Assessment of Variation in Ambulatory Cardiac Monitoring: Real-World Evidence of Commercially Insured Beneficiaries

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Background

- Ambulatory cardiac monitors (ACM) enable heart rhythm monitoring for various durations, including Holter monitors (0–48 hours), long-term continuous monitors (LTCM, 3–14 days), and external ambulatory event monitors (AEM, up to 30 days).
- These devices detect intermittent or asymptomatic arrhythmias that might go unnoticed with a standard electrocardiogram.
- Previous research explored variations in ACM use among older and sicker Medicare beneficiaries (Mean Age: 76 years; Charlson Comorbidity Index [CCI]: 2.4)[1], but differences among commercially insured patients remain unclear.

Objective

- This study assessed the incidence of clinical outcomes among commercially insured diagnostic-naïve patients who received their first ACM.

Methods

- Retrospective cohort study using a large commercial claims database focused on patients without prior arrhythmia diagnoses who underwent their first ACM between 2016 and 2023.
- Outcomes:
  - New arrhythmia diagnoses within 90 days (based on ICD-10 codes)
  - Repeat ACM testing within 180 days
  - Cardiovascular (CV) events within 365 days
- Results stratified by major ACM manufacturers using national provider identifiers (NPI).
- To minimize confounding, inverse probability of treatment weighting (IPTW) balanced covariates, and adjusted regression models were used to evaluate outcomes.
- Models account for variation in patients' sociodemographic, comorbidities, and baseline healthcare resource utilization.#

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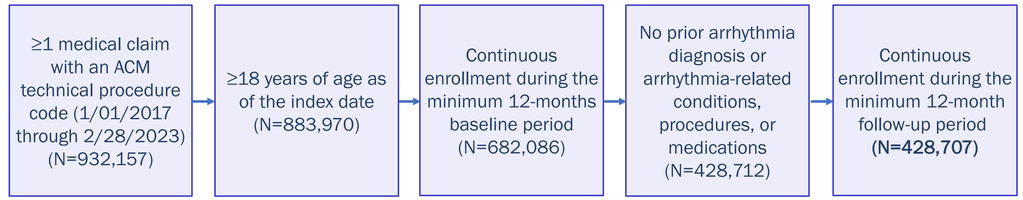
The Zio monitor is a prescription-only, single-use ECG monitor that continuously records data for up to 14 days. It is indicated for use on patients who may be asymptomatic or who may suffer from transient symptoms such as palpitations, shortness of breath, dizziness, lightheadedness, pre-syncope, syncope, fatigue, or anxiety.

Figure. ACM Cohort Identification



- Mean Age: 46 years (SD: 13 years)
- Mean CCI score: 0.5 (SD: 1)
- ACM Usage: LTCM: 36% AEM: 27% Holter: 36%

Table. Adjusted Odds of New Arrhythmia Diagnosis, Retests, and CV Events By Ambulatory Cardiac Monitor Type

Cardiac Monitor	Sample Size	New Diagnosis of Specified Arrhythmia Within 90-days*			ACM Retest Within 180-days			Any CV Event (excluding arrhythmia) Within 365-days†		
		%	aOR (95% CI)	P-value	%	aOR (95% CI)	P-value	%	aOR (95% CI)	P-value
Modality										
iRhythm LTCM (ref)	95,324	26.5%	--	--	3.1%	--	--	11.2%	--	--
non-iRhythm LTCM	59,370	18.4%	0.64 (0.63-0.65)	<0.001	5.6%	1.95 (1.85-2.06)	<0.001	13.3%	1.23 (1.19-1.27)	<0.001
Holter	156,469	14.7%	0.49 (0.48-0.50)	<0.001	6.2%	2.16 (2.06-2.26)	<0.001	10.5%	1.13 (1.10-1.16)	<0.001
External AEM	117,544	17.0%	0.59 (0.58-0.60)	<0.001	2.8%	0.94 (0.89-0.99)	0.016	15.0%	1.21 (1.18-1.24)	<0.001
LTCM Brand										
iRhythm LTCM (ref)	95,324	26.5%	--	--	3.1%	--	--	11.2%	--	--
LTCM B	10,742	24.2%	0.89 (0.85-0.93)	<0.001	4.3%	1.41 (1.27-1.56)	<0.001	12.8%	1.11 (1.04-1.18)	0.002
LTCM C	19,545	16.8%	0.58 (0.55-0.60)	<0.001	4.1%	1.39 (1.27-1.51)	<0.001	13.5%	1.24 (1.18-1.30)	<0.001
LTCM D	9,941	17.0%	0.59 (0.56-0.63)	<0.001	3.8%	1.30 (1.16-1.45)	<0.001	12.6%	1.19 (1.11-1.27)	<0.001
Other LTCM	19,142	17.3%	0.62 (0.59-0.65)	<0.001	9.1%	3.52 (3.29-3.77)	<0.001	13.7%	1.23 (1.17-1.30)	<0.001

*Arrhythmias defined as claims for atrial fibrillation/atrial flutter (I48, I480, I481, I4811, I4819, I482, I4820, I4820, I4821, I483, I484, I489, I4891, I4892), atrial ectopic beats (I491), bradyarrhythmia (I495, R001), conduction disorder (I440, I441, I442, I4430, I4439, I444, I445, I4460, I4469, I447, I450, I4510, I4519, I452, I453, I454, I455, I456, I4581, I470, I492, I4940, I4949, Q246), supraventricular tachycardia (I471, I479, I493), ventricular dysrhythmia (I472, I4720, I4721, I4729, I4902, I4902), or nonspecific tachycardia (R000).

†CV Events defined as cardiac arrest, MI, arterial embolism and thrombosis, embolic stroke, systemic embolism, coronary heart disease, chronic obstructive pulmonary disease, cerebrovascular disease, heart failure.

iRhythm LTCM (Zio® XT): iRhythm Technologies (San Francisco, CA), LTCM B: Bardy (Milpitas, CA), LTCM C: BioTelemetry Inc (Malvern, PA), LTCM D: Preventice Inc (Rochester, MN), Other LTCM: Unidentified due to lack of NPI or small sample size.

Covariate Adjustment: age, gender, geographic region, urbanicity, race/ethnicity, socioeconomic vulnerability index, and comorbidities (anxiety/depression, diabetes, dyslipidemia with and without use of antihyperlipidemic drugs, hypertension w/ and w/o antihypertensive drugs, cerebrovascular disease/stroke, congestive heart failure, valvular heart disease, pulmonary disease, smoking status, anticoagulant use w/ or w/o pulmonary embolism, obesity, obstructive sleep apnea, thyroid dysfunction, syncope, moderate/severe liver disease, myocardial infarction, mild liver disease, renal disease, and use of heart rate control drugs).

Results

- **Modality**: iRhythm LTCM was associated with higher adjusted odds of arrhythmia diagnoses, fewer retests (except AEM), and lower odds of CV events compared to other modalities.
- **LTCM Brand**: iRhythm LTCM was associated with higher adjusted odds of arrhythmia diagnoses and lower adjusted odds of retest and CV events compared to other LTCM manufacturers.

Limitations

- This analysis is limited to data from a large commercial claims database.

Conclusions

- **Clinical outcomes vary by ACM type among commercially insured patients.**
- **iRhythm LTCM (Zio XT) demonstrated superior performance, and was associated with higher odds of arrhythmia diagnoses as well as lower odds of repeat tests and cardiovascular events compared to other ACM modalities and LTCM brands.**
- **Results are consistent with previous results from a Medicare FFS population.[1]**

References

1. Reynolds MR, et al. Am Heart J. 2024 Mar: 269:25-34.

Disclosures

- E Hendrickson, K Boyle, B Wright are employees of and have received equity from iRhythm Technologies, Inc. P. Russo is a paid consultant with iRhythm Technologies. H. Coetzer and Health Intelligence Company LLC were contracted by iRhythm to conduct the study and provide independent statistical review.