# Arrhythmias in Patients with Daily vs. Non-Daily Symptoms Undergoing Long-Term Continuous Patch ECG Monitoring

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## Background

- Patch-based long-term continuous ambulatory ECG monitoring (LTCM) of 14 days has shown greater arrhythmia yield compared to <48 hour Holter.
- However, Holter remains in use for patients who report daily symptoms based on clinical or payor preferences.

## Objective

- We compared arrhythmia yield in patients based on symptom frequency.

## Methods

- Retrospective cohort study of Zio® monitor or XT LTCM (iRhythm Technologies, San Francisco, CA) devices prescribed in the US between June 2023 and July 2024 **(Figure 1)**.
- Devices included a patient-activated button to document symptoms.
- Inclusions: Patients ≥18 years; Devices worn for >7 to 14 days.
- Exclusions: 100% AF.
- Data were stratified by observed symptom frequency, defined as the number of button presses/day:
  - Daily Symptoms (≥ 1/day), or
  - Non-Daily Symptoms (< 1/day)
- ECG data was analyzed via a deep-learned AI algorithm and confirmed by certified cardiographic technicians.
- Mean time to first episode and % detection within 48 hrs. were determined for each arrhythmia type.
- Odds Ratios were calculated to compare Daily vs. Non-Daily frequency groups within the first 48 hours of wear time. Logistic regression models were used to calculate odds ratios adjusting for age and sex difference.

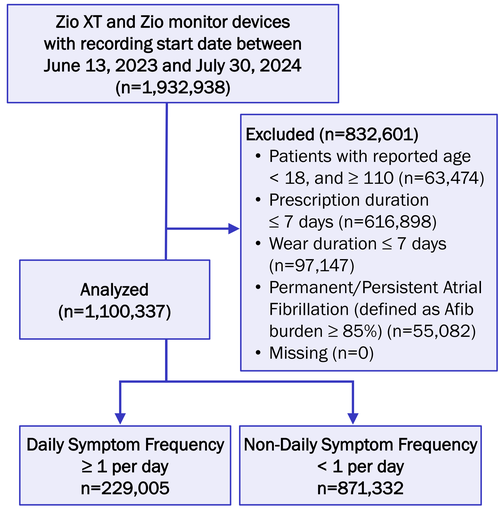
ZIO® BY iRHYTHM

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.

CEM0015.01

## Results

### Figure 1. Study Diagram




### Cohort Description

- Cohort size of 1,100,337 patients:
  - 21% Daily Symptoms
  - 79% Non-Daily Symptoms
- Patients with Daily Symptoms were more likely:
  - To be younger (mean age 50.9 vs. 64.1 yrs.)
  - To be female (66.8% vs. 52.6%)
  - To have lower arrhythmia yield (69.1% vs. 80.9%)

### Daily vs. Non-Daily Symptoms Findings

- Patients reporting Daily Symptoms had a longer time to first detected arrhythmia (2.71±3.26 vs. 2.01±2.86 days) and first actionable arrhythmia (4.52±3.96 vs. 4.20±3.93 days) than patients with Non-Daily Symptoms **(Table 1)**.
- However, Daily Symptom patients experienced a shorter mean time to first detected AF, sustained SVT, VF, and Pause episodes.
- For all arrhythmia types, mean time to first detected episode was >48 hours, regardless of symptom frequency.
- Percent detection through 48 hours varied by rhythm type and symptom frequency.
- 36.0% of Daily and 40.1% of Non-Daily patients with Actionable Arrhythmias were detected within 48 hours.
- Percentage of total yield detected within 48 hours was lower for Daily (59.4%) vs. Non-Daily (70.1%) patients.
- Percent detection of SVT, VT, and AV Block within 48 hours was lower for the Daily vs. Non-Daily group.
- Percent detection of AF, sustained SVT, VF and Pause within 48 hours was higher for the Daily group.
- Differences in 48-hour detection between Daily and Non-Daily Symptom patients remained consistent in the age and sex adjusted logistic regression models.

### Table 1. Arrhythmias Detected at 48 hours by Symptom Frequency

| Rhythm | Total Population | | Detection by Symptom Frequency | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Daily Symptoms (≥1 per day) n = 229,005 | | Non-Daily††† Symptoms (<1 per day) n = 871,332 | | | |
| | Total Wear Detection n = 1,100,337 | 48 Hour Detection | Detection within 48 hours (%) | Days to First Episode (Mean ± SD) | Detection within 48 hours (%) | Days to First Episode (Mean ± SD) | Odds Ratio* (95% CI) | P-value |
| Total Arrhythmia Yield† | 78.5% (863,393) | 68.2% (589,046/863,393) | 59.4% (87,946/148,061) | 2.71 ± 3.26 | 70.1% (501,100/715,332) | 2.01 ± 2.86 | 0.63 (0.62-0.63) | <0.0001 |
| Actionable Arrhythmias†† | 35.8% (393,892) | 39.5% (155,447/393,892) | 36.0% (20,710/57,519) | 4.52 ± 3.96 | 40.1% (134,737/336,373) | 4.20 ± 3.93 | 0.84 (0.83-0.86) | <0.0001 |
| AF | 7.2% (79,329) | 62.8% (49,808/79,329) | 66.5% (6,281/9,450) | 2.37 ± 3.37 | 62.3% (43,522/69,879) | 2.68 ± 3.56 | 1.20 (1.15-1.26) | <0.0001 |
| SVT (All) | 71.3% (784,824) | 66.5% (521,513/784,824) | 58.4% (77,999/133,549) | 2.77 ± 3.27 | 68.1% (443,514/651,275) | 2.15 ± 2.94 | 0.66 (0.65-0.67) | <0.0001 |
| SVT Sustained†† | 6.5% (71,275) | 20.6% (14,683/71,275) | 21.3% (2,144/10,054) | 6.42 ± 3.98 | 20.5% (12,539/61,221) | 6.63 ± 4.05 | 1.05 (1.00-1.11) | 0.053 |
| VT | 25.5% (280,287) | 30.7% (86,174/280,287) | 27.7% (11,427/41,251) | 5.22 ± 3.91 | 31.3% (74,747/239,036) | 4.95 ± 3.95 | 0.84 (0.82-0.86) | <0.0001 |
| VF | 0.01% (116) | 18.1% (21/116) | 20.0% (5/25) | 5.25 ± 3.56 | 17.6% (16/91) | 6.20 ± 3.63 | 1.17 (0.38-3.59) | 0.781 |
| Pause | 3.2% (35,032) | 36.9% (12,291/35,032) | 38.0% (1,649/4,335) | 4.36 ± 3.81 | 36.7% (11,272/30,697) | 4.61 ± 3.94 | 1.06 (0.99-1.13) | 0.092 |
| AV Block (Any 2nd Degree or CHB) | 1.5% (16,715) | 47.0% (7,856/16,715) | 43.8% (966/2,208) | 4.08 ± 3.98 | 47.5% (6,890/14,507) | 3.82 ± 3.94 | 0.86 (0.79-0.94) | 0.001 |

†Arrhythmia Yield defined as any episode of AF ≥30 sec, **SVT ≥90 bpm & ≥4 beats**, VT ≥100 bpm & ≥4 beats, any VF, Pause ≥3 sec, and/or AVB (any 2nd Deg or CHB).
††Actionable Arrhythmia defined as AF ≥30 sec, **SVT ≥90 bpm & ≥30s**, VT ≥100 bpm & ≥4 beats, any VF, Pause ≥3 sec, and/or AVB (any 2nd Deg or CHB).
†††Includes 32.7% (284,784/871,332) of patients who reported no symptoms.
*Odds Ratios and P-values compare rates of detection within 48 hours for Daily vs. Non-Daily Symptoms groups.

## Limitations

- Symptom frequency was determined from the number of button presses during the monitoring period.
- Symptoms may have been present but not reported by button press in some cases.

## Conclusions

- **In patients reporting daily symptoms with actionable arrhythmias detected through >7 days of LTCM, no actionable arrhythmias were detected during the first 48 hours in 64% of cases.**
- **In most patients, Holter (<48 hours) is inadequate for arrhythmia detection, as daily symptom reporting may be uncorrelated to arrhythmia frequency.**

### Disclosures

- AJ Battisti, R Pinkerton, V Fokin, and B Wright are employees of and have received equity from iRhythm Technologies, Inc.
- Dr. Turakhia has received equity from iRhythm, Connect America, Evidently, PocketRN, AliveCor, and Hippocratic.ai. Dr Turakhia is an employee and corporate officer of iRhythm Technologies Inc.