

SUPPLEMENTAL MATERIAL

Table S1: Extrapolated life expectancies for the general population and elective aneurysm repair survivors

Extrapolated IFoA and ONS Life expectancies (years)

	Men			Women		
	Smokers [#]	Non-smokers [#]	Total [*]	Smokers [#]	Non-smokers [#]	Total [*]
UK Population						
2010						
65yrs	16.3	22.2	21.0	18.1	24.8	23.7
75yrs	9.3	13.5	12.8	10.4	15.4	14.7
85yrs	4.9	6.9	6.5	5.2	7.6	7.3
2020						
65yrs	17.3	23.4	22.2	19.0	26.1	24.9
75yrs	10.4	15.0	14.2	11.4	16.9	16.1
85yrs	5.9	8.3	7.9	6.2	9.2	8.8
2030						
65yrs	18.2	24.7	23.4	19.8	27.2	26.0
75yrs	11.1	16.0	15.2	12.1	17.8	17.0
85yrs	6.6	9.3	8.8	6.9	10.2	9.7
Elective Aneurysm Repair Survivors[‡]						
2010						
65yrs	11.8	16.0	15.2	9.7	13.3	12.7
75yrs	6.7	9.8	9.2	5.6	8.3	7.9
85yrs	3.5	5.0	4.7	2.8	4.1	3.9
2020						
65yrs	12.5	16.9	16.0	10.2	14.0	13.3
75yrs	7.5	10.8	10.3	6.1	9.0	8.6
85yrs	4.3	6.0	5.7	3.3	4.9	4.7
2030						
65yrs	13.1	17.8	16.9	10.6	14.6	13.9
75yrs	8.0	11.6	11.0	6.5	9.5	9.1
85yrs	4.8	6.7	6.4	3.7	5.4	5.2

*Based on ONS projections for all men and women at the appropriate age-bands

[#]Estimated by applying the current IFoA mortality rate variance for smokers and non-smokers at appropriate age-bands onto the ONS “total” projections

[‡]Based on data from Mani et al. 2009: 10 year survival (excluding 90 day post-operative mortality) following elective AAA repair compared to age and sex matched population controls (72.2% for men, 53.6% for women)

Table S2: Current and projected life-years gained per year for the current screening strategy and potential alternatives

Screening Strategy	2010	2020	2030
Annual AAA-related deaths	3957	3860	4078
AAA-related life-years lost	21796	21348	21938
Current: Men aged 65			
AAA-related deaths prevented N (%)	221	144	87
Life-years saved N (%)	2606 (12.0)	1795 (8.4)	1143 (5.2)
Number of scans to save 1 year of life	121	181	369
ALTERNATIVE A: Men aged 65 current smokers + All Men aged 75			
AAA-related deaths prevented N (%)	835	681	561
Life-years saved N (%)	7266 (33.3)	6316 (29.6)	5415 (24.7)
Number of scans to save 1 year of life	34	49	62
ALTERNATIVE B: Men aged 65 current smokers + All Men aged 75 + Women aged 75 with diagnosed hypertension			
AAA-related deaths prevented N (%)	985	813	686
Life-years saved N (%)	8219 (37.7)	7235 (33.9)	6333 (28.9)
Number of scans to save 1 year of life	41	58	71

Table S3: Sensitivity analysis on the projected impact of screening programme alternative strategies on acute abdominal aortic events if incidence rates reduce by the same age-adjusted degree as they have for last decade

	2010*		2020*		2030*	
Total UK population ≥ 55 years	17,646,359		20,861,307		23,923,713	
Annual AAA-related events	6905		6344		6372	
Length of Screening Efficacy (Yrs)	10	15	10	15	10	15
SCREENING PROGRAMME						
<i>All Men aged 65 and 75 and All Women aged 75</i>						
Acute AAA events expected in screened population N (%)	3875 (56.1)	4990 (72.3)	3064 (48.3)	4445 (70.1)	2469 (38.7)	4262 (66.9)
Acute AAA events prevented N (%)	1938 (28.1)	2495 (36.1)	1532 (24.1)	2222 (35.0)	1234 (19.4)	2131 (33.4)
Annual Scans	752,100	752,100	877,300	877,300	1004,900	1004,900
Scans required to prevent 1 event	388	301	573	395	814	472
<i>All Men and All Women aged 75</i>						
Acute AAA events expected in screened population N (%)	2404 (34.8)	3518 (51.0)	2103 (33.1)	3484 (54.9)	1887 (29.6)	3680 (57.8)
Acute AAA events prevented N (%)	1202 (17.4)	1759 (25.5)	1051 (16.6)	1742 (27.5)	944 (14.8)	1840 (28.9)
Annual Scans	436,900	436,900	551,900	551,900	583,200	583,200
Scans required to prevent 1 event	363	248	525	317	618	317
<i>All hypertensive Women aged 75</i>						
Acute AAA events expected in screened population N (%)	524 (7.6)	948 (13.7)	460 (7.3)	951 (15.0)	437 (6.9)	1073 (16.8)
Acute AAA events prevented N (%)	262 (3.8)	474 (6.9)	230 (3.6)	475 (7.5)	218 (3.4)	536 (8.4)
Annual Scans	88,500	88,500	109,900	109,900	115,900	115,900
Scans required to prevent 1 event	338	187	478	231	532	216

Values are given as overall numbers with percentages in brackets unless otherwise stated

*Incorporates 2010 UK population census and ONS Principal Population Projections for 2010 - 2030

Table S4: Sensitivity analysis on the projected impact on aneurysm-related death for screening programme alternative strategies if incidence rates reduce by the same age-adjusted degree as they have for last decade

	2010*		2020*		2030*	
Total UK population ≥ 55 years	17,646,359		20,861,307		23,923,713	
Annual AAA-related deaths	3957		3860		4078	
Length of Screening Efficacy (Yrs)	10	15	10	15	10	15
SCREENING PROGRAMME						
<i>All Men aged 65 and 75 and All Women aged 75</i>						
AAA-related deaths expected in screened population N (%)	1970 (49.8)	2743 (69.3)	1625 (42.1)	2593 (67.2)	1372 (33.7)	2629 (64.5)
AAA-related deaths prevented N (%)	985 (24.9)	1371 (34.7)	813 (21.0)	1296 (33.6)	686 (16.8)	1314 (32.2)
Annual Scans required	752,100	752,100	877,300	877,300	1004,900	1004,900
Scans required to prevent 1 death	764	549	1079	677	1465	765
<i>All Men and All Women aged 75</i>						
AAA-related deaths expected in screened population N (%)	1528 (38.6)	2301 (58.2)	1337 (34.6)	2305 (59.7)	1198 (29.4)	2454 (60.2)
AAA-related deaths prevented N (%)	764 (19.3)	1151 (29.1)	669 (17.3)	1152 (29.9)	599 (14.7)	1227 (30.1)
Annual Scans required	436,900	436,900	551,900	551,900	583,200	583,200
Scans required to prevent 1 death	571	380	825	479	974	475
<i>All hypertensive Women aged 75</i>						
AAA-related deaths expected in screened population N (%)	300 (7.6)	554 (14.0)	263 (6.8)	557 (14.4)	250 (6.1)	631 (15.5)
AAA-related deaths prevented N (%)	150 (3.8)	277 (7.0)	131 (3.4)	279 (7.2)	125 (3.1)	316 (7.7)
Annual Scans required	88,500	88,500	109,900	109,900	115,900	115,900
Scans required to prevent 1 death	590	319	839	394	927	367

Table S5: Comparison of the presence of risk factors in those with acute events versus the background study population expressed as age-sex-adjusted risk ratios.

Aged 55-74 yrs	Risk Factor	Event Group	Risk Factor	Study Population	RR	95%CI	p-value	
Men								
	Ever-smokers	27	28	4248	8717	1.98	1.84-2.13	<0.001
	Current smokers	21	28	1492	8717	4.38	3.52-5.45	<0.001
	Hypertension	15	28	2755	8717	1.70	1.20-2.40	0.003
Women								
	Ever-smokers	6	7	3604	8699	2.07	1.53-2.80	<0.001
	Current smokers	3	7	1099	8699	3.39	1.44-7.99	0.005
	Hypertension	6	7	2656	8699	2.81	2.07-3.81	<0.001
Aged ≥ 75 yrs								
Men								
	Ever-smokers	35	47	1616	2609	1.20	1.01-1.43	0.03
	Current smokers	8	47	416	2609	1.07	0.56-2.02	0.84
	Hypertension	29	47	1399	2609	1.15	0.92-1.45	0.23
Women								
	Ever-smokers	11	21	2012	3783	0.98	0.65-1.48	0.94
	Current smokers	3	21	537	3783	1.01	0.35-2.88	0.99
	Hypertension	20	21	2144	3783	1.68	1.52-1.86	<0.001
All ≥ 55 yrs								
Men								
	Ever-smokers	62	75	5864	11326	1.60	1.44-1.77	<0.001
	Current smokers	29	75	1908	11326	2.30	1.72-3.06	<0.001
	Hypertension	44	75	4154	11326	1.60	1.32-1.94	<0.001
Women								
	Ever-smokers	17	28	5616	12482	1.35	1.00-1.82	0.05
	Current smokers	6	28	1636	12482	1.63	0.80-3.33	0.18
	Hypertension	26	28	4800	12482	2.41	2.17-2.68	<0.001

Table S6: OXVASC: Events and aneurysm-related mortality rates by age and risk factor status

	< 75 yrs	75-84 yrs	≥ 85 yrs	P	Total
Events	35	38	30		103
Out-of-Hospital Death	6 (17.1%)	15 (39.5%)	10 (33.3%)	0.10	31 (30.1%)
Aneurysm-related Death	14 (40.0%)	25 (66.8%)	22 (73.3%)	0.01	61 (59.2%)
Male	28 (80.0%)	28 (73.7%)	19 (63.3%)	0.14	75 (72.8%)
Aneurysm-related Death	10 (35.7%)	19 (67.9%)	16 (84.2%)	0.002	45 (60.0%)
Female	7 (20.0%)	10 (26.3%)	11 (36.7%)	0.14	28 (27.2%)
Aneurysm-related Death	4 (57.1%)	6 (60.0%)	6 (54.5%)	0.97	16 (57.1%)
Ever-Smoked	33 (94.3%)	27 (71.1%)	19 (63.3%)	0.008	79 (76.7%)
Aneurysm-related Death	13 (39.4%)	17 (63.0%)	15 (78.9%)	0.02	45 (57.0%)
Current Smokers	24 (68.6%)	9 (23.7%)	2 (6.7%)	<0.001	35 (34.0%)
Aneurysm-related Death	8 (33.3%)	7 (77.8%)	1 (50.0%)	0.07	16 (45.7%)
Non-Smokers	2 (5.7%)	11 (28.9%)	11 (23.3%)	0.008	24 (23.3%)
Aneurysm-related Death	1 (50.0%)	8 (72.7%)	7 (63.6%)	0.79	16 (66.7%)
Hypertensive	21 (60.0%)	25 (65.8%)	24 (80.0%)	0.21	70 (68.0%)
Aneurysm-related Death	9 (42.9%)	17 (68.0%)	17 (70.8%)	0.11	43 (61.4%)
Normotensive	14 (40.0%)	13 (34.2%)	6 (20.0%)	0.21	33 (32.0%)
Aneurysm-related Death	5 (35.7%)	8 (61.5%)	5 (83.3%)	0.12	18 (54.5%)

Current UK figures for aneurysm-related mortality following Elective AAA repair*

	< 75 yrs	75-84 yrs	≥ 85 yrs
Aneurysm-related Death	2%	4%	6%

***References**

Grant SW, Hickey GL, Grayson AD, Mitchell DC, McCollum CN. National risk prediction model for elective abdominal aortic aneurysm repair. *Br J Surg.* 2013; 100: 645-53.

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Choke E, Lee K, McCarthy M, Nasim A, Naylor AR, Bown M, Sayers R. Risk models for mortality following elective open and endovascular abdominal aortic aneurysm repair: A single institution experience. *Eur J Vasc Endovasc Surg.* 2012;44:549-554.

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Table S7: Changes in disability status for patients with incident acute events

Total population

		6M mRS				Total
		0-2	3	4-5	6	
Pre-morbid mRS	0-2	25	6	1	42	74
	3	0	2	2	23	27
	4-5	0	0	0	2	2
	Total	25	8	3	67	103

Population aged <75

		6M mRS				Total
		0-2	3	4-5	6	
Pre-morbid mRS	0-2	18	1	0	13	32
	3	0	0	0	3	3
	4-5	0	0	0	0	0
	Total	18	1	0	16	35

Population aged 75-84

		6M mRS				Total
		0-2	3	4-5	6	
Pre-morbid mRS	0-2	5	1	1	19	26
	3	0	1	2	8	11
	4-5	0	0	0	1	1
	Total	5	2	3	28	38

Population aged ≥85

		6M mRS				Total
		0-2	3	4-5	6	
Pre-morbid mRS	0-2	2	4	0	10	16
	3	0	1	0	12	13
	4-5	0	0	0	1	1
	Total	2	5	0	23	30

Table S8: Additional sensitivity analysis on the projected impact of the current UK screening programme on acute AAA events versus alternative strategies if cases with known AAAs are excluded (and incidence rates reduce by the same age-adjusted degree as they have for last decade)

	2010*		2020*		2030*	
Total UK population ≥ 55 years	17,646,359		20,861,307		23,923,713	
Annual acute AAA events	6905		6344		6372	
Length of Screening Efficacy (Yrs)	10	15	10	15	10	15
SCREENING PROGRAMME						
CURRENT: Men aged 65						
Acute AAA events expected in screened population N (%)	1398 (20.3)	2229 (32.3)	912 (14.4)	1639 (25.8)	552 (8.7)	1194 (18.7)
Acute AAA events prevented N (%)	699 (10.1)	1115 (16.1)	456 (7.2)	820 (12.9)	276 (4.3)	597 (9.4)
Annual Scans	315,200	315,200	325,400	325,400	421,700	421,700
Scans required to prevent 1 event	451	283	714	397	1528	706
ALTERNATIVE A: Men aged 65 current smokers[#] + All Men aged 75						
Acute AAA events expected in screened population N (%)	2840 (41.1)	3359 (48.6)	2222 (35.0)	2895 (45.6)	1748 (27.4)	2623 (41.2)
Acute AAA events prevented N (%)	1420 (20.6)	1679 (24.3)	1111 (17.5)	1447 (22.8)	874 (13.7)	1311 (20.6)
Annual Scans	247,900	247,900	307,200	307,200	336,800	336,800
Scans required to prevent 1 event	175	148	277	212	385	257
ALTERNATIVE B: Men aged 65 current smokers[#] + All Men aged 75 + Women aged 75 with diagnosed hypertension						
Acute AAA events expected in screened population N (%)	3289 (47.6)	4368 (63.3)	2616 (41.2)	3633 (57.3)	2123 (33.3)	3442 (54.0)
Acute AAA events prevented N (%)	1645 (23.8)	2184 (31.6)	1308 (20.6)	1816 (28.7)	1061 (16.7)	1721 (27.0)
Annual Scans	336,400	336,400	417,200	417,200	452,700	452,700
Scans required to prevent 1 event	204	154	319	230	427	263

Values are given as overall numbers with percentages in brackets unless otherwise stated

*Incorporates 2010 UK population census and ONS Principal Population Projections for 2010 - 2030

[#] Current smoking was defined as daily smoking within the previous 12 months.

Table S9: Additional sensitivity analysis on the projected impact of the current UK screening programme on aneurysm-related deaths versus alternative strategies if cases with known prevalent AAAs already under surveillance are excluded (and incidence rates reduce by the same age-adjusted degree as they have for last decade)

	2010*		2020*		2030*	
Total UK population ≥ 55 years	17,646,359		20,861,307		23,923,713	
Annual acute AAA events	3957		3860		4078	
Length of Screening Efficacy (Yrs)	10	15	10	15	10	15
SCREENING PROGRAMME						
CURRENT: Men aged 65						
Acute AAA events expected in screened population N (%)	368 (9.3)	946 (23.9)	240 (6.2)	746 (19.3)	145 (3.6)	592 (14.5)
Acute AAA events prevented N (%)	184 (4.6)	473 (12.0)	120 (3.1)	373 (9.7)	73 (1.8)	296 (7.3)
Annual Scans	315,200	315,200	325,400	325,400	421,700	421,700
Scans required to prevent 1 event	1713	666	2712	872	5777	1425
ALTERNATIVE A: Men aged 65 current smokers[#] + All Men aged 75						
Acute AAA events expected in screened population N (%)	1749 (44.2)	1957 (49.5)	1251 (32.4)	1812 (46.9)	1038 (25.5)	1767 (43.3)
Acute AAA events prevented N (%)	875 (22.1)	978 (24.7)	626 (16.2)	906 (23.5)	519 (12.7)	883 (21.7)
Annual Scans	247,900	247,900	307,200	307,200	336,800	336,800
Scans required to prevent 1 event	283	253	491	339	649	381
ALTERNATIVE B: Men aged 65 current smokers[#] + All Men aged 75 + Women aged 75 with diagnosed hypertension						
Acute AAA events expected in screened population N (%)	1749 (44.2)	2351 (59.4)	1448 (37.5)	2206 (57.1)	1225 (30.0)	2208 (54.2)
Acute AAA events prevented N (%)	875 (22.1)	1175 (29.7)	724 (18.8)	1103 (28.6)	613 (15.0)	1104 (27.1)
Annual Scans	336,400	336,400	417,200	417,200	452,700	452,700
Scans required to prevent 1 event	384	286	576	378	738	410

Values are given as overall numbers with percentages in brackets unless otherwise stated

*Incorporates 2010 UK population census and ONS Principal Population Projections for 2010 - 2030

[#] Current smoking was defined as daily smoking within the previous 12 months.