

Supplementary Table SI. Definitions of comorbidities and stroke prophylaxis therapy

Comorbidities	ICD/ATC/NOMESCO Codes	Comment
Previous ischaemic stroke	ICDs: I61, I6290, I63, I64, I74; OENO codes for CT/MRI: 34410, 34411, 34412, 34490, 34914 and 34915	2 incidences of any of detailed coded
Cardiac heart failure	ICDs: I50 and I42, I110, J81	2 incidences of any of detailed coded
Hypertension	ICDs: I10 Antihypertensive drugs: adrenergic antagonists, non-loop diuretics, vasodilators, betablockers, calcium-channel blockers, and renin-angiotensin, system inhibitors; ATC: C02A, C02B, C02C, C02L, C03A, C03B, C03D, C03E, C03X, C07B, C07C, C07D, C08G, C02DA, C09BA, C09DA, C02DB, C02DD, C02DG, C07A, C07B, C07C, C07D, C07F, C08, C09BB, C09DB, C09AA, C09BA, C09BB, C09CA, C09DA, C09DB, C09XA02, C09XA52	Occurrence of ICD together with fulfilment of a hypertension drug with at least one repetition of given ATC drugs within a period more than 30 days but less than or equal to 365 days
Previous thromboembolism	ICDs: I6310, I6340, I7400, I7410, I7420, I7430, I7440, I7450, I7480, I7490	2 incidences of any of detailed coded
Type 2 diabetes	ICDs: E10, E11 or E14; ATC: A10	2 incidences of T2DM ICDs or 2 prescriptions of antidiabetic treatment
Vascular disease	ICDs: I21, I22, I700, I701, I702, I703, I704, I705, I706, I707, I708, I709, I2500, I2510, I7039, I2300, I2310, I2320, I2330, I2340, I2350, I2360, I2370, I2380, I2390	2 incidences of any of detailed coded
Peripheral arterial disease	ICDs: I701, I702, I703, I704, I705, I706, I707, I708, I709, I7039	2 incidences of any of detailed coded
Myocardial infarction	ICDs: I2100, I2110, I2120, I2130, I2140, I2190, I2200, I2210, I2280, I2290, I2300, I2310, I2320, I2330, I2340, I2350, I2360, I2370, I2380, I2390	2 incidences of any of detailed coded
Acetylsalicylic acid	ATC: B01AC06, N02BA01	
NSAID	ATC: M01A	Excludes glucosamine (M01AX05)
CHA2DS2-VASc score for risk stratification	Patients were given 1 point for CHF, hypertension, age 65 to 74 years, type 2 diabetes mellitus, vascular disease, and 2 points for age 75 years or older and for the occurrence of stroke and/or TIA and/or thromboembolism. 1 point was allocated to females only if other co-morbidities were present	

Supplementary Table SII. The annual prevalence (n, % of total population, rate per 1000 person-years) of registered AF patients by age in the population of Hungary from 2011 to 2016

Patients with AF diagnosis	2011			2012			2013			2014			2015			2016			Mean annual change % (95% CI), p-value	
	n	% of p	rate per 1.000 p-y	n	% of p	rate per 1.000 p-y	n	% of p	rate per 1.000 p-y	n	% of p	rate per 1.000 p-y	n	% of p	rate per 1.000 p-y	n	% of p	rate per 1.000 p-y		
Female	88,848	1.70	16.02	97,855	1.88	17.64	104,689	2.02	18.68	111,994	2.17	19.74	118,293	2.30	20.63	123,255	2.40	21.34	5.69%	(4.04%; 7.54%) < 0.0001
Males	80,525	1.70	23.59	89,246	1.89	26.10	95,822	2.03	27.67	103,420	2.20	29.39	109,985	2.34	30.89	116,448	2.49	32.35	6.26%	(4.94%; 7.81%) < 0.0001
Females by age-groups:																				
0–39	442	0.02	0.18	541	0.02	0.23	621	0.03	0.27	681	0.03	0.30	725	0.03	0.32	792	0.04	0.36	13.31%	(9.68%; 19.54%) < 0.0001
40–49	993	0.15	1.53	1,176	0.18	1.76	1,322	0.19	1.95	1,458	0.21	2.09	1,581	0.22	2.18	1,725	0.23	2.30	8.07%	(5.1%; 12.32%) < 0.0001
50–59	5,229	0.70	7.00	5,786	0.78	7.79	6,027	0.84	8.36	6,145	0.89	8.89	6,084	0.92	9.20	5,833	0.91	9.15	5.49%	(1.81%; 8.91%) 0.0107
60–69	16,704	2.58	25.85	18,238	2.74	27.39	19,285	2.85	28.47	20,493	2.95	29.48	21,316	2.98	29.78	22,294	3.03	30.35	3.13%	(1.54%; 4.74%) < 0.0001
70–79	34,147	7.15	71.54	37,003	7.73	77.27	39,199	8.11	81.09	41,769	8.52	85.24	44,189	8.92	89.24	46,094	9.28	92.82	5.20%	(4.4%; 6.15%) < 0.0001
80–89	28,281	11.25	112.46	31,304	12.56	125.56	33,727	13.44	134.43	36,145	14.30	142.95	38,541	15.19	151.85	40,030	15.74	157.37	6.75%	(5.12%; 8.83%) < 0.0001
≥ 90	3,052	8.65	86.46	3,807	11.06	110.55	4,508	12.03	120.32	5,303	13.32	133.24	5,857	14.00	140.04	6,487	14.72	147.23	10.06%	(5.12%; 15.55%) < 0.0001
Males by age-groups:																				
0–39	999	0.04	0.39	1,177	0.05	0.48	1,333	0.05	0.55	1,458	0.06	0.61	1,538	0.07	0.65	1,585	0.07	0.68	6.26%	(6.24%; 16.95%) < 0.0001
40–49	2,356	0.36	3.63	2,656	0.40	3.98	2,935	0.43	4.30	3,148	0.45	4.48	3,439	0.47	4.70	3,788	0.50	4.99	11.08%	(4.56%; 8.73%) < 0.0001
50–59	10,791	1.64	16.35	11,689	1.75	17.48	12,249	1.88	18.82	12,634	2.01	20.12	12,537	2.07	20.74	12,349	2.10	21.01	6.21%	(2.31%; 7.35%) < 0.0001
60–69	22,409	4.54	45.43	24,930	4.80	47.97	26,707	5.03	50.34	29,061	5.31	53.14	30,951	5.47	54.71	33,595	5.78	57.78	5.33%	(4.07%; 5.33%) < 0.0001
70–79	27,352	9.90	99.03	29,850	10.58	105.85	31,892	11.08	110.83	34,482	11.69	116.93	37,104	12.33	123.32	39,360	12.91	129.07	4.82%	(5.04%; 5.64%) < 0.0001
80–89	15,349	14.01	140.09	17,323	16.22	162.16	18,811	17.37	173.74	20,516	18.70	186.98	22,058	19.94	199.44	23,167	20.92	209.18	5.38%	(5.9%; 10.38%) < 0.0001
≥ 90	1,269	9.46	94.59	1,621	14.32	143.24	1,895	15.57	155.72	2,121	16.51	165.10	2,358	17.63	176.25	2,604	18.69	186.87	7.88%	(6.31%; 22.16%) < 0.0001

Supplementary Table SIII. The annual all-cause mortality (*n*, % of AF patients, rate per 1000 AF patients) of registered AF patients by age in Hungary from 2011 to 2016

Number of AF patients died	2011		2012		2013		2014		2015		2016		Mean annual change % (95% CI), <i>p</i> -value							
	<i>n</i>	% of AF p 1.000 p-y	<i>n</i>	% of AF p 1.000 p-y	<i>n</i>	% of AF p 1.000 p-y	<i>n</i>	% of AF p 1.000 p-y	<i>n</i>	% of AF p 1.000 p-y	<i>n</i>	% of AF p 1.000 p-y								
Female	13,257	14.92	46.79	14,208	14.52	44.86	14,672	14.01	38.49	15,236	13.60	41.58	16,324	13.80	39.19	15,567	12.63	38.27	-3.89% (-8.78%; -0.19%)	0.038
Males	10,865	13.49	56.27	11,721	13.13	55.83	12,001	12.52	53.07	12,763	12.34	49.32	13,414	12.20	48.84	13,624	11.70	46.82	-3.82% (-6.23%; -2.21%)	0.009
Females by age-groups:																				
0-39	< 10	1.36	13.57	<10	1.29	12.94	< 10	0.32	3.22	< 10	1.32	13.22	< 10	0.83	8.28	< 10	1.01	10.10	-3.42% (-17.49%; 25.63%)	0.520
40-49	27	2.72	27.19	30	2.55	25.51	31	2.34	23.45	27	1.85	18.52	26	1.64	16.45	44	2.55	25.51	-5.02% (-16.53%; 13.31%)	0.177
50-59	215	4.11	41.12	229	3.96	39.58	233	3.87	38.66	249	4.05	40.52	241	3.96	39.61	214	3.67	36.69	-1.25% (-4.49%; 1.92%)	0.255
60-69	988	5.91	59.15	1,053	5.77	57.74	1,083	5.62	56.16	1,086	5.30	52.99	1,209	5.67	56.72	1,108	4.97	49.70	-2.58% (-4.46%; -0.22%)	0.037
70-79	3,771	11.04	110.43	3,836	10.37	103.67	3,836	9.79	97.86	3,994	9.56	95.62	4,133	9.35	93.53	3,925	8.52	85.15	-4.46% (-5.64%; -2.07%)	< 0.001
80-89	6,830	24.15	241.50	7,329	23.41	234.12	7,590	22.50	225.04	7,709	21.33	213.28	8,322	21.59	215.93	7,762	19.39	193.90	-3.88% (-4.71%; -2.65%)	0.009
≥ 90	1,420	46.53	465.27	1,724	45.29	452.85	1,897	42.08	420.81	2,162	40.77	407.69	2,387	40.75	407.55	2,506	38.63	386.31	-3.58% (-5.19%; -1.84%)	< 0.001
Males by age-groups:																				
0-39	14	1.40	14.01	20	1.70	16.99	21	1.58	15.75	14	0.96	9.60	17	1.11	11.05	18	1.14	11.36	-8.44% (-23.12%; 5.65%)	0.130
40-49	82	3.48	34.80	85	3.20	32.00	93	3.17	31.69	92	2.92	29.22	96	2.79	27.92	86	2.27	22.70	-6.99% (-9.9%; -3.86%)	0.010
50-59	640	5.93	59.31	679	5.81	58.09	682	5.57	55.68	711	5.63	56.28	684	5.46	54.56	654	5.30	52.96	-1.95% (-2.72%; -1.05%)	< 0.001
60-69	1,918	8.56	85.59	2,069	8.30	82.99	2,140	8.01	80.13	2,322	7.99	79.90	2,313	7.47	74.73	2,533	7.54	75.40	-2.78% (-3.67%; -2.16%)	0.009
70-79	3,804	13.91	139.08	4,013	13.44	134.44	3,936	12.34	123.42	4,182	12.13	121.28	4,488	12.10	120.96	4,406	11.19	111.94	-3.92% (-5.64%; -0.96%)	< 0.001
80-89	3,846	25.06	250.57	4,165	24.04	240.43	4,340	23.07	230.72	4,573	22.29	222.90	4,850	21.99	219.87	4,896	21.13	211.34	-3.28% (-4.02%; -2.47%)	< 0.001
≥ 90	561	44.21	442.08	690	42.57	425.66	789	41.64	416.36	869	40.97	409.71	966	40.97	409.67	1,031	39.59	395.93	-1.91% (-2.88%; -0.85%)	0.009

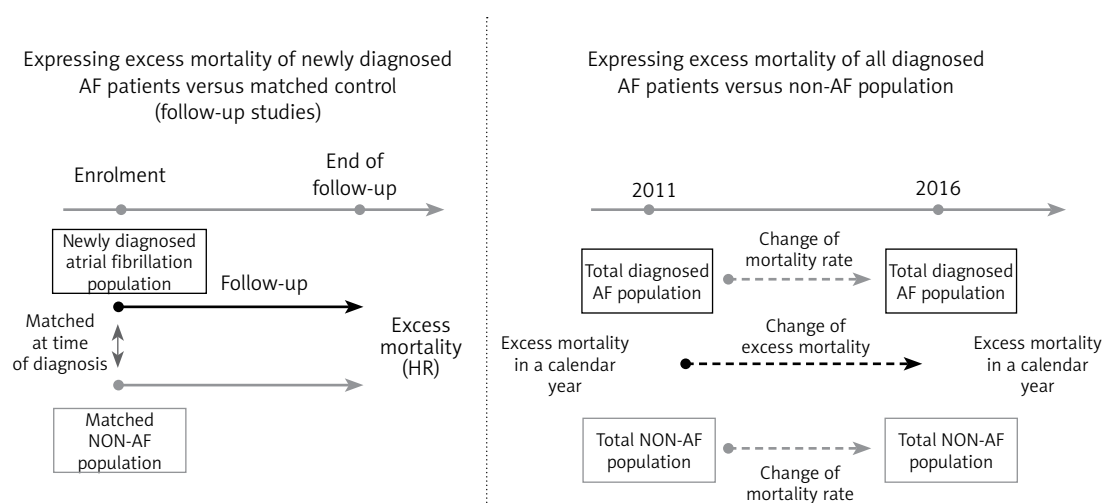
Supplementary Table SIV. The incidence of comorbidities by age and gender in 2011 and in 2016 (% of AF patients)

Gender	2011									2016								
	0-29	30-39	40-49	50-59	60-69	70-79	80-89	≥ 90	Total	0-29	30-39	40-49	50-59	60-69	70-79	80-89	≥ 90	Total
Male:																		
Myocardial infarction	0.00%	1.39%	4.20%	4.34%	4.70%	5.18%	5.24%	5.44%	4.87%	0.00%	2.75%	5.70%	7.97%	8.23%	8.43%	8.14%	7.68%	8.08%
Chronic heart failure	8.21%	15.66%	28.82%	32.33%	30.75%	34.50%	37.19%	37.59%	33.31%	9.87%	11.83%	22.68%	32.76%	31.67%	33.60%	38.12%	42.13%	33.38%
Hypertension	37.20%	58.21%	78.06%	88.53%	92.56%	93.85%	92.48%	88.73%	91.48%	52.21%	64.75%	79.57%	91.63%	95.76%	97.31%	97.57%	96.16%	95.23%
Prior stroke	0.00%	3.03%	6.96%	11.15%	14.81%	20.20%	21.84%	20.09%	17.20%	2.60%	5.42%	8.53%	14.38%	19.47%	25.31%	29.37%	28.00%	22.51%
T2DM	0.00%	3.41%	12.22%	20.78%	24.40%	23.16%	16.92%	11.11%	21.24%	0.00%	3.33%	10.77%	23.26%	29.01%	28.57%	22.81%	13.63%	25.72%
Thromboembolism	12.08%	9.09%	7.60%	6.44%	6.07%	6.18%	5.94%	5.75%	6.22%	15.58%	15.75%	13.41%	10.52%	9.11%	8.63%	8.62%	7.30%	9.19%
Female:																		
Myocardial infarction	0.00%	0.00%	2.62%	2.77%	3.41%	3.71%	4.56%	4.23%	3.86%	0.00%	2.40%	3.30%	4.83%	4.96%	5.75%	6.33%	6.35%	5.72%
Chronic heart failure	0.00%	9.36%	14.90%	20.83%	25.21%	32.57%	38.03%	41.25%	32.22%	11.00%	8.58%	12.75%	19.82%	23.67%	31.08%	39.17%	43.13%	32.07%
Hypertension	34.00%	47.08%	70.69%	87.78%	93.94%	96.10%	94.98%	91.68%	94.15%	41.63%	56.95%	74.49%	91.36%	96.21%	98.44%	98.53%	97.55%	97.05%
Prior stroke	0.00%	6.14%	8.96%	11.44%	14.01%	18.47%	22.89%	23.66%	18.63%	7.18%	7.89%	10.78%	15.79%	18.71%	24.17%	29.01%	28.36%	24.29%
T2DM	0.00%	4.39%	11.08%	18.45%	23.22%	23.88%	17.73%	10.71%	20.78%	0.00%	3.60%	9.33%	18.53%	25.26%	27.61%	23.13%	14.91%	24.22%
Thromboembolism	28.00%	22.81%	16.01%	8.38%	6.30%	5.84%	6.11%	6.88%	6.40%	37.32%	33.10%	25.45%	15.19%	10.29%	8.22%	8.21%	7.72%	9.30%

Supplementary Table SV. Stroke prophylaxis therapy by age and gender in 2011 and in 2016 (% of AF patients) (ASA – acetylsalicylic acid, NOAC – novel anticoagulant therapy, VKA – vitamin-K antagonists)

Parameter	2011									2016								
	0-29	30-39	40-49	50-59	60-69	70-79	80-89	≥ 90	Total	0-29	30-39	40-49	50-59	60-69	70-79	80-89	≥ 90	Total
Male:																		
Not appropriate therapy	36.23%	23.95%	10.48%	6.51%	5.06%	5.08%	8.07%	15.68%	6.46%	37.40%	30.29%	15.05%	6.88%	4.76%	3.71%	4.42%	9.56%	5.39%
NOAC treatment	0.00%	0.00%	0.00%	0.00%	0.06%	0.00%	0.00%	0.00%	0.04%	10.65%	9.71%	11.85%	12.26%	16.16%	17.10%	16.49%	13.79%	15.87%
VKA therapy	49.28%	56.27%	73.43%	79.78%	83.88%	83.83%	75.47%	56.74%	80.56%	40.78%	45.52%	59.27%	68.81%	69.60%	70.50%	67.37%	56.37%	68.37%
Only ASA therapy	14.49%	19.77%	16.09%	13.71%	11.00%	11.09%	16.46%	27.58%	12.95%	11.17%	14.48%	13.83%	12.05%	9.48%	8.68%	11.72%	20.28%	10.37%
Female:																		
Not appropriate therapy	37.00%	21.18%	12.88%	7.75%	5.48%	5.21%	9.10%	18.94%	7.30%	29.61%	24.70%	15.88%	9.10%	5.05%	3.83%	5.47%	11.78%	5.58%
NOAC treatment	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.02%	14.08%	13.99%	11.54%	11.93%	16.55%	18.27%	16.60%	11.44%	16.64%
VKA therapy	63.00%	65.88%	68.46%	74.81%	82.00%	83.04%	72.62%	49.80%	77.62%	56.31%	53.54%	59.42%	64.70%	67.08%	68.55%	64.82%	53.08%	65.83%
Only ASA therapy	0.00%	12.94%	18.66%	17.44%	12.52%	11.75%	18.28%	31.26%	15.06%	0.00%	7.77%	13.16%	14.26%	11.32%	9.34%	13.11%	23.71%	11.95%

ASA – acetylsalicylic acid, NOAC – novel anticoagulant therapy, VKA – vitamin-K antagonists.



Supplementary Figure S1. Differences between expressing excess mortality of newly diagnosed AF patients versus entire diagnosed AF population in a calendar year