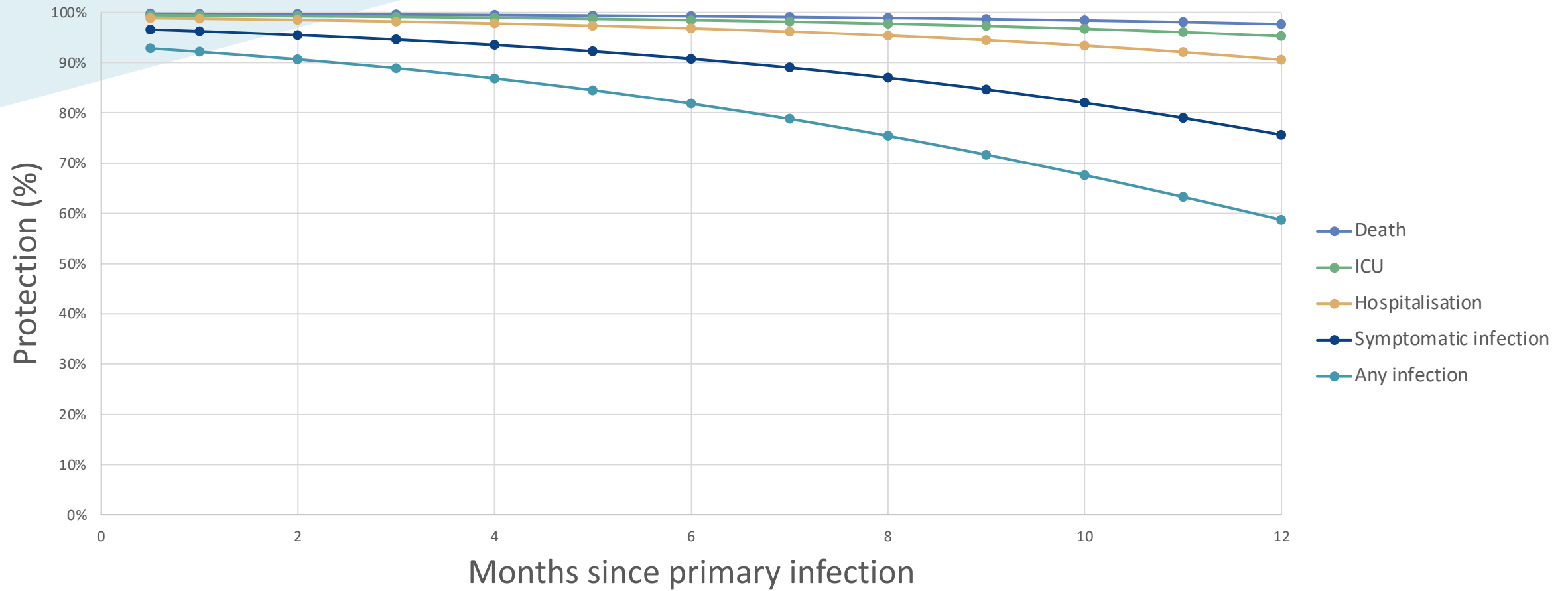
VE for triple and double dose by clinical outcome, people <60 years, Omicron variant



$$\text{logit}(VE) = \alpha + \beta_0 \text{Age} + \beta_1 \text{Severity}_j + \beta_2 \text{Triple} + \beta_3 \text{Month} + \beta_4 \text{Severity} * \text{Month} + \beta_5 \text{Triple} * \text{Month}$$

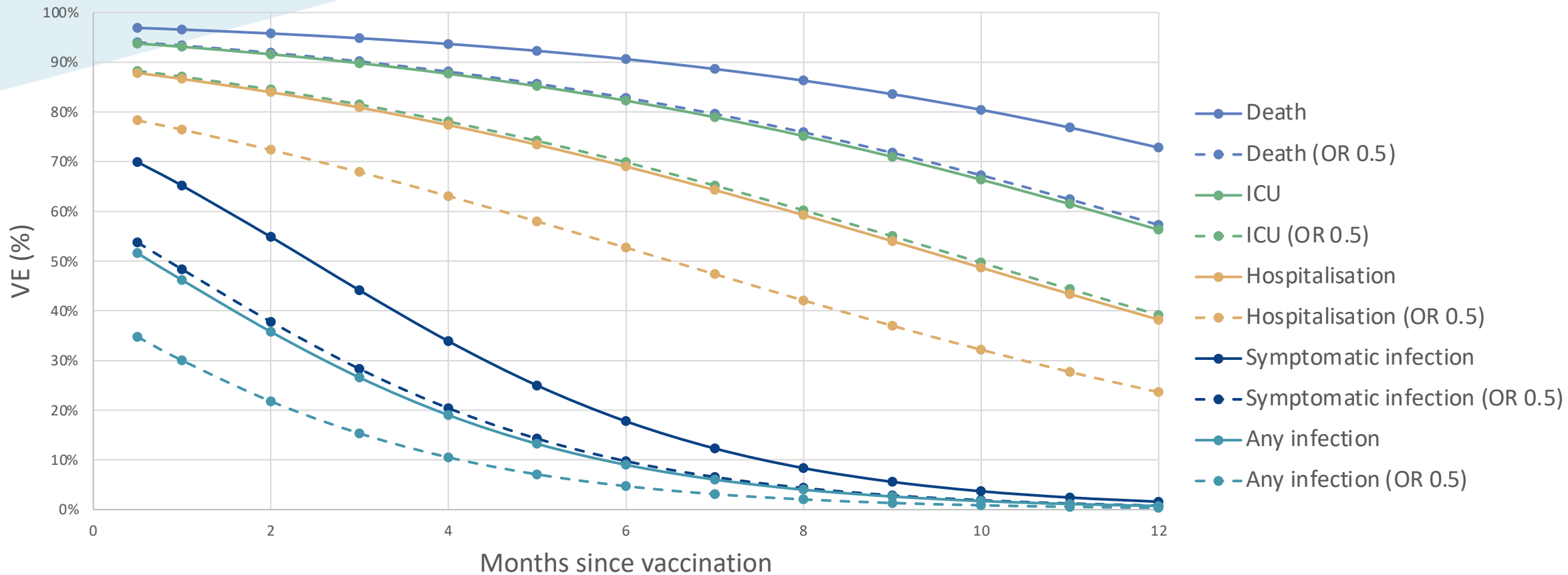
Immunity and waning – natural immunity

Protection following infection by clinical outcome, people <60 years



Immunity and waning – immune escape

VE for triple dose (current generation vaccine) by clinical outcome, people <60 years, Omicron BA.1/2 variant (solid lines) and variant with immune escape (dashed lines; OR 0.5 applied)





Results

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Outputs

- Acute COVID-19 morbidity (number of infections/hospitalisations/ICU admissions and HALY loss)
- Long COVID morbidity
- Mortality (number of deaths and HALY loss)
- Acute COVID-19 expenditure (testing, medication, ambulatory care and hospital/ICU costs)
- Long COVID expenditure
- Intervention costs (unit costs of vaccines and respirators, associated health promotion/transport/storage/vaccine administration/respirator distribution costs)
- Unrelated disease costs (reduced future health expenditure due to deaths)
- GDP loss due to PHSMs
- Net monetary benefit – from (i) health system and (ii) health system plus GDP (i.e. partial societal) perspectives
- Overall policy ranking using (i) NMB from health system perspective, (ii) NMB from health system + GDP perspective, (iii) deaths and (iv) health system (hospital) pressure



Results – heat maps (infections, 18 months)

PHSM policy stringency

Respirator stockpile?

Vaccine schedule

Lower												Higher												Higher												Higher											
No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	E	F	G	H	I	J	K	L

Virulence RO Immune escape Antigenic characteristics

Virulence	RO	Immune escape	Antigenic characteristics
<i>Incursion day 91</i>			
High	11	Higher	Novel
High	11	Higher	Omicron-like
High	11	Lower	Novel
High	11	Lower	Omicron-like
High	14	Higher	Novel
High	14	Higher	Omicron-like
High	14	Lower	Novel
High	14	Lower	Omicron-like
Low	11	Higher	Novel
Low	11	Higher	Omicron-like
Low	11	Lower	Novel
Low	11	Lower	Omicron-like
Low	14	Higher	Novel
Low	14	Higher	Omicron-like
Low	14	Lower	Novel
Low	14	Lower	Omicron-like

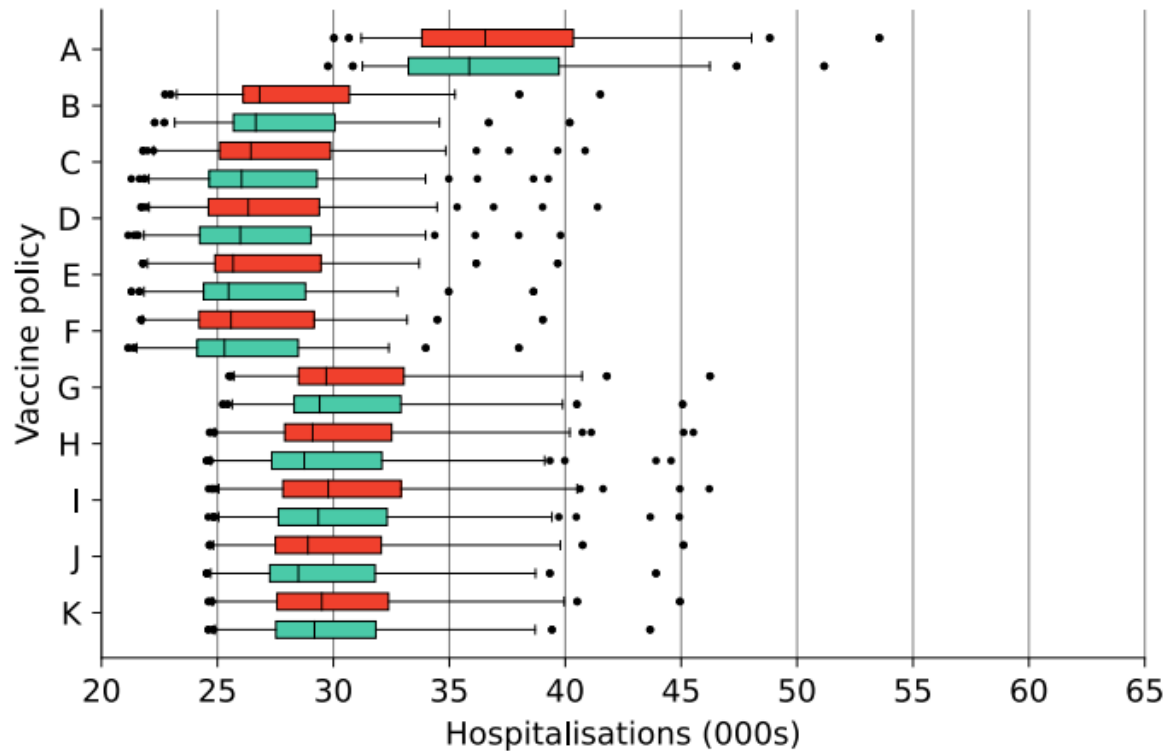
5.9M	5.9M	6.0M	6.0M	6.0M	5.9M	6.3M	6.3M	6.4M	6.4M	6.4M	5.8M	5.8M	5.9M	5.9M	5.9M	5.8M	6.2M	6.2M	6.3M	6.3M	6.3M	4.6M	4.7M	4.8M	4.8M	4.8M	4.8M	5.0M	5.1M	5.1M	5.1M	5.1M	4.5M	4.6M	4.6M	4.7M	4.6M	4.7M	4.8M	4.9M	4.9M	5.0M	5.0M	5.0M	5.0M	
5.9M	5.9M	6.0M	5.9M	6.0M	5.9M	6.3M	6.4M	6.4M	6.4M	6.4M	5.8M	5.8M	5.9M	5.8M	5.9M	5.8M	6.2M	6.3M	6.3M	6.3M	6.3M	4.6M	4.7M	4.8M	4.8M	4.8M	4.8M	5.0M	5.1M	5.1M	5.1M	5.1M	4.5M	4.6M	4.6M	4.7M	4.6M	4.7M	4.8M	5.0M	5.0M	5.0M	5.0M	5.0M	5.0M	
5.5M	5.3M	5.4M	5.4M	5.4M	5.3M	5.8M	5.9M	5.9M	5.9M	6.0M	5.4M	5.3M	5.3M	5.4M	5.3M	5.3M	5.8M	5.8M	5.9M	5.9M	5.9M	4.4M	4.4M	4.4M	4.5M	4.4M	4.4M	4.8M	4.9M	4.9M	4.9M	5.0M	4.3M	4.2M	4.3M	4.4M	4.3M	4.4M	4.7M	4.7M	4.8M	4.8M	4.8M	4.8M	4.8M	
5.5M	5.3M	5.4M	5.3M	5.4M	5.3M	5.8M	5.9M	6.0M	5.9M	6.0M	5.4M	5.3M	5.3M	5.3M	5.3M	5.8M	5.9M	5.9M	5.9M	5.9M	4.4M	4.4M	4.4M	4.4M	4.4M	4.4M	4.8M	4.9M	5.0M	4.9M	5.0M	4.3M	4.2M	4.3M	4.4M	4.3M	4.4M	4.7M	4.8M	4.8M	4.8M	4.8M	4.8M	4.8M	4.8M	
7.2M	7.2M	7.3M	7.2M	7.2M	7.1M	7.7M	7.8M	7.8M	7.8M	7.8M	7.0M	7.1M	7.1M	7.1M	7.1M	7.0M	7.6M	7.6M	7.6M	7.7M	7.7M	5.7M	5.8M	5.9M	5.9M	5.9M	5.9M	6.2M	6.2M	6.3M	6.3M	6.4M	5.4M	5.6M	5.6M	5.7M	5.7M	5.7M	6.0M	6.0M	6.0M	6.1M	6.1M	6.1M	6.1M	6.1M
7.2M	7.2M	7.2M	7.1M	7.2M	7.1M	7.7M	7.8M	7.8M	7.8M	7.8M	7.0M	7.1M	7.1M	7.0M	7.1M	7.0M	7.6M	7.7M	7.7M	7.7M	7.7M	5.7M	5.8M	5.9M	5.9M	5.9M	6.2M	6.3M	6.4M	6.3M	6.4M	5.4M	5.6M	5.7M	5.7M	5.7M	5.7M	6.0M	6.1M	6.1M	6.1M	6.1M	6.1M	6.1M	6.1M	6.1M
6.8M	6.6M	6.6M	6.6M	6.5M	6.4M	7.2M	7.3M	7.3M	7.3M	7.3M	6.6M	6.5M	6.5M	6.5M	6.5M	6.4M	7.1M	7.2M	7.2M	7.2M	7.2M	5.4M	5.4M	5.4M	5.5M	5.4M	5.4M	5.9M	6.0M	6.0M	6.0M	6.1M	5.2M	5.2M	5.3M	5.3M	5.2M	5.2M	5.7M	5.8M	5.8M	5.8M	5.8M	5.8M	5.8M	5.8M
6.8M	6.6M	6.5M	6.4M	6.5M	6.4M	7.2M	7.3M	7.3M	7.3M	7.3M	6.6M	6.5M	6.5M	6.4M	6.5M	6.4M	7.1M	7.2M	7.2M	7.2M	7.2M	5.4M	5.4M	5.4M	5.4M	5.4M	5.9M	6.0M	6.1M	6.0M	6.1M	5.2M	5.2M	5.2M	5.2M	5.2M	5.2M	5.7M	5.8M	5.8M	5.8M	5.8M	5.8M	5.8M	5.8M	
7.2M	6.8M	6.9M	6.7M	6.7M	6.5M	7.1M	7.2M	7.1M	7.1M	7.2M	7.2M	6.8M	6.8M	6.7M	6.8M	6.5M	7.2M	7.2M	7.1M	7.2M	7.1M	6.5M	6.3M	6.4M	6.2M	6.3M	6.0M	6.7M	6.7M	6.7M	6.7M	6.6M	6.4M	6.3M	6.3M	6.1M	6.2M	6.0M	6.7M	6.7M	6.6M	6.7M	6.6M	6.7M	6.6M	
7.2M	6.8M	6.7M	6.5M	6.7M	6.5M	7.1M	7.1M	7.1M	7.1M	7.2M	7.2M	6.8M	6.8M	6.5M	6.8M	6.5M	7.2M	7.2M	7.1M	7.2M	7.1M	6.5M	6.3M	6.3M	6.0M	6.3M	6.0M	6.7M	6.7M	6.6M	6.7M	6.6M	6.4M	6.3M	6.2M	6.0M	6.2M	6.0M	6.7M	6.7M	6.6M	6.7M	6.6M	6.7M	6.6M	
6.6M	6.2M	6.2M	6.0M	6.1M	5.9M	6.7M	6.6M	6.6M	6.6M	6.6M	6.6M	6.2M	6.2M	6.0M	6.1M	5.9M	6.6M	6.6M	6.6M	6.6M	6.6M	6.1M	5.8M	5.8M	5.6M	5.6M	5.4M	6.2M	6.2M	6.2M	6.2M	6.2M	6.0M	5.7M	5.7M	5.5M	5.7M	5.4M	6.2M	6.1M	6.1M	6.2M	6.2M	6.2M	6.2M	
6.6M	6.2M	6.1M	5.9M	6.1M	5.9M	6.7M	6.6M	6.6M	6.6M	6.6M	6.6M	6.2M	6.1M	5.9M	6.1M	5.9M	6.6M	6.6M	6.6M	6.6M	6.6M	6.1M	5.8M	5.6M	5.4M	5.6M	5.4M	6.2M	6.2M	6.2M	6.2M	6.2M	6.0M	5.7M	5.7M	5.4M	5.7M	5.4M	6.2M	6.2M	6.2M	6.2M	6.2M	6.2M	6.2M	
8.8M	8.4M	8.5M	8.2M	8.4M	8.0M	8.9M	8.9M	8.8M	8.9M	8.8M	8.8M	8.3M	8.5M	8.1M	8.4M	8.0M	8.9M	8.9M	8.8M	8.9M	8.8M	8.0M	7.7M	7.8M	7.4M	7.8M	7.4M	8.3M	8.2M	8.1M	8.2M	8.1M	7.9M	7.7M	7.8M	7.5M	7.7M	7.3M	8.2M	8.2M	8.1M	8.2M	8.1M	8.2M	8.1M	
8.8M	8.4M	8.4M	8.0M	8.4M	8.0M	8.9M	8.9M	8.8M	8.9M	8.8M	8.8M	8.4M	8.4M	8.0M	8.4M	8.0M	8.9M	8.9M	8.8M	8.9M	8.8M	8.0M	7.7M	7.8M	7.4M	7.8M	7.4M	8.3M	8.2M	8.1M	8.2M	8.1M	7.9M	7.7M	7.7M	7.3M	7.7M	7.3M	8.2M	8.2M	8.1M	8.2M	8.1M	8.2M	8.1M	
8.2M	7.6M	7.7M	7.4M	7.5M	7.2M	8.3M	8.3M	8.1M	8.2M	8.2M	8.2M	7.6M	7.7M	7.4M	7.5M	7.2M	8.2M	8.3M	8.2M	8.3M	8.1M	7.5M	7.1M	7.2M	6.9M	7.1M	6.7M	7.7M	7.7M	7.6M	7.6M	7.4M	7.1M	7.1M	6.8M	7.0M	6.6M	7.7M	7.7M	7.6M	7.7M	7.6M	7.7M	7.6M		
8.2M	7.6M	7.5M	7.2M	7.5M	7.2M	8.3M	8.2M	8.2M	8.2M	8.2M	8.2M	7.6M	7.5M	7.2M	7.5M	7.2M	8.2M	8.3M	8.1M	8.3M	8.1M	7.5M	7.1M	7.1M	6.7M	7.1M	6.7M	7.7M	7.7M	7.6M	7.6M	7.4M	7.1M	7.0M	6.6M	7.0M	6.6M	7.7M	7.7M	7.6M	7.7M	7.6M	7.7M	7.6M		

*single incursion date shown (July 2022)

Results – median hospitalisations, 18 months

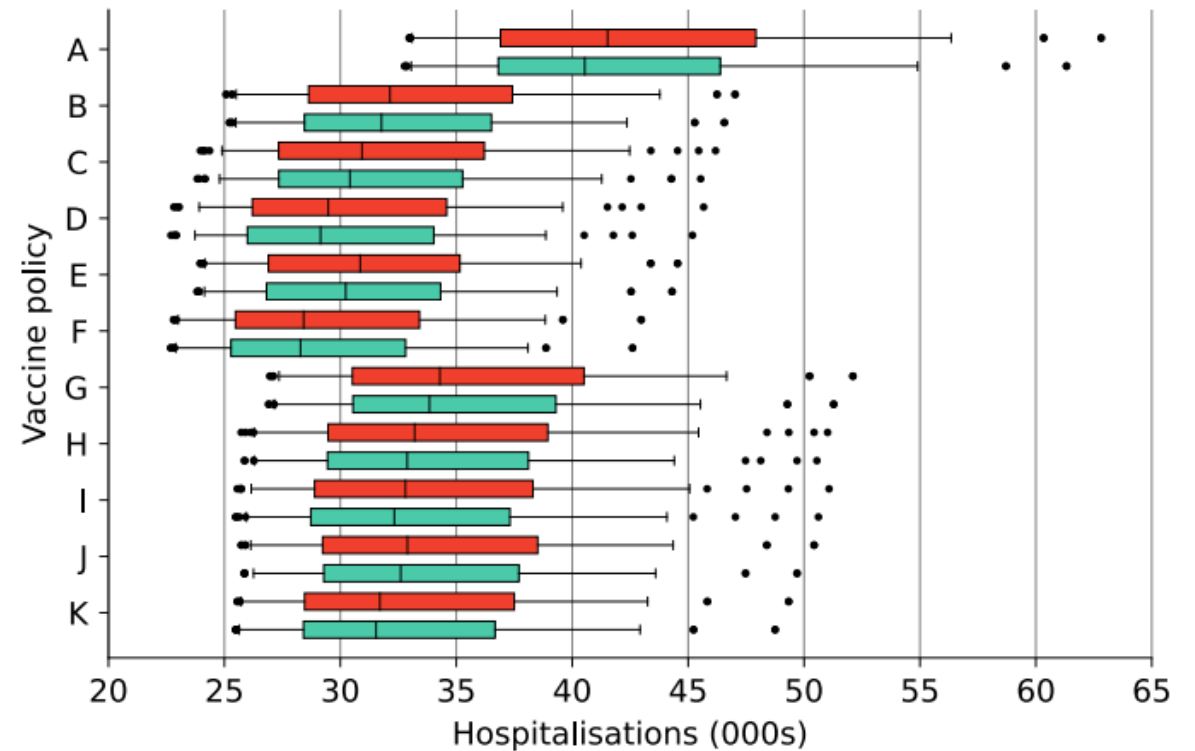
Low stringency public health and social measures (PHSMs)

Total hospitalisations



High stringency public health and social measures (PHSMs)

^{1pt} Total hospitalisations



■ Stockpile respirators
 ■ No stockpile of respirators

Results – ranked policies, evenly weighted over all 64 variant scenarios

Vaccine schedule	Vaccines	Age group vaccinated	Stockpile respirators?	PHSM stringency	NMB rank (health system only)	NMB rank (health system plus GDP)	Hospitalisations >750 (days)	Hospitalisations >1500 (days)	Deaths	Overall rank
F	MV (Q3/5)	All	No	Higher	2	23	52	12	4069	1
F	MV (Q3/5)	All	Yes	Higher	14	25	50	11	4062	2
D	OT (Q3/5)	All	No	Higher	1	24	53	12	4186	3
F	MV (Q3/5)	All	Yes	Lower	16	2	64	24	4440	4
F	MV (Q3/5)	All	No	Lower	12	1	65	25	4601	5
D	OT (Q3/5)	All	Yes	Higher	15	26	52	11	4182	6
E	CG (Q2), MV (Q4/6)	All	No	Higher	11	28	52	14	4151	6
J	CG (Q2), MV (Q4/6)	≥60	No	Higher	8	33	52	10	4501	8
D	OT (Q3/5)	All	Yes	Lower	17	4	66	25	4502	9
K	MV (Q3/5)	≥60	No	Higher	5	27	54	11	4607	10
H	CG (Q2), OT (Q4/6)	≥60	No	Higher	7	34	53	10	4553	11
E	CG (Q2), MV (Q4/6)	All	Yes	Higher	22	32	51	12	4136	11
D	OT (Q3/5)	All	No	Lower	13	3	67	26	4674	13
C	CG (Q2), OT (Q4/6)	All	No	Higher	10	31	54	15	4269	14
I	OT (Q3/5)	≥60	No	Higher	4	29	55	11	4673	15
B	CG (Q2/4/6)	All	No	Higher	9	36	56	14	4364	16
C	CG (Q2), OT (Q4/6)	All	Yes	Higher	21	35	53	13	4214	17
K	MV (Q3/5)	≥60	Yes	Higher	24	30	53	10	4608	18
J	CG (Q2), MV (Q4/6)	≥60	Yes	Higher	27	39	52	9	4488	19
K	MV (Q3/5)	≥60	No	Lower	18	5	70	25	5018	19
C	CG (Q2/4/6)	≥60	No	Higher	6	27	56	11	4668	21

Policy ranking

This table ranks optimal combinations of vaccine policy, public health and social measure (PHSM) policy, and respirator policy, according to various health and economic outcome metrics.¹ Rankings are produced using the scenario criteria specified in the [control panel](#), and the outcome metric weights specified in the [ranking criteria](#).

Vaccine policy ²	PHSM policy	Respirator policy	NMB (health system) rank ³	NMB (health system + GDP) rank ³	Health system stress rank ⁴	Deaths rank ⁵	Overall rank
2 doses multivalent vaccines to all age-groups	High stringency PHSM	No stockpile of respirators	2	23	7	2	1
2 doses multivalent vaccines to all age-groups	High stringency PHSM	Stockpile respirators	14	25	3	1	2
2 doses omicron-targeted vaccines to all age-groups	High stringency PHSM	No stockpile of respirators	1	24	15	6	3
2 doses multivalent vaccines to all age-groups	Low stringency PHSM	Stockpile of respirators	16	2	22	11	4

► [Supplementary notes \(click to reveal\):](#)

Ranking criteria

Define your own ranking criteria, and see how this alters optimal [policy ranking](#).

Metric weights

Specify how much weight to provide each outcome metric when calculating the overall rank.

1	NMB (health system)	0.25
2	NMB (health system + GDP)	0.25
3	Health system stress	0.25
4	Deaths	0.25

[Calculate](#) →

Control Panel

Policy ranking

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► [Supplementary notes \(click to reveal\):](#)

Ranking criteria

Control Panel

Add or remove scenarios based on your view of future SARS-CoV-2 evolution, and see how this alters optimal policy ranking.

Timing of variant arrival

Innate transmissibility (R0)

Virulence

Antigenic composition

Immune escape capacity

Calculate →



Policy implications

- Unique model – incorporates policy combinations, SARS-CoV-2 evolution, waning immunity, acute and long COVID morbidity, economic evaluation
- Irrespective of the mitigation policies implemented, our findings suggest that significant ongoing pandemic-related morbidity and mortality should be expected in the coming months and years
- Policy-relevant findings:
 - PHSMs: conflict between health system and health system plus GDP perspectives
 - Respirators: in the context of the modelled policy they had little effect, despite the significant protection against infection that they afford at the individual level
 - Vaccines: the provision of any vaccine was more beneficial than not providing boosters. Vaccinating all age groups was more optimal than vaccinating ≥ 60 -year-olds
 - Variants: characteristics such as virulence (predictably) influence outcomes. If an incoming variant can be predicted, optimal policy changes (and not always as one would expect)



References

1. Andrejko KL, Pry JM, Myers JF, Fukui N, DeGuzman JL, Openshaw J, et al. Effectiveness of Face Mask or Respirator Use in Indoor Public Settings for Prevention of SARS-CoV-2 Infection - California, February-December 2021. MMWR - Morbidity & Mortality Weekly Report. 2022;71(6):212-6.



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Thank you

