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Tables

Manuscript Title:

Modelling the economic impact of interventions for older populations with multimorbidity: a method of linking multiple single-disease models

Table 1. An illustration of individual’s movement through the linked model *

Simulation time	Location (Event where updates occur)	Time to next disease event
Time 0	Entry	Time to next heart disease event: Sampled to be 2.5 years Time to next Alzheimer’s disease event: Sampled to be 12 years Time to next osteoporosis event: Sampled to be 4.5 years
Time 0	Central router	<ul style="list-style-type: none"> • Time to next event: 2.5 years (heart disease event) • Utility weight until next event: 0.85 (baseline utility)
Time 2.5	Heart disease event	Next heart disease event: Sampled to be 6.8 years
Time 2.5	Central router	Next heart disease event: 6.8 years Next Alzheimer’s disease event: Updated to 9.5 (12-2.5) years Next osteoporosis event: Updated to 2 (4.5-2.5) years <ul style="list-style-type: none"> • Time to next event: 2 years (osteoporosis event) • Utility weight until next event: 0.595 [=0.85 (baseline utility) x 0.7 (utility multiplier for heart disease events)]
Time 4.5	Osteo event	Next osteoporosis event: Sampled to be 7.3 years
Time 4.5	Central router	Next heart disease event: Updated to 4.8 (6.8-2) years Next Alzheimer’s disease event: Updated to 7.5 (9.5-2) years Next osteoporosis event: 7.3 years <ul style="list-style-type: none"> • Time to next event: 4.8 years (heart disease) • Utility weight until next event: 0.476 [=0.85 (baseline) x 0.7 (heart disease) x 0.8 (utility multiplier for osteoporosis events)]
Time 9.3	Heart disease event	Next heart disease event: Sampled to be 8.2 years
Time 9.3	Central router	Next heart disease event: 8.2 years Next Alzheimer’s disease event: Updated to 2.7 (7.5-4.8) years Next osteoporosis event: Updated to 2.5 (7.3-4.8) years <ul style="list-style-type: none"> • Time to next event: 2.5 years (osteoporosis) • Utility weight until next event: 0.476 [=0.85 (baseline) x 0.7 (heart disease)† x 0.8 (osteoporosis)]
		⋮ The process continues until death

*For illustration, the same utility values were assumed across all events within one disease: 0.7 for heart disease events and 0.8 for osteoporosis events. A constant baseline utility weight of 0.85 was assumed; †When the same event occurs more than once (e.g. two strokes within a year), a utility multiplier is applied only once.

Table 2. Per-capita results from the independently linked model based on n=700,000 simulated individuals

	Independently linked model			Individual disease models
	With all treatments*	None of the three treatments	Incremental values	Sum of incremental values across three individual models
Cost	£ 14,776	£ 13,936	£ 840	£ 408
QALYs	8.956	8.722	0.234	0.280
ICER			£ 3,582 /QALY	£ 1,458

*All the default treatments were assumed to be available.

Table 3. Cost-effectiveness of individual treatments from the all-disease linked model where diseases were assumed independent

All disease linked model	HD treatment		AD treatment		Osteoporosis treatment	
	No HD treatment*	Incremental values**	No AD treatment*	Incremental values**	No Osteoporosis treatment*	Incremental values**
Based on 700,000 simulated individuals						
Cost	£ 13,815	£ 960	£ 14,800	-£ 24	£ 14,942	-£ 166
QALYs	8.720	0.236	8.957	-0.001	8.954	0.002
ICER		£ 4,068		£ 32,549†		Dominating
Based on 2,000,000 simulated individuals						
Cost	£ 13,798	£ 1,004	£ 14,819	-£ 18	£ 14,914	-£ 112
QALYs	8.717	0.240	8.958	0.000	8.952	0.005
ICER		£ 4,175		Dominating		Dominating

HD=heart disease; AD=Alzheimer's disease; *Treatments for the remaining two diseases were assumed to be available; **All incremental values are compared with the results with all three treatments available;

†Treatment with lower costs and lower QALYs; Costs and QALYs discounted at 3.5% p.a.

Table 4. Base-case results from the all-disease model with correlations between diseases incorporated based on n=700,000 simulated individuals

	Linked model with correlations incorporated		
	With all three treatments*	None of the three treatments	Incremental values
Cost	£ 14,741	£ 13,894	£ 847
QALYs	8.962	8.725	0.236
ICER			£3,583 /QALY

*All the default treatments were assumed to be available.

Table 5. Cost-effectiveness of individual treatments using results from the all-disease linked model with correlations incorporated, based on n=2,000,000 simulated individuals

	HD treatment		AD treatment		Osteoporosis treatment	
	No HD treatment*	Incremental values**	No AD treatment*	Incremental values**	No Osteoporosis treatment*	Incremental values**
Cost	£ 13,791	£ 936	£ 14,742	-£ 15	£ 14,869	-£ 142
QALYs	8.730	0.235	8.963	0.002	8.961	0.004
ICER (£/QALY)		£ 3,978		Dominating		Dominating

HD=heart disease; AD=Alzheimer's disease; *Treatments for the remaining two diseases were assumed to be available; **All incremental values are compared with the results with all three treatments available.