

## Supplemental material

Supplement to HS Ørbo, KH Bjørlykke, J Sexton et al. **Incidence and outcome of COVID-19 following vaccine and hybrid immunity in patients on immunosuppressive therapy: identification of protective post-immunisation anti-RBD antibody levels in a prospective cohort study**

**Supplemental table 1.** Inclusion and exclusion criteria

<b>Inclusion criteria</b>	<ul style="list-style-type: none"> <li>• An established clinical diagnosis of one of the following immune-mediated diseases: rheumatoid arthritis (RA), spondyloarthritis (SpA), psoriatic arthritis (PsA), Crohn's disease (CD), and ulcerative colitis (UC)</li> <li>• On treatment with relevant immunosuppressive and/or immunomodulating medication (see below)</li> <li>• Adult patients (<math>\geq 18</math> years)</li> <li>• Patient intended to obtain vaccination against COVID-19 during the next six months</li> </ul>
<b>Exclusion criterion</b>	<ul style="list-style-type: none"> <li>• Allergy or intolerance to elements of the COVID-19 vaccines</li> </ul>

**Supplemental table 2.** Relevant immunosuppressive medication

<b>Medication group</b>	<b>Included medication</b>
Tumor necrosis factor inhibitor	Infliximab, etanercept, golimumab, adalimumab, certolizumab pegol
Janus kinase inhibitor	Tofacitinib, baricitinib, upadacitinib, filgotinib
Tumor necrosis factor inhibitor in combination	+ methotrexate, azathioprine, sulfasalazine, leflunomide or prednisolone
Methotrexate	
Azathioprine	
Tocilizumab	
Abatacept	
Sulfasalazine	
Vedolizumab	
Ustekinumab	
Secukinumab	
Leflunomide	
Prednisolone	
6-mercaptopurine	
Rituximab	

**Supplemental table 3.** Comorbidities registered according to Charlson Comorbidity Index

Comorbidities
Myocardial infarction
Heart failure
Periferal vascular disease
Aortic aneurysm
Cerebral infarction or TIA
Dementia
COPD
Connective tissue disease
Gastric ulcer
Liver disease
Diabetes
Paralysis
Moderate to severe chronic kidney disease
Malignancies
AIDS
TIA: Transient ischemic attack COPD: Chronic obstructive pulmonary disease AIDS: Acquired immunodeficiency syndrome

**Supplemental table 4.** Description of patients with severe COVID-19

Sex, Age	Disease	Comorbidities	Medication	Vaccine doses received prior to hospital admission	Anti-RBD antibody levels prior to admission	Time of hospital admission	Clinical features on admission	Treatment	Follow-up
Female, 70s	RA	Yes	Rituximab	3	1 BAU/ml	Dec. -21	Viral pneumonia	Mononuclear antibody infusion	Outward clinic
Female, 50s	RA	Yes	Methotrexate	0	-	Jan. -21	Viral pneumonia	Supplementary oxygen Antibiotics i.v.	Rehabilitation centre
Female, 70s	PsA	Yes	TNF inhibitor combination therapy	3	2876 BAU/ml	Jun. -22	Dizziness	Observation only	None
Male, 40s	SpA	Yes	TNF inhibitor monotherapy	2	132 BAU/ml	Nov. -21	Pulmonary embolism	Anticoagulants	None
Female, 70s	RA	Yes	TNF inhibitor monotherapy	2	444 BAU/ml	Sept. -21	Viral pneumonia Renal failure	Supplementary oxygen Anticoagulants	Rehabilitation centre
Male, 50s	RA	Yes	Rituximab	0	-	Mar. -21	Viral pneumonia	Antibiotics i.v. Corticosteroids	Rehabilitation centre
Female, 60s	RA	Yes	Other	0	-	Nov. -20	Viral pneumonia ARDS	ICU Anticoagulants Corticosteroids	Rehabilitation centre

Male, 40s	PsA	Yes	TNF inhibitor monotherapy	0	-	Mar. -21	Viral pneumonia	Supplementary oxygen Anticoagulants Corticosteroids	None
Female, 50s	RA	Yes	JAK-inhibitor	4	-	Mar. -22	Viral pneumonia	Supplementary oxygen	None
Male, 30s	SpA	Yes	TNF inhibitor monotherapy	3	-	Feb. -22	Gastroenteritis	Rehydration	None
Female, 70s	RA	Yes	Other	2	31 BAU/ml	Nov. -21	ARDS Lung embolism Enterocolitis	ICU IL-inhibitor Corticosteroids Antibiotics i.v. Anticoagulants	Rehabilitation centre
Male, 70s	RA	Yes	Methotrexate	4	358 BAU/ml	Jun. -22	Afasia, partial paralysis	Thrombolysis	Outward clinic
Female, 60s	RA	Yes	Methotrexate	0	-	Mar. -20	Viral pneumonia ARDS	ICU Antibiotics i.v. Anticoagulants	Rehabilitation centre
Female, 50s	RA	Yes	TNF inhibitor combination therapy	3	809 BAU/ml	Jul. -22	Syncope	Observation only	Outward clinic

Male, 70s	RA	Yes	Other	3	24 BAU/ml	Jun. -22	Viral pneumonia Fall tendency	Corticosteroids	None
Male, 70s	PsA	Yes	TNF inhibitor combination therapy	4	713 BAU/ml	Aug. -22	ARDS Pulmonary embolism	ICU Antivirals Corticosteroids Anticoagulants Antibiotics i.v.	Rehabilitation centre Outward clinic
Female, 30s	UC	Yes	JAK-inhibitor	0	-	Mar. -20	Viral pneumonia	Supplementary oxygen Corticosteroids	Outward clinic
Male, 30s	CD	Yes	TNF inhibitor monotherapy	0	-	Apr. -21	Viral pneumonia	Anticoagulants	None
Male, 30s	UC	None	TNF inhibitor combination therapy	0	-	Mar. -20	UC-flare	Corticosteroids Anticoagulants Antivirals Antibiotics i.v.	None
Male, 60s	CD	Yes	TNF inhibitor monotherapy	0	-	Mar. -21	Viral pneumonia Renal failure	Supplementary oxygen Corticosteroids Rehydration	None
Male, 60s	UC	Yes	IL-inhibitor	3	6705 BAU/ml	May -22	Dyspnea	Observation only	None

Male, 40s	UC	None	TNF inhibitor monotherapy	3	1634 BAU/ml	Jul. -22	Dyspnea	Observation only	None
BAU/ml: Binding antibody units. ARDS: Acute respiratory distress syndrome. ICU: Intensive care unit.									

**Supplemental table 5.** Risk of COVID-19 after a second, third and fourth SARS-CoV-2 vaccine dose and hybrid immunity, and protective antibody levels, sensitivity analyses with additional adjustments

	Following second dose		Following third dose		Following fourth dose		Following hybrid immunity	
	Patients included, n = 1392		Patients included, n = 1092		Patients included, n = 639		Patients included, n = 212	
	Events of COVID-19, n = 61		Events of COVID-19, n = 277		Events of COVID-19, n = 297		Events of COVID-19, n = 29	
	Time at risk (days): 205322		Time at risk (days): 166120		Time at risk (days): 139884		Time at risk (days): 59998	
	Mean observation time (days): 147		Mean observation time (days): 152		Mean observation time (days): 218		Mean observation time (days): 283	
<b>Anti-RBD antibody levels (BAU/ml) post-immunisation</b>	<b>HR (95% CI)</b>	<b>p-value</b>	<b>HR (95% CI)</b>	<b>p-value</b>	<b>HR (95% CI)</b>	<b>p-value</b>	<b>HR (95% CI)</b>	<b>p-value</b>
<b>&lt;50 BAU/ml</b>								
<50 *	N/A	..	0.96 (0.42–2.24)	0.93	0.85 (0.46–1.56)	0.60	N/A	..
<50 †	N/A	..	1.08 (0.46–2.54)	0.86	0.86 (0.47–1.58)	0.63	N/A	..
<50 ‡	N/A	..	1.08 (0.46–2.53)	0.86	0.85 (0.46–1.58)	0.61	N/A	..
<50 §	N/A	..	1.19 (0.50–2.81)	0.69	0.84 (0.45–1.54)	0.56	N/A	..
<b>&lt;100 BAU/ml</b>								
<100 *	0.41 (0.06–2.96)	0.37	1.02 (0.46–2.23)	0.97	0.98 (0.57–1.68)	0.93	N/A	..
<100 †	0.41 (0.06–3.01)	0.38	1.15 (0.52–2.55)	0.73	0.99 (0.57–1.71)	0.98	N/A	..
<100 ‡	0.38 (0.05–2.79)	0.34	1.15 (0.52–2.55)	0.73	0.98 (0.57–1.70)	0.96	N/A	..
<100 §	0.41 (0.06–3.03)	0.38	1.27 (0.57–2.83)	0.56	0.96 (0.56–1.66)	0.89	N/A	--
<b>&lt;200 BAU/ml</b>								
<200 *	0.34 (0.05–2.48)	0.29	0.99 (0.52–1.91)	0.98	1.05 (0.63–1.76)	0.84	N/A	..
<200 †	0.34 (0.05–2.50)	0.29	1.19 (0.61–2.32)	0.60	1.09 (0.65–1.82)	0.75	N/A	..
<200 ‡	0.32 (0.04–2.35)	0.26	1.19 (0.61–2.32)	0.60	1.08 (0.65–1.81)	0.77	N/A	..
<200 §	0.34 (0.05–2.52)	0.29	1.28 (0.66–2.49)	0.47	1.06 (0.63–1.77)	0.84	N/A	..



<b>&lt;1000 BAU/ml</b>								
<1000 *	0.99 (0.50–1.97)	0.97	0.73 (0.47–1.14)	0.17	0.98 (0.66–1.46)	0.94	N/A	..
<1000 †	1.01 (0.50–2.03)	0.98	0.87 (0.56–1.37)	0.55	1.04 (0.70–1.55)	0.85	N/A	..
<1000 ‡	0.97 (0.48–1.93)	0.92	0.88 (0.56–1.37)	0.57	1.03 (0.69–1.53)	0.90	N/A	..
<1000 §	0.99 (0.49–1.99)	0.98	0.89 (0.57–1.40)	0.62	1.00 (0.67–1.49)	0.99	N/A	..
<b>&lt;2000 BAU/ml</b>								
<2000 *	1.28 (0.76–2.15)	0.36	1.06 (0.77–1.44)	0.74	1.00 (0.73–1.36)	1.00	N/A	..
<2000 †	1.30 (0.77–2.19)	0.33	1.20 (0.87–1.65)	0.26	1.05 (0.77–1.44)	0.74	N/A	..
<2000 ‡	1.34 (0.79–2.27)	0.27	1.19 (0.87–1.64)	0.27	1.05 (0.77–1.44)	0.74	N/A	..
<2000 §	1.38 (0.82–2.34)	0.23	1.21 (0.88–1.66)	0.25	1.02 (0.75–1.40)	0.89	N/A	..
<b>&lt;3000 BAU/ml</b>								
<3000 *	1.05 (0.63–1.75)	0.86	1.00 (0.76–1.33)	0.99	1.19 (0.91–1.56)	0.21	N/A	..
<3000 †	1.04 (0.62–1.74)	0.88	1.08 (0.81–1.43)	0.60	1.27 (0.96–1.67)	0.09	N/A	..
<3000 ‡	1.05 (0.63–1.76)	0.85	1.09 (0.82–1.45)	0.55	1.26 (0.96–1.66)	0.10	N/A	..
<3000 §	1.08 (0.64–1.81)	0.77	1.10 (0.83–1.46)	0.51	1.27 (0.97–1.67)	0.097	N/A	..
<b>&lt;4000 BAU/ml</b>								
<4000 *	0.85 (0.51–1.43)	0.54	1.15 (0.88–1.49)	0.30	1.11 (0.86–1.43)	0.41	N/A	..
<4000 †	0.85 (0.51–1.43)	0.55	1.21 (0.93–1.57)	0.16	1.17 (0.90–1.51)	0.24	N/A	..
<4000 ‡	0.84 (0.50–1.42)	0.53	1.21 (0.93–1.58)	0.15	1.17 (0.91–1.51)	0.22	N/A	..
<4000 §	0.84 (0.50–1.42)	0.53	1.23 (0.94–1.60)	0.13	1.17 (0.91–1.51)	0.23	N/A	..
<b>&lt;5000 BAU/ml</b>								
<5000	0.74 (0.44–1.24)	0.25	1.26 (0.98–1.61)	0.069	1.14 (0.90–1.45)	0.29	N/A	..
<5000 †	0.75 (0.44–1.28)	0.29	1.36 (1.06–1.75)	0.014	1.20 (0.94–1.52)	0.15	N/A	..
<5000 ‡	0.75 (0.44–1.27)	0.28	1.36 (1.06–1.74)	0.015	1.19 (0.94–1.52)	0.15	N/A	..

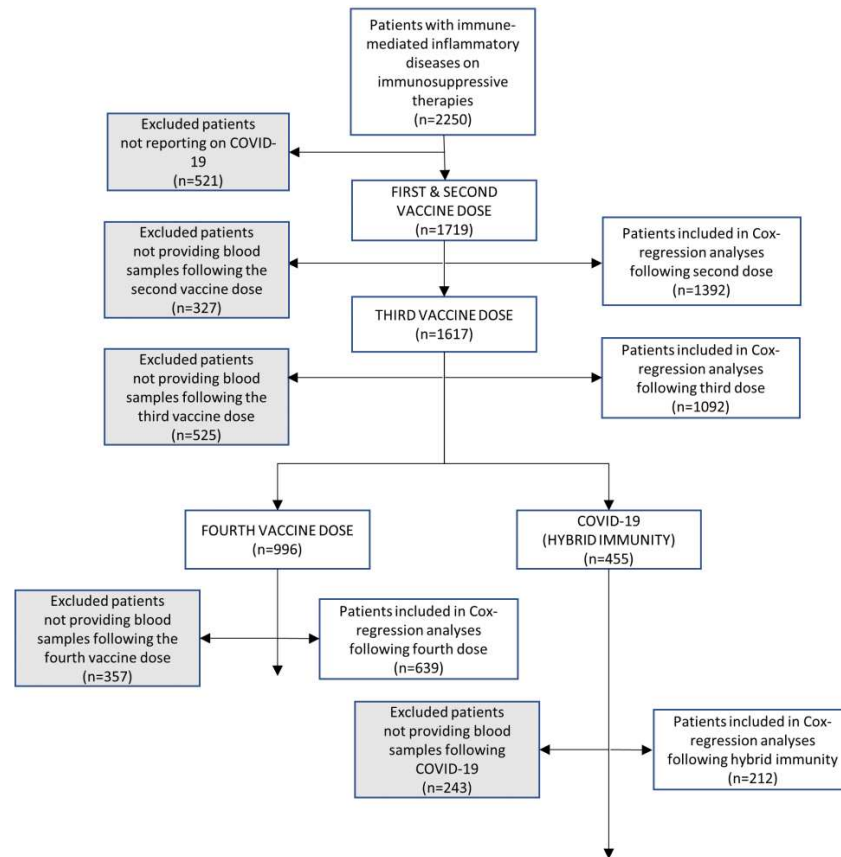
<5000 <sup>§</sup>	0.75 (0.44–1.27)	0.28	1.35 (1.06–1.74)	0.017	1.18 (0.93–1.50)	0.18	N/A	..
<b>&lt;6000 BAU/ml</b>								
<6000 <sup>*</sup>	0.69 (0.40–1.20)	0.19	1.27 (1.00–1.62)	0.049	1.24 (0.98–1.56)	0.074	4.41 (1.87–10.44)	0.0010
<6000 <sup>†</sup>	0.70 (0.40–1.22)	0.20	1.37 (1.08–1.74)	0.011	1.28 (1.02–1.62)	0.036	4.47 (1.87–10.67)	0.0010
<6000 <sup>‡</sup>	0.67 (0.38–1.17)	0.16	1.36 (1.07–1.73)	0.013	1.27 (1.00–1.60)	0.049	4.47 (1.87–10.67)	0.0010
<6000 <sup>§</sup>	0.65 (0.37–1.13)	0.13	1.32 (1.04–1.69)	0.023	1.26 (0.99–1.59)	0.056	..	..
<b>&lt;7000 BAU/ml</b>								
<7000 <sup>*</sup>	0.59 (0.33–1.08)	0.086	1.27 (1.00–1.62)	0.053	1.27 (1.00–1.60)	0.047	4.20 (1.83–9.65)	0.0010
<7000 <sup>†</sup>	0.61 (0.34–1.11)	0.10	1.34 (1.05–1.71)	0.020	1.33 (1.05–1.68)	0.019	4.14 (1.79–9.57)	0.0010
<7000 <sup>‡</sup>	0.57 (0.31–1.04)	0.07	1.32 (1.03–1.68)	0.028	1.30 (1.03–1.65)	0.030	4.17 (1.79–9.70)	0.0010
<7000 <sup>§</sup>	0.53 (0.29–0.97)	0.039	1.30 (1.02–1.65)	0.036	1.29 (1.01–1.63)	0.039	..	..
<b>&lt;8000 BAU/ml</b>								
<8000 <sup>*</sup>	0.61 (0.30–1.24)	0.17	1.40 (1.08–1.80)	0.010	1.39 (1.09–1.77)	0.0078	3.85 (1.67–8.85)	0.0020
<8000 <sup>†</sup>	0.62 (0.30–1.27)	0.19	1.47 (1.14–1.90)	0.0033	1.44 (1.13–1.83)	0.0033	3.84 (1.67–9.87)	0.0020
<8000 <sup>‡</sup>	0.58 (0.28–1.20)	0.14	1.44 (1.11–1.85)	0.0057	1.40 (1.10–1.79)	0.0065	3.89 (1.67–9.04)	0.0020
<8000 <sup>§</sup>	0.51 (0.25–1.07)	0.076	1.40 (1.09–1.81)	0.0093	1.38 (1.08–1.75)	0.010	..	..
<b>&lt;9000 BAU/ml</b>								
<9000 <sup>*</sup>	0.83 (0.34–2.02)	0.69	1.36 (1.04–1.79)	0.026	1.52 (1.18–1.96)	0.001	3.01 (1.32–6.87)	0.0090
<9000 <sup>†</sup>	0.82 (0.34–1.99)	0.66	1.42 (1.08–1.87)	0.012	1.59 (1.23–2.06)	0.00039	3.07 (1.34–7.05)	0.0080
<9000 <sup>‡</sup>	0.74 (0.30–1.80)	0.50	1.45 (1.10–1.91)	0.0080	1.54 (1.19–1.99)	0.00098	3.13 (1.35–7.26)	0.0080
<9000 <sup>§</sup>	0.60 (0.24–1.51)	0.28	1.41 (1.07–1.86)	0.013	1.52 (1.18–1.97)	0.0013	..	..
<b>&lt;10000 BAU/ml</b>								
<10000 <sup>*</sup>	1.26 (0.38–4.22)	0.71	1.62 (1.19–2.19)	0.0019	1.53 (1.17–1.99)	0.0017	2.93 (1.30–6.56)	0.0090
<10000 <sup>†</sup>	1.24 (0.37–4.15)	0.73	1.68 (1.24–2.28)	0.00087	1.59 (1.22–2.07)	0.00061	2.99 (1.33–6.73)	0.0080

<10000 ‡	1.33 (0.39–4.50)	0.65	1.70 (1.25–2.31)	0.00064	1.53 (1.17–2.00)	0.0017	3.04 (1.34–6.89)	0.0080
<10000 §	1.10 (0.31–3.82)	0.89	1.66 (1.22–2.25)	0.0011	1.50 (1.15–1.96)	0.0026	..	..
<b>&lt;11000 BAU/ml</b>								
<11000 *	1.25 (0.28–5.64)	0.77	1.71 (1.23–2.40)	0.0017	1.55 (1.17–2.05)	0.0020	2.52 (1.13–5.61)	0.024
<11000 †	1.27 (0.28–5.73)	0.75	1.79 (1.27–2.50)	0.00075	1.64 (1.24–2.17)	0.00055	2.62 (1.17–5.85)	0.019
<11000 ‡	1.44 (0.32–6.52)	0.64	1.84 (1.31–2.58)	0.00041	1.57 (1.19–2.08)	0.0017	2.67 (1.18–6.06)	0.019
<11000 §	1.05 (0.21–5.20)	0.95	1.80 (1.29–2.53)	0.00062	1.53 (1.16–2.03)	0.0029	..	..
<b>&lt;12000 BAU/ml</b>								
<12000 *	1.14 (0.25–5.18)	0.86	1.90 (1.32–2.75)	0.00060	1.46 (1.09–1.95)	0.012	2.34 (1.07–5.15)	0.034
<12000 †	1.18 (0.26–5.36)	0.83	1.97 (1.36–2.86)	0.00031	1.50 (1.12–2.02)	0.0066	2.40 (1.09–5.28)	0.030
<12000 ‡	1.33 (0.29–6.11)	0.71	2.03 (1.40–2.94)	0.00017	1.47 (1.09–1.97)	0.010	2.42 (1.09–5.37)	0.029
<12000 §	0.92 (0.18–4.66)	0.92	1.98 (1.36–2.86)	0.00031	1.44 (1.07–1.93)	0.015	..	..
<b>&lt;13000 BAU/ml</b>								
<13000 *	0.96 (0.21–4.35)	0.96	1.83 (1.23–2.73)	0.0031	1.35 (0.99–1.85)	0.061	1.99 (0.91–4.38)	0.086
<13000 †	0.99 (0.22–4.49)	0.99	1.90 (1.27–2.85)	0.0017	1.38 (1.01–1.90)	0.042	2.04 (0.93–4.51)	0.077
<13000 ‡	1.12 (0.25–5.12)	0.88	1.96 (1.31–2.93)	0.0011	1.34 (0.98–1.83)	0.07	2.06 (0.93–4.59)	0.076
<13000 §	0.64 (0.13–3.17)	0.58	1.93 (1.29–2.89)	0.0014	1.30 (0.95–1.77)	0.11	..	..
<b>&lt;14000 BAU/ml</b>								
<14000 *	1.34 (0.17–10.46)	0.78	1.47 (0.95–2.28)	0.086	1.40 (1.00–1.95)	0.049	1.52 (0.68–3.40)	0.31
<14000 †	1.40 (0.18–10.79)	0.75	1.55 (1.00–2.41)	0.052	1.45 (1.04–2.03)	0.028	1.51 (0.67–3.40)	0.32
<14000 ‡	1.60 (0.21–12.33)	0.65	1.60 (1.03–2.49)	0.038	1.40 (1.00–1.95)	0.051	1.52 (0.67–3.44)	0.32
<14000 §	0.68 (0.08–5.92)	0.72	1.66 (1.06–2.58)	0.026	1.34 (0.96–1.88)	0.082	..	..
<b>&lt;15000 BAU/ml</b>								
<15000 *	N/A	..	1.30 (0.75–2.23)	0.35	1.28 (0.91–1.81)	0.15	2.02 (0.88–4.63)	0.10

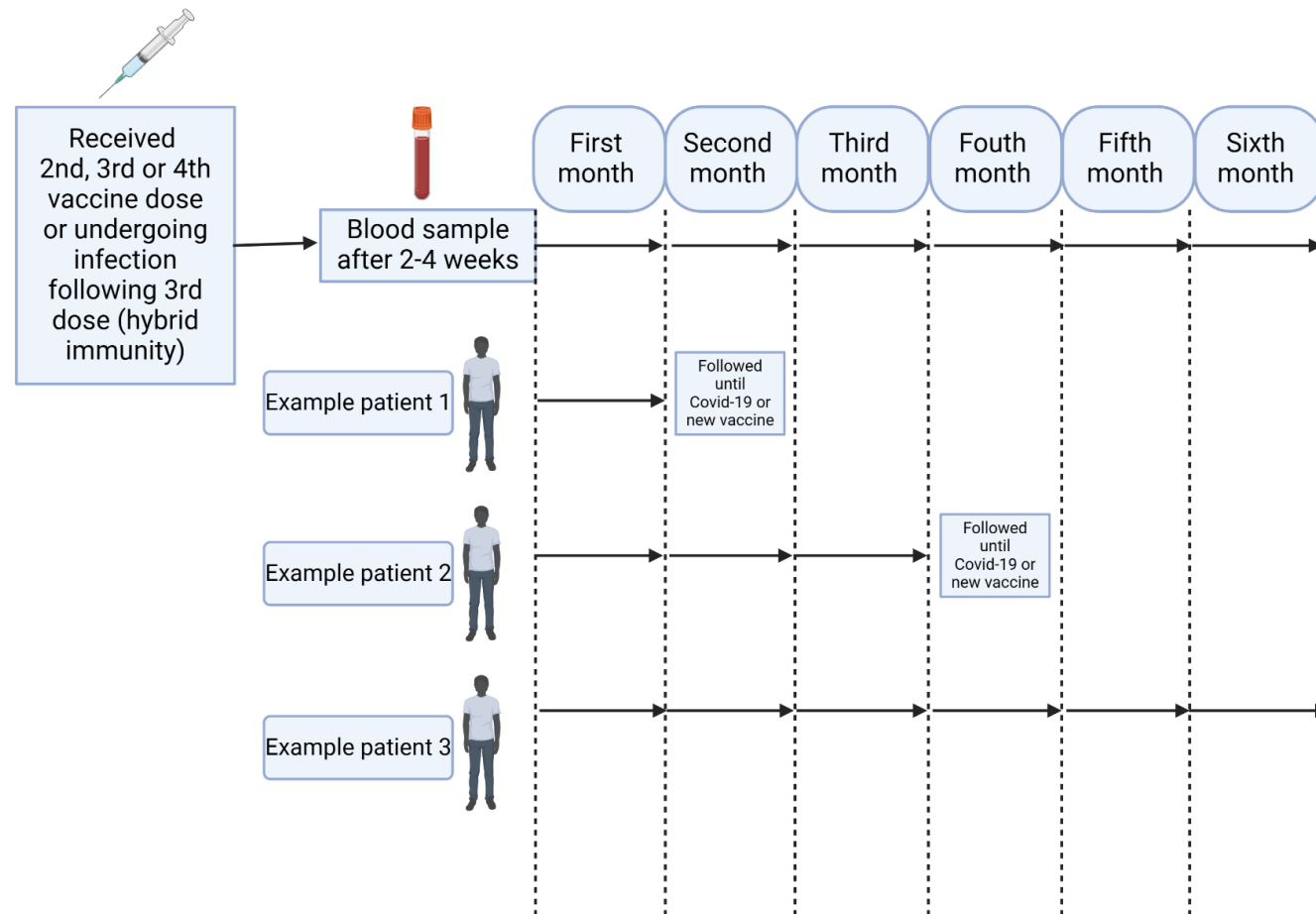
<15000 †	N/A	..	1.34 (0.78–2.31)	0.29	1.33 (0.95–1.88)	0.10	2.03 (0.88–4.68)	0.10
<15000 ‡	N/A	..	1.38 (0.80–2.38)	0.24	1.35 (0.96–1.90)	0.087	2.06 (0.89–4.78)	0.10
<15000 §	N/A	..	1.39 (0.81–2.39)	0.23	1.31 (0.93–1.85)	0.12		
<b>&lt;16000 BAU/ml</b>								
<16000 *	N/A	..	1.40 (0.72–2.74)	0.32	1.29 (0.91–1.84)	0.16	1.77 (0.77–4.06)	0.18
<16000 †	N/A	..	1.38 (0.70–2.69)	0.35	1.34 (0.94–1.91)	0.11	1.78 (0.77–4.09)	0.18
<16000 **	N/A	..	1.41 (0.72–2.76)	0.31	1.35 (0.95–1.93)	0.10	1.79 (0.77–4.15)	0.17
<16000 §	N/A	..	1.37 (0.70–2.67)	0.36	1.31 (0.92–1.87)	0.14	..	..
<b>&lt;17000 BAU/ml</b>								
<17000 *	N/A	..	1.56 (0.69–3.55)	0.29	1.33 (0.92–1.91)	0.13	1.62 (0.71–3.73)	0.25
<17000 †	N/A	..	1.52 (0.67–3.46)	0.32	1.36 (0.95–1.96)	0.096	1.65 (0.71–3.80)	0.24
<17000 ‡	N/A	..	1.57 (0.69–3.57)	0.29	1.38 (0.96–1.99)	0.082	1.66 (0.71–3.86)	0.24
<17000 §	N/A	..	1.52 (0.67–3.46)	0.32	1.33 (0.93–1.92)	0.12	..	..
<b>&lt;18000 BAU/ml</b>								
<18000 *	N/A	..	1.47 (0.65–3.34)	0.36	1.29 (0.90–1.86)	0.16	1.94 (0.84–4.50)	0.12
<18000 †	N/A	..	1.41 (0.62–3.22)	0.41	1.34 (0.93–1.92)	0.12	1.97 (0.85–4.58)	0.11
<18000 ‡	N/A	..	1.45 (0.63–3.31)	0.38	1.35 (0.94–1.94)	0.10	2.00 (0.85–4.67)	0.11
<18000 §	N/A	..	1.41 (0.62–3.20)	0.42	1.33 (0.92–1.91)	0.13	..	..
<b>&lt;19000 BAU/ml</b>								
<19000 *	N/A	..	1.37 (0.60–3.12)	0.45	1.41 (0.96–2.07)	0.079	1.94 (0.84–4.49)	0.12
<19000 †	N/A	..	1.31 (0.57–2.99)	0.53	1.48 (1.00–2.17)	0.048	1.97 (0.85–4.58)	0.11
<19000 ‡	N/A	..	1.35 (0.59–3.08)	0.48	1.49 (1.01–2.19)	0.042	2.00 (0.85–4.67)	0.11
<19000 §	N/A	..	1.30 (0.57–2.98)	0.53	1.46 (0.99–2.14)	0.055	..	..
<b>&lt;20000 BAU/ml</b>								

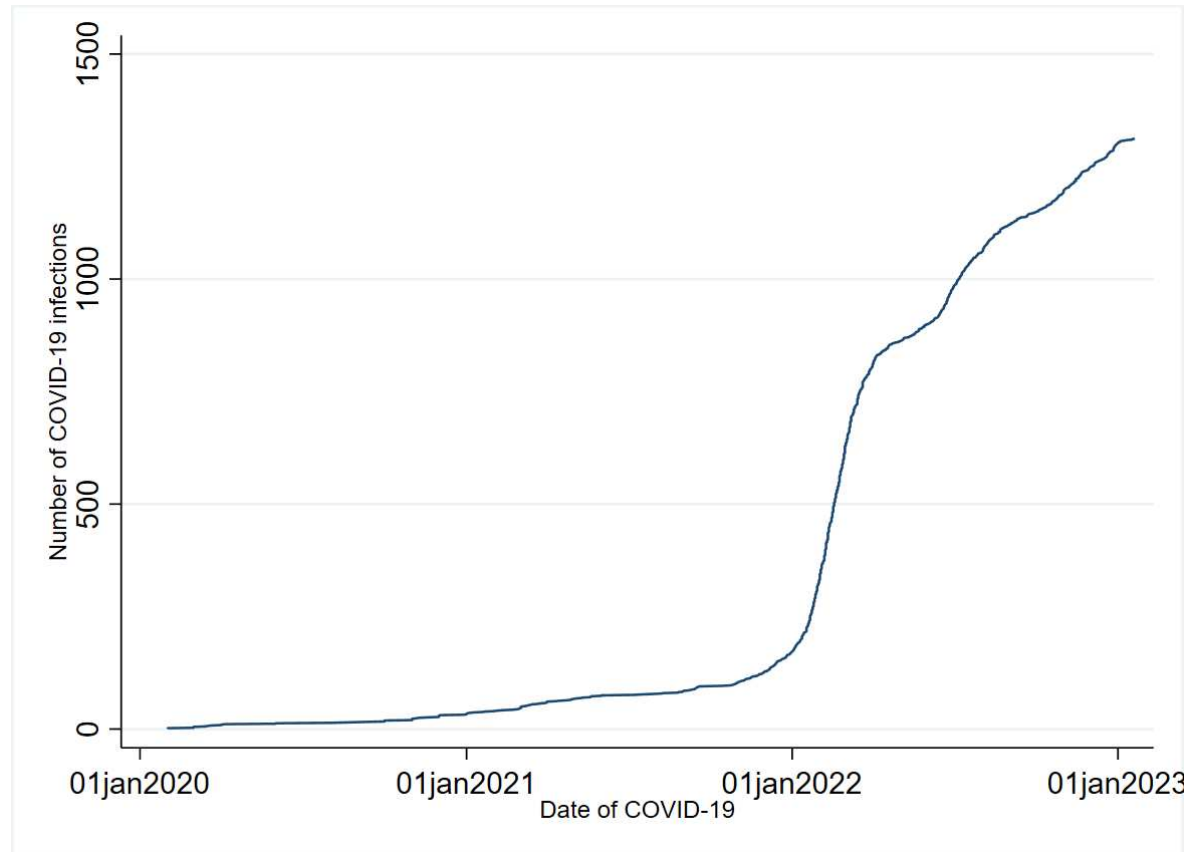
<20000 *	N/A	..	1.60 (0.58–4.41)	0.36	1.32 (0.90–1.95)	0.16	1.81 (0.79–4.16)	0.16
<20000 †	N/A	..	1.62 (0.59–4.48)	0.35	1.37 (0.93–2.02)	0.11	1.84 (0.80–4.27)	0.15
<20000 ‡	N/A	..	1.69 (0.61–4.66)	0.31	1.39 (0.94–2.04)	0.10	1.86 (0.80–4.33)	0.15
<20000 §	N/A	..	1.61 (0.59–4.44)	0.35	1.35 (0.91–1.99)	0.13	..	..
<b>&lt;25000 BAU/ml</b>								
<25000 *	N/A	..	N/A	..	1.28 (0.85–1.94)	0.24	1.24 (0.54–2.85)	0.60
<25000 †	N/A	..	N/A	..	1.32 (0.87–1.99)	0.19	1.26 (0.55–2.91)	0.59
<25000 ‡	N/A	..	N/A	..	1.33 (0.88–2.01)	0.17	1.30 (0.54–2.94)	0.59
<25000 §	N/A	..	N/A	..	1.28 (0.85–1.94)	0.24	..	..
*Adjusted for calendar month								
†Adjusted for age, sex and calendar month								
‡Adjusted for age, sex, calendar month and comorbidities								
§Adjusted for age, sex, calendar month, prior Covid-19, plus any comorbidities								

**Supplemental figure 1.** Patient distribution showing patients excluded and included in each Cox regression analyses based on providing post-vaccination blood samples



**Supplemental figure 2.** Inclusion of patients in the Cox regression analyses where stippled line indicates timing of inclusion for analyses (created with BioRender.com)



**Supplemental figure 3a.** Cumulative distribution of COVID-19 among included patients during the study period



**Supplemental figure 3b.** Cumulative distribution of COVID-19 in the hybrid vs vaccine group