

Supplementary Table 1 Calculation of efficacy of biologics for treating moderate to severe Crohn's disease

Phase	Biologics	Clinical response		Clinical remission		Ref. ¹
		OR	Rate	OR	Rate	
Biologic-naïve						
Induction phase	IFX	22.00	86.12%	6.17	43.27%	Singh S, 2021
	ADA	2.49	41.26%	4.1	33.63%	Singh S, 2021
	UST	2.79	44.04%	3.58	30.67%	Singh S, 2021
	VDZ	1.72	32.67%	2.71	25.09%	Singh S, 2021
	PBO	anchor	22.00%	anchor	11.00%	Solitano V, 2025
Maintenance phase	IFX	2.57	62.17%	1.91	47.34%	Disher T, 2025
	ADA	11.26	87.80%	11.59	84.51%	Disher T, 2025
	UST	13.83	89.84%	11.95	84.90%	Disher T, 2025
	VDZ	2.46	61.13%	1.87	46.81%	Disher T, 2025
	PBO	anchor	39.00%	anchor	32.00%	Solitano V, 2025
Biologic-exposed						
Induction phase	IFX	1.77	30.68%	1.26	12.28%	Singh S, 2021
	ADA	2.19	35.38%	3.55	28.29%	Singh S, 2021
	UST	2.47	38.18%	1.97	17.96%	Singh S, 2021
	VDZ	1.77	30.68%	1.26	12.28%	Singh S, 2021
	PBO	anchor	20.00%	anchor	10.00%	Solitano V, 2025
Maintenance phase	IFX	1.47	34.06%	1.11	17.45%	Disher T, 2025
	ADA	1.47	34.06%	1.11	17.45%	Disher T, 2025
	UST	6.61	69.90%	5.20	49.76%	Disher T, 2025
	VDZ	1.47	34.06%	1.11	17.45%	Disher T, 2025
	PBO	anchor	26.00%	anchor	16.00%	Solitano V, 2025

¹The reference data cited were OR values or placebo rates.

Supplementary Table 2 Calculation of safety of biologics for treating moderate to

severe Crohn's disease

Phase	Biologics	SAE		Ref. ¹
		OR	Rate	
Induction phase	IFX	0.94	6.61%	Singh S, 2021
	ADA	0.62	4.46%	Singh S, 2021
	UST	0.74	5.28%	Singh S, 2021
	VDZ	0.98	6.87%	Singh S, 2021
	PBO	anchor	7.00%	Solitano V, 2025
Maintenance phase	IFX	0.94	16.14%	Singh S, 2021
	ADA	0.62	11.27%	Singh S, 2021
	UST	0.74	13.16%	Singh S, 2021
	VDZ	0.98	16.72%	Singh S, 2021
	PBO	anchor	17.00%	Solitano V, 2025

¹The reference data cited were OR values or placebo rates.

Supplementary Table 3 Calculation of transition probabilities of biologics for treating moderate to severe Crohn's disease

	Proportion of patients in			Probability of loss of response per cycle	Proportion of patient per cycle in	
	Response (incl. remission)	Response (excl. remission)	Remission		Response (excl. remission)	Remission
Biologic-naïve						
Induction phase						
IFX	86.1 %	42.9%	43.3%	-	42.9%	43.3%
ADA	41.3%	7.6%	33.6%	-	7.6%	33.6%
UST	44.0%	13.4%	30.7%	-	13.4%	30.7%
VDZ	32.7%	7.6%	25.1%	-	7.6%	25.1%
Maintenance phase	A	C = A-B	B	$1-[1-(1-A)]^{0.154}$	C/ A	B/ A
IFX	62.2%	14.8%	47.3%	7.1%	23.9%	76.1%
ADA	87.8%	3.3%	84.5%	2.0%	3.8%	96.2%
UST	89.8%	4.9%	84.9%	1.6%	5.5%	94.5%
VDZ	61.1%	14.3%	46.8%	7.3%	23.4%	76.6%
Biologic-exposed						
Induction phase						

IFX	30.7%	18.4%	12.3%	-	18.4%	12.3%
ADA	35.4%	7.1%	28.3%	-	7.1%	28.3%
UST	38.2%	20.2%	18.0%	-	20.2%	18.0%
VDZ	30.7%	18.4%	12.3%	-	18.4%	12.3%
Maintenance phase	A	C=A-B	B	$1-[1-(1-A)]^{0.154}$	C/A	B/A
IFX	34.1%	16.6%	17.5%	15.3%	48.8%	51.2%
ADA	34.1%	16.6%	17.5%	15.3%	48.8%	51.2%
UST	69.9%	20.1%	49.8%	5.4%	28.8%	71.2%
VDZ	34.1%	16.6%	17.5%	15.3%	48.8%	51.2%

Supplementary Table 4 Parameters, value ranges, and distributions included in the sensitivity analysis

Parameter	Value (range)	Distribution
Costs (\$)		
Price of IFX in induction phase	204.40 (163.52-245.28)	Gamma
Price of ADA in induction phase	144.71 (115.77-173.65)	Gamma
Price of UST in induction phase	302.11 (241.69-362.53)	Gamma
Price of VDZ in induction phase	699.27 (559.42-839.13)	Gamma
Price of IFX in maintenance phase	204.40 (163.52-245.28)	Gamma
Price of ADA in maintenance phase	144.71 (115.77-173.65)	Gamma
Price of UST in maintenance phase	958.59 (766.87-1150.30)	Gamma
Price of VDZ in maintenance phase	699.27 (559.42-839.13)	Gamma
cost of SAE	1507.46 (1205.97-1808.95)	Gamma
cost of surgery	9849.27 (7879.41-11819.12)	Gamma
cost of conventional therapy (induction)	125.42 (100.34-150.50)	Gamma
cost of conventional therapy (maintenance)	103.79 (83.03-124.55)	Gamma
Utility (QALY)		
utility of active disease	0.40 (0.32-0.48)	beta
utility of remission	0.83 (0.66-1.00)	beta
utility of response	0.55 (0.44-0.66)	beta
utility of surgery	0.40 (0.32-0.48)	beta
utility of post-surgical remission	0.67 (0.54-0.80)	beta
utility of post-surgical active disease	0.40 (0.32-0.48)	beta
disutility of SAE	0.07 (0.06-0.08)	beta
ORs and transition probabilities		
p_PBO_naive_Induction_response	0.22 (0.16-0.29)	Normal
p_PBO_naive_Induction_remission	0.11 (0.08-0.15)	Normal
p_PBO_failure_Induction_response	0.20 (0.17-0.24)	Normal

p_PBO_failure_Induction_remission	0.10 (0.08-0.14)	Normal
p_PBO_naive_Maintenance_response	0.39 (0.32-0.45)	Normal
p_PBO_naive_Maintenance_remission	0.32 (0.24-0.40)	Normal
p_PBO_failure_Maintenance_response	0.26 (0.19-0.33)	Normal
p_PBO_failure_Maintenance_remission	0.16 (0.13-0.21)	Normal
p_PBO_Induction_SAE	0.07 (0.06-0.08)	Normal
p_PBO_maintenance_SAE	0.17 (0.14-0.20)	Normal
OR_Induction_IFX_naive_resopnse	22.00 (5.17-93.56)	LogNormal
OR_Induction_IFX_naive_remission	6.17 (2.54-15.01)	LogNormal
OR_Induction_IFX_failure_resopnse	1.77 (1.42-2.12)	LogNormal
OR_Induction_IFX_failure_remission	1.26 (1.01-1.51)	LogNormal
OR_Induction_ADA_naive_resopnse	2.49 (1.62-3.82)	LogNormal
OR_Induction_ADA_naive_remission	4.10 (2.31-7.27)	LogNormal
OR_Induction_ADA_failure_resopnse	2.19 (1.17-4.09)	LogNormal
OR_Induction_ADA_failure_remission	3.55 (1.82-6.93)	LogNormal
OR_Induction_UST_naive_resopnse	2.79 (1.94-3.99)	LogNormal
OR_Induction_UST_naive_remission	3.58 (2.05-6.25)	LogNormal
OR_Induction_UST_failure_resopnse	2.47 (1.49-4.09)	LogNormal
OR_Induction_UST_failure_remission	1.97 (1.31-2.97)	LogNormal
OR_Induction_VDZ_naive_resopnse	1.72 (1.04-2.85)	LogNormal
OR_Induction_VDZ_naive_remission	2.71 (1.34-5.48)	LogNormal
OR_Induction_VDZ_failure_resopnse	1.77 (1.07-2.92)	LogNormal
OR_Induction_VDZ_failure_remission	1.26 (0.74-2.14)	LogNormal
OR_MaintenanceIFX_naive_resopnse	2.57 (1.00-6.70)	LogNormal
OR_MaintenanceIFX_naive_remission	1.91 (0.82-4.46)	LogNormal
OR_MaintenanceIFX_failure_resopnse	1.47 (1.18-1.76)	LogNormal
OR_MaintenanceIFX_failure_remission	1.11 (0.89-1.33)	LogNormal
OR_MaintenanceADA_naive_resopnse	11.26 (3.52-33.64)	LogNormal

OR_MaintenanceADA_naive_remission	11.59 (4.47-30.89)	LogNormal
OR_MaintenanceADA_failure_resopnse	1.47 (1.18-1.76)	LogNormal
OR_MaintenanceADA_failure_remission	1.11 (0.89-1.33)	LogNormal
OR_MaintenanceUST_naive_resopnse	13.83 (3.94-45.68)	LogNormal
OR_MaintenanceUST_naive_remission	11.95 (3.95-36.07)	LogNormal
OR_MaintenanceUST_failure_resopnse	6.61 (2.13-20.89)	LogNormal
OR_MaintenanceUST_failure_remission	5.20 (1.58-16.63)	LogNormal
OR_MaintenanceVDZ_naive_resopnse	2.46 (0.81-7.38)	LogNormal
OR_MaintenanceVDZ_naive_remission	1.87 (0.66-5.08)	LogNormal
OR_MaintenanceVDZ_failure_resopnse	1.47 (0.47-4.81)	LogNormal
OR_MaintenanceVDZ_failure_remission	1.11 (0.30-3.91)	LogNormal
OR_IFX_SAE	0.94 (0.60-1.47)	LogNormal
OR_ADA_SAE	0.62 (0.41-0.94)	LogNormal
OR_UST_SAE	0.74 (0.44-1.24)	LogNormal
OR_VDZ_SAE	0.98 (0.63-1.52)	LogNormal
p_surgery_active	0.47 (0.38-0.57)	Normal
p_surgery_recurrence	0.04 (0.03-0.04)	Normal
discount rate of cost	0.05 (0.00-0.08)	uniform
discount rate of utility	0.05 (0.00-0.08)	uniform

Supplementary Table 5 Summary of net monetary benefit and incremental cost-effectiveness ratio results comparing different biologic sequences for biologic-naive Crohn's disease patients over a lifetime horizon

Sequence	Costs (\$)	QALY	Net monetary benefit (\$)	Incremental costs (\$)	Incremen tal QALYs	Incremental cost- effectiveness ratio (\$/QALY) ¹
Sequence1: VDZ-UST	31321.36	8.302	80293.04	-	-	-

Sequence2: IFX-ADA	32327.12	8.447	81244.16	1005.76	0.146	6910.02
Sequence3: ADA-UST	34614.18	8.986	86194.24	3292.82	0.684	4815.18
Sequence4: IFX-UST	33877.82	8.643	82320.86	2556.45	0.341	7497.52
Sequence5: ADA-VDZ	33974.36	8.780	84076.52	2652.99	0.479	5541.65
Sequence6: UST-VDZ	36299.79	8.966	84241.11	4978.43	0.664	7498.28
Sequence7: IFX-VDZ	33222.98	8.430	80119.93	1901.62	0.129	14791.19
Sequence8: IFX-UST-VDZ	36544.42	8.706	80508.21	5223.05	0.404	12912.72
Sequence9: IFX-ADA-VDZ	35079.43	8.513	79373.39	3758.06	0.211	17800.74
Sequence10: IFX-UST-ADA	35695.95	8.722	81572.62	4374.59	0.421	10402.04
Sequence11: IFX-ADA-UST	35716.22	8.720	81523.03	4394.86	0.418	10504.72
Sequence12: IFX-VDZ-UST	36620.15	8.704	80399.07	5298.79	0.402	13180.92
Sequence13: ADA-UST-VDZ	37208.23	9.047	84424.92	5886.87	0.745	7899.90
Sequence14: ADA-VDZ-UST	37276.09	9.045	84324.72	5954.73	0.743	8016.84
Sequence15: UST-VDZ-ADA	38084.81	9.043	83493.92	6763.44	0.741	9125.79
Sequence16: VDZ-ADA-UST	33287.17	8.384	79428.00	1965.80	0.082	24010.24
Sequence17: VDZ-UST-ADA	33267.66	8.386	79478.99	1946.29	0.084	23111.05

¹Compared to Sequence1 (VDZ-UST).

Supplementary Table 6 Summary of net monetary benefit and incremental cost-effectiveness ratio results comparing different biologic sequences for biologic-exposed Crohn's disease patients over a lifetime horizon

Sequence	Costs (\$)	QALY	Net monetary benefit (\$)	Incremental costs (\$)	Incremental QALYs	Incremental cost-effectiveness ratio (\$/QALY) ¹
Sequence1:VDZ-UST	30322.79	8.233	80362.16	-	-	-
Sequence3:ADA-UST	29765.19	8.250	81158.27	-557.60	0.018	-31432.32
Sequence5:ADA-VDZ	29054.63	8.022	78803.83	-1268.16	-0.210	6032.20

Sequence6:UST-VDZ	30862.36	8.235	79857.27	539.57	0.003	209197.16
Sequence13:ADA-UST-VDZ	32636.25	8.319	79204.68	2313.46	0.086	26906.89
Sequence14:ADA-VDZ-UST	32711.55	8.316	79093.50	2388.77	0.083	28672.40
Sequence15:UST-VDZ-ADA	32831.47	8.321	79040.02	2508.68	0.088	28425.80
Sequence16:VDZ-ADA-UST	32312.87	8.316	79491.83	1990.08	0.083	23894.61
Sequence17:VDZ-UST-ADA	32293.04	8.318	79543.66	1970.26	0.086	22999.24

¹Compared to Sequence1(VDZ-UST).

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