BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

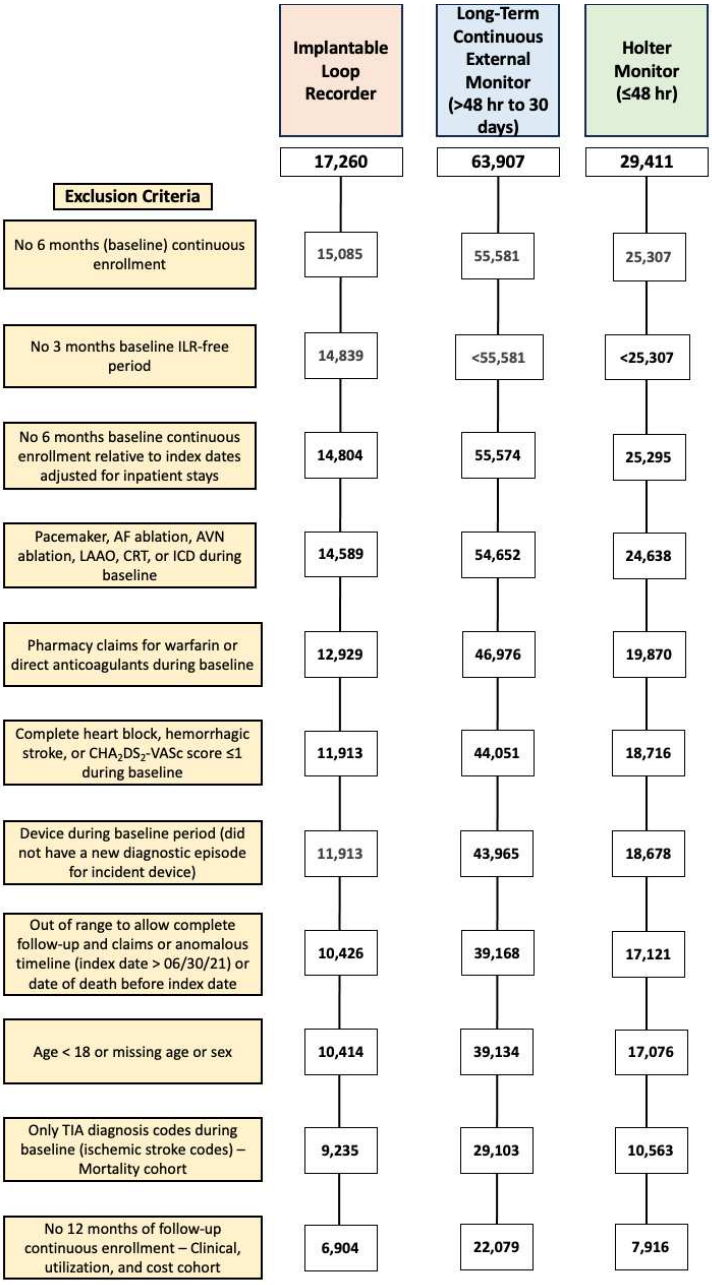
Supplemental Material

Table of Contents	Page
Figure S1: Flow Diagram of Patient Inclusion	2
Figure S2: All-Cause Mortality Over 12 Months Follow-Up	3
Table S1: Code Lists for Cardiac Rhythm Monitoring Devices	4
Table S2: Code Lists for Clinical Conditions	5
Table S3: Code Lists for Procedures Used for Exclusion Criteria	6
Table S4: Lists of Medications	7
Table S5: Code Lists for Safety Outcomes	8
Table S6: Clinical Utilization Cohort Baseline Characteristics	9
Table S7: Unadjusted Risk of Mortality at 12 Months	11
Table S8: Unadjusted Risk of Mortality at 12 Months for Subgroups of Patients with Fewer than 45 Days of Long-Term Care During Baseline and for Patients with No Baseline History of a Prior Rhythm Monitoring Device	12
Table S9: Unadjusted Clinical Outcomes at 12 Months	13
Table S10: Unadjusted Utilization Outcomes	14
Table S11: Unadjusted Cost Outcomes	15

Dhruva SS, *et al. Open Heart* 2024; 11:e002714. doi: 10.1136/openhrt-2024-002714

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

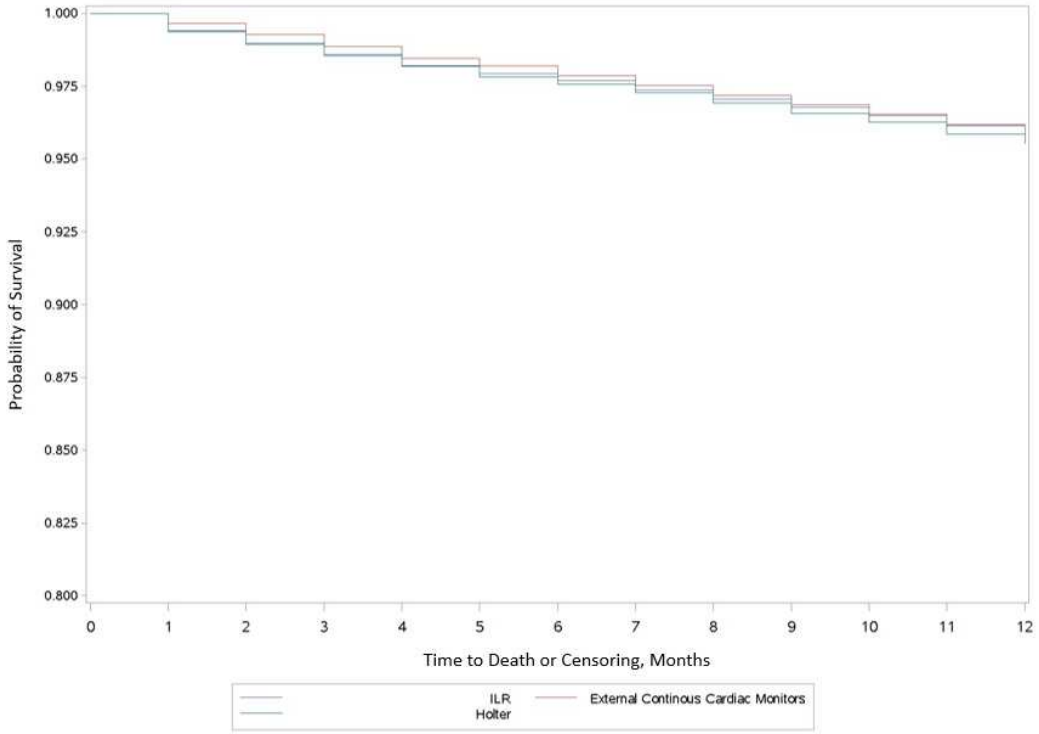
Figure S1: Flow Diagram of Patient Inclusion



Abbreviations: ILR, implantable loop recorder; AF, atrial fibrillation; AVN, atrioventricular node; LAAO, left atrial appendage occlusion; CRT, cardiac resynchronization therapy; ICD, implantable cardioverter-defibrillator; CHA_2DS_2-VASc score: 1 point for congestive heart failure, 1 point for hypertension, 1 point for diabetes mellitus, 2 points for ischemic stroke/transient ischemic attack/thromboembolism, 1 point for vascular diseases, 1 point for age 65 to 74 years, 2 points for age ≥75 years, and 1 point for female sex; TIA, transient ischemic attack

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Figure S2: All-Cause Mortality Over 12 Months Follow-Up



Abbreviations: ILR, implantable loop recorder

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Table S1: Code Lists for Cardiac Rhythm Monitoring Devices

Implantable loop recorders / implantable cardiac monitors	CPT: 33285, 33282, 93298, 93285, 93291, 0650T, 93285, 93291, 93298, 93299, G2066, 33286 ICD-10-PCS: 0JH632Z, 0JH602Z, 4A02XFZ, 0JPT32Z HCPCS: E0616, C1764
Long-term continuous external monitors	CPT: 93228, 93229, 93268, 93270, 93271, 93272, 0498T, 0295T, 0296T, 0297T, 0298T, 0497T
Holter monitors	CPT: 93224, 93225, 93226, 93227

Abbreviations: CPT, Current Procedural Terminology; ICD-10-PCS, 10th revision of the International Classification of Diseases Procedural Coding System; HCPCS stands for the Healthcare Common Procedure Coding System

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Table S2: Code Lists for Clinical Conditions

Cryptogenic Stroke	
	ICD-9-CM: 43491 ICD-10-CM: I639
Ischemic Stroke or Transient Ischemic Attack	
	ICD-9-CM: 43301, 43311, 43321, 43331, 43381, 43391, 4340, 43400, 43401, 4341, 43410, 43411, 43490, 435, 4350, 4351, 4353, 4358, 4359, 436, 99702 ICD-10-CM: G45, G450, G451, G452, G453, G458, G459, G46, G460, G461, G462, G463, G464, G465, G466, G467, G468, I630, I6300, I6301, I63011, I63012, I63013, I63019, I6302, I6303, I63031, I63032, I63033, I63039, I6309, I631, I6310, I6311, I63111, I63112, I63113, I63119, I6312, I6313, I63131, I63132, I63133, I63139, I6319, I632, I6320, I6321, I63211, I63212, I63213, I63219, I6322, I6323, I63231, I63232, I63233, I63239, I6329, I633, I6330, I6331, I63311, I63312, I63313, I63319, I6332, I63321, I63322, I63323, I63329, I6333, I63331, I63332, I63333, I63339, I6334, I63341, I63342, I63343, I63349, I6339, I634, I6340, I6341, I63411, I63412, I63413, I63419, I6342, I63421, I63422, I63423, I63429, I6343, I63431, I63432, I63433, I63439, I6344, I63441, I63442, I63443, I63449, I6349, I635, I6350, I6351, I63511, I63512, I63513, I63519, I6352, I63521, I63522, I63523, I63529, I6353, I63531, I63532, I63533, I63539, I6354, I63541, I63542, I63543, I63549, I6359, I636, I638, I6381, I6389, I6782
Haemorrhagic Stroke	
	ICD-9-CM: 430, 431, 432, 4320, 4321, 4329 ICD-10-CM: I6000, I6001, I6002, I6010, I6011, I6012, I602, I6020, I6021, I6022, I6030, I6031, I6032, I604, I6050, I6051, I6052, I606, I607, I608, I609, I610, I614, I615, I616, I618, I6200, I6201, I6202, I6203, I621, I629, I61, I611, I612, I613, I619
Atrial Fibrillation	
	ICD-9-CM: 42731 ICD-10-CM: I480, I481, I4811, I4819, I482, I4820, I4821
Heart Block	
	ICD-9-CM: 4260, 42612, 42613 ICD-10-CM: I441, I442

Abbreviations: ICD-9-CM, 9th revision of the International Classification of Diseases, Clinical Modification; ICD-10-CM, 10th revision of the International Classification of Diseases, Clinical Modification

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Table S3: Code Lists for Procedures Used for Exclusion Criteria

Pacemaker	
	CPT: 33202, 33203, 33206, 33207, 33208, 33212, 33213, 33214, 33216, 33218, 33220, 33221, 33222, 33227, 33228, 33234, 33236, 33237, 33274, 33275, 93260, 93261, 93279, 93280, 93281, 93282, 93283, 93284, 93286, 93287, 93288, 93289, 93294, 93295, 93296, 33229, 33233, 33235 ICD-9-PCS: 3770, 3771, 3772, 3773, 3774, 3776, 3777, 3780, 3781, 3782, 3783, 3785, 3786, 3787, 3789, 3794, 3797 ICD-10-PCS: 02H63JZ, 02HK3JZ, 02HK3NZ, 02PA3MZ, 0JH604Z, 0JH605Z, 0JH606Z, 0JPT0PZ
Implantable Cardioverter-Defibrillator	
	CPT: 33215, 33217, 33223, 33230, 33231, 33240, 33241, 33244, 33249, 33271, 33262, 33263, 33264 ICD-9-PCS: 3796, 3798 ICD-10-PCS: 02H63KZ, 02HK3KZ, 02HN0KZ, 02PA0MZ, 02WA0MZ, 02WA3MZ, 0JH608Z, 0JH60PZ, 0JH638Z, 0JH808Z, 0JH838Z, 0JWT0PZ
Cardiac Resynchronization Therapy Only	
	CPT: 33225 ICD-10-PCS: 02H43JZ, 02H43KZ, 0JH607Z, 0JH609Z
Ablation	
Atrial fibrillation ablation	CPT: 93656, 93657 ICD-10-PCS: 025S3ZZ, 025T3ZZ, 025S4ZZ, 025T4ZZ
Atrioventricular node ablation	CPT: 93650 ICD-10-PCS: 02583ZZ
Left Atrial Appendage Closure	
	CPT: 33340 ICD-9-PCS: 3790 ICD-10-PCS: 02L73DK

Abbreviations: CPT, Current Procedural Terminology; ICD-9-PCS, 9th revision of the International Classification of Diseases Procedural Coding System; ICD-10-PCS, 10th revision of the International Classification of Diseases Procedural Coding System

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Table S4: Lists of Medications

Direct Oral Anticoagulants	
	APIXABAN, BETRIXABAN, DABIGATRAN, EDOXABAN, RIVAROXABAN
Warfarin	
	DICUMAROL, WARFARIN

Dhruva SS, *et al. Open Heart* 2024; 11:e002714. doi: 10.1136/openhrt-2024-002714

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Table S5: Code Lists for Safety Outcomes

Major Gastrointestinal Bleeding	
	ICD-9-CM: 4552, 4555, 4558, 4560, 45620, 53021, 5307, 53082, 53551, 53561, 53571, 53783, 56202, 56203, 56212, 56213, 5693, 56985, 578, 5780, 5781, 5789 ICD-10-CM: K250, K252, K254, K256, K260, K262, K264, K266, K270, K272, K274, K276, K280, K282, K284, K286, K2901, K2921, K2931, K2941, K2951, K2961, K2971, K2981, K2991, K31811, K5701, K5721, K5731, K5733, K5741, K5751, K5753, K5781, K5791, K5793, K625, K921, K922
Other Major Bleeding	
	ICD-9-CM: 36281, 36361, 37632, 4230, 4233, 56881 ICD-10-CM: H05233, H31309, H3560, H3561, H3562, H3563, I312, K661
Other Minor Bleeding	
	ICD-9-CM: 2851, 4590, 5967, 5997, 59970, 59971, 59972, 6262, 6266, 6268, 7191, 71910, 71911, 71912, 71913, 71914, 71915, 71916, 71917, 71918, 71919, 7847, 7848, 7863, 78630, 78639 ICD-10-CM: D500, M2500, N029, N921, N939, R040, R041, R042, R0489, R049, R319, R58

Abbreviations: ICD-9-CM, 9th revision of the International Classification of Diseases, Clinical Modification; ICD-10-CM, 10th revision of the International Classification of Diseases, Clinical Modification

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Table S6: Clinical Utilization Cohort Baseline Characteristics

	Total		Implantable Loop Recorder		Long-Term Continuous External Monitor		Holter Monitor		
	N	%	N	%	N	%	N	%	Global P-value
Cohort N	36,899		6,904	18.7	22,079	59.8	7,916	21.5	
Age, years (Mean, SD)	70.5 (11.5)		70.1 (11.1)		70.4 (11.6)		71.1 (11.5)		<0.001
Gender									
Female	19,926	54.0	3,535	51.2	12,087	54.7	4,304	54.4	<0.001
Male	16,973	46.0	3,369	48.8	9,992	45.3	3,612	45.6	<0.001
Insurance Type									
Commercial	8,118	22.0	1,625	23.6	4,979	22.6	1,514	19.1	<0.001
Medicare Advantage	28,768	78.0	5,275	76.5	17,092	77.4	6,401	80.9	<0.001
Index Date Year									
2016	4,426	12.0	661	9.6	2,318	10.5	1,447	18.3	<0.001
2017	5,904	16.0	1,018	14.8	3,260	14.8	1,626	20.5	<0.001
2018	7,170	19.4	1,428	20.7	4,116	18.6	1,626	20.5	<0.001
2019	8,376	22.7	1,619	23.5	5,229	23.7	1,528	19.3	<0.001
2020	7,582	20.6	1,442	20.9	5,076	23.0	1,064	13.4	<0.001
2021	3,441	9.3	736	10.7	2,080	9.4	625	7.9	<0.001
Index Date Setting and Provider									
Index date between a hospitalization and discharge	5,847	15.9	2,628	38.1	2,698	12.2	521	6.6	<0.001
Index date in emergency department	3,456	9.4	1,788	25.9	1,281	5.8	387	4.9	<0.001
Procedures of Interest									
Holter in 6-months baseline	1,930	5.2	529	7.7	1,401	6.4	0	0	<0.001
External monitor in 6-months baseline	1,625	4.4	1,620	23.5	0	0.0	<11[a]	<0.1[a]	<0.001
CHA_2DS_2-VASc Score and Comorbidities (Based on 6 Months Baseline Period)									
Heart failure	5,453	14.8	1,122	16.3	3,143	14.2	1,188	15.0	<0.001
Hypertension	31,802	86.2	6,169	89.4	18,879	85.5	6,754	85.3	<0.001
Diabetes	13,171	35.7	2,559	37.1	7,789	35.3	2,823	35.7	0.026
Coronary artery disease	13,110	35.5	2,710	39.3	7,556	34.2	2,844	35.9	<0.001
Peripheral arterial disease	1,683	4.6	296	4.3	904	4.1	483	6.1	<0.001
Thromboembolism	34,761	94.2	6,776	98.2	20,974	95.0	7,011	88.6	<0.001
CHA_2DS_2-VASc - continuous (Mean, SD)	5.3	1.5	5.44	1.5	5.3	1.5	5.3	1.6	<0.001
CHA_2DS_2-VASc score of	4,705	12.8	722	10.5	2,845	12.9	1,138	14.4	<0.001

Dhruva SS, *et al. Open Heart* 2024; 11:e002714. doi: 10.1136/openhrt-2024-002714

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

2 or 3									
CHA_2DS_2-VASc score of 4 or more	32,194	87.3	6,182	89.5	19,234	87.1	6,778	85.6	<0.001

[a]Masked to meet small cell suppression policy

Abbreviations: CHA_2DS_2-VASc score: 1 point for congestive heart failure, 1 point for hypertension, 1 point for diabetes mellitus, 2 points for ischemic stroke/transient ischemic attack/thromboembolism, 1 point for vascular diseases, 1 point for age 65 to 74 years, 2 points for age ≥75 years, and 1 point for female sex.

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Table S7: Unadjusted Risk of Mortality at 12 Months

	Total		Implantable Loop Recorder		Long-Term Continuous External Monitor		Holter Monitor		
	N	%	N	%	N	%	N	%	Global P-Value
N	48,901		9,235	18.9	29,103	59.5	10,563	21.6	
All-cause mortality	2,095	4.3	389	4.2	1,209	4.2	497	4.7	0.053

Dhruva SS, *et al. Open Heart* 2024; 11:e002714. doi: 10.1136/openhrt-2024-002714

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Table S8: Unadjusted Risk of Mortality at 12 Months for Subgroups of Patients with Fewer than 45 Days of Long-Term Care During Baseline and for Patients with No Baseline History of a Prior Rhythm Monitoring Device

	Total		Implantable Loop Recorder		Long-Term Continuous External Monitor		Holter Monitor		
	N	%	N	%	N	%	N	%	Global P-Value
<45 Days of Long-Term Care During Baseline									
N	48,156		9,068	18.8	28,707	59.6	10,381	21.5	
All-cause mortality	1,973	4.1	364	4.0	1,146	4.0	463	4.5	0.108
No Baseline History of a Prior Rhythm Monitoring Device									
N	44,532		6,692	15.0	27,282	61.3	10,558	23.7	
All-cause mortality	1,984	4.5	327	4.9	1,160	4.3	497	4.7	0.028

Dhruva SS, *et al. Open Heart* 2024; 11:e002714. doi: 10.1136/openhrt-2024-002714

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Table S9: Unadjusted Clinical Outcomes at 12 Months

	Total		Implantable Loop Recorder		Long-Term Continuous External Monitor		Holter Monitor		
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Global P-Value**
N	36,899		6,904	18.7	22,079	59.8	7,916	21.5	
New atrial fibrillation	5,280	14.3	1,604	23.2	3,027	13.7	649	8.2	<0.001
Anticoagulant initiation	5,429	14.7	1,761	25.5	2,952	13.4	716	9.0	<0.001
Safety Outcomes									
Major gastrointestinal bleeding	2,231	6.1	425	6.2	1,318	6.0	488	6.2	0.75
Haemorrhagic stroke	636	1.7	175	2.5	351	1.6	110	1.4	<0.001
Other major bleeding	306	0.8	67	1.0	191	0.9	48	0.6	0.033
Other minor bleeding	3,738	10.1	722	10.5	2,175	9.9	841	10.6	0.09

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Table S10: Unadjusted Utilization Outcomes

	Total		Implantable Loop Recorder		Long-Term Continuous External Monitor		Holter Monitor		
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Global P-value**
Cohort N	36,899		6,904	18.7	22,079	59.8	7,916	21.5	
Inpatient Stay									
Baseline (months -6 to -1, including index date)	17,212	46.7	4,169	60.4	10,605	48.0	2,438	30.8	<0.001
Follow-up (months 1 to 12)	8,540	23.1	1,748	25.3	5,023	22.8	1,769	22.4	<0.001
Any Emergency Department Visit									
Baseline (months -6 to -1, including index date)	26,002	70.5	5,108	74.0	16,179	73.3	4,715	59.6	<0.001
Follow-up (months 1 to 12)	16,756	45.4	3,240	46.9	10,061	45.6	3,455	43.7	<0.001
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Global P-value**
Inpatient Stays									
Baseline (months -6 to -1, including index date)	0.6	0.7	0.71	0.7	0.56	0.7	0.38	0.7	<0.001
Follow-up (months 1 to 12)	0.4	0.9	0.4	0.9	0.4	0.8	0.4	0.9	0.002
Length of Stay, days									
Baseline (months -6 to -1, including index date)	2.7	5.4	3.7	5.8	2.7	5.0	2.2	5.8	<0.001
Follow-up (months 1 to 12)	2.3	7.6	2.5	7.6	2.2	7.1	2.4	8.9	0.015
Emergency Department Visits									
Baseline (months -6 to -1, including index date)	1.1	1.2	1.2	1.2	1.1	1.2	1.0	1.3	<0.001
Follow-up (months 1 to 12)	1.0	1.8	1.0	1.9	1.0	1.8	1.0	2	0.012
Number of Office Visits									
Baseline (months -6 to -1, including index date)	10.0	8.4	9.7	8.5	9.8	8.2	10.5	8.6	<0.001
Follow-up (months 1 to 12)	19.5	16.1	24.9	17.6	18.3	15.5	18.0	15.2	<0.001

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Table S11: Unadjusted Cost Outcomes

	Total		Implantable Loop Recorder		Long-Term Continuous External Monitor		Holter Monitor		
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Global P-value**
Total Cost of Care									
Baseline[a], $	22,741	30,064	34,453	32,357	21,112	27,850	17,067	31,266	<0.001
Follow-up[b], $	24,562	40,063	26,967	42,696	24,403	39,291	22,911	39,729	<0.001
Medical Costs									
Baseline[a], $	20,626	28,930	32,419	31,591	18,963	26,395	14,978	30,448	<0.001
Follow-up[b], $	19,565	35,941	21,794	39,026	19,373	34,659	18,157	36,559	<0.001
Pharmacy Costs									
Baseline[a], $	2,115	7,067	2,034	6,487	2,150	7,699	2,089	5,549	0.462
Follow-up[b], $	4,997	14,487	5,173	15,006	5,029	15,064	4,755	12,200	0.188
Health Plan Paid Costs									
Baseline[a], $	20,470	29,025	31,701	31,411	18,890	26,791	15,079	30,308	<0.001
Follow-up[b], $	21,649	38,210	23,943	41,100	21,523	37,345	19,998	37,885	<0.001
Out-of-Pocket Costs									
Baseline[a], $	1,936	1,914	2,446	2,139	1,897	1,864	1,602	1,749	<0.001
Follow-up[b], $	2,150	2,294	2,316	2,294	2,119	2,284	2,093	2,313	<0.001
Costs, Per Member Per Month (PMPM)									
Total Cost of Care									
Baseline[a], $	3,778	4,994	5,723	5,375	3,507	4,626	2,835	5,194	<0.001
Follow-up[b], $	2,051	3,346	2,252	3,566	2,038	3,281	1,913	3,318	<0.001
Medical Costs									
Baseline[a], $	3,426	4,806	5,385	5,248	3,150	4,385	2,488	5,058	<0.001
Follow-up[b], $	1,634	3,002	1,820	3,259	1,618	2,895	1,516	3,053	<0.001
Pharmacy Costs									
Baseline[a], $	351	1,174	338	1,078	357	1,279	347	922	0.462
Follow-up[b], $	417	1,210	432	1,253	420	1,258	397	1,019	0.188

Dhruva SS, *et al. Open Heart* 2024; 11:e002714. doi: 10.1136/openhrt-2024-002714

BMJ Publishing Group Limited (BMJ) disclaims all liability and responsibility arising from any reliance placed on this supplemental material which has been supplied by the author(s)

Health Plan Paid Costs									
Baseline[a], $	3,400	4,822	5,266	5,218	3,138	4,451	2,505	5,035	<0.001
Follow-up[b], $	1,808	3,191	2,000	3,432	1,798	3,119	1,670	3,164	<0.001
Out-of-Pocket Costs									
Baseline[a], $	322	318	406	355	315	310	266	291	<0.001
Follow-up[b], $	180	192	193	192	177	191	175	193	<0.001
Device Costs, Baseline[a] and Follow-Up[b]									
Device direct medical costs, $	2,915	8,407	13,975	15,033	449	592	149	268	<0.001
Health plan paid costs, $	2,712	8,122	13,121	14,773	385	529	122	247	<0.001
Out-of-pocket paid costs, $	204	567	854	1,046	64	174	27	84	<0.001
Device Costs, Baseline[a] and Follow-Up[b]									
Device direct medical costs, PMPM, $	162	467	777	835	25	33	8	15	<0.001
Out-of-pocket paid costs, PMPM, $	11	32	47	58	4	10	1	5	<0.001

[a]Months -6 to -1, including index date

[b]Months 1 to 12

Note: All costs were adjusted to 2020 values using the Consumer Price Index (CPI).