

Waning Effectiveness & Safety of Homologous Primary AZD1222, CoronaVac, and BNT162b2 Vaccines in the Adult Population in Malaysia

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Context and Methodology

Test-Negative Design (infection), **Retrospective Cohort Among Confirmed Cases** (severe) using **nationally-comprehensive** data covering tests, admission, deaths, vaccination, automated contact tracing in Malaysia, which has a **diverse vaccine portfolio**, spanning those vaccinated between 21 Jul - 31 Oct, and tested positive up to 31 Dec 2021.

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Case-Based Hospital Monitoring (safety) additionally uses all-cause hospital admissions, all-cause mortality data, spanning 2019 to 31 Oct 2021.

GitHub: Details & Replication

<https://github.com/suahjl/waningve-covid-mys-2022-expansion>



TL;DR

- All 3 vaccines showed no clear waning in VE against ICU and death; AZD1222 and BNT162b2 were comparable, and CoronaVac had lower VE.
- VE against infection of AZD1222 remained stable up to 3-4 months.
- AESI rates within 21 days post-vaccination were low.
- **Caveat:** Study covered the predominantly Delta period, with relatively strict NPIs
- The risk-benefit calculus ought to be updated in light of new VOCs.

† **A = AZD1222; P = BNT162b2; S = CoronaVac**

Vaccine Effectiveness (VE) Over Time

Figure: AORs of Infection (Ref: 2x AZD1222; 0-2 weeks)

	AOR	LB	UB
aa_11to14Weeks	0.97	0.93	1.01
aa_7to10Weeks	1	0.96	1.04
aa_3to6Weeks	1.14	1.1	1.18
pp_11to14Weeks	0.95	0.92	0.98
pp_7to10Weeks	0.92	0.89	0.95
pp_3to6Weeks	0.76	0.74	0.78
pp_0to2Weeks	0.64	0.61	0.67
ss_11to14Weeks	1.16	1.13	1.2
ss_7to10Weeks	0.99	0.96	1.02
ss_3to6Weeks	0.82	0.8	0.85
ss_0to2Weeks	0.67	0.63	0.71

Figure: VE Against ICU Admission (Ref: Unvaccinated Cases)

	VE	LB	UB
aa_7to14Weeks	74.45	65.88	80.87
aa_0to7Weeks	79.99	71.06	86.16
pp_7to14Weeks	78.31	74.5	81.56
pp_0to7Weeks	73.71	66.11	79.61
ss_7to14Weeks	34.99	26.84	42.23
ss_0to7Weeks	41.08	28.37	51.54

Figure: VE Against Death (Ref: Unvaccinated Cases)

	VE	LB	UB
aa_7to14Weeks	87.68	80.99	92.02
aa_0to7Weeks	86.18	76.27	91.96
pp_7to14Weeks	87.75	84.99	90
pp_0to7Weeks	69.26	58.75	77.09
ss_7to14Weeks	74.2	69.56	78.13
ss_0to7Weeks	65.1	54.07	73.48

Rates of Adverse Events of Special Interest

Figure: Hospital Admission Rates for AESIs 1-21 Days Post-Vaccination

	BNT162b2			CoronaVac			AZD1222		
	N	Event per Million Doses	95% CI	N	Event per Million Doses	95% CI	N	Event per Million Doses	95% CI
Pulmonary embolism	145	5.37	(4.56, 6.33)	129	6.46	(5.43, 7.67)	17	4.17	(2.55, 6.73)
Lower limb venous thrombosis	62	2.30	(1.79, 2.95)	33	1.65	(1.17, 2.33)	4	0.98	(0.28, 2.62)
Splanchnic thrombosis	11	0.41	(0.22, 0.74)	4	0.20	(0.06, 0.54)	0	-	-
Other venous thrombosis	49	1.82	(1.37, 2.41)	23	1.15	(0.76, 1.74)	4	0.98	(0.28, 2.62)
Central venous thrombosis	6	0.22	(0.08, 0.49)	2	0.10	(<0.01, 0.39)	0	-	-
Stroke, haemorrhagic	310	11.49	(10.3, 12.8)	218	10.91	(9.55, 12.5)	30	7.36	(5.11, 10.5)
Stroke, ischaemic	765	28.35	(26.4, 30.4)	543	27.18	(25.0, 29.6)	55	13.49	(10.3, 17.6)
Stroke, unspecified	586	21.72	(20.0, 23.6)	388	19.42	(17.6, 21.5)	46	11.28	(8.42, 15.1)
Acute myocardial infarction	1006	37.28	(35.0, 39.7)	718	35.93	(33.4, 38.7)	96	23.54	(19.3, 28.8)
Myocarditis / pericarditis	51	1.89	(1.43, 2.49)	22	1.10	(0.72, 1.68)	4	0.98	(0.28, 2.62)
Heart failure	800	29.65	(27.7, 31.8)	484	24.22	(22.2, 26.5)	70	17.17	(13.6, 21.7)
Thrombocytopenia	211	7.82	(6.83, 8.95)	102	5.10	(4.20, 6.20)	19	4.66	(2.93, 7.33)
Bell's Palsy	25	0.93	(0.62, 1.37)	15	0.75	(0.43, 1.25)	3	0.74	(0.14, 2.27)

Figure: By Age: Hospital Admission Rates for AESIs 1-21 Days Post-Vaccination

	BNT162b2			CoronaVac			AZD1222		
	N	Event per Million Doses	95% CI	N	Event per Million Doses	95% CI	N	Event per Million Doses	95% CI
Pulmonary embolism	-	-	-	-	-	-	-	-	-
18-59	88.0	4.88	(3.96, 6.02)	88.0	5.28	(4.28, 6.52)	11.0	3.21	(1.72, 5.83)
60+	57.0	17.3	(13.3, 22.4)	41.0	14.22	(10.4, 19.3)	6.0	10.01	(4.01, 22.4)
Lower limb venous thrombosis	-	-	-	-	-	-	-	-	-
18-59	33.0	1.83	(1.29, 2.58)	16.0	0.96	(0.58, 1.57)	2.0	0.58	(0.02, 2.28)
60+	27.0	8.19	(5.58, 12.0)	17.0	5.9	(3.61, 9.52)	2.0	3.34	(0.06, 13.0)
Splanchnic thrombosis	-	-	-	-	-	-	-	-	-
18-59	4.0	0.22	(0.06, 0.59)	3.0	0.18	(0.03, 0.56)	0.0	-	-
60+	7.0	2.12	(0.93, 4.48)	1.0	0.35	(<0.01, 2.17)	0.0	-	-
Other venous thrombosis	-	-	-	-	-	-	-	-	-
18-59	29.0	1.61	(1.97, 4.11)	15.0	0.9	(1.97, 4.11)	3.0	0.88	(1.97, 4.11)
60+	20.0	6.07	(5.86, 14.3)	8.0	2.77	(5.86, 14.3)	1.0	1.67	(5.86, 14.3)
Central venous thrombosis	-	-	-	-	-	-	-	-	-
18-59	5.0	0.28	(0.17, 1.19)	1.0	0.06	(0.17, 1.19)	0.0	-	-
60+	1.0	0.3	(<0.01, 2.88)	1.0	0.35	(<0.01, 2.88)	0.0	-	-
Thrombocytopenia	-	-	-	-	-	-	-	-	-
18-59	120.0	6.65	(9.85, 14.1)	58.0	3.48	(9.85, 14.1)	9.0	2.63	(9.85, 14.1)
60+	80.0	24.28	(29.5, 45.8)	44.0	15.26	(29.5, 45.8)	10.0	16.68	(29.5, 45.8)
Stroke, haemorrhagic	-	-	-	-	-	-	-	-	-
18-59	167.0	9.26	(14.1, 19.1)	114.0	6.85	(14.1, 19.1)	16.0	4.67	(14.1, 19.1)
60+	141.0	42.79	(54.9, 76.5)	102.0	35.37	(54.9, 76.5)	14.0	23.35	(54.9, 76.5)
Stroke, ischaemic	-	-	-	-	-	-	-	-	-
18-59	311.0	17.24	(27.3, 34.1)	221.0	13.27	(27.3, 34.1)	24.0	7.01	(27.3, 34.1)
60+	452.0	137.17	(189.4, 227.8)	322.0	111.67	(189.4, 227.8)	31.0	51.69	(189.4, 227.8)
Acute myocardial infarction	-	-	-	-	-	-	-	-	-
18-59	515.0	12.03	(10.5, 13.7)	359.0	8.47	(7.17, 9.99)	48.0	4.38	(2.59, 7.30)
60+	491.0	111.67	(100.8, 123.7)	359.0	85.66	(75.6, 97.0)	48.0	51.69	(36.1, 73.6)
Myocarditis / pericarditis	-	-	-	-	-	-	-	-	-
18-59	31.0	28.56	(46.4, 55.1)	17.0	21.56	(46.4, 55.1)	4.0	14.02	(46.4, 55.1)
60+	1.0	149.0	(206.6, 246.6)	5.0	124.5	(206.6, 246.6)	0.0	80.04	(206.6, 246.6)
Heart failure	-	-	-	-	-	-	-	-	-
18-59	302.0	1.72	(2.13, 4.34)	158.0	1.02	(2.13, 4.34)	20.0	1.17	(2.13, 4.34)
60+	497.0	0.3	(<0.01, 2.88)	326.0	1.73	(<0.01, 2.88)	50.0	0	-
Bell's Palsy	-	-	-	-	-	-	-	-	-
18-59	18.0	1.0	(0.62, 1.59)	8.0	0.48	(0.23, 0.97)	1.0	0.29	(<0.01, 1.83)
60+	6.0	1.82	(0.73, 4.08)	7.0	2.43	(1.06, 5.12)	2.0	3.34	(0.07, 13.0)

Ethical Consideration

This is part of The Real-World Evaluation of COVID-19 Vaccines under the Malaysia National COVID-19 Immunization Programme (**RECoVaM**), and The Case-Based Monitoring of Adverse Events Following COVID-19 Vaccination (**SAFECOVAC**) studies registered in the National Medical Research Register (**NMRR-21-1660-60697**, and **NMRR-21-322-59745**). Ethical approvals were granted by the Medical Research and Ethics Committee (MREC), Ministry of Health, Malaysia.