Supplementary material online

Table S1. Search strategy.

Electronic database	**Search strategy**
PubMed (NCBI)	(((((atrial fibrillation[MeSH Terms]) OR atrial fibrillation[Title]) OR AF[Title]) OR Afib[Title])) AND ((((((((((((((((app) OR application-based) OR app-based) OR smartphone) OR smartphone-based) OR mobile health) OR mhealth) OR ehealth) OR ecardiology) OR telemedicine) OR wearable) OR digital treatment) OR alivecor) OR mydiagnostick) OR fibricheck) OR apple watch) OR myaf) OR remote monitoring)
Embase (Ovid)	(atrial fibrillation or AF or Afib).ti. and (app or app-based or application-based or smartphone-based or smartphone or mobile health or mhealth or ehealth or ecardiology or telemedicine or wearable or digital treatment or alivecor or mydiagnostick or fibricheck or apple watch or myaf or remote monitoring).ab.
Cochrane	(((MeSH descriptor: [Atrial Fibrillation] explode all trees) OR ((atrial fibrillation):ti OR (AF):ti OR (Afib):ti)) AND ((app) OR (app-based) OR (application-based) OR (smartphone) OR (smartphone-based) OR (mobile health) OR (mhealth) OR (ehealth) OR (ecardiology) OR (telemedicine) OR (wearable) OR (digital treatment) OR (alivecor) OR (mydiagnostick) OR (fibricheck) OR (apple watch) OR (myaf) OR (remote monitoring)))

Table S2. Baseline characteristic and outcomes of analyzed studies regrading handheld devices in patients with atrial fibrillation.

Study	Country	Design	Device	Type	Technology	Population	# included patients	Age (years)	Females	Monitoring time	AF rate	Sensitivity	Specificity	Reference test
PPG-based handheld devices														
Birkemeyer et al [1]	Germany	Case-control	Smartphone camera	Preventicus	PPG	Simulated group	10000	≥75-years	N/D	N/D	N/D	N/D	N/D	N/D
Brasier et al [2]	Germany Switzerland	Prospective single arm	Smartphone camera	Preventicus	PPG	Hospitalized (cardiology/ pulmonology ward)	592	78±13	45.3%	5min x 1 single-time	41.9%	89.9% (1min) 91.3% (3min) 91.5% (5min)	99.1% (1min) 98.7% (3min) 99.6%(5min)	single-lead ECG
Chan et al [3]	China	Prospective single arm	Smartphone camera	CardioRythm	PPG	With diabetes/ hypertension/elderly (≥65-years old)	1013	68.4±12.2	53.2%	20s x 1 single-time	2.76%	92.9%	97.7%	expert' diagnosis
Fan et al [4]	China	Prospective	Smartphone camera	Preventicus	PPG	Hospitalized (cardiology/ geriatric ward)	108	62 (mean)	41.7%	3 min x 1 single-time	48.1%	95.0%	99.7%	12-lead ECG
Guo et al [5]	China	RCT	Smartphone camera	mAFA	PPG	AF	3324 1646 (IC) 1646 (UC)	67 (mean) 67±15 (IC) 70±12 (UC)	38% 38% (IC) 38% ((UC)	N/D	N/D	N/D	N/D	N/D
Krivoshei et al [6]	Switzerland	Case-control	Smartphone camera	Preventicus	PPG	Ambulatory	80	78 (mean)	N/D	1 min x 1 single-time	50%	90%	85%	single-lead ECG
McManus et al [7]	USA	Prospective single arm	Smartphone camera	PULSE-SMART	PPG	Planned for ECV	121	66 (mean)	19%	2 min x 2 single-time	100%	97%	93.5%	12-lead ECG
Mutke et al [8]	Germany Switzerland	Prospective single arm	Smartphone camera Smartwatch	Preventicus	PPG	Data from DETECT-AF [2] and WATCH-AF[9]	1 101	N/D	N/D	N/D	46.7%	95.4%	91.6%	single-lead ECG
Proesmans et al [10]	Belgium	Prospective single arm	Smartphone camera	FibriCheck	PPG	Elderly (≥65-years old)	223	77±8	53.4%	1 min x 3 single-time	45.7%	95.3%	96.2%	12-lead ECG
Rozen et al [11]	USA	Prospective single arm	Smartphone camera	CardioRythm	PPG	Planned for ECV	98	67.7±10.5	24.5%	20s x 6 single-time	100%	93.1%	90.9%	12-lead ECG
Van Haelst [12]	The Netherlands	Prospective single arm	Smartphone camera	FibriCheck	PPG	Elderly (≥65-years old)	190	77.3±8.0	57.4%	1min x1 single-time	48.4%	98%	88%	12-lead ECG
Verbrugge et al [13]	Belgium	Prospective single arm	Smartphone camera	FibriCheck	PPG	General population	1179	49±14	42%	1min ≥1/day 7 days	1.1%	N/D	N/D	N/D
Yan et al [14]	China	Prospective single arm	Smartphone camera	CardioRythm	PPG	Hospitalized (cardiology ward)	217	70.3±13.9	28.6	20s x 3 single-time	34.6%	95%	96%	12-lead ECG
ECG-based handheld devices														
Battipaglia et al [15]	UK	Prospective single arm	Stick	MyDiagnostick	Single-lead ECG	General population	855	N/D	N/D	15s single-time	0.8%	100%*	100%*	Expert expertise
Desteghe et al [16]	Belgium	Prospective two arm	Stick	MyDiagnostick	Single-lead ECG	Hospitalized (cardiology/geriatric ward)	320	67.9±14.6	43.1%,	1 min single-time	11.9% (cardiology ward) 36% (geriatric ward)	60.5% (PM; cardiology ward) 81.8% (no PM; cardiology ward) 81.8% (PM; geriatric ward) 89.5% (no PM; geriatric ward)	93.3% (PM; cardiology ward) 94.2% (no PM; cardiology ward) 96.1% (PM; geriatric ward) 95.7% (no PM; geriatric ward)	12-lead ECG
Jacobs et al [17]	The Netherlands	Prospective two arm	Stick	MyDiagnostick	Single-lead ECG	Influenza-vaccinated	1 952 811	77.4 (mean)	N/D	1min single-time	1.3%	N/D	N/D	N/D

Kaasenbrood et al [18]	The Netherlands	Prospective single arm	Stick	MyDiagnostick	Single-lead ECG	Influenza-vaccinated	3269	69.4±8.9	51%	1 min single-time	3.7% 5.9% (detected by device)	96%*	100%*	Expert expertise
Pluymaekers et al [19]	The Netherlands	Multicenter RCT	Stick	MyDiagnostick	Single-lead ECG	Planned for ECV	437	65±11	40%	1 min x 3 4 weeks	30% (RAF)	N/D	N/D	N/D
Rivezzi et al [20]	Italy	Prospective single arm	Stick	MyDiagnostick	Single-lead ECG	Elderly (≥65-years old)	1820	50% aged 65-74 50% aged ≥75	53.4%	1 min single-time	5.5% 7.9% (detected by device0	94%*	100%*	12-lead ECG
Tavernier et al [21]	Belgium	Prospective single arm	Stick	MyDiagnostick	Single-lead ECG	Hospitalized (geriatric ward)	214	84±6	61.7%	1 min single-time	33%	88%	97%	12-lead ECG
Tieleman et al [22]	The Netherlands	Prospective single arm	Stick	MyDiagnostick	Single-lead ECG	Influenza-vaccinated	192	69.4±12.6	51.6%	1 min single-time	27.6%	100%	95.9%	12-lead ECG
Vaes et al [23]	Belgium	Prospective single arm	Stick	MyDiagnostick	Single-lead ECG	Primary care patients (84% with AF)	191	74.6±9.7	48%	1-2 min x 3 single-time	54%	94%	93%	12-lead ECG
Anderson et al [24]	USA	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	General population (health fair)	697	56±15	71%	30s x 1 single-time	2.3% (16/697)	N/D	N/D	N/D
Andrade et al [25]	Canada	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old) without prior AF	16 817	N/D	N/D	30s x 1 single-time	7% (1171/16817 detected by device0	69%*	N/D	12-lead ECG
Bumgarner et al [26]	USA	Prospective single arm	Plate attached to watch	KardiaMobile	Single-lead ECG	Planned for ECV	100	68.2±10.9	17%	30s x 1 single-time	N/D	93%	84%	12-lead ECG
Caceres et al [27]	USA	RCT	Plate	KardiaMobile	Single-lead ECG	Planned for ECV/AF-ablation	238 115 (IC) 123 (UC)	61.3±11.9 61.4±11.9 (IC) 61.2±11.8 (UC)	27% 27% (IC) 27% (UC)	30s 3x/week 6 months	55% 61% (IC) 49% (UC)	N/D	N/D	N/D
Chan et al [3]	China	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old)/ diabetic/ hypertensive	1013	68.4±12.2	53.2%	30s x 1 single-time	2.78% (28/1013)	71.4%	99.4%	Expert expertise
Chan et al [28]	China	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old) diabetic/ hypertensive	2052	67.8±10.6	54.2%	30s x 1 single-time	1.2% (24/2052)	66.7%	99.5%	12-lead ECG
Chan et al [29]	China	Prospective two arm	Plate	KardiaMobile	Single-lead ECG	General population	13122	64.7±13.4	71.5%	30s x 1 single-time	1.8% (239/13122 detected by device)	98%	29.2%	Expert expertise
Chan et al [30]	China	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (≥50-years old)	10735	78.6±8.1	79.8%	30s x 1 single-time	2.3% (244/10735) 2.6% detected by device (282/10753)	75%	98.2%	Expert expertise
Chen et al [31]	China	Multicenter prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old)	4531	71.6±6.3	66%	30s x 1 single-time	4.0% (183/4531)	N/D	N/D	N/D
Cunha et al [32]	Portugal	Multicenter longitudinal	Plate	KardiaMobile	Single-lead ECG	General population (health fair)	205	66±15	64 %	30s x 1 single-time	22% (22/100) 22% (22/100 detected by device)	90.9%	97.4%	12-lead ECG
Desteghe et al [16]	Belgium	Prospective two arm	Plate	KardiaMobile	Single-lead ECG	Hospitalized (cardiological or geriatric ward)	320	67.9±14.6	43.1%,	30s x 1 single-time	11.9% (cardiology ward) 36% (geriatric ward)	36.8% (PM; cardiology ward) 54.5% (no PM; cardiology ward) 72.7% (PM; geriatric ward) 78.9% (no PM; geriatric ward)	96.1% (PM; cardiology ward) 97.5% (no PM; cardiology ward) 98.1% (PM; geriatric ward) 97.9% (no PM; geriatric ward)	12-lead ECG
Evans et al [33]	Kenya	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Hospitalized (internal, diabetic, ophthalmology, emergency, inpatient men's ward)	50	54.3±20.5	66%	30s x 1 single-time	8% (4/50)	100%	100%	12-lead ECG

Godin et al [34]	Canada	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old) without prior AF	7585	35% aged ≥65	N/D	30s x 1 single-time	3.9%% (297/7585) 6.2% (471/7585 detected by device)	63%	N/D	Expert expertise
Goldenthal et al [35]	USA	RCT	Plate	KardiaMobile	Single-lead ECG	Planned for ECV/AF-ablation	238 115 (IC) 123 (UC)	61±12 61±12 (IC) 61±12 (UC)	23% 23% (IC) 22% (UC)	30s 1/day 6 months	50% (IC) 42% (UC)	N/D	N/D	N/D
Gropler et al [36]	Singapore	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Children	30	8.2 (0-17)	53%	30s x 1 single-time	0% 13% (4/30 detected by device)	N/D	87%	12-lead ECG
Grubb et al [37]	UK	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old) primary healthcare	1805	74.9±7.1	38.9%	30s x 1 single-time	5.1% (92/1805)	N/D	N/D	N/D
Gwynn et al [38]	Australia	Multicenter cross-sectional	Plate	KardiaMobile	Single-lead ECG	Mid-aged (≥45-years old)	619	N/D	56.1%	30s x 1 single-time	4.7% (29/619) 4.8% (30/619 detected by device0	85%*	65%*	12-lead ECG
Haberman et al [39]	USA	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Athletes/young adults/ hospitalized (cardiology ward)	381	35±20	51%	30s x 1 single-time	N/D	94.4%	99.4%	12-lead ECG
Halcox et al [40]	UK	RCT	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old) High stroke risk Without prior AF	1001 500 (IC) 501 (UC)	72.6±5.4 72.6±5.4 (IC) 72.6±5.4 (UC)	53.4% 51.8% (IC) 55.1% (UC)	30s, 2x/week 12 months	3.8% (19/500) 1.0% (5/501)	N/D	N/D	N/D
Hermans et al [41]	The Netherlands	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Post AF-ablation	115	64.0 (58.0-68.0)	30.4%	30s, 3x/day in case of symptoms, 4 weeks	25.2% (29/115)	95.3%	97.5%	≥24-h Holter
Hickey et al [42]	USA	RCT	Plate	KardiaMobile	Single-lead ECG	Cardiac electrophysiology and ambulatory care	46 23 (IC) 23 (UC)	55±10 (IC) 55±9 (UC)	29% (IC) 29% (UC)	30s >1/day (max 5 min/day) 6 months	61% (14/23; IC) 30% (7/23; UC)	N/D	N/D	N/D
Kim et al [43]	Korea	Multicenter prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (≥60-years old)	2422	75.5±6.5	68.5%	40s x 1 single-time	3% (73/2422) 5.1% (124/2422 detected by device)	59%	N/D	12-lead ECG
Koltowski [44]	Poland	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Hospitalized (cardiology ward)	100	68±14.2	34%	30s x 1 single-time	N/D	92.8%	100%	12-lead ECG
Kropp et al [45]	USA	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	High AF risk; pharmacy customers	250	61.7±15.3	60%	30s x 1 single-time	3% 4% (10/250 detected by device)	N/D	N/D	N/D
Lown et al [46]	USA	Case-control	Plate	KardiaMobile	Single-lead ECG	Elderly (>65-years old) primary healthcare	418	73.9±6.1	N/D	30s x 1 single-time	19% (79/418 detected by device)	87.8%	98.81%	12-lead ECG
Lowres et al [47]	Australia	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Hospitalized (surgery)	42	69±9	20%	30s, 4x/day 4 weeks	24% (10/42 detected by device)	94.6%	92.9%	12-lead ECG
Lowres et al [48]	Australia	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old) pharmacy customers	1 000	76±7	56%	30-60s single-time	6.7% (67/1000)	98.5%	91.4%	12-lead ECG
Macniven et al [49]	Australia	Prospective single arm (on device's feasibility)	Plate	KardiaMobile	Single-lead ECG	Primary healthcare	18	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Magnani et al [50]	USA	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	AF	31	68±11	39%	30s, 20 times over 30 days	N/D	N/D	N/D	N/D
Mutke et al [8]	Switzerland	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Data from DETECT-AF [2] and WATCH-AF[9]	1 101	N/D	N/D	30s x 1 single-time	46.7%	99.6%	97.4%	Expert expertise
Orchard et al [51]	Australia	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old) without prior AF	1805	75.7	66%	30s x 1 single-time	3.7% (67/1805 detected by device)	N/D	N/D	N/D
Orchard et al [52]	Australia	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (>65-years old) primary healthcare	88	74.8±8.8	49%	30s x 1 single-time	19% (17/88)	N/D	N/D	N/D
Orchard et al [53]	Australia	RCT	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old) without prior AF	3103	75.1±6.8	36%	30s x 1 single-time	1.2% (36/3103)	97%	92%	12-lead ECG

						primary health care								
Orchard et al [54]	Australia	Cross-sectional	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old) influenza-vaccinated	972	N/D	N/D	30s x 1 single-time	3.7% (36/972) 4.5% (44/972 detected by device)	95%	99%	Expert expertise
Rajakariar et al [55]	Australia	Prospective single arm	Plate attached to watch	KardiaMobile	Single-lead ECG	Hospitalized (medical, cardiac ward or ICU)	200	67±16	43.5%	30s x 1 single-time	19% (38/200)	94.4%	81.9%	12-lead ECG
Reed et al [56]	UK	RCT	Plate	KardiaMobile	Single-lead ECG	Hospitalized (emergency ward)	243 126 (IC) 117 (UC)	39.6±13.8 40±14 (IC) 39.1±13.5 (UC)	66.6% 59.2% (IC) 53.8% (UC)	30s x 1-2 90 days	6.5% (8/124) 0 (0/116)	N/D	N/D	N/D
Reed et al [57]	UK	Prospective single arm	Plate	KardiaMobile	Singe-lead ECG	Hospitalized (emergency ward)	68	45.8±15.1	441%	30s x 1-2 90 days	2 (3%)	N/D	N/D	N/D
Rischard et al [58]	France	Multicenter prospective single arm	Plate	KardiaMobile	Single-lead ECG	Hospitalized (cardiology ward)	1322	68.7±16.2	34.7%	30s x 1 single-time	20.8% (275/1322)	95%	86%	12-lead ECG
Rosenfeld et al [59]	USA	Multicenter prospective single arm	Plate	KardiaMobile	Single-lead ECG	High AF risk	772	65.2±15.4	67.5%	60s x 1 single-time	2.2% (17/670 detected by device)	N/D	N/D	N/D
Savickas et al [60]	UK	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old) influenza-vaccinated	604	73 (69-78)	57.3%	30s x 1-2 single-time	4.3% (26/6040	92.3%	97.4%	12-lead ECG
Selder et al [61]	The Netherlands	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Ambulatory	233	58.4±14	48%	30s x 1 single-time	N/D	92%	95%	Expert expertise
Soni et al [62]	India	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	General population	2074	33.7% aged ≥66	52.2%	30s, 2-3x/day, 5 days	1.6% (33/2074) 4.2% (88/2074 detected by device)	38%	N/D	Expert expertise
Stavrakis et al [63]	USA	RCT	Plate	KardiaMobile	Single-lead ECG	Paroxysmal AF High stroke risk	58 29 (IC) 29 (IC)	62.5±12.2 (IC) 60.9±14.4 (UC)	43% 41% (IC) 45% (UC)	30s ≥1/day 7 days	62% (18/29)	N/D	N.D	N/D
Tarakji et al [64]	USA	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Planned for AF ablation	55	60±12	22%	30s x 1 single-time	N/D	100%	97%	Expert expertise
Van Haelst et al [12]	The Netherlands	Multicenter prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (>65-years old)	190	77.3±8.0	57.4%	30s x 1 single-time	48.4% (92/190)	98%	85%	12-lead ECG
Wasserlauf et al [65]	USA	Prospective two-arm	Plate attached to watch	KardiaMobile	Single-lead ECG	Paroxysmal AF with ICM	24	72.1±7.2	34.6%	30s x 1 single-time	N/D	100%	83.3%	ICM
Wegner et al [66]	Germany	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Hospitalized (cardiac ward)	99	64±15	38.4%	30s x 1 single-time	22% (22/99)	70%	69%	12-lead ECG
William et al [67]	USA	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	AF	52	68.1 (42.6-85.6)	32.7%	30s x 1 single-time	N/D	96.6%	94.1%	12-lead ECG
Williams et al [68]	UK	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	AF	95	N/D	N/D	30s x 1 single-time	31% (29/95)	93%	76%	12-lead ECG
Yan et al [69]	Australia and China	Prospective two arm	Plate	KardiaMobile	Single-lead ECG	Post stroke/TIA	1079 785 (iECG) 294 (Holter +iECG)	66 (55-75) 64 (54-75) 68 (57-77)	38.6% 35.8% 45.9%	30s x 1 single-time	8.8% (69/785) 8.5% (25/294)	N/D	N/D	N/D
Zado et al [70]	USA	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Post-AF ablation	99	64±8	16%	30s x 2 30 days	16% (16/99)	N/D	N/D	N/D
Zaprutko et al [71]	Poland	Prospective single arm	Plate	KardiaMobile	Single-lead ECG	Elderly (≥65-years old) without prior AF pharmacy customers	525	73.7 ±6.5	68.2%	30s x 1 single-time	2.4% (12/490) 3.5% (17/490 detected by device)	100%	98.7%	Expert expertise
Aljuaid et al [72]	USA	Retrospective two-arm	Device	ECG check	Single-lead ECG	Post AF-ablation	90 45 (IC) 45 (UC)	66 (mean) 61.3±7.7 (IC) 60.9±7.4 (UC)	40% 37.8% (IC) 42.2% (UC)	30s, 1x/day 100 days	N/D	100%	97%	Expert expertise

Anczykowski et al [73]	Germany	Retrospective single arm	Device	Card Guard	Single-lead ECG	With symptoms of cardiac arrhythmia	790	54±18	60%	32s, ≥1/day 2-4weeks	14% (110/790)	N/D	N/D	N/D
Boriani et al [74]	World	Survey	Device/app	Several devices and applications	ECG and PPG	Healthcare professionals	588	N/D	N/D	N/D	N/D	N/D	N/D	N/D
Busch et al [75]	Germany	Retrospective two arm	Device	Sensor mobile 100	Single-lead ECG	General population	1678	54 (28-65)	N/D	30s, 2x/day 4 weeks	1.3% (21/1678) 2.6% (43/1678 detected by device)	N/D	N/D	12-lead ECG
Chen et al [76]	Taiwan	Prospective single arm	Device	DiGiO2	Single lead-ECG	General population	922	58.1±15	53.8%	15s x 1 single-time	2.4% (22/922)	95.5%	97.7%	Expert expertise
Gudmundsdottir et al [77]	Sweden	RCT	Device	Zenicor	Single lead-ECG	Elderly (75/76-years old)	6868	(75-76)	N/D	30s x 1 single-time in case of SR and high AF risk: 30s 4x/day 2 weeks	8.1% (553/6688) known AF 0.5% (29/6315) newly detected AF 4.4% (164/3766) newly detected AF in 2 weeks	N/D	N/D	N/D
Gussak et al [78]	Serbia	Prospective single arm	Device	CardioBip	3 lead ECG	Post AF-ablation	25	51.5±2.8	16%	3x/day, 60 days +2x/day 30 days (at 6 month)	32% (8/25) 88% (22/25 detected by device)	100%*	24%*	12-lead ECG and 24-h Holter
Jaakkola et al [79]	Finland	Case-control	Device	Mechanocardiography	Mechanocardiography	Hospitalized (cardiology/internal ward)	300	74.8 (73.7-75.9)	44%	3min x 1 single-time	N/D	95.3 %	96%	Tele-ECG
Liu et al [80]	China	Prospective two arm	Device	Sensor mobile 100	Single-lead ECG	Post AF-ablation	92	54.4±9.8	78.3%	30s, 1x/day, 90 days	29.3% (27/92) 42.4% (39/92 detected by device)	N/D	N/D	12-lead ECG and 24-h Holter
Olsson et al [81]	Sweden	Retrospective single arm	Device	Zenicor	Single lead-ECG	Post stroke/TIA	370	66±12	47%	30s 2x/day 2 weeks	7.6% (27/356)	N/D	N/D	N/D
Svennberg et al [82]	Sweden	RCT	Device	Zenicor	Single lead-ECG	Elderly (75/76-years old)	7173	(75-76)	N/D	30s 2x/day 2 weeks	12.3% (884//7173) 9.3% (666/7173) known AF 3.0%(218/7173) newly detected AF	N/D	N/D	N/D
Vukajlovic et al [83]	Serbia	Prospective single arm	Device	CardioBip	3 lead ECG	Post AF-ablation	21	50.0±13.8	N/D	≤3/day 60 days	195 (4/21) 90% (19/21 detected by device)	N/D	N/D	12-lead ECG and 24-h Holter

Values are presented as median (interquartile range), (range), mean±standard deviation, or number with percentages. **Abbreviations:** AF, atrial fibrillation; DM, diabetes mellitus; ECG, electrocardiogram; ECV, electrical cardioversion; HT, hypertension; IC, intervention care; UC, usual care ; N/D, no data; PM, pacemaker; PPG, photoplethysmography.

***data counted based on available data**

Table S3. Baseline characteristic and outcomes of analyzed studies regrading wearable devices in patients with atrial fibrillation.

Study	Country	Design	Device	Type	Technology	Population	No. of patients	Age (years)	Females	Monitoring time (day)	AF rate	Sensitivity	Specificity	Reference test
PPG-based wearables														
Al-Kaisey et al [84]	Australia	Prospective single arm	Wristwatch	Fitbit Charge HR and Apple Watch Series 3	PPG	Referred for Holter monitoring	32	68±12	38%	24 hours	26 (81%)	N/D	N/D	24-hour Holter
Bonomi et al [85]	The Netherlands	Prospective single arm	Wrist device	CM3 Generation-3	PPG	1. Planned for ECV 2. Referred for Holter monitoring	1. 18 2. 34	1. 73.1±11.6 2. 67.4±12.1	1. 44% 2. 38%	1. 42 hours 2. 855 hours	1. 18 (100%) 2. 34 (100%)	1. 97% 2. 93%	1. 100% 2. 100%	1. Single-lead ECG 2. 24-hour Holter
Chen et al [86]	China	Prospective randomized	Wristband	Amazfit Health Band 1S	1. PPG 2. Single-lead ECG	Hospitalized/ ambulatory	401	N/D	49.1%	1. 3 minutes 2. 60 seconds	150 (37%)	1. 88.00% 2. 87.33%	1. 96.41% 2. 99.20%	12-lead ECG
Conroy et al [87]	USA	Prospective single arm	Earlobe sensor	HeartSensor HRS-07UE	PPG	Planned for ECV	55	N/D	N/D	One time for >4 minutes	N/D	90.9%	90.9%	Single-lead ECG
Corino et al [88]	Italy	Prospective single arm	Wristband	Empatica E4	PPG	Hospitalized	70	N/D	49%	10 minutes	30 (43%)	75.4%	96.3%	N/D
Dörr et al [9]	Switzerland	Two-center prospective single arm	Wristband and wristwatch	Wavelet Health and Gear Fit 2	PPG	Hospitalized	508	76.4±9.5	44.3%	5 minutes	237 (46.7%)	93.7%	98.2%	Expert expertise based on single-lead ECG
Eerikäinen et al [89]	The Netherlands	Prospective single arm	Wrist device	CM3 Generation-3	PPG	1. Planned for ECV 2. Ambulatory	1. 18 2. 16	1. 75±11 2. 65±14	1. 44% 2. 37%	1. 1-hour before and after ECV 2. 24 hours	1. 18 (100%) 2. 4 (25%)	1. 92.3% 2. 71.6%	1. 60.7% 2. 84.9%	1. Single-lead ECG 2. 24-hour Holter
Guo et al [90]	China	Prospective single arm	Wristband and wristwatch	Honor Band 4, Huawei Watch GT and Honor Watch	PPG	Ambulatory	187 912	34.7±11.5	13.3%	60 seconds every 10 minutes for 14 days	227/262 (87%)	N/D	N/D	12-lead ECG and 24-hour Holter
Hochstadt et al [91]	Israel	Prospective single arm	Wristwatch	CardiacSense	PPG	Planned for ECV	20	74.1±8.7	25%	30 minutes before ECV and 10 minutes after ECV	20 (100%)	100%	93.1%	12-lead ECG
Huynh et al [92]	USA	Prospective single arm	Wristwatch	Apple Watch A1554	PPG	Obstructive sleep apnea	20	66±6.5	15%	60 seconds seven times	20 (100%)	N/D	N/D	12-lead ECG
Huynh et al [93]	USA	Prospective single arm	Wristwatch	Apple Watch	PPG	OSA in AF	20	66±6.5	15%	60 seconds every 10 seconds	20 (100%)	N/D	N/D	Telemetry
Inui et al [94]	Japan	Prospective single arm	Wristwatch and wristband	Apple Watch Series 3 and Fitbit Charge HR	PPG	Hospitalized (cardiac surgery)	40	70.9±11.1	32%	Two weeks	20 (50%)	N/D	N/D	12-lead ECG

				Wireless Activity										
Jacobsen et al [95]	Germany	Prospective single arm	Upper armband	Everion®	PPG	AF	102	71.0±11.9	48%	24 hours	48 (47%)	95.2%	92.5%	24-hour Holter
Koshy et al [96]	Australia	Prospective single arm	Wristwatch	Apple Watch and Fitbit	PPG	Hospitalized	102	68±15	35%	1 minute every 15 seconds for 30 minutes	32 (31%)	N/D	N/D	ECG telemetry
Kwon et al [97]	Republic of Korea	Prospective single arm	Fingerband	CardioTracker	PPG	Persistent AF; planned for ECV	100	63.8±8.5	19%	15 minutes before and after ECV	100 (100%)	99.0%	94.3%	Single-lead ECG
Nemati et al [98]	USA	Retrospective single arm	Wristwatch	Samsung Simband	PPG	Hospitalized	36	N/D	N/D	(3.5-8.5) minutes	12 (33%)	97%	94%	Single-lead ECG
Perez et al [99]	USA	Prospective single arm	Wristwatch	Apple Watch	PPG	Without AF	419 297	41±13	42%	117 (113-186) days	153/450 (34%)	N/D	N/D	7-day ECG patch
Selder et al [100]	Belgium	Prospective single arm	Wristband	1. Wavelet Health with FibriCheck algorithm 2. KardiaBand	1. PPG 2. Single-lead ECG	Elderly	60	69.6±16.9	68%	Three times 1. 60 seconds 2. 30 seconds	6 (10%)	1. 79% 2. 93%	1. 98% 2. 98%	1. Single lead ECG 2. Expert expertise
Seshadri et al [101]	USA	Prospective single arm	Wristwatch	Apple Watch 4	PPG	Hospitalized (cardiac surgery)	50	61.4±10.4	28%	Six times	25 (50%)	N/D	N/D	6-lead telemetry
Tison et al [102]	USA	Multicenter prospective single arm	Wristwatch	Apple Watch	PPG	1. Ambulatory 2. Planned for ECV	1. 1617 2. 51	1. N/D 2. 66.1±10.7	1. N/D 2. 16%	1. N/D 2. 20 minutes	1. 64 (4%) 2. 51 (100%)	1. 67.7% 2. 98.0%	1. 67.6% 2. 90.2%	12-lead ECG
Zhang et al [103]	China	Prospective single arm	Wristband and wristwatch	Honor Band 4, Huawei Watch GT and Honor Watch	PPG	Ambulatory	361	50 (36-62)	49.3%	60 seconds every 10 minutes for 14 days (band) and 45 seconds (watch)	31 (8.6%)	100%	99%	12-lead ECG
ECG-based wearables														
Fukuma et al [104]	Japan	Prospective single arm	Patch	T-shirt with a highly conductive material	Single-lead ECG	Low AF risk	100	52.5±5.4	0%	40 hours a week over 2 months	10 (10%)	N/D	N/D	Expert expertise
Heo et al [105]	USA	Prospective single arm	Patch	iRhythm Zio^{XT}	Single-lead ECG	Diabetic without prior AF	608	70.9±6.7	31.9%	2 weeks, twice	19 (3%)	N/D	N/D	Expert expertise
Lown et al [46]	UK	Multicenter prospective single arm	1. Chest belt 2. Patch	1. Polar-H7 2. Firstbeat Bodyguard 2	Single-lead ECG	Elderly (>65-years old)	418	N/D	N/D	1. 45 seconds 2. 2 minutes	79 (19%)	1. 96.3% 2. 96.3%,	1. 98.2% 2. 98.5%,	12-lead ECG
Reverberi et al [106]	Italy	Prospective single arm	Chest belt	Consumer-grade Bluetooth low-energy HR monitor with RITMIA™ application	Single-lead ECG	Planned for ECV	95	66.2±10.7	21.1%	10 minutes	Pre- ECV, 92%; post-ECV 13%	97%	95.6%	12-lead ECG

Sabar et al [107]	UK	Prospective single arm	Patch	RhythmPad	6-lead ECG	High AF risk	750	(18-97)	51%	10 seconds	66 (10%)	AF detection, 93.4%; AF diagnosis 95.4%	AF detection, 96.8%; AF diagnosis, 98.8%	12-lead ECG
Steinhubl et al [108]	USA	Prospective randomized	Patch	Zio^{XT}	Single-lead ECG	High AF risk	2659	72.4±7.3	38.6%	4 weeks	53 (3.9%) vs 12 (0.9%)	N/D	N/D	Expert expertise
Torfs et al [109]	Belgium	Prospective single arm	Patch	N/D	3-lead ECG	1. Chronic AF 2. Planned for ECV	10	N/D	N/D	1. 24 hours 2. 2/3 hours	N/D	N/D	N/D	24-hour Holter
Turakhia et al [110]	USA	Prospective single arm	Patch	Zio^{XT}	Single-lead ECG	High AF risk	75	69±8.0	0%	2 weeks	4 (5.3%)	N/D	N/D	Expert expertise
Wineinger et al [111]	USA	Retrospective single arm	Patch	Zio^{XT}	Single-lead ECG	Paroxysmal AF	13 293	69.4±11.1	40.3%	2 weeks	1 041 504 paroxysmal episodes >30 seconds	N/D	N/D	N/D
Atarashi et al [112]	Japan	Prospective randomized	Wireless recorder	Cardiophone^{TM}	Single-lead ECG	Paroxysmal AF/ AFL	123	N/D	21%	30 seconds daily for 4 weeks	95 (77%)	N/D	N/D	Expert expertise
Brunetti et al [113]	Italy	Prospective single arm	Wireless recorder	CardioVox P12	12-lead ECG	Hospitalized (emergency ward)	27 841	N/D	51%	N/D	3 249 (11.67%)	N/D	N/D	Expert expertise
Højager et al. [114]	Denmark	Prospective single arm	Wireless recorder	R.Test Evolution 4	ECG	High stroke risk; diabetes	200	66±0.7	41.5%	Every 2-3s; 5-7 days	21 (10.5%)	N/D	N/D	N/D
Kimura et al [115]	Japan	Prospective single arm	Wireless recorder	Cardiophone^{TM}	Single-lead ECG	Planned for AF ablation	30	59±9	13%	30 seconds twice daily for 6 months	30 (100%)	N/D	N/D	12-lead ECG and 24-hour Holter
Lin et al [116]	Taiwan	Prospective single arm	Wireless recorder	Medi-Trace 200	3-lead ECG	Hospitalized (cardiac ward, ICU)	30	N/D	N/D	6 minutes	20 (67%)	94.6%	N/D	12-lead ECG
Scalvini et al [117]	Italy	Prospective single arm	Wireless recorder	CG-7100	12-lead ECG	Primary healthcare	7 516	61±20	56%	N/D	719 (9%)	N/D	N/D	N/D
Wu et al [118]	Taiwan	Prospective single arm	Wireless recorder	CG-7100 and CG-2100	12-lead ECG (7100) and single-lead ECG (2100)	Cardiovascular disease	70	N/D	N/D	N/D	25 (36%)	N/D	N/D	N/D
Pulse variability-based wearables														
Chan et al [28]	China	Prospective single arm	Sphygmomanometer	Microlife WatchBP Office AFIB	Pulse beat interval algorithm	Diabetic or hypertensive	2052	67.8±10.6	54.2%	N/D	24 (1.2%)	83.3%	98.7%	12-lead ECG
Gandolfo et al [119]	Italy	Prospective single arm	Sphygmomanometer	Microlife BP3MQ1-2D	Pulse beat interval algorithm	Post stroke/TIA	207	77.7±11.34	50.2%	Three times	38 (18.4%)	89.5%	98.8%	12-lead ECG
Kearley et al [120]	UK	Prospective single arm	Sphygmomanometer	WatchBP	Pulse beat interval algorithm	Ambulatory	999	79.7 (75.1-99.8)	50.7%	One time	79 (7.9%)	94.9%	89.7%	12-lead ECG
Marazzi et al [121]	Italy	Prospective single arm	Sphygmomanometer	1. Microlife® BP A200 Plus	Pulse beat interval algorithm	Hypertensive	503	67.0±10.5	45.7%	Three times	101 (20%)	1. 92% 2. 100%	1. 97% 2. 94%	12-lead ECG

				2. OMRON® M6										
Omboni et al [122]	Italy	Prospective single arm	Sphygmomanometer	Microlife WatchBP Office AFIB	Pulse beat interval algorithm	Ambulatory	220	57.5±15.3	48.6%	Three times	4 (1.8%)	N/D	N/D	Single-lead ECG
Stergiou et al [123]	Greece	Prospective single arm	Sphygmomanometer	Microlife BPA 100 Plus	Pulse beat interval algorithm	Hospitalized/ ambulatory/ aged ≥35	73	70.5±10.6	34.2%	Three times	27 (37%)	100%	89%	12-lead ECG
Wiesel et al [124]	USA	Prospective single arm	Sphygmomanometer	Microlife BP monitor model BPM BP3MQ1-2D	Pulse beat interval algorithm	High AF risk	139	67 (26-89)	63%	Three times a day for 30 days	14 (10.1%)	99.2%	92.9%	Single-lead ECG
Wiesel et al [125]	USA	Prospective single arm	Sphygmomanometer	Microlife BP monitor model BP3MQ1-2D	Pulse beat interval algorithm	Ambulatory	405	73 (34-98)	49%	Three times	93 (23%)	96.8%	88.8%	12-lead ECG
Wiesel et al [126]	USA	Prospective single arm	Sphygmomanometer	Omron 712C	Pulse beat interval algorithm	Ambulatory	450	69 (31-99)	41%	Two times	54 (12%)	100%	91%	12-lead ECG

Values are presented as median (interquartile range), (range), mean±standard deviation, or number with percentages. **Abbreviations:** AF, atrial fibrillation; AFL, atrial flutter; ECG, electrocardiogram; ECV, electrical cardioversion; ICU, intensive care unit); N/D, no data; OSA, obstructive sleep apnea; PPG, photoplethysmography.

Table S4. Overview of the implantable cardiac monitor technologies under assessment.

Device features	BioMonitor 2-AF™ (Biotronik SE& Co. KG, Berlin, Germany)	Reveal LINQ™ (Medtronic plc, Minneapolis, MN, USA)	Reveal XT (Medtronic plc, Minneapolis, MN, USA)	Confirm Rx™ (Abbott Laboratories, Lake Bluff, IL, USA)
Standard components	• BioMonitor 2-AF device with flexible lead body • Insertion tools • SensingConsult™ (Biotronik SE & Co. KG) programmer, software	• Reveal LINQ device • Insertion tools • CareLink™ (Medtronic) programmer, software • MyCareLink™ monitor	• Reveal XT device • Insertion tools • CareLink™ (Medtronic) programmer, software	• Confirm Rx device • Insertion tools • Merlin™ (Abbott) programmer, software • myMerlin™ mobile app
Additional components		• Patient activity accelerometer • Triage and monitoring service (FocusOn™; Medtronic)		• Symptom annotator via app • Free technical support available via helpline or local staff
Patient activation	• Optional patient assistant device	• Patient assistant device as standard	• Optional patient assistant device	• Integrated™ in myMerlin app
Detection triggers and sensing parameters	• Atrial fibrillation (adjustable or pre-set functions to detect various atrial fibrillation characteristics) • Bradycardia • Sudden rate drop • Asystole • High ventricular rate	• Atrial tachyarrhythmia (including atrial fibrillation/ flutter) (exclusive algorithm) P-wave morphology discriminator algorithm • Bradyarrhythmia • Ventricular tachyarrhythmia • Pause episodes	• Atrial tachyarrhythmia (including atrial fibrillation/ flutter) (exclusive algorithm) • Bradyarrhythmia • Ventricular tachyarrhythmia • Pause episodes	• Atrial fibrillation (regularity, R–R variance and sudden onset) • Bradyarrhythmia • Tachyarrhythmia • Pause episodes • Transient loss of consciousness conditions • Epilepsy exclusion
Dimension	88.4 x15.2 x 6.2mm	44.8 x 7.2 x 4.0mm	95 x 62 x 8.0mm	49.0 x 9.4 x 3.1mm
Weight	10.1g	2.5 ± 0.5g	15g	3.0g
Device storage	• total duration of 60 min • 55 x 40s automatically activated episodes • 4 x 7.5 min patient-activated episodes	• total duration of 57 min • 27 min of automatically activated episodes • 30 min of patient-activated episodes	• total duration of 49.5 min • 27 min of automatically activated episodes • 22.5 min of patient-activated episodes	• total duration of 60 min • up to 250 atrial fibrillation episodes plus 250 auto-/patient-activated episodes of other arrhythmias
Estimated battery life	4 years	3 years	3 years	2 years
Telemetry	• via mobile phone network to Home Monitoring Service Centre	• via myCareLink™ monitor to a CareLink™ server using a mobile phone network	• via CareLink™ programmer to CareLink™ server	• via app to Merlin.net patient care network accessed by clinicians
Sensitivity	92%[127] – 100%[128]	97.4%[129] a – 100%*[130] a 98.4%[129] b 93.7%[129] c 97.3%[129] d 97.2%[129] e	96.1%[131] a – 96.1%*[130] a 98.1%[130] b 89.0%[130] c 85.2%[130] d 87.9%[130] e	100%[132] a 84.2%[132] b 96.4%[132] c 94.5%[132] d 95.6%[132] e
Specificity	67%[128]	97.0%[129] a – 99.0%*[130] a 99.5%[129] b 99.6%[129] c	85.4%[131] a – 90.0%*[130] a 98.5%[130] b 91.3%[130] c	85.7%[132] a 99.4%[132] b 99.4%[132] c 86.6%[132] d 98.2%[132] e
PPV	59% [127] – 83%[128]	92.5%[129] a – 97.4%*[130] a 97.2%[129] b 90.6%[129] c 74.8%[129] d 90.4%[129] e	79.3%[131] a – 84.9%*[130] a 91.9%[130] b 75.2%[130] c 38.8%[130] d 73.6%[130] e	64%[132] a 93.5%[132] b 63.3%[132] c 64.0%[132] d 60.7%[132] e
NPV	100%[128]	99.0%[129] a – 100%*[130] a 99.7%[129] b 96.4%[129] c	97.4%[131] a – 97.5%*[130] a 99.7%[130] b 97.1%[130] c	100%[132] a 98.4%[132] b 92.2%[132] c 76.4%[132] d 89.8%[132] e
Accuracy	N/A	97.1%[129] a – 99.3%*[130] a	89.3%[131] a – 92.2%*[130] a	N/A

*adaptive P-Sense algorithm. Diagnostic significance in BioMonitor and Confirm devices are reported for their earlier versions. a, patient based (gross); b, duration based (gross); c duration gross (patient average); d, episode based (gross); e episode gross (patient average). **Abbreviations:** PPV, positive predictive value; N/A, non-available; NPV, negative predictive value.

Table S5. Baseline characteristic and outcomes of analyzed studies regrading implantable cardiac monitor in patients with atrial fibrillation.

Study	Country	Design	Device	No. of patients	Age (years)	Females	Population	Monitoring time (day)	Implantation after event (day)	Insertion to AF detection (day)	AF definition	AF rate
Asaithambi et al [133]	USA	Retrospective single arm	Reveal LINQ	234	72 [61-78]	45%	CS	536 [282-848]	4 [2-9]	94.5 [16-239]	N/D	20 (9%) (1mo) 47 (20%) (6mo) 57 (24%) (12mo) 68 (29%) (22mo)
Bergau et al [134]	Germany	Retrospective randomized	Reveal XT	30	67±10	44%	Post-AF ablation	1011±388	at the same day	N/D	≥30s	N/D
Bertelsen et al [135]	Denmark	RCT	Reveal LINQ	68	76.2±4.5	33.8%	Post-MRI	41 (36-43)	N/A	N/D	≥6min	32 (47%)
Carrazco et al [136]	USA	Prospective and retrospective single arm	Reveal LINQ (90%)/ XT (10%)	100	65.8 [28-93]	52.5%	CS	(240-540)	4.2±2.6	108 (0-514)	≥2min	25 (25%)
Choe et al [137]	International	ICM registry vs. simulated intermittent monitoring	Reveal XT	168	61.3± 11	32%	CS	>345	N/D	N/D	>30s	30 (18%)
Chorin et al [138]	USA	Retrospective single arm	Reveal LINQ Reveal XT	145	67 [53-70]	43%	CS	28 ± 12mo	N/D	7.4 ± 21.3 mo	≥2min	4 (2.8%) (1mo) 8 (5.5%) (6mo) 11 (7.6%) (12mo) 13 (9.6%) (24mo) 17 (12%) (36mo)
Christensen et al [139]	Denmark	Prospective single arm	Reveal XT	85	56.7 (mean)	45%	CS	569±310	107±117	109±48	>2min	14 (16%)
Ciconte et al [128]	Italy	Prospective single arm	BioMonitor	63	60.4±9.4	13.6%	AF-episodes/ management	N/D	N/D	N/D	>2min	39 (62%)
Cotter et al [140]	UK	Prospective single arm	Reveal XT	51	51±13.9	45.1%	CS	229±116	174±134	48 [34-118]	≥2min	13 (25%)
Dekker et al [141]	International	Prospective single arm	Reveal LINQ	121	57±11.4	25.6%	Pre/post AF-ablation	56 [37-174] (pre-) >180 (post ablation)	N/D	N/D	≥5min	28/71 (39%)
De With [142]	The Netherlands	RCT	Reveal LINQ	202	64±9	42%	Paroxysmal AF	183	N/D	N/D	≥2 min	139 (69%)
Diederichsen et al [143]	International	Prospective single arm	Reveal LINQ	597	76±4.0	43%	High stroke risk	1200 [1110-1260]	N/D	165 [42-510] 420 [144-780] 600 [192-900]	≥6min ≥5h ≥24h	209 (35%)
Dion et al [144]	France	Prospective single arm	Reveal Plus	24	49±13.6	37.5%	CS	435 (mean)	90±30.3	N/D	≥30s	1 (4.2%)
Etgen et al [145]	Germany	Prospective single arm	Reveal XT	22	61.6 [51.9-71.3]	50%	CS	360	8.5 [6.5-10.5]	152.8 [61.6-244.1]	≥6min	6 (27%)
Forkmann et al [146]	Germany	Prospective single arm	Reveal LINQ	126	63±10	38.9%	Post AF-ablation	90 (ER) 360 (LR)	at the next day	N/D	≥30s	72 (57%) (ER) 57 (45%) (LR)
Haldar et al [147]	International	RCT	Reveal LINQ	120	62.3±9.6	36%	Post AF-ablation	22 (16-31) mo	0	N/D	≥30s	83 (73%)
Healey et al [148]	Canada	Prospective single arm	Confirm-AF	256	74±6	34.4%	High stroke risk	489±114	N/D	153±165	≥5min	31 (12.1% (1mo) 58 (22.3%) (6mo) 78 (30.5%) (12mo) 90 (35.2%) (18mo)
Hindricks et al [131]	International	Prospective single arm	Reveal XT	247	57±10	33.2%	High AF risk	N/D	N/D	N/D	≥2min	76 (37%)
Israel et al [149]	Germany	Prospective single arm	Reveal XT (87%)/ BioMonitor (13%)	123	65±9.0	39.8%	ESUS	381±165	20 (mean)	108±102	≥2min	8 (6.5%) (1mo) 15 (12%) (3mo) 21 (17%) (6mo)

												29 (24%) (13mo)
Jorfida et al [150]	Italy	Prospective single arm	Reveal XT	54	67.8±9.4	42.6%	CS	435 (261-675)	108±60	162 [30-540]	≥5min	25 (46%)
Kitsiou et al [151]	Germany	Prospective single arm	Reveal XT	123	65±9	40%	ESUS	1095	20 (mean)	354 (mean)	≥2min	51 (41.4%)
Kusiak et al [152]	Poland	Prospective single arm	Reveal LINQ	29	55.6 (34-72)	31%	Post AF-ablation	90 (before) 180 (after)	N/D	N/D	≥2min	N/D
Lacour et al [153]	Germany	Retrospective single arm	BioMonitor 2-AF	19	61.3±13.0	42.1%	CS, HCM, SSS, syncope, AT, VT	42	N/D	N/D	N/D	1 (5.3%)
Lauschke et al [127]	International	Prospective single arm	BioMonitor	153	62.5±14.0	49%	Post AF-ablation	321±108	at the same day	N/D	≥2min	3/77 (3.9%)
Makimoto et al [154]	Germany	Prospective single arm	N/D	146	62±12	42.5%	ESUS	387 [283-552]	N/D	N/D	>30s	30 (21%)
Marks et al [155]	USA	Retrospective single arm	Reveal XT /LINQ	178	65 (mean)	52%	CS	384.1 ±218.9	5 (mean)	131.5 (median)	>2min	9 (5%) (1mo) 14 (16.2%) (12mo) 35 (19.6%) (30mo)
Merce et al [156]	Spain	Prospective single arm	Reveal XT	14	65.4±10.9	28.6%	CS	870±177	<30	174 (mean)	N/D	5 (36%)
Muller et al [157]	Germany	Prospective single arm	Reveal XT	90	57.7±12.3	48%	CS	331±186	<60	40.7±42.2	≥30s	8 (9%) (1mo) 16 (18%) (6mo)
Nasir et al [158]	USA	Prospective single arm	Reveal LINQ(?)/ XT(?)	245	74.3±7.7	41.2%	High stroke risk	451±185	<30	141.3±139.5	≥6min	54 (22%)
Nölker et al [132]	International	Prospective single arm	Confirm DM2102	90	65.7± 9.6	39%	High AF/AF risk	N/D	N/D	N/D	≥2min	N/D
Pedersen et al [159]	Denmark	Prospective single arm	Reveal LINQ (72%)/ XT (28%)	105	65.4 [27.1-80.8]	54%	TIA	381 [371-390]	113 (30-294)	21 (5-146)	≥2min	7 (6.7%)
Poli et al [160]	Germany	Prospective single arm	Reveal LINQ (51%)/ XT (49%)	74	66.4±12.5	53.3%	CS	311±251	27±24	105±135	>2min	25 (34%)
Prabhu et al [161]	Australia	RCT	Confirm Reveal LINQ	68	(65-74)	9%	Post AF-ablation/medical rate control	6 months	At the procedure	N/D	>30s	average AF burden post-AF ablation was 1.6±5.0%
Purerfellner et al [130]	International	Enhanced AF algorithm detection using XPECT [131] and LINQ Usability Study [129]	Reveal LINQ (40%)/ XT (60%)	346	N/D	N/A	Post AF-ablation AF-management Syncope, CS high AF risk	N/D	N/D	N/D	≥2min	114 (33%)
Reiffel et al [162]	International	Prospective single arm	Reveal LINQ (69%)/XT(31%)	394	71.5±9.9	47.8%	High stroke risk	675±231	N/D	123 [41-330]	≥6min	6.2% (1mo) 20.4% (6mo) 27.1% (12mo) 29.3% (18mo) 33.6% (24mo) 40% (30mo)
Reinke et al [163]	Germany	Prospective single arm	Reveal XT	105	64.4±12.6	44%	CS	217[72.5-338]	0-28	N/D	≥30s	19 (18%)
Ritter et al [164]	Germany	Within-patient comparison of 7-day ECG vs. ICM	Reveal XT	60	63 [48.5-72]	43%	CS	382 [89-670]	13 [10-67]	64 (1-556)	≥30s	4 (6.7%) (1mo) 7 (12%) (3mo) 9 (15%) (6mo) 9 (15%) (12mo) 10 (17%) (21mo)
Romanov et al [165]	International	Prospective randomized	Reveal XT	60	62.5±6.5	20%	Post CABG	1080	at the same day	N/D	N/D	22 (37%)
Sanders et al [129]	International	Prospective single arm	Reveal LINQ	138	56.6±12.1	33%	Post AF-ablation AF-management Syncope, CS high AF risk	30	N/D	N/D	≥2min	38 (28%)

Sanna et al [166]	International	Prospective randomized	Reveal XT	441 (221with ICM)	61.5±11.3	36.5%	CS	1080	38.1±27.6	41 [14-84](6mo) 84 (18-265) (12mo)	≥30s	(8.9%) (6mo) (12.4%) (12mo) (30%) (36mo)
Seow et al [167]	Singapore	Prospective single arm	Reveal LINQ	71	61.9±13.5	22.5%	CS	345±229	66 (median)	50 (median)	≥2min	9 (12.9%) (6mo) 11 (15.2%) (12mo)
Victor et al [168]	Spain	Prospective single arm	Reveal LINQ (86%)/XT (14%)	65	65.4±13.8	44.6%	ESUS	513±321	56 [28-109]	31 [11-59] 28 [20.5-117](XT) 31 [11-56] (LINQ)	≥30s (XT) ≥2min (LINQ)	19 (29%)
Wasserlauf et al [169]	USA	Within-patient comparison of AF-sensing watch vs. ICM	Reveal LINQ	24	72.1±7.2	34.6%	Syncope, AF-management, CS	110.3±35.7	N/D	N/D	N/D	N/D
Watson et al. [170]	USA	Retrospective single arm	Reveal LINQ	273	64.8±13.4	49.5%	CS CRAO	5.1 (max; CS) 3.6 (max; CRAO)	18 (median; CRAO) 21 (median; CS)	N/D	≥2min	64 (23%)
Wechselberger et al [171]	International	Prospective single arm	Reveal LINQ	419	65±10	43%	Post AF-ablation	450±180	at the same day	N/D	≥2min	227 (54%)
Xu et al. [172]	USA	Prospective single arm	Reveal LINQ	389	67 (mean)	46%	CS	542 days (median)	N/D	133 days (mean)	≥2min	102 (27.2%)
Yaeger et al [173]	USA	Unclear (ICM group within PENN AF Care Program)	Reveal XT	251	N/D	N/D	Post AF-ablation	30	at the same day	N/D	≥30s	90 (36%)
Ziegler et al [174, 175]	USA	ICM registry vs. simulated intermittent monitoring	Reveal LINQ	1 247	65.3±13.0	47%	CS	579±222	N/D	112 [35-293]	≥2min	4.6% (1mo) 12.2% (6mo) 16.3% (12mo) 21.5% (24mo)

Values are presented as median (interquartile range), (range), mean±standard deviation, or number with percentages. **Abbreviations:** AF, atrial fibrillation; AT, atrial tachyarrhythmia; CABG, coronary artery bypass graft; CS, cryptogenic stroke; ECG, electrocardiogram; ER, early recurrences; ESUS, embolic stroke of undetermined source; HCM, hypertrophic cardiomyopathy; ICM; implantable cardiac monitor; LR, late recurrences; mo; month; N/D, no data; SC, subcutaneous implantation; SP, subpectoral implantation; SSS, sick sinus syndrome; VT, ventricular tachyarrhythmia.

Table S6. Available FDA/CE-approved mobile applications.

Name	Company	FDA/ CE	Method, technology	Clinical application (selected)		Sensitivity	Specificity	PPV
				AF detection	Other			
Devices and mobile applications that are SPECIFIED in AF detection								
ECG App	Apple	FDA	smartwatch, PPG	yes	no	98,3%	99,6%	N/A
ECG Check	Cardiac Designs, Inc.	FDA, CE	ECG-handle device, ECG	yes	no	75%	97%	N/A
FibriCheck	Qompium nv	FDA, CE	smartphone's camera, PPG	yes	no	97%	94%	61.3%
Kardia	AliveCor, Inc.	FDA, CE	handle device, ECG	yes	no	89%	89%	89%
Microlife Connected Health	Microlife Corp.	CE	arm-worn device, MCG	yes	blood pressure	81-100%	89-99%	N/A
MoMe Kardia	InfoBionic, Inc.	FDA, CE	handle device, ECG	yes	no	N/A	N/A	N/A
myMerlin for Confirm Rx ICM	Abbott (formerly St. Jude Medical)	FDA, CE	implantable cardiac monitor	yes	no	97%	N/A	N/A
PatientCare; BodyGuardian Heart	Preventice, Inc.	FDA, CE	wearable patch ECG (chest)	yes	no	95.9%	N/A	99%
Peerbridge Cor	Peerbridge Health, Inc.	FDA	wearable patch ECG (chest)	yes	no	N/A	N/A	N/A
Verily Study Watch	Verily (Google Alphabet)	FDA	Smartwatch, PPG	yes	no	N/A	N/A	N/A
Eko Stethoscope CORE/DUO	Eko Devices, Inc.	FDA, CE	electronic stethoscope, MCG	yes	auscultation	99%	97%	NA
Devices and mobile applications that COULD be used in AF detection (ECG feature)								
Name	**Company**	**FDA/ CE**	**Method, technology**	**Clinical application (selected)**				
Health Mate	Withings France SA (formerly Nokia)	FDA, CE	arm-device, watch/mobile application	ECG, blood pressure, skin temperature, activity tracking, sleep tracking, respiratory tracking, women health				
Global ECG Management System (GEMS)	CardioComm Solutions, Inc.	FDA, CE	handle ECG device	ECG				
Qardio heart health	Qardio, Inc.	FDA, CE	arm-device, chest belt with sensors/mobile application	ECG, blood pressure, heart rate, respiratory rate, activity tracking, body composition, women health				
SimplECG	Nanowear, Inc.	FDA	bra or undershirt with sensors	ECG, blood pressure, heart rate, respiratory rate				
Master Caution	HealthWatch Technologies, Ltd.	FDA, CE	vest with sensors	ECG, heart rate, respiratory rate, skin temperature, body posture				
McKesson ECG Mobile	McKesson Corp.	FDA	wearable patch ECG (chest)	ECG				
Invision ECG system	InvisionHeart, Inc.	FDA	12-Lead ECG device	ECG				
Physiotrace Smart	NimbleHearth, Inc.	FDA	wearable patch ECG (chest)	ECG				
Rooti Rx	Rooti Labs, Ltd.	FDA	wearable patch ECG (chest)	ECG				
Smartheart	Shl Telemedicine, Ltd.	FDA, CE	ECG put-on chest device	ECG				
CoVa™ 2	toSense, Inc.	FDA	neck-worn sensor	ECG, stroke volume, cardiac output, chest fluid, heart rate, heart rate variability, respiration, skin temperature; remote monitoring portal access				

CADence IRONMAN	AUM Cardiovascular, Inc.	FDA	electronic stethoscope	auscultation (heart, lung), ECG, blood pressure
No matching applications in AF detection used in "Heart/Circulatory System"				
Viz.ai	Viz.ai, Inc.	FDA, CE	mobile application	automatically identify suspected large vessel occlusion strokes on computed tomography angiogram imaging
RhythmAnalytics	Biofourmis, Inc	FDA	arm-worn device	heart rate, skin temperature, respiratory rate, blood oxygenation, blood pulse wave, fitness trackers, sleep quality, heart rate variability, inter-beat-interval & a stress score
StethoMe	StethoMe sp. z o.o.	CE	electronic stethoscope	auscultation (heart, lung), heart rate, respiration rate
CareTaker	CareTaker, LLC	FDA, CE	hand-cuff device	blood, pressure, heart rate, respiration rate, oxygen saturation, arterial stiffness
eMurmur ID	CSD Labs International Inc. d.b.a. eMurmur	FDA, CE	electronic stethoscope	auscultation (heart, lung), heart rate, respiration rate, health assistance (video-chat)
PhysioWave Pro	PhysioWave, Inc.	FDA	stand-on device	pulse wave velocity, pulse rate, body weight
Syndo Health	Syndo Health nv	CE	mobile application	blood pressure, fitness and body mass trackers, medication alerts, health educational tips, health assistance (chat)
Samsung Health	Samsung Electronics Co, Ltd.	FDA	mobile application	heart rate, oxygen saturation, stress, women health, fitness and body trackers
iHealth MyVitals	iHealthLabs, Inc.	FDA, CE	mobile application	blood pressure, scales, pulse oximeters, fitness and body mass trackers.
Masimo Professional or Personal Health	Masimo Corp.	FDA, CE	mobile application	heart rate, oxygen saturation, respiratory rate, respiratory effort index, pleth variability index, perfusion index

Abbreviations: CE, Conformité Européenne; ECG, electrocardiogram; FDA, Food & Drug Administration; MCG, mechanocardiography; N/A, non-applicable; PPG, photoplethysmography; PPV, positive predictive value.

Table S7. Mobile applications and platforms supporting management of atrial fibrillation.

Study	Country	Design	Intervention	No. of patients	Age (years)	Females	%of AF patients	Study duration	Outcomes measured	Results
For patients										
Desteghe et al [176]	USA	Prospective single arm	Mobile app = Health Buddies - medication tracker, educational quizzes (grandparent) - healthy challenge tracker, educational games (grandchild) - communication with HCP - OAC refilling reminders	15 + grandchildren (n=20)	69.2 ±3.7	33%	100%	3 months	Patient AF knowledge (JAKQ) Patient drug adherence (MMAS-8) Patient motivation to use Mobile app feasibility, usability, satisfaction	• Patient AF knowledge: improved from 64.6+14.7% at baseline to 70.4+10.4% after 3 months (p = 0.09) • Medication adherence: 7.7±0.6 at baseline and 7.4±0.9 at end of study; electronic monitoring showed lower taking and regimen adherence than self-reported on app (taking adherence 88.6±15.4%) and regime adherence (81.8±18.7%); pill count adherence 94.5±9.2% • Motivation to use app: decreased towards end of study in both pts (p= 0.009) and grandchildren (p < 0.001). 87% of patients completed the 90-day contract • Mean days using app significantly higher in pts vs grandchildren (57.7±30.0% and 24.3±23.8%, respectively; p= 0.002) • App experience: rated positively on clarity (1.500), novelty (0.942) and stimulation (0.923) and attractiveness (0.859); efficiency (0.577) and dependability (0.481) received neutral rating
Magnani et al [50]	USA	Prospective single arm	Mobile app (animated character with speech, body gesture, facial expression) - AF education - symptom tracker - medication adherence - heart rate/rhythm monitoring (by ACK)	31	68±11	39%	100%	1 month	Patient QoL (AFEQT, HRQoL) Patient medication adherence (MMAS-8) Patient activation (PAM)	• Patient QoL: improved from 64.5±22.9 at baseline to 76.3±19.4 (p<0.01) • Patient drug adherence: improved from 7.3±0.9 to 7.7±0.5 (p=0.01) • Most of the participants found the relational agent useful, informative, and trustworthy
Ghanbari et al [177]	USA	Prospective single arm	Mobile app = miAfib - AF symptom tracker - affect tracker	10	ND	50%	100%	1 month	Patient engagement and acceptability Mobile app usability (5-ponit Likert scale)	• Patients found app easy to use (4.75 ± 0.46), intended to use it in the future (4.37 ± 1.06) and found it easy to integrate into daily routine (4.5 ± 1.07)
Guo et al [178]	China	RCT	Mobile application = mAFA - AF education - CDSS (CHA_2DS_2-VASc, HAS-BLED, SAMe-TT_2R_2 scores) - thromboprophylaxis guidance - patient event tracker - heart rhythm monitoring - blood pressure monitoring - symptom tracker - lifestyle trackers - medication adherence - self-care protocols - structured follow-up	3292 1646 (IC) 1646 (UC)	67 (mean) 67±15 (IC) 70±12 (UC)	38% 38% (IC) 38% (IC)	100%	291 days (mean)	Assessment of mobile application impact on long term outcomes	• Composite of ischemic stroke/systemic thromboembolism, death, and rehospitalization (1.9% in IC vs 6.0% in UC); HR 0.39 (95% CI 0.22-0.67); p<0.01 • Rehospitalization rate (1.2% in IC vs. 4.5% in UC); HR 0.32 (95% CI 0.17- 0.60); p<0.001
Guo et al [179]	China	RCT		1793 657 (IC) 1136 (UC)	64±24 N/D (IC) N/D (UC)	33% N/D (IC) N/D (UC)	100%	12 months	Assessment of mobile application impact on long term outcomes	• Bleeding events (2.1% in IC vs 4.3% in UC, p<0.01) • OAC use decreased significantly by 25% among AF patients receiving UC
Guo et al [180]	China	RCT		209 113 (IC) 96 (UC)	67.4 ±10.6 70.9 ±17.4	42.5% 44.8%	100%	1 and 3 months	Patient AF knowledge (11-item AF questionnaire) Patient QoL (EQ-5D-Y) Patient drug adherence (Pharmacy Quality Alliance adherence measure) Patient OAC satisfaction (Anti-Clot Treatment Scale)	• Patient AF knowledge: improved vs. standard care (all p<0.05) • Patient QoL: increased vs. standard care at baseline (86.5 vs. 71.3), 1 month (87.6 vs. 70.1) and 3 months (87.2 vs. 69.9) (all p<0.05) • Patient drug adherence: increased vs. standard care at 1 month (0 (0–4) vs. 4 (0–11); p<0.001); 3 months (2 (0–4) vs.4 (0–11); p<0.001)

									Mobile app feasibility, usability, satisfaction	• Patient anticoagulation satisfaction: standard care expressed more OAC burden (all p< 0.05); mAFA pts reported significantly more OAC benefit at 1 month only (p=0.013) • App usability: 90% reported app
Guo et al [181]	China	RCT		2473 1261 (IC) 1212 (UC)	67.0 (mean) (IC) 70.1 (mean) (UC)	38.0% (IC) 42.1% (UC)	100%	≥1 year	Stroke/thromboembolism All-cause death Rehospitalization App usability	• Lower composite outcome of ischaemic stroke/systemic thromboembolism, death, and rehospitalization in IC vs UC (HR 0.18, 95% CI: 0.13–0.25, *p*< 0.001) • App usability: 842 patients used mAFA, of which 70.8% had good management adherence, with the persistence of use of 91.7%
Hirschey et al [182]	USA	Prospective single arm	Mobile app - AF education - AF episodes tracker - AF triggers tracker -news from Cardiology Societies - medication reminders - heart rate monitoring - appointment reminder	12	59 [37-67]	42%	100%	1 month	Mobile app feasibility, usability, satisfaction	• App satisfaction (reported by 92% of participants), ease of use (100%), software bugs (58%), similarity to other apps used before (83%) • Perceptions of app usefulness: core needs of the patient segment, patient workflow while managing AF, app's ability to support the patient's evolving needs • Usability improvement: clarity of app instructions and design, software bugs
Manimaran et al [183]	UK	Prospective single arm	Mobile app = Ortus-iHealth (virtual arrhythmia clinic appointment via video call)	46	62 [23-86]	36%	100%	3 months	Mobile app feasibility, usability, satisfaction	• Patient activation: high satisfaction with installation and registration process (in 62% patients), sense of reminders (100%) and clinical letters (83%) usefulness, sense of cost- and time-effectiveness (80%)
Stephan et al [184]	Brazil	Prospective single arm	Mobile application - AF education - CDSS (CHA_2DS_2-VASc, HAS-BLED, SAMe-TT_2R_2 scores)	20	67.7 ±9.4	40%	100%	N/D	Patient AF knowledge Treatment decision conflict	• Patient AF knowledge: increased from 4.7±1.8 to 7.2±1.0, p<0.001 • Mobile app used resulted in low decisional conflict (11 ± 16/100 points in decisional conflict scale)
Balsam et al [185]	Poland	Prospective single arm	Educational program - AF education (video)	100	63±15	38%	62%	1 year	Patient AF knowledge (stroke risk, stroke reduction by drugs/OAC)	• Patient AF risk knowledge: increased from 22% (before), to 83% (immediately after), 79% (1 week after), 71% (1 year after movie) • Patient drugs knowledge: increased from 88% (before) to 100% (immediately after), 100% (1 week after), 97% (1 year after) • Patient OAC knowledge: increased from 70% (before) to 96% (immediately after), 92% (1 week after), 99% (1 year after)
Desteghe et al [186]	Belgium	RCT	Educational program - AF education (platform) 1. on-line tailored education group (group 1) 2. standard care with online access (group 2) 3. standard care only (group 3)	120 35 (gr.1) 36 (gr.2) 49 (gr.3)	68±10.2 62±10.1 (gr.1) 65±8.9 (gr.2) 74±7.6 (gr.3)	35% 23% (gr.1) 31% (gr.2) 47% (gr.3)	100%	12 months	Patient AF knowledge (JAKQ) Patient QoL (AFEQT) Patient experience/ opinion	• Group 1: significantly improved AF knowledge (75.0 [66.7–85.0] %; p= 0.001); knowledge persisted at 6 weeks (77.5 [65.0–85.0]%; p=0.010) and 12 weeks (80.0 [70.0–90.0] %; p< 0.001) after DCCV/PVI procedure • Group 2: no improvement in AF knowledge (65.0 [50.0–73.8]%; p=1.00); significant improvement between baseline and 6-week post-procedure (p= 0.010) and between hospitalization and 6-week post-procedure (p= 0.016) • Group 3: no knowledge improvement (p =0.248) • Group 1 and 2: significant increase in overall AFEQT score 6- and 12-week post-procedure compared to baseline and at hospitalization • Group 3: no significant difference in overall AFEQT score over time (p=0.082) • Usability: on-line platform rated positively on all aspects

Goni et al [187]	Spain	RCT	Educational program for Mediterranean diet enriched with extra virgin olive oil - phone contacts - web-based interventions with provision of dietary recommendations - access to web page, mobile app and printed resources	720 365 (IC) 355 (UC)	59.7±10.7 59.9±10.5 (IC) 59.6±10.9 (UC)	171 (24%) 82 (22.5%) (IC) 89 (25.1%) (UC)	N/D	2 years	14-item Mediterranean Diet Adherence Screener (MEDAS) questionnaire and a semi quantitative food frequency questionnaire	• Adherence to Mediterranean diet: higher improvement in IC compared with UC (net between-group difference: 1.8 points in the MEDAS questionnaire; p<.001)
Guhl et al [188]	USA	RCT	Educational program (animated character with speech, body gesture, facial expression) - AF education - AF symptom tracker - heart rhythm monitoring (by ACK)	120 61 (IC) 59 (UC)	72±9.1 72+10.6 (IC) 73+7.3 (UC)	52% 53% (IC) 51% (UC)	100%	1 month	Patient QoL (AFEQT) Patient experience/ opinion Patient daily activity Patient medication adherence	• Patient QoL: improved in IC (adjusted mean difference 4.5; 95% CI 0.6-8.3; p=0.03) compared with the UC • Patient daily activity: improved in IC (adjusted mean difference 7.1; 95% CI 1.8-12.4; p=0.009) compared with the UC • Patient medication adherence (3.5% in IC vs. 23.2% in UC; adjusted difference 16.6%; 95% CI 2.8%-30.4%; p<0.001). • Qualitative assessments of acceptability identified that participants found the relational agent useful, informative, and trustworthy
Carter et al [189]	Canada	RCT	Educational program - AF education via telephone	433 185 (UC) 228 (IC)	64±15 64±15 (IC) 64±15 (UC)	44% 43% (IC) 45% (UC)	100%	12 months	Assessment of AF knowledge on long term outcomes and OAC prescription	• Composite of death, cardiovascular hospitalization, and AF-related emergency department visits: 17.3% vs. 26.2% (IC vs. UC) OR 0.71 (95% CI 0.59 - 1.00); p=0.049 • Prescription of OAC increased in the $CHADS_2 \geq 2$ group (88.4% in the IC vs. 58.5% in UC group, $p<0.01$).
Ferguson et al [190]	Australia	Prospective single arm	Educational program - thromboprophylaxis guidance and AF education based on 12 case scenarios	74	88% aged<45	82%	N/D	6 weeks	Nurse AF and OAC knowledge Mobile app satisfaction	• There was a 54% mean improvement in knowledge levels post-intervention • Improvement in the use of the CHA_2DS_2-VASc (2.5–37.5%) and HAS-BLED (2.5–35%) tools to assess stroke and bleeding risk ($p<0.01$) • Mobile app satisfaction: very high satisfaction with the learning module (87%), with the content clarity (89%), ease in use (87%)
Mesquita et al [191]	International	RCT	Educational program - online training for electrophysiologists regarding identification of AF driver sites	12 6 (IC) 6 (UC)	30 [28-32] 28 [26-30] (IC) 31 [30-33] (UC)	50% 50% (IC) 50% (UC)	100%	N/D	Impact of online training on identification of AF driver sites	• Baseline identification of AF termination sites increased from 35%±8% to 50.0%±8.2% (p=0.04) in training group, whereas no changes were observed in control group (37%±10% to 37.8%±10.5%, p=NS) • Training improved overall performance by 13.1%±3.6%, (p<0.001) while accuracy did not change for first- and second reads in the control group (2.7%±3.4%, p=0.439)
Cox et al [192]	Canada	RCT	CDSS - AF education - patient health record - thromboprophylaxis guidance - heart rate and rhythm control guidance - symptom tracker	11333 590 (IC) 543 (UC)	72+10 73+10 (IC) 72+9.9 (UC)	39.1% 60% (IC) 65% (UC)	100%	12 months	Assessment of CDS impact on long term outcomes	• Composite of unplanned emergency department visit or cardiovascular hospitalization 20.0% vs. 23.9% (IC vs. UC) HR 1.06 (95% CI 0.77 - 1.47); p=0.71 • Major bleeding 1.3% vs. 1.3% (IC vs. UC) HR 1.04 (95% CI 0.38 - 2.88); p=0.94
Eckman et al. [193]	USA	Prospective single arm	CDSS - thromboprophylaxis guidance	65	66±10.5	35%	100%	1 month	Clinical decision support Patient AF knowledge Patient AF knowledge about personal stroke and bleeding risk	• Decisional conflict decreased from an average of 31 to 9; mean change was 22.3 (95% CI, 25.7 - 37.1) • Satisfaction with decision increased from 4.0 to 4.5 • Patient AF knowledge increased from 8.4 to 9.1

									Patient medication adherence (MMAS-8)	• Patient AF knowledge bout personal stroke and bleeding risk increased from 1 to 1.5 ($p < 0.0001$) • Patient medication adherence improved from 5.9 to 6.4 ($p<0.0001$).
Eckman et al. [194]	UK USA	RCT	CDSS - thromboprophylaxis guidance	1493 801 (IC) 692 (UC)	70 70 (IC) 70 (UC)	44% 44% 48%	100%	12 months	Clinical decision support	• Rate of discordant therapy decreased from 63% to 59% (p=0.02).
Hendriks et al [195]	The Netherlands	RCT	CDSS - AF management (thromboprophylaxis guidance, related treatment)	712 356 (IC) 356 (UC)	67±12 66±13 (IC) 67±12 (UC)	41.3% 44.7% (IC) 37.9% (UC)	100%	22 months (mean)	Comparison of AF nurse-led and routine clinical care	• Composite of cardiovascular hospitalization or cardiovascular death 14.3% vs. 20.8% (IC vs.UC) HR 0.65 (95% CI 0.45_0.93); p=0.017
Karlsson et al [196]	Sweden	RCT	CDSS - alert about high-risk patients left untreated	13379 7764 (IC) 6370 (UC)	59% of aged ≥75 58% (IC) 58% (UC)	43% 43% (IC) 43% (UC)	100%	12 months	Assessment of CDS impact on long term outcomes and guidelines adherence	• Adherence to guidelines increased from 70.3% (95% CI 62.9%–77.7%) to 73.0%, (95% CI 64.6%–81.4%) in IC and from 70.0% (95% CI 60.4%–79.6%) to 71.2% (95% CI 60.8%–81.6%) in UC, p = 0.013 • No difference in the incidence of stroke, transient ischemic attack, or systemic thromboembolism in the IC vs. UC (49 [95% CI 43–55] per 1,000 patients with AF in the IC compared to 47 [95% CI 39–55] per 1,000 patients with AF in UC, p= 0.64) • IC had a lower incidence of significant bleeding, with events in 12 (95% CI 9–15) per 1,000 patients with AF compared to 16 (95% CI 12–20) per 1,000 patients with AF in UC (p = 0.04)
Sheibani et al [197]	Iran	Prospective single arm	CDSS - thromboprophylaxis guidance	10 HCP 373 pts	43.8 [33-58]	30%	100% (newly diagnosed)	6 months before and 6 months after intervention	Provider adherence to OAC guidelines for AF	• CDSS improved adherence to guidelines for OAC for AF (from 48% to 65.5%, p < 0.0001)
Thomson et al [198] (DARTS-II)	UK	RCT	CDSS - thromboprophylaxis guidance	109 53 (IC) 56 (UC)	73 73±6.7 (IC) 74±6.2 (UC)	44% 43% (IC) 45% (UC)	100%	3 months	Clinical decision support	• Decision conflict was lower in IC vs. UC; mean difference -0.18 (95% CI -0.34 to -0.01) • Participants in IC not already on warfarin were much less likely to start warfarin than those in UC (25% vs. 93.8%); RR 0.27 (95% CI 0.11-0.63).
Wijtvielt et al [199]	The Netherlands	RCT	CDSS - AF management (thromboprophylaxis guidance, related treatment)	1374 671 (IC) 683 (UC)	64±10 64±10 (IC) 64±11 (UC)	44% 33% (IC) 35% (UC)	100%	37 months	Comparison of AF nurse-led and routine clinical care	• Composite of cardiovascular death and cardiovascular hospital admissions 9.7% per year vs. 11.6% per year (IC vs. UC) HR 0.85 (95% CI 0.69-1.04); p=0.12 • In a pre-specified subgroup analysis by center experience; HR 0.52 (95% CI 0.37–to 0.71) in four experienced centers and 1.24 (95% CI 0.94–1.63) in four less experienced centers (p for interaction <0.001).
Rosier et al [200]	France	Retrospective single arm	AF detection system - application filtering AF alerts	60	N/D	N/D	100%	9 months (mean)	Adequate classification of remote AF alerts	• 98% adequate classification of AF alerts • 84% reduction in the workload of remote monitoring of AF alerts
Zoppo et al [201]	Italy	Prospective single arm	AF detection system (AFinder web-based software)	472	69±10	23%	44%	24 months	AF detection via web-based software scanning of CIED data remote transmissions	• AFinder enhanced AF detection sensitivity by 10% • AFinder improved OAC optimal treatment by a factor of 6%
Shacham et al [202]	Israel	RCT	Remote patient-management system (remote management of PAF by telephonically transmitted recommendations (group A)	646 576 (gr.A) 160 (gr. B)	73±11	48%	100%	2-3 months	Remote AF management	• Group A: 79.5% of PAF episodes (1326/1667) were converted into sinus rhythm; mean heart rate decreased from 85±15 to 66±10 beats per minute (p<0.001). • Group B: 70% of PAF episodes (153/218) were converted into sinus rhythm; mean heart rate decreased from 92 ± 24 to 68 ± 21 beats per minute (p<0.001).

			or also included intervention by the attending physician (group B))							
Stegman et al [203]	Germany	RCT	Remote patient management (daily transmission of body weight, blood pressure, heart rate/rhythm, oxygen saturation, and self-rated health status)	571 282 (IC) 289 (UC)	74+8.0 (IC) 74+8.1 (UC)	32% (IC) 30% (UC)	100%	12 months	Remote AF management on long term outcomes	• Days lost due to unplanned cardiovascular hospital admissions or all-cause death: 5.64%,(95% CI 3.81-7.48) in IC vs. 9.37% (95% CI 6.98-11.76) in UC group, ratio 0.60, P = 0.015). • All-cause mortality: 9.2% (95% CI 6.1–13.2) IC vs. 14.5% (95% CI 10.7–18.1) in the UC group (HR 0.60, CI 0.36–1.00, p= 0.050).
Jiang et al [204]	China	Prospective single arm	Remote patient-management system = HCFT-AF - AF education (for patient, HCP) - personal health record - AF symptom tracker - heart rate/rhythm monitoring - blood pressure monitoring - remote consultation	73	68±10.3	48%	100%	4 months	HCFT-AF program acceptability, feasibility, and usability	• HCFT-AF program satisfaction 5.21+1.43; ease of use 4.76+1.58, usefulness 5.45+1.40; overall usability 5.11+1.52 • Self-monitoring of blood pressure increased from 26% to 72% (p<0.001), heart rate from 8% to 52%(p<0.001), heart rhythm from 7% to 48%(p<0.001) • Healthy lifestyle: moderate physical activity increased from 22% to 42% (p=0.09), quitting or reducing alcohol intake from 51 to 73% (p=0.005), quitting or reducing smoking from 62% to 72% (p=0.04) • Low-salt, low-fat diet increased from 42% to 61% (p=0.04), more fruits or vegetables consumption increased from 25% to 76% (p<0.001) • 94% of indicated patients received OAC therapy
Goette et al [205]	Germany	RCT	Remote patient-management system=transtelephonic ECG transmission	225 214 (IC) 211 (UC)	61+11.2 (IC) 62+10.2 (UC)	38% (IC) 45% (UC)	100%	12 months	AF burden	•
Stewart et al [206]	Australia	RCT	Remote patient-management system - home visit and Holter monitoring 7-14 days after hospital discharge with additional telephone support	335 127 (IC) 137 (UC)	72±11 72±11 (IC) 71±12 (UC)	48% 50% (IC) 46% (UC)	100%	905 [773-1050] days	Comparison of AF nurse-led and routine clinical care	• Death or unplanned readmission 76% vs. 82% (IC vs. UC) HR 0.97 (95% CI 0.76 - 1.23); p=0.85
Vinereanu et al [207]	International	RCT	Remote patient-management system - AF education with regular monitoring and feedback to HCP	2281 1187 (IC) 1094 (UC)	70±11 70±11 (IC) 69±12 (UC)	47.3% 48% (IC) 46% (UC)	100%	12 months	Change in the proportion of patients treated with OAC Reduction in stroke risk	• Change in proportion of patients on OAC: from 68% to 80% (IC) from 64% to 67% (UC) • Absolute difference in the change between groups was 9.1% (95% CI 3.8-14.4); OR of change in the use of OAC between groups was 3.28 (95% CI 1.67-6.44; adjusted p value=0.0002). • Kaplan-Meier estimates showed a reduction in the stroke in the IC vs. UC (HR 0.48, 95% CI 0.23-0.99; log-rank p value=0·0434).
Peleg et al [208]	Italy	Prospective single arm	Remote patient-management system - AF education - patient health record - symptom tracking - lifestyle tracking - CDSS - medication adherence - heart rate/rhythm monitoring - blood pressure monitoring	10	N/D	N/D	100%	127.2 ±68.6 days	Patient compliance to ECG and blood pressure measurement Patient QoL (EuroQoL and AFEQT) Clinician / patient compliance to DSS recommendations Patient satisfaction (Likert scale) Clinician satisfaction (Likert scale)	• Patient compliance to ECG and blood pressure measurement was 0.65±0.28 and 0.75±1.33, respectively • The proportion of AF episodes in patient-initiated measurements was higher than that found in system-initiated requests (p=0.01) • Patient QoL: increased from 77.6 ± 0.23 to 78.4 ± 0.23; 50% patients improved, 18% remained, 37.5% deteriorated (EuroQoL, utility coefficient), from 67.5 ± 18.6 to 80.1 ± 13.0; 62.5% patients improved, 12.5% remained, 25% deteriorated (EuroQoL, analogue score) from 73.0 ± 14.9 to 67.8 ± 11.1; 25% patients improved, 12.5% remained, 62.5% deteriorated AFEQT,

										(overall score), from 72.3±18.7 to 71.9±21.7; 37.5% patients improved, 37.5% remained; 25% deteriorated (AFEQT, treatment satisfaction) • Clinician compliance to DSS recommendations (0.3) • Patient compliance to DSS recommendations (>0.9) • Patient satisfaction: system increased patient's confidence (in 50% of patients), made ability to adapt to context (86%), improved patients' peace of mind during travel (88%), improved their interaction with clinicians (>50%); was recommend to others (100%), was intended to use it in the future (89%); not complicated patients' lives (33%) • Clinician satisfaction: system helped to identify priorities and increases patient safety (in 100% of clinicians), made it easier to manage patients (100%)

Abbreviations: AF, atrial fibrillation; AFDST, Atrial fibrillation Decision Support tool; AFEQT, Atrial Fibrillation Effect on Quality of life; AFSDM, Atrial fibrillation shared decision-making tool; AI, artificial intelligence; CDS, clinical decision support; CDS-AF, Clinical Decision Support for Atrial Fibrillation; CDSS, computerized decision support system; DARTS, Decision Analysis in Routine Treatment Study; ECG, electrocardiogram; IC, intervention care; INR, international Normalized Ratio; MMAS-8, Morisky 8-item Medication Adherence Scale; N/OAC, oral anticoagulant; PAM, Patient Activation Measure; RCT, randomized controlled trial; UC, usual care.

Table S8. Excluded studies and reason for exclusion.

Author, year, reference	Reason for exclusion
Lau 2013 [209]	Wrong intervention (development optimized algorithm for AF detection)
Lee 2013 [210]	Wrong intervention (development new AF detection technology)
McManus 2013 [211]	Wrong intervention (development new AF detection technology)
Shrivastav 2014 [212]	Wrong intervention (not focused only on AF population)
Chung 2015 [213]	Wrong intervention (development new QTc interval detection technology)
Marcolino 2015 [214]	Wrong intervention (description of teleservice collecting 12-lead ECG)
Nguyen 2015 [215]	Wrong intervention (not focused only on AF population)
Weidemann 2016 [216]	Wrong intervention (not focused only on AF population)
Coppetti 2017 [217]	Wrong intervention (not focused only on AF population)
Chong 2018 [218]	Wrong intervention (development new AF detection technology)
Lahdenoja 2018 [219]	Wrong intervention (development new AF detection technology)
Nguyen 2018 [220]	Wrong intervention (development new AF detection technology)
Baca-Motes 2019 [221]	Wrong intervention (methods for recruitment potential research participants)
Marinucci 2020 [222]	Wrong intervention (development new AF detection technology)
Luo 2021 [223]	Wrong intervention (development new AF detection technology)

Abbreviations: AF, atrial fibrillation; ECG, electrocardiogram.

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