

Cost-effectiveness of osteoporotic fracture risk assessment in people with intellectual disabilities

SUPPLEMENTARY MATERIAL

TABLES

Supplementary Table 1. Model parameters

Parameter	Value	Reference
Transition probability		
Sensitivity of QFracture at 10% cutoff for MOF among people with ID (%)	17.9 (95%CI 16.2-19.5)	HES-CPRD
Sensitivity of QFracture at 3% cutoff for hip fracture among people with ID (%)	34.3 (95%CI 31.2-37.4)	HES-CPRD
Specificity of QFracture at 10% cutoff for MOF among people with ID (%)	92.9 (95%CI 92.6-93.1)	HES-CPRD
Specificity of QFracture at 3% cutoff for HF among people with ID (%)	88.5 (95%CI 88.2-88.8)	HES-CPRD
Sensitivity of IDFracture at 10% cutoff for MOF among people with ID (%)	53.9 (95%CI 51.7-56.0)	HES-CPRD
Sensitivity of IDFracture at 3% cutoff for HF among people with ID (%)	77.2 (95%CI 74.4-79.9)	HES-CPRD
Specificity of IDFracture at 10% cutoff for MOF among people with ID (%)	73.7 (95%CI 73.2-74.1)	HES-CPRD
Specificity of IDFracture at 3% cutoff for HF among people with ID (%)	62.7 (95%CI 62.2-63.2)	HES-CPRD
Sensitivity of DXA (%)	100	assumed
Specificity of DXA (%)	100	assumed
Prevalence of osteopenia per year (%)	33.2	[1]
Prevalence of osteoporosis per year (%)	41	[1]
Probability of developing MOF within 10 years among people with ID	Men, 40-79yo: 0.0695 (95%CI 0.0650-0.0743) Men, 40-49yo: 0.0442 (95%CI 0.0391-0.0500) Men, 50-74yo: 0.0874 (95%CI 0.0804-0.0951) Men, 75-79yo: 0.2432 (95%CI 0.1856-0.3149) Women, 40-79yo: 0.1173 (95%CI 0.1106-0.1243) Women, 40-49yo: 0.0606 (95%CI 0.0534-0.0687) Women, 50-64yo: 0.1347 (95%CI 0.1236-0.1467) Women, 65-79yo: 0.2565 (95%CI 0.2308-0.2845)	HES-CPRD
Probability of developing HF within 10 years among people with ID	Men, 40-79yo: 0.0352 (95%CI 0.0320-0.0387) Men, 40-49yo: 0.0177 (95%CI 0.0145-0.0216) Men, 50-74yo: 0.0476 (95%CI 0.0424-0.0534) Men, 75-79yo: 0.1612 (95%CI 0.1134-0.2265) Women, 40-79yo: 0.0456 (95%CI 0.0414-0.0503)	HES-CPRD

Parameter	Value	Reference
Probability of developing MOF over a lifetime among people with ID	Women, 40-49yo: 0.0127 (95%CI 0.0095-0.0168)	derived from 10-year probability of developing MOF
	Women, 50-64yo: 0.0490 (95%CI 0.0421-0.0570)	
	Women, 65-79yo: 0.1509 (95%CI 0.1298-0.1750)	
	Men, 40-79yo: 0.1761 Men, 40-49yo: 0.0988 Men, 50-74yo: 0.2014 Men, 75-79yo: 0.4008	
Probability of developing HF over a lifetime among people with ID	Women, 40-79yo: 0.2902 Women, 40-49yo: 0.1003 Women, 50-64yo: 0.2732 Women, 65-79yo: 0.4670	derived from 10-year probability of developing HF
	Men, 40-79yo: 0.0997 Men, 40-49yo: 0.0378 Men, 50-74yo: 0.1157 Men, 75-79yo: 0.2476	
	Women, 40-79yo: 0.1302 Women, 40-49yo: 0.0218 Women, 50-64yo: 0.1009 Women, 65-79yo: 0.2401	
	40-49 yo: 3 (range: 1-5) Men, 50-74 yo: 35-50 Men, 75-79 yo: 100 Women, 50-64 yo: 35 Women, 65-79 yo: 100	
Risk assessment (%)		expert opinion
10-year probability of MOF among people without ID but with a previous fragility fracture (%)*	Men: 9.6 Women: 16.4	[2]
10-year probability of HF among people without ID but with a previous fragility fracture (%)*	Men: 1.9 Women: 3.2	[2]
Proportion of MOF that has osteoporosis (%)	Men: 20.69 Women: 44.09	[3]
Proportion of HF that has osteoporosis (%)	Men: 38.89 Women: 63.79	[3]
Proportion of MOF that has osteopenia (%)	Men: 61.38 Women: 43.29	[3]
Proportion of HF that has osteopenia (%)	Men: 58.33 Women: 31.03	[3]
Relative risk of MOF after alendronate**	0.53 (95%CI 0.44-0.65)	[4]
Relative risk of HF after alendronate**	0.61 (95%CI 0.39-0.95)	[4]
Relative risk of MOF after calcium and Vitamin D	0.94 (95%CI 0.89-0.99)	[5]
Relative risk of HF after calcium and Vitamin D	0.84 (95%CI 0.72-0.97)	[5]
Hazard ratio of death after MOF	Men: 2.00 (95%CI 1.88-2.12) Women: 1.37 (95%CI 1.31-1.43)	[6]
Hazard ratio of death after HF	Men: 2.13 (95%CI 1.96-2.31) Women: 1.60 (95%CI 1.50-1.70)	[6]
Adherence to osteoporosis treatment (%)	43 (95%CI 38-49)	[7]
Adherence to osteopenia treatment among people with ID (%)	80.4	[8]
Mortality rate (per 1000 population) among people with ID	Men, 35-44yo: 4.4 (95%CI 2.8-6.7)	[9]

Parameter	Value	Reference
	Men, 45-54yo: 10.8 (95%CI 8.3-13.9)	
	Men, 55-64yo: 26.7 (95%CI 21.5-32.8)	
	Men, 65-74yo: 45.7 (95%CI 36.4-56.8)	
	Men, 75-84yo: 104.3 (95%CI 79.0-135.2)	
	Men, 85-99yo: 221.0 (95%CI 136.8-337.9)	
	Women, 35-44yo: 4.4 (95%CI 2.7-6.8)	
	Women, 45-54yo: 8.2 (95%CI 5.8-11.1)	
	Women, 55-64yo: 21.6 (95%CI 16.6-27.6)	
	Women, 65-74yo: 35.1 (95%CI 26.4-45.6)	
	Women, 75-84yo: 85.7 (95%CI 63.6-113.0)	
	Women, 85-99yo: 222.4 (95%CI 147.8-321.5)	
Utility[†]		
Fracture-free	35-44 yo: 0.893 45-54 yo: 0.855 55-64 yo: 0.810 65-74 yo: 0.773 75+ yo: 0.703	[10]
Disutility		
MOF	0.27 (95%CI 0.24-0.29)	[11]
Hip fracture	0.34 (95%CI 0.33-0.36)	[11]
Post MOF	0.13 (95%CI 0.10-0.15)	[11]
Post hip fracture	0.11 (95%CI 0.09-0.12)	[11]
Annual cost (£), in 2021/22 prices		
DXA	95.45	[12]
General practitioner consultation	41	[13]
Bisphosphonate (i.e. Alendronate 10mg)	91.25	[14]
Calcium and vitamin D (i.e. Calcichew 1000mg/800unit)	83.95	[14]
First year MOF cost among people with ID [‡]	9,407 (SE 284)	HES-CPRD
First year HF cost among people with ID [‡]	12,761 (SE 410)	HES-CPRD
Post 1-year MOF cost among people with ID [‡]	5,687 (SE 594)	HES-CPRD
Post 1-year HF cost among people with ID [‡]	5,319 (SE 885)	HES-CPRD

CI: confidence interval, CPRD: Clinical Practice Research Datalink, DXA: dual-energy x-ray absorptiometry, HES: Hospital Episode Statistics, HF: Hip fracture, HRQoL: health-related quality of life, ID: intellectual disabilities, MOF: major osteoporotic fracture, SE: standard error, yo: years old

*Converted to 1-year probability using the formula: $p' = 1 - (1 - p)^{1/t}$ where p is the original probability and t is time.

** People with alendronate in this network meta-analysis also had calcium and Vitamin D.

[†]Utility of treated osteoporosis, treated osteopenia, untreated osteoporosis and untreated osteopenia were assumed to be the same as the utility of a person who is fracture-free.

Recovery rate of major osteoporotic fracture was assumed to be the same as hip fracture.

[‡]Adjusted by age, gender, Indices of Multiple Deprivation quintile and baseline cost.

References of Supplementary Table 1

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Supplementary Table 2. Predicted population size following screening during cycle 1 of the Markov model for major osteoporotic fracture and hip fracture

	Untreated osteoporosis	Treated osteoporosis	Treated osteopenia	Untreated osteopenia	Normal BMD	No Fracture	Fracture	Post-fracture	Dead
Major osteoporotic fracture									
Strategy 1	38.08836122	0.2056388	0.1665173	30.84228274	24.0972	906.6	0	0	0
Strategy 2	17.653534	20.64047	16.71374	14.2950568	24.0972	906.6	0	0	0
Strategy 3	0	38.294	31.0088	0	24.0972	906.6	0	0	0
Hip fracture									
Strategy 1	16.39355644	0.1704436	0.1380177	13.27478229	10.4232	959.6	0	0	0
Strategy 2	3.776592	12.78741	10.35468	3.0581184	10.4232	959.6	0	0	0
Strategy 3	0	16.564	13.4128	0	10.4232	959.6	0	0	0

BMD: bone mineral density, DXA: dual-energy x-ray absorptiometry

Supplementary Table 3. Costs and effects of the fracture risk assessment strategies for major osteoporotic fracture based on sensitivity and subgroup analyses

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/ QALY	£20 000/ QALY	£30 000/ QALY
Sensitivity analysis								
Risk assessment at 1% for Strategy 1								
Strategy 1	2,724	12.22	-	-	-	-	-	-
Strategy 2	2,717	12.22	-7.32	0.0028	-2,583	50	64	92
Strategy 3	2,733	12.22	8.72	0.0053	1,655	70	97	149
Risk assessment at 5% for Strategy 1								
Strategy 1	2,724	12.22	-	-	-	-	-	-
Strategy 2	2,717	12.22	-7.14	0.0028	-2,554	49	63	91
Strategy 3	2,733	12.22	8.90	0.0052	1,701	70	96	148
Adherence to osteoporosis treatment -20%								
Strategy 1	2,744	12.21	-	-	-	-	-	-
Strategy 2	2,737	12.22	-6.62	0.0027	-2,412	48	62	89
Strategy 3	2,754	12.22	9.95	0.0051	1,946	67	92	143
Adherence to osteoporosis treatment at 100%								
Strategy 1	2,618	12.22	-	-	-	-	-	-
Strategy 2	2,566	12.23	-52.15	0.0074	-7,007	164	201	275
Strategy 3	2,543	12.24	-74.91	0.0139	-5,400	283	352	491
Adherence to osteopenia treatment -20%								
Strategy 1	2,762	12.21	-	-	-	-	-	-
Strategy 2	2,750	12.22	-11.77	0.0029	-4,019	56	70	100
Strategy 3	2,762	12.22	0.35	0.0055	63	82	109	163
Adherence to osteopenia treatment at 100%								
Strategy 1	2,684	12.22	-	-	-	-	-	-
Strategy 2	2,696	12.22	11.64	0.0024	4,770	25	37	62
Strategy 3	2,728	12.22	43.98	0.0045	9,672	24	47	92
Sensitivity of IDFracture for fracture -20%								
Strategy 1	2,724	12.22	-	-	-	-	-	-
Strategy 2	2,725	12.22	0.75	0.0022	332	33	44	67
Strategy 3	2,733	12.22	8.81	0.0052	1,678	70	96	149
Sensitivity of IDFracture for fracture at 99.9%*								
Strategy 1	2,724	12.22	-	-	-	-	-	-
Strategy 2	2,683	12.22	-41.29	0.0052	-7,873	120	146	199
Strategy 3	2,733	12.22	8.81	0.0052	1,678	70	96	149
Specificity of IDFracture for fracture -20%								
Strategy 1	2,724	12.22	-	-	-	-	-	-
Strategy 2	2,735	12.22	11.00	0.0028	3,906	31	45	73
Strategy 3	2,733	12.22	8.81	0.0052	1,678	70	96	149
Specificity of IDFracture for fracture at 100%								
Strategy 1	2,724	12.22	-	-	-	-	-	-
Strategy 2	2,684	12.22	-39.77	0.0028	-14,120	82	96	124
Strategy 3	2,733	12.22	8.81	0.0052	1,678	70	96	149
Sensitivity of QFracture for fracture -20%								
Strategy 1	2,724	12.22	-	-	-	-	-	-

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/QALY	£20 000/QALY	£30 000/QALY
Strategy 2	2,717	12.22	-7.31	0.0028	-2,591	50	64	92
Strategy 3	2,733	12.22	8.73	0.0053	1,661	70	96	149
<i>Sensitivity of QFracture for fracture at 100%</i>								
Strategy 1	2,722	12.22	-	-	-	-	-	-
Strategy 2	2,717	12.22	-5.41	0.0027	-2,014	46	59	86
Strategy 3	2,733	12.22	10.63	0.0051	2,077	66	92	143
<i>Specificity of QFracture for fracture -20%</i>								
Strategy 1	2,725	12.22	-	-	-	-	-	-
Strategy 2	2,717	12.22	-7.92	0.0028	-2,813	50	64	92
Strategy 3	2,733	12.22	8.12	0.0052	1,547	71	97	149
<i>Specificity of QFracture for fracture at 100%</i>								
Strategy 1	2,724	12.22	-	-	-	-	-	-
Strategy 2	2,717	12.22	-6.97	0.0028	-2,475	49	63	91
Strategy 3	2,733	12.22	9.07	0.0052	1,728	70	96	148
<i>Cost of alendronate -50%</i>								
Strategy 1	2,479	12.22	-	-	-	-	-	-
Strategy 2	2,471	12.22	-8.73	0.0028	-3,101	51	65	93
Strategy 3	2,485	12.22	6.01	0.0052	1,146	73	99	151
<i>Cost of alendronate +100%</i>								
Strategy 1	3,213	12.22	-	-	-	-	-	-
Strategy 2	3,209	12.22	-4.23	0.0028	-1,503	46	61	89
Strategy 3	3,228	12.22	14.40	0.0052	2,743	64	91	143
<i>Cost of vitamin D and calcium -50%</i>								
Strategy 1	2,317	12.22	-	-	-	-	-	-
Strategy 2	2,306	12.22	-11.22	0.0028	-3,983	53	68	96
Strategy 3	2,318	12.22	1.38	0.0052	263	77	104	156
<i>Cost of vitamin D and calcium +100%</i>								
Strategy 1	3,539	12.22	-	-	-	-	-	-
Strategy 2	3,539	12.22	0.74	0.0028	261	42	56	84
Strategy 3	3,562	12.22	23.66	0.0052	4,508	55	81	134
<i>Cost of DXA -50%</i>								
Strategy 1	2,724	12.22	-	-	-	-	-	-
Strategy 2	2,703	12.22	-20.90	0.0028	-7,421	63	77	105
Strategy 3	2,685	12.22	-38.80	0.0052	-7,391	118	144	196
<i>Cost of DXA +100%</i>								
Strategy 1	2,724	12.22	-	-	-	-	-	-
Strategy 2	2,744	12.22	20.10	0.0028	7,136	22	36	64
Strategy 3	2,828	12.22	104.03	0.0052	19,817	-25	1	53
<i>Cost of fracture -50%</i>								
Strategy 1	2,600	12.22	-	-	-	-	-	-
Strategy 2	2,597	12.22	-3.14	0.0028	-1,116	45	59	88
Strategy 3	2,616	12.22	16.43	0.0052	3,130	62	89	141
<i>Cost of fracture +100%</i>								
Strategy 1	2,973	12.22	-	-	-	-	-	-

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/ QALY	£20 000/ QALY	£30 000/ QALY
Strategy 2	2,957	12.22	-15.41	0.0028	-5,473	58	72	100
Strategy 3	2,966	12.22	-6.44	0.0052	-1,226	85	111	164
<i>Cost of post fracture -50%</i>								
Strategy 1	2,159	12.22	-	-	-	-	-	-
Strategy 2	2,176	12.22	17.31	0.0028	6,147	25	39	67
Strategy 3	2,214	12.22	54.56	0.0052	10,394	24	50	103
<i>Cost of post fracture +100%</i>								
Strategy 1	3,854	12.22	-	-	-	-	-	-
Strategy 2	3,798	12.22	-56.33	0.0028	-20,000	99	113	141
Strategy 3	3,772	12.22	-82.70	0.0052	-15,754	161	188	240
<i>10-year time horizon</i>								
Strategy 1	1,146	7.17	-	-	-	-	-	-
Strategy 2	1,160	7.17	13.78	0.0011	12,308	3	9	20
Strategy 3	1,194	7.18	47.98	0.0021	22,990	-17	-6	15
<i>Lifetime fracture risk</i>								
Strategy 1	7,849	11.94	-	-	-	-	-	-
Strategy 2	7,668	11.95	-180.87	0.0120	-15,047	361	421	541
Strategy 3	7,525	11.96	-324.58	0.0224	-14,488	661	773	997
Subgroup analysis								
<i>40-49 years old</i>								
Strategy 1	2,181	14.12	-	-	-	-	-	-
Strategy 2	2,202	14.12	20.52	0.0010	19,603	-5	0	11
Strategy 3	2,245	14.13	63.40	0.0020	32,496	-34	-24	-5
<i>Men aged 50-74 years old, risk assessment at 35% for Strategy 1</i>								
Strategy 1	1,568	9.74	-	-	-	-	-	-
Strategy 2	1,592	9.74	23.70	0.0012	19,763	-6	0	12
Strategy 3	1,638	9.74	69.95	0.0024	29,643	-35	-23	1
<i>Women aged 50-64 years old, risk assessment at 35% for Strategy 1</i>								
Strategy 1	3,137	10.87	-	-	-	-	-	-
Strategy 2	3,104	10.88	-32.28	0.0030	-10,708	77	93	123
Strategy 3	3,093	10.88	-43.51	0.0059	-7,335	132	162	221
<i>Men aged 50-74 years old, risk assessment at 50% for Strategy 1</i>								
Strategy 1	1,569	9.74	-	-	-	-	-	-
Strategy 2	1,592	9.74	22.72	0.0011	20,075	-6	0	11
Strategy 3	1,638	9.74	68.96	0.0023	30,088	-35	-23	-0.2
<i>Women aged 50-64 years old, risk assessment at 50% for Strategy 1</i>								
Strategy 1	3,134	10.87	-	-	-	-	-	-
Strategy 2	3,104	10.88	-30.13	0.0028	-10,591	73	87	115
Strategy 3	3,093	10.88	-41.36	0.0058	-7,178	128	157	214
<i>Men aged 75-79 years old, risk assessment at 100% for Strategy 1</i>								
Strategy 1	773	5.07	-	-	-	-	-	-

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/QALY	£20 000/QALY	£30 000/QALY
Strategy 2	799	5.07	25.94	0.0005	52,222	-18	-16	-11
Strategy 3	854	5.07	80.52	0.0011	71,074	-64	-58	-47
<i>Women aged 65-79 years old, risk assessment at 100% for Strategy 1</i>								
Strategy 1	1,691	6.95	-	-	-	-	-	-
Strategy 2	1,688	6.96	-2.59	0.0017	-1,514	28	37	54
Strategy 3	1,703	6.96	12.24	0.0039	3,135	46	66	105

DXA: dual x-ray absorptiometry, ICER: incremental cost-effectiveness ratio, QALY: quality-adjusted life-year

*99.9% instead of 100% was used as the high value for IDFracture sensitivity due to the incremental QALY between Strategy 2 and Strategy 3 to be less than <0.00001 when sensitivity of IDFracture is 100% and the ICER goes to infinity due to the small incremental QALY.

Supplementary Table 4. Costs and effects of the fracture risk assessment strategies for hip fracture based on sensitivity and subgroup analyses

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/QALY	£20 000/QALY	£30 000/QALY
Sensitivity analysis								
<i>Risk assessment at 1% for Strategy 1</i>								
Strategy 1	1,709	12.27	-	-	-	-	-	-
Strategy 2	1,747	12.27	37.97	0.0012	32,003	-20	-14	-2
Strategy 3	1,785	12.27	75.89	0.0015	49,328	-53	-45	-30
<i>Risk assessment at 5% for Strategy 1</i>								
Strategy 1	1,710	12.27	-	-	-	-	-	-
Strategy 2	1,747	12.27	37.56	0.0012	32,232	-20	-14	-3
Strategy 3	1,785	12.27	75.48	0.0015	49,746	-53	-45	-30
<i>Adherence to osteoporosis treatment -20%</i>								
Strategy 1	1,716	12.27	-	-	-	-	-	-
Strategy 2	1,754	12.27	37.60	0.0012	32,467	-20	-14	-3
Strategy 3	1,792	12.27	75.47	0.0015	50,154	-53	-45	-30
<i>Adherence to osteoporosis treatment at 100%</i>								
Strategy 1	1,675	12.27	-	-	-	-	-	-
Strategy 2	1,712	12.28	37.15	0.0028	13,491	4	18	45
Strategy 3	1,750	12.28	74.88	0.0036	20,930	-21	-3	32
<i>Adherence to osteopenia treatment -20%</i>								
Strategy 1	1,717	12.27	-	-	-	-	-	-
Strategy 2	1,754	12.27	36.66	0.0012	31,615	-19	-13	-2
Strategy 3	1,791	12.27	74.25	0.0015	49,277	-52	-44	-29
<i>Adherence to osteopenia treatment at 100%</i>								
Strategy 1	1,702	12.27	-	-	-	-	-	-
Strategy 2	1,745	12.27	43.51	0.0013	32,804	-24	-17	-4
Strategy 3	1,785	12.27	83.14	0.0017	48,248	-57	-49	-31
<i>Sensitivity of IDFracture for fracture -20%</i>								
Strategy 1	1,710	12.27	-	-	-	-	-	-
Strategy 2	1,749	12.27	39.92	0.0009	42,578	-26	-21	-12
Strategy 3	1,785	12.27	75.68	0.0015	49,536	-53	-45	-30
<i>Sensitivity of IDFracture for fracture at 99.9%*</i>								
Strategy 1	1,710	12.27	-	-	-	-	-	-
Strategy 2	1,744	12.27	34.60	0.0015	22,668	-12	-4	11
Strategy 3	1,785	12.27	75.68	0.0015	49,536	-53	-45	-30
<i>Specificity of IDFracture for fracture -20%</i>								
Strategy 1	1,710	12.27	-	-	-	-	-	-
Strategy 2	1,764	12.27	54.18	0.0012	46,080	-37	-31	-19
Strategy 3	1,785	12.27	75.68	0.0015	49,536	-53	-45	-30
<i>Specificity of IDFracture for fracture at 100%</i>								
Strategy 1	1,710	12.27	-	-	-	-	-	-
Strategy 2	1,699	12.27	-11.08	0.0012	-9,419	29	35	46
Strategy 3	1,785	12.27	75.68	0.0015	49,536	-53	-45	-30
<i>Sensitivity of QFracture for fracture -20%</i>								
Strategy 1	1,710	12.27	-	-	-	-	-	-

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/ QALY	£20 000/ QALY	£30 000/ QALY
Strategy 2	1,747	12.27	37.74	0.0012	32,005	-20	-14	-2
Strategy 3	1,785	12.27	75.65	0.0015	49,414	-53	-45	-30
<i>Sensitivity of QFracture for fracture at 100%</i>								
Strategy 1	1,709	12.27	-	-	-	-	-	-
Strategy 2	1,747	12.27	38.04	0.0011	33,209	-21	-15	-4
Strategy 3	1,785	12.27	75.96	0.0015	50,726	-53	-46	-31
<i>Specificity of QFracture for fracture -20%</i>								
Strategy 1	1,710	12.27	-	-	-	-	-	-
Strategy 2	1,747	12.27	37.07	0.0012	31,525	-19	-14	-2
Strategy 3	1,785	12.27	74.99	0.0015	49,080	-52	-44	-29
<i>Specificity of QFracture for fracture at 100%</i>								
Strategy 1	1,709	12.27	-	-	-	-	-	-
Strategy 2	1,747	12.27	38.22	0.0012	32,500	-21	-15	-3
Strategy 3	1,785	12.27	76.13	0.0015	49,831	-53	-46	-30
<i>Cost of alendronate -50%</i>								
Strategy 1	1,451	12.27	-	-	-	-	-	-
Strategy 2	1,487	12.27	36.84	0.0012	31,326	-19	-13	-2
Strategy 3	1,525	12.27	74.47	0.0015	48,746	-52	-44	-29
<i>Cost of alendronate +100%</i>								
Strategy 1	2,227	12.27	-	-	-	-	-	-
Strategy 2	2,267	12.27	39.62	0.0012	33,696	-22	-16	-4
Strategy 3	2,306	12.27	78.10	0.0015	51,115	-55	-48	-32
<i>Cost of vitamin D and calcium -50%</i>								
Strategy 1	1,278	12.27	-	-	-	-	-	-
Strategy 2	1,314	12.27	35.22	0.0012	29,953	-18	-12	0.1
Strategy 3	1,351	12.27	72.38	0.0015	47,373	-49	-42	-27
<i>Cost of vitamin D and calcium +100%</i>								
Strategy 1	2,572	12.27	-	-	-	-	-	-
Strategy 2	2,615	12.27	42.85	0.0012	36,441	-25	-19	-8
Strategy 3	2,654	12.27	82.29	0.0015	53,861	-59	-52	-36
<i>Cost of DXA -50%</i>								
Strategy 1	1,709	12.27	-	-	-	-	-	-
Strategy 2	1,729	12.27	19.37	0.0012	16,474	-2	4	16
Strategy 3	1,738	12.27	28.13	0.0015	18,415	-5	2	18
<i>Cost of DXA +100%</i>								
Strategy 1	1,710	12.27	-	-	-	-	-	-
Strategy 2	1,784	12.27	74.55	0.0012	63,400	-57	-51	-39
Strategy 3	1,881	12.27	170.78	0.0015	111,777	-148	-140	-125
<i>Cost of fracture -50%</i>								
Strategy 1	1,675	12.27	-	-	-	-	-	-
Strategy 2	1,715	12.27	39.81	0.0012	33,853	-22	-16	-5
Strategy 3	1,754	12.27	78.33	0.0015	51,272	-55	-48	-33
<i>Cost of fracture +100%</i>								
Strategy 1	1,778	12.27	-	-	-	-	-	-

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/QALY	£20 000/QALY	£30 000/QALY
Strategy 2	1,812	12.27	33.68	0.0012	28,643	-16	-10	2
Strategy 3	1,848	12.27	70.37	0.0015	46,062	-47	-40	-25
<i>Cost of post fracture -50%</i>								
Strategy 1	1,600	12.27	-	-	-	-	-	-
Strategy 2	1,646	12.27	46.61	0.0012	39,635	-29	-23	-11
Strategy 3	1,687	12.27	87.17	0.0015	57,054	-64	-57	-41
<i>Cost of post fracture +100%</i>								
Strategy 1	1,929	12.27	-	-	-	-	-	-
Strategy 2	1,949	12.27	20.08	0.0012	17,078	-2	3	15
Strategy 3	1,982	12.27	52.71	0.0015	34,498	-30	-22	-7
<i>10-year time horizon</i>								
Strategy 1	868	7.18	-	-	-	-	-	-
Strategy 2	914	7.18	45.61	0.0004	108,412	-39	-37	-33
Strategy 3	954	7.18	85.88	0.0005	157,098	-78	-75	-69
<i>Lifetime fracture risk</i>								
Strategy 1	3,240	12.18	-	-	-	-	-	-
Strategy 2	3,179	12.19	-60.76	0.0072	-8,403	169	205	278
Strategy 3	3,183	12.19	-57.59	0.0094	-6,130	199	246	339
Subgroup analysis								
<i>40-49 years old</i>								
Strategy 1	1,697	14.15	-	-	-	-	-	-
Strategy 2	1,747	14.15	49.97	0.0002	259,532	-47	-46	-44
Strategy 3	1,790	14.15	93.32	0.0003	373,010	-90	-88	-86
<i>Men aged 50-74 years old, risk assessment at 35% for Strategy 1</i>								
Strategy 1	1,290	9.76	-	-	-	-	-	-
Strategy 2	1,332	9.76	41.78	0.0007	59,658	-31	-28	-21
Strategy 3	1,373	9.76	82.61	0.0009	87,400	-68	-64	-54
<i>Women aged 50-64 years old, risk assessment at 35% for Strategy 1</i>								
Strategy 1	1,620	10.93	-	-	-	-	-	-
Strategy 2	1,651	10.94	31.07	0.0010	30,617	-16	-11	-1
Strategy 3	1,688	10.94	67.44	0.0014	49,231	-47	-40	-26
<i>Men aged 50-74 years old, risk assessment at 50% for Strategy 1</i>								
Strategy 1	1,292	9.76	-	-	-	-	-	-
Strategy 2	1,332	9.76	39.67	0.0006	61,497	-30	-27	-20
Strategy 3	1,373	9.76	80.50	0.0009	90,456	-67	-63	-54
<i>Women aged 50-64 years old, risk assessment at 50% for Strategy 1</i>								
Strategy 1	1,621	10.93	-	-	-	-	-	-
Strategy 2	1,651	10.94	29.79	0.0009	31,872	-16	-11	-2
Strategy 3	1,688	10.94	66.16	0.0013	51,297	-47	-40	-27
<i>Men aged 75-79 years old, risk assessment at 100% for Strategy 1</i>								
Strategy 1	701	5.08	-	-	-	-	-	-
Strategy 2	736	5.08	35.52	0.0003	140,028	-32	-30	-28
Strategy 3	779	5.08	77.89	0.0004	200,494	-72	-70	-66

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/ QALY	£20 000/ QALY	£30 000/ QALY
<i>Women aged 65-79 years old, risk assessment at 100% for Strategy 1</i>								
Strategy 1	1,023	6.99	-	-	-	-	-	-
Strategy 2	1,054	6.99	30.66	0.0005	61,866	-23	-21	-16
Strategy 3	1,093	6.99	69.76	0.0008	91,896	-58	-55	-47

DXA: dual x-ray absorptiometry, ICER: incremental cost-effectiveness ratio, QALY: quality-adjusted life-year

*99.9% instead of 100% was used as the high value for IDFracture sensitivity due to the incremental QALY between Strategy 2 and Strategy 3 to be less than <0.00001 when sensitivity of IDFracture is 100% and the ICER goes to infinity due to the small incremental QALY.

Supplementary Table 5. Cost-effectiveness analysis of Strategy 2 vs. Strategy 3 among people with intellectual disabilities with major osteoporotic fracture

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/QALY	£20 000/QALY	£30 000/QALY
Base case								
Strategy 2	2,717	12.22	-	-	-	-	-	-
Strategy 3	2,733	12.22	16.04	0.0024	6,594	20	33	57
Sensitivity analysis								
<i>Adherence to osteoporosis treatment -20%</i>								
Strategy 2	2,737	12.22	-	-	-	-	-	-
Strategy 3	2,754	12.22	16.57	0.0024	6,991	19	31	55
<i>Adherence to osteoporosis treatment at 100%</i>								
Strategy 2	2,566	12.23	-	-	-	-	-	-
Strategy 3	2,543	12.24	-22.76	0.0064	-3,540	119	151	216
<i>Adherence to osteopenia treatment -20%</i>								
Strategy 2	2,750	12.22	-	-	-	-	-	-
Strategy 3	2,762	12.22	12.12	0.0025	4,789	26	39	64
<i>Adherence to osteopenia treatment at 100%</i>								
Strategy 2	2,696	12.22	-	-	-	-	-	-
Strategy 3	2,728	12.22	32.35	0.0021	15,347	-1	10	31
<i>Sensitivity of IDFracture for fracture -20%</i>								
Strategy 2	2,725	12.22	-	-	-	-	-	-
Strategy 3	2,733	12.22	8.06	0.0030	2,686	37	52	82
<i>Sensitivity of IDFracture for fracture at 99.9%*</i>								
Strategy 2	2,683	12.22	-	-	-	-	-	-
Strategy 3	2,733	12.22	50.10	<0.0001	9,491,917	-50	-50	-50
<i>Specificity of IDFracture for fracture -20%</i>								
Strategy 2	2,735	12.22	-	-	-	-	-	-
Strategy 3	2,733	12.22	-2.19	0.0024	-901	39	51	75
<i>Specificity of IDFracture for fracture at 100%</i>								
Strategy 2	2,684	12.22	-	-	-	-	-	-
Strategy 3	2,733	12.22	48.58	0.0024	19,965	-12	0	24
<i>Cost of alendronate -50%</i>								
Strategy 2	2,471	12.22	-	-	-	-	-	-
Strategy 3	2,485	12.22	14.75	0.0024	6,061	22	34	58
<i>Cost of alendronate +100%</i>								
Strategy 2	3,209	12.22	-	-	-	-	-	-
Strategy 3	3,228	12.22	18.64	0.0024	7,659	18	30	54
<i>Cost of vitamin D and calcium treatment -50%</i>								
Strategy 2	2,306	12.22	-	-	-	-	-	-
Strategy 3	2,318	12.22	12.60	0.0024	5,179	24	36	60
<i>Cost of vitamin D and calcium treatment +100%</i>								
Strategy 2	3,539	12.22	-	-	-	-	-	-
Strategy 3	3,562	12.22	22.93	0.0024	9,423	14	26	50
<i>Cost of DXA -50%</i>								
Strategy 2	2,703	12.22	-	-	-	-	-	-
Strategy 3	2,685	12.22	-17.90	0.0024	-7,357	54	67	91

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/QALY	£20 000/QALY	£30 000/QALY
<i>Cost of DXA +100%</i>								
Strategy 2	2,744	12.22	-	-	-	-	-	-
Strategy 3	2,828	12.22	83.93	0.0024	34,495	-47	-35	-11
<i>Cost of fracture -50%</i>								
Strategy 2	2,597	12.22	-	-	-	-	-	-
Strategy 3	2,616	12.22	19.58	0.0024	8,046	17	29	53
<i>Cost of fracture +100%</i>								
Strategy 2	2,957	12.22	-	-	-	-	-	-
Strategy 3	2,966	12.22	8.98	0.0024	3,689	28	40	64
<i>Cost of post fracture -50%</i>								
Strategy 2	2,176	12.22	-	-	-	-	-	-
Strategy 3	2,214	12.22	37.25	0.0024	15,310	-1	11	36
<i>Cost of post fracture +100%</i>								
Strategy 2	3,798	12.22	-	-	-	-	-	-
Strategy 3	3,772	12.22	-26.37	0.0024	-10,838	63	75	99
<i>10-year time horizon</i>								
Strategy 2	1,160	7.17	-	-	-	-	-	-
Strategy 3	1,194	7.18	34.20	0.0010	35,355	-20	-15	-5
<i>Lifetime fracture risk</i>								
Strategy 2	7,668	11.95	-	-	-	-	-	-
Strategy 3	7,525	11.96	-143.71	0.0104	-13,840	299	351	455
Subgroup analysis								
<i>40-49 years old</i>								
Strategy 2	2,202	14.12	-	-	-	-	-	-
Strategy 3	2,245	14.13	42.88	0.0009	47,420	-29	-25	-16
<i>Men aged 50-74 years old, risk assessment at 35% for Strategy 1</i>								
Strategy 2	1,592	9.74	-	-	-	-	-	-
Strategy 3	1,638	9.74	46.25	0.0012	39,851	-29	-23	-11
<i>Women aged 50-64 years old, risk assessment at 35% for Strategy 1</i>								
Strategy 2	3,104	10.88	-	-	-	-	-	-
Strategy 3	3,093	10.88	-11.23	0.0029	-3,850	55	70	99
<i>Men aged 50-74 years old, risk assessment at 50% for Strategy 1</i>								
Strategy 2	1,592	9.74	-	-	-	-	-	-
Strategy 3	1,638	9.74	46.25	0.0012	39,851	-29	-23	-11
<i>Women aged 50-64 years old, risk assessment at 50% for Strategy 1</i>								
Strategy 2	3,104	10.88	-	-	-	-	-	-
Strategy 3	3,093	10.88	-11.23	0.0029	-3,850	55	70	99
<i>Men aged 75-79 years old, risk assessment at 100% for Strategy 1</i>								
Strategy 2	799	5.07	-	-	-	-	-	-
Strategy 3	854	5.07	54.58	0.0006	85,795	-45	-42	-35

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/QALY	£20 000/QALY	£30 000/QALY
<i>Women aged 65-79 years old, risk assessment at 100% for Strategy 1</i>								
Strategy 2	1,688	6.96	-	-	-	-	-	-
Strategy 3	1,703	6.96	14.83	0.0022	6,766	18	29	51

DXA: dual x-ray absorptiometry, ICER: incremental cost-effectiveness ratio, QALY: quality-adjusted life-year

*99.9% instead of 100% was used as the high value for IDFracture sensitivity due to the incremental QALY between Strategy 2 and Strategy 3 to be less than <0.00001 when sensitivity of IDFracture is 100% and the ICER goes to infinity due to the small incremental QALY.

Supplementary Table 6. Cost-effectiveness analysis of Strategy 2 vs. Strategy 3 among people with intellectual disabilities with hip fracture

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/QALY	£20 000/QALY	£30 000/QALY
Base case								
Strategy 2	1,747	12.27	-	-	-	-	-	-
Strategy 3	1,785	12.27	37.92	0.0004	107,731	-33	-31	-27
Sensitivity analysis								
<i>Adherence to osteoporosis treatment -20%</i>								
Strategy 2	1,754	12.27	-	-	-	-	-	-
Strategy 3	1,792	12.27	37.87	0.0003	109,245	-33	-31	-27
<i>Adherence to osteoporosis treatment at 100%</i>								
Strategy 2	1,712	12.28	-	-	-	-	-	-
Strategy 3	1,750	12.28	37.73	0.0008	45,782	-25	-21	-13
<i>Adherence to osteopenia treatment -20%</i>								
Strategy 2	1,754	12.27	-	-	-	-	-	-
Strategy 3	1,791	12.27	37.59	0.0003	108,285	-32	-31	-27
<i>Adherence to osteopenia treatment at 100%</i>								
Strategy 2	1,745	12.27	-	-	-	-	-	-
Strategy 3	1,785	12.27	39.64	0.0004	99,846	-34	-32	-28
<i>Sensitivity of IDFracture for fracture -20%</i>								
Strategy 2	1,749	12.27	-	-	-	-	-	-
Strategy 3	1,785	12.27	35.76	0.0006	60,585	-27	-24	-18
<i>Sensitivity of IDFracture for fracture at 99.9%*</i>								
Strategy 2	1,744	12.27	-	-	-	-	-	-
Strategy 3	1,785	12.27	41.08	<0.0001	26,613,676	-41	-41	-41
<i>Specificity of IDFracture for fracture -20%</i>								
Strategy 2	1,764	12.27	-	-	-	-	-	-
Strategy 3	1,785	12.27	21.50	0.0004	61,080	-16	-14	-11
<i>Specificity of IDFracture for fracture at 100%</i>								
Strategy 2	1,699	12.27	-	-	-	-	-	-
Strategy 3	1,785	12.27	86.76	0.0004	246,494	-81	-80	-76
<i>Cost of alendronate -50%</i>								
Strategy 2	1,487	12.27	-	-	-	-	-	-
Strategy 3	1,525	12.27	37.64	0.0004	106,941	-32	-31	-27
<i>Cost of alendronate +100%</i>								
Strategy 2	2,267	12.27	-	-	-	-	-	-
Strategy 3	2,306	12.27	38.47	0.0004	109,311	-33	-31	-28
<i>Cost of vitamin D and calcium treatment -50%</i>								
Strategy 2	1,314	12.27	-	-	-	-	-	-
Strategy 3	1,351	12.27	37.16	0.0004	105,568	-32	-30	-27
<i>Cost of vitamin D and calcium treatment +100%</i>								
Strategy 2	2,615	12.27	-	-	-	-	-	-
Strategy 3	2,654	12.27	39.44	0.0004	112,057	-34	-32	-29
<i>Cost of DXA -50%</i>								
Strategy 2	1,729	12.27	-	-	-	-	-	-
Strategy 3	1,738	12.27	8.76	0.0004	24,899	-3	-2	2

	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/QALY	£20 000/QALY	£30 000/QALY
<i>Cost of DXA +100%</i>								
Strategy 2	1,784	12.27	-	-	-	-	-	-
Strategy 3	1,881	12.27	96.23	0.0004	273,396	-91	-89	-86
<i>Cost of fracture -50%</i>								
Strategy 2	1,715	12.27	-	-	-	-	-	-
Strategy 3	1,754	12.27	38.53	0.0004	109,468	-33	-31	-28
<i>Cost of fracture +100%</i>								
Strategy 2	1,812	12.27	-	-	-	-	-	-
Strategy 3	1,848	12.27	36.70	0.0004	104,258	-31	-30	-26
<i>Cost of post fracture -50%</i>								
Strategy 2	1,646	12.27	-	-	-	-	-	-
Strategy 3	1,687	12.27	40.56	0.0004	115,250	-35	-34	-30
<i>Cost of post fracture +100%</i>								
Strategy 2	1,949	12.27	-	-	-	-	-	-
Strategy 3	1,982	12.27	32.62	0.0004	92,693	-27	-26	-22
<i>10-year time horizon</i>								
Strategy 2	914	7.18	-	-	-	-	-	-
Strategy 3	954	7.18	40.27	0.0001	319,747	-38	-38	-36
<i>Lifetime fracture risk</i>								
Strategy 2	3,179	12.19	-	-	-	-	-	-
Strategy 3	3,183	12.19	3.17	0.0022	1,465	29	40	62
Subgroup analysis								
<i>40-49 years old</i>								
Strategy 2	1,747	14.15	-	-	-	-	-	-
Strategy 3	1,790	14.15	43.35	<0.0001	752,122	-42	-42	-42
<i>Men aged 50-74 years old, risk assessment at 35% for Strategy 1</i>								
Strategy 2	1,332	9.76	-	-	-	-	-	-
Strategy 3	1,373	9.76	40.83	0.0002	166,726	-37	-36	-33
<i>Women aged 50-64 years old, risk assessment at 35% for Strategy 1</i>								
Strategy 2	1,651	10.94	-	-	-	-	-	-
Strategy 3	1,688	10.94	36.37	0.0004	102,457	-31	-29	-26
<i>Men aged 50-74 years old, risk assessment at 50% for Strategy 1</i>								
Strategy 2	1,332	9.76	-	-	-	-	-	-
Strategy 3	1,373	9.76	40.83	0.0002	166,726	-37	-36	-33
<i>Women aged 50-64 years old, risk assessment at 50% for Strategy 1</i>								
Strategy 2	1,651	10.94	-	-	-	-	-	-
Strategy 3	1,688	10.94	36.37	0.0004	102,457	-31	-29	-26
<i>Men aged 75-79 years old, risk assessment at 100% for Strategy 1</i>								
Strategy 2	736	5.08	-	-	-	-	-	-
Strategy 3	779	5.08	42.37	0.0001	314,266	-40	-40	-38

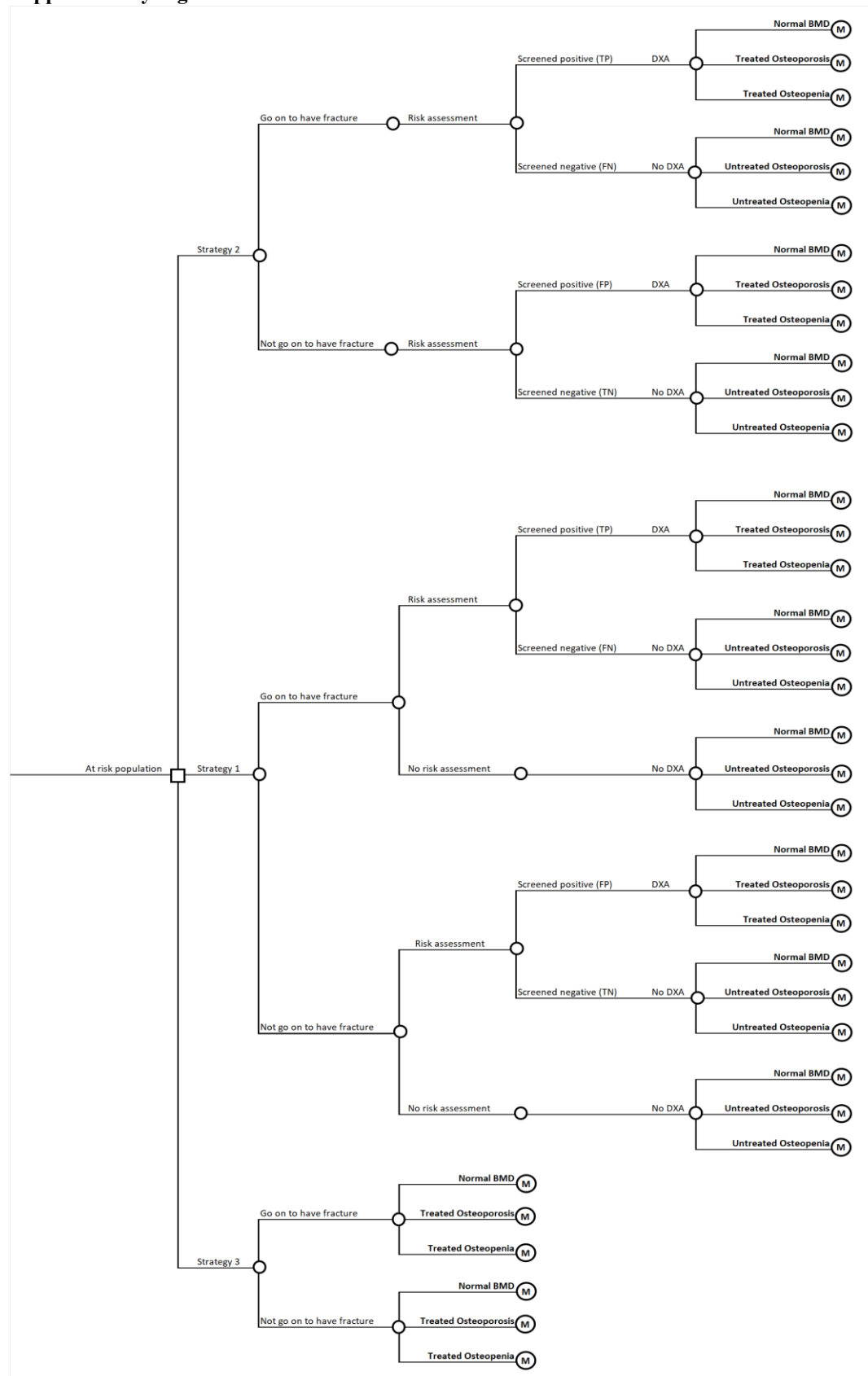
	Mean Cost	Mean QALY	Incremental Cost	Incremental QALY	ICER (£/QALY)	Incremental net monetary benefit at cost-effectiveness threshold of		
						£15 000/QALY	£20 000/QALY	£30 000/QALY
<i>Women aged 65-79 years old, risk assessment at 100% for Strategy 1</i>								
Strategy 2	1,054	6.99	-	-	-	-	-	-
Strategy 3	1,093	6.99	39.09	0.0003	148,401	-35	-34	-31

DXA: dual x-ray absorptiometry, ICER: incremental cost-effectiveness ratio, QALY: quality-adjusted life-year

*99.9% instead of 100% was used as the high value for IDFracture sensitivity due to the incremental QALY between Strategy 2 and Strategy 3 to be less than <0.00001 when sensitivity of IDFracture is 100% and the ICER goes to infinity due to the small incremental QALY.

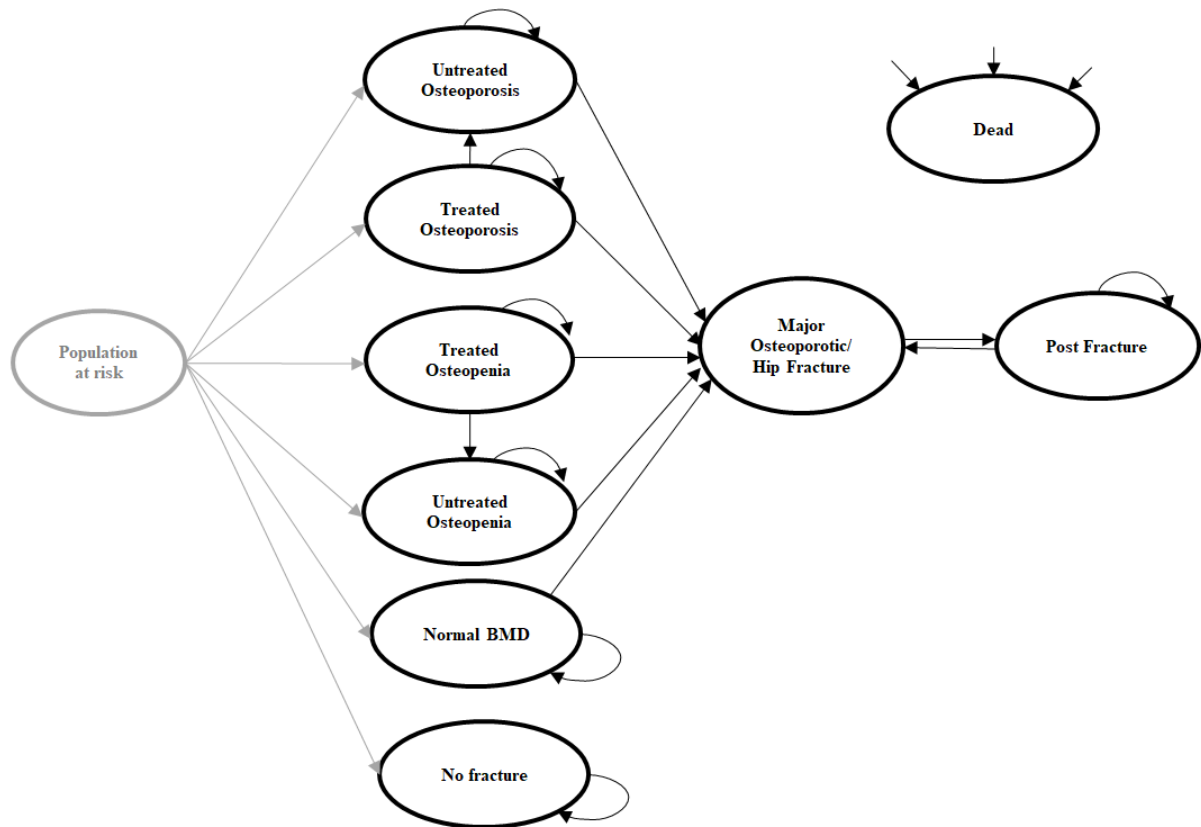
FIGURES

Supplementary Fig. 1. Decision tree model



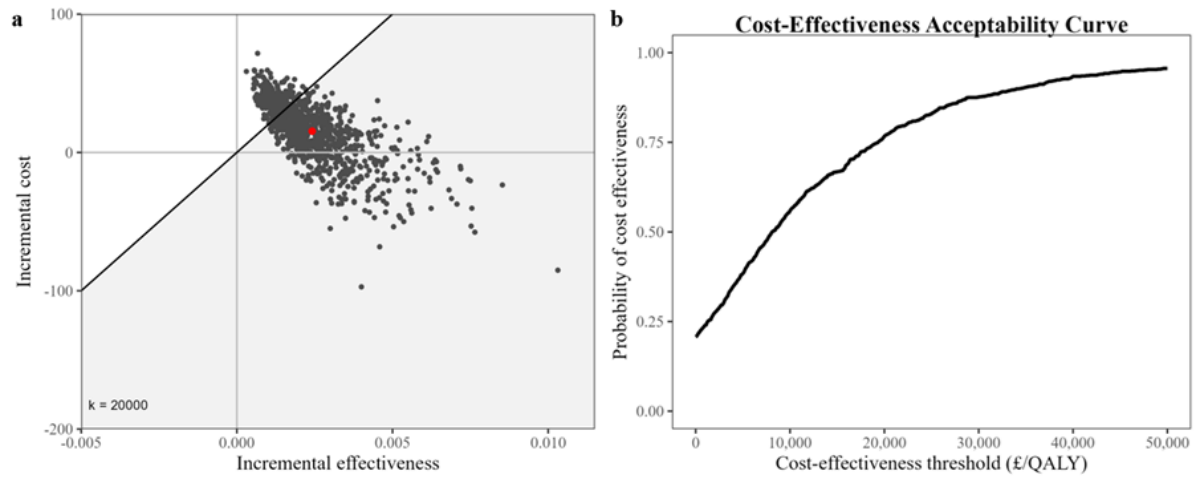
BMD: bone mineral density. DXA: dual-energy X-ray absorptiometry.

Supplementary Fig. 2. Markov model



“Population at risk” is not a health state in the Markov model, it represents the movement of people in the decision tree. BMD: bone mineral density.

Supplementary Fig. 3. Cost-effectiveness analysis of Strategy 2 vs. Strategy 3 among people with intellectual disabilities with major osteoporotic fracture using (a) cost-effectiveness plane and (b) cost-effectiveness acceptability curve.



Supplementary Fig. 4. Cost-effectiveness analysis of Strategy 2 vs. Strategy 3 among people with intellectual disabilities with hip fracture using (a) cost-effectiveness plane and (b) cost-effectiveness acceptability curve.

