

# Cutting Through the Noise

## An Innovative Approach to Cardiac Remote Monitoring

Live at HRX 2024 | Atlanta, GA



# Meet Your Presenters



## **Aileen Ferrick, PhD, ACNP, RN, FHRS**

Assistant Director of Cardiac Electrophysiology  
Research Acute Care Nurse Practitioner | White Plains  
Hospital

## **Theresa McIlraith, MSEE, FHRS, CCDS**

Lead Cardiac Device Specialist | Piedmont Hospitals





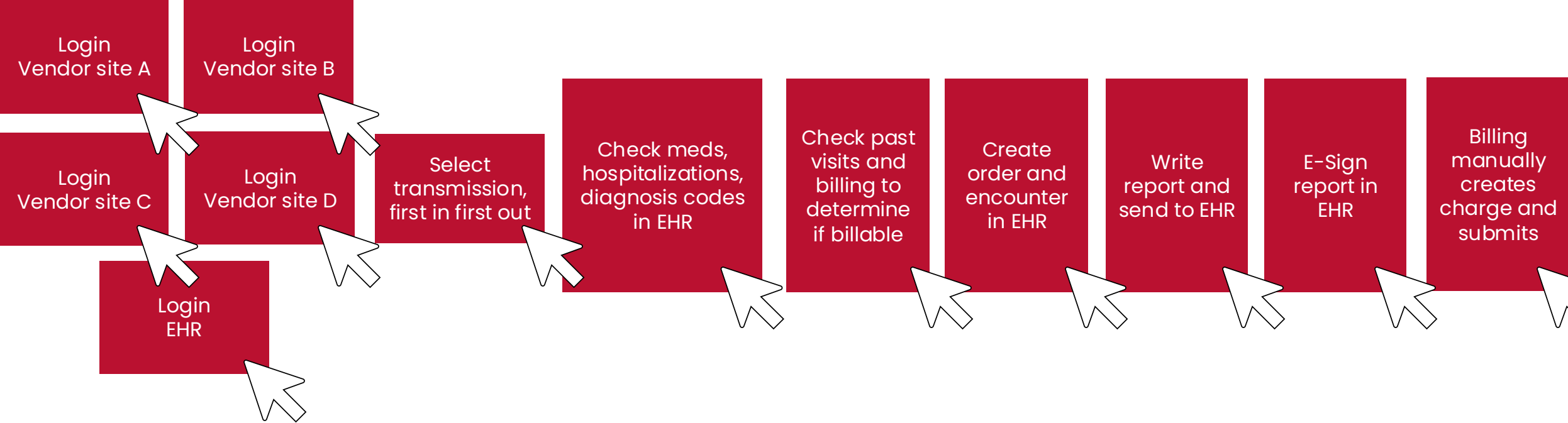
3.7M+ Patients

44k+ Employees  
23 Hospitals  
1,755 Locations

4 Device Clinics  
14,000 Patients

2 Admin Staff  
9 Clinical Staff

# Old Remote Workflow



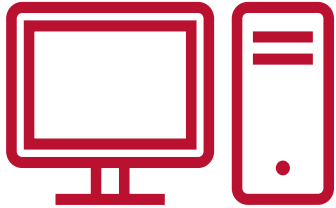
Manage patient connectivity and troubleshooting in spare time



# PaceMate: **Vendor of Choice for Piedmont**

- Seamless integration of data across **all cardiac device types**.
- Merges **real-time** EHR data with specific device data for comprehensive insights.
- Robust analytics database for **identifying procedure candidates, facilitating research, and monitoring ROI**.
- **Flexible clinical support** options tailored to your needs: 24/7/365 continuous coverage or temporary, on-demand assistance.

# The Old Remote Monitoring Model



**ON-PREMISE  
SOLUTION**



**DATA OVERLOAD**



**OVERBURDENED  
STAFF**

# The Piedmont Search

Selecting a vendor was a three-year process that included evaluating several different systems & conducting six in-clinic visits to watch workflows in real time.

## Vendor Search Criteria

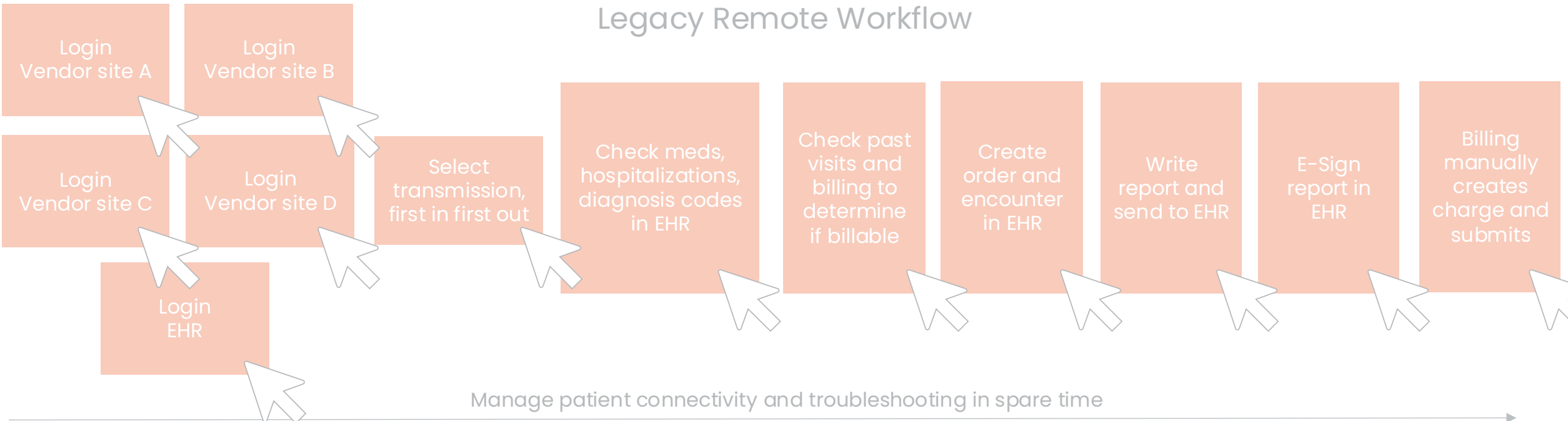
A REAL real-time EHR integration with medications

A collaborative development partner

Billing algorithms and automation to optimize revenue capture

Flexible service options with after-hours support

## Legacy Remote Workflow



## PaceMate Remote Workflow





# Reducing Alert Burden with Customization

Firm guidelines for alert criteria were implemented to eliminate individual preference and to **filter out the noise** of repeat, unnecessary alerts.

V.02.22.2023 - Custom

| Alert Customization Request Form  |                            | Alert Severity<br><small>(Define how alerts are prioritized on your dashboard)</small> |                                  |                                  | Notifications<br><small>(Define how you would like to be notified outside of PML)</small> |                                     |                          |                          |
|---|----------------------------|--|----------------------------------|----------------------------------|---|-------------------------------------|--------------------------|--------------------------|
|   |                            | Red  | Yellow                           | Green                            | Phone**   |                                     | Email                    |                          |
| Event Description:  | Range / Value              |  |                                  |                                  | Business hours  | After hours phone call / Page       | Email Clinic             | CC Provider              |
| <b>Applicable to High Voltage Devices Only:</b>   |                            |  |                                  |                                  |   |                                     |                          |                          |
| Shock delivered (Red Criteria)  | ≥ 2 delivered              | <input checked="" type="radio"/>   | <input type="radio"/>            | <input type="radio"/>            | <input type="checkbox"/>  | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Shock delivered (Yellow Criteria)   | ≤ 1 delivered              | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| ATP (Call Criteria)   | ≥ 10 episodes              | <input checked="" type="radio"/>   | <input type="radio"/>            | <input type="radio"/>            | <input type="checkbox"/>  | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ATP (Red Criteria)  | ≥ 2 episodes               | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| ATP (Yellow Criteria)   | ≤ 1 episodes               | <input type="radio"/>  | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| VF status: Off (Red Criteria)<br>(No reasoning documented)  | Always                     | <input checked="" type="radio"/>   | <input type="radio"/>            | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Excessive Charge Time   | ≥ 15 sec                   | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Shock Impedance Out of Range  | [ 20 - 100 ] Ω             | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| VF Episode (High Voltage)   | Clinical VF (Any)          | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| VT Episode (High Voltage)   | ≥30 seconds                | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| High Voltage SVT - Manual   | ≥200 bpm for ≥5 min        | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Applicable to Low Voltage Devices Only:</b>  |                            |  |                                  |                                  |   |                                     |                          |                          |
| VF Episode (Low Voltage)  | Clinical VF (Any)          | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| VT Episode (Low Voltage)  | ≥40 beats                  | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Non-Sustained VT Episode (Low Voltage)  | ≥10 beats                  | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Low Voltage SVT - Manual  | ≥200 bpm for ≥5 min        | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Applicable to All Devices:</b>   |                            |  |                                  |                                  |   |                                     |                          |                          |
| Battery status: EOS (Only notify clinic if New)   | Always Flag                | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Battery status: RRT / ERI (Only notify clinic if New)   | Always Flag                | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Possible HF - Manual  | ≥3 HF metrics trending (-) | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| CRT / LV pacing percentage below threshold  | ≤ 80 %                     | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>AF Management - Rate vs. Rhythm</b>  |                            |  |                                  |                                  |   |                                     |                          |                          |
| AF - No OAC (Absence of OAC)  | ≥ 30 secor (time)          | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| New Onset of AF (Absence of AF Dx)  | ≥ 6 minute (time)          | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| New Recurrence of AF (AF Dx present)  | ≥ 48 hours (time)          | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| AF w/ RVR - Manual  | Median ≥130bpm for ≥5min   | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Monitor Specific:</b>  |                            |  |                                  |                                  |   |                                     |                          |                          |
| PAUSE (Red Criteria) duration of pause  | ≥ 6 sec                    | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| PAUSE (Yellow Criteria) duration of pause   | ≥ 4 sec                    | <input type="radio"/>  | <input type="radio"/>            | <input checked="" type="radio"/> | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| TACHY (episode duration)  | ≥ 10 secor (time)          | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| BRADY (episode duration)  | ≥ 10 secor (time)          | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| SYMPTOM   | Always                     | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Lead Issue (Red Criteria):</b>   |                            |  |                                  |                                  |   |                                     |                          |                          |
| <small>Defined as Acute Lead Failure / Loss of Capture / Oversensing / Lead Noise on presenting or stored ECGs with risk of inhibiting pacing in a pacemaker dependent patient or inappropriate therapies Deemed Clinically Actionable.</small> |                            |  |                                  |                                  |   |                                     |                          |                          |
| RV Threshold Increase   | ≥ 2 volts                  | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| High RV Output  | ≥ 5 volts                  | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| RV Impedance Boundary   | [ 200 - 2000 ] Ω           | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| RV Impedance Change   | ≥ 500 Ω                    | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| RV Loss of Capture (dependent) - Manual   | Always                     | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| <b>Lead Issue (Yellow Criteria):</b>  |                            |  |                                  |                                  |   |                                     |                          |                          |
| <small>Defined as Lead Deterioration in the form of Lead noise / Impedance Changes / Threshold Changes / Oversensing. Reprogramming or clinical decision-making advised with urgency.</small>   |                            |  |                                  |                                  |   |                                     |                          |                          |
| RA Threshold Change   | ≥ 2 volts                  | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| RA Impedance Boundary   | [ 200 - 2000 ] Ω           | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| LV Threshold Change   | ≥ 2 volts                  | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| LV Impedance Boundary   | [ 200 - 2000 ] Ω           | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |
| Noise Reversion   | Always                     | <input type="radio"/>  | <input checked="" type="radio"/> | <input type="radio"/>            | <input type="checkbox"/>  | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> |

\*Non-billable green transmissions will be archived. Archived transmissions are available in the patient's report history in PaceMate L/VE. \*\*Phone calls will only apply to events that have occurred within the last 24 hours.

This Alert Customization Request is applicable to the:  Clinic Level  Group Level  Provider Level

Account / Clinic Name: PIED\_ATL  
 Group Name: Enter if provider level request.  
 Provider Name: Enter if provider level request.

Physician Signature: Dr. Ashish Bhimani Date: 11/30/2023

# Reducing Alert Burden

Despite an 11% increase in devices...

...there was a 9% decrease in transmissions

| Quarter   | BIO   | BSX   | MDT   | SOR | STJ   | Total  |
|---|-------|-------|-------|-----|-------|--------|
| Q2' 2022  | 1,129 | 809   | 2,916 | 27  | 1,756 | 6,637  |
| Q3' 2022  | 1,194 | 831   | 2,916 | 42  | 1,781 | 6,764  |
| Q4' 2022  | 1,220 | 865   | 2,889 | 22  | 1,842 | 6,838  |
| Q1' 2023  | 1,250 | 850   | 2,916 | 26  | 1,853 | 6,895  |
| Q2' 2023  | 1,295 | 864   | 2,908 | 17  | 1,924 | 7,008  |
| Q3' 2023  | 1,344 | 925   | 2,932 | 16  | 1,961 | 7,178  |
| Q4' 2023  | 1,379 | 961   | 2,885 | 12  | 2,017 | 7,254  |
| Q1' 2024  | 1,401 | 1,012 | 2,888 | 10  | 2,028 | 7,339  |
| <b>Total (Distinct Devices over Complete Time Period)</b> | 1,939 | 1,505 | 4,854 | 70  | 3,056 | 11,424 |

| Quarter      | S_ICD | Monitor | IPG_LL | IPG    | ICD    | CRT_P | CRT_D  | Total   |
|--------------|-------|---------|--------|--------|--------|-------|--------|---------|
| Q2' 2022     | 103   | 5,032   | 140    | 8,079  | 3,838  | 1,025 | 3,175  | 21,392  |
| Q3' 2022     | 107   | 3,036   | 152    | 6,428  | 2,985  | 847   | 2,599  | 16,154  |
| Q4' 2022     | 98    | 2,767   | 105    | 5,816  | 2,664  | 822   | 2,134  | 14,406  |
| Q1' 2023     | 118   | 3,075   | 180    | 6,014  | 2,770  | 840   | 2,143  | 15,140  |
| Q2' 2023     | 97    | 3,104   | 180    | 6,944  | 2,961  | 1,037 | 2,223  | 16,546  |
| Q3' 2023     | 118   | 3,113   | 271    | 7,621  | 2,979  | 1,050 | 2,196  | 17,348  |
| Q4' 2023     | 115   | 3,189   | 445    | 7,704  | 2,936  | 1,084 | 2,328  | 17,801  |
| Q1' 2024     | 154   | 3,278   | 289    | 8,397  | 3,335  | 1,300 | 2,662  | 19,415  |
| <b>Total</b> | 910   | 26,594  | 1,762  | 57,003 | 24,468 | 8,005 | 19,460 | 138,202 |

# Reducing Transmission Volume from Outliers

**Top 20 Transmitting Patients**  
(representing <0.3% of patients)

**5496**

Total Transmission Count

**5%**

Of Total Remote Volume

**Top 100 Transmitting Patients**  
(representing 1% of patients)

**14,447**

Total Transmission Count

**13%**

Of Total Remote Volume

# A Systematic Approach to Frequent Fliers

The PaceMate Transformation team is a group of highly experienced clinicians solely focused on remediating frequent fliers. The initial focus at Piedmont was with atrial fibrillation alerts.

The results

**1,723** → **209**

Transmissions in prior 30 days

Transmissions in following 30 days

| Device Type  | Device Volume | Prior 30-day count | Avg/month prior 30 | Post 30-day count | Avg/month Post 30 | Transmission Reduction |
|--------------|---------------|--------------------|--------------------|-------------------|-------------------|------------------------|
| CRT-D        | 33            | 485                | 14.7               | 43                | 1.3               | -442                   |
| CRT-P        | 13            | 115                | 8.9                | 13                | 1.0               | -102                   |
| ICD          | 17            | 157                | 9.2                | 25                | 1.5               | -132                   |
| IPG          | 84            | 820                | 9.8                | 87                | 1.2               | -733                   |
| ILR          | 11            | 146                | 13.3               | 41                | 3.7               | -105                   |
| <b>Total</b> | <b>158</b>    | <b>1723</b>        | <b>10.9</b>        | <b>209</b>        | <b>1.3</b>        | <b>-1514</b>           |

# The Impact of Remote Monitoring Services

**25,514 phone calls**

made by PaceMate to Piedmont patients

5 minute  
avg call time = 127,570  
minutes = **2,100+**  
**hours saved**

# Billing: It's Not Just Quantity, It's Quality

| CPT Code | Description                                  | Volume |
|----------|--|--------|
| 93294    | Professional fee – IPG, CRT-P, leadless IPG  | 24072  |
| 93295    | Professional fee – ICD, CRT-D, S-ICD         | 15546  |
| 93296    | Technical fee – IPG, ICD, CRT, S-ICD         | 39618  |
| 93297    | Professional fee – HF from ICD, CRT-P, CRT-D | 12812  |
| 93298    | Professional fee – loop recorder             | 10652  |
| G2066    | Technical fee – loop recorder                | 9578   |
| Total    |  | 112278 |

| CPT Code | Description             | Volume |
|----------|-------------------------|--------|
| 93279    | Single lead pacemaker   | 1385   |
| 93280    | Dual lead pacemaker     | 10985  |
| 93281    | Multi-lead pacemaker    | 1566   |
| 93282    | Single lead defib       | 2173   |
| 93283    | Dual lead defib         | 2615   |
| 93284    | Multi-lead defib        | 3709   |
| 93288    | Interrogation only IPG  | 2419   |
| 93289    | Interrogation only ICD  | 1166   |
| 93291    | Interrogation only Loop | 893    |
| Total    |                         | 26911  |

## Piedmont Achieves **94% Billing Capture**

109,010 Total Remote Transmissions (100%)

92,977 Remotes Sent to Piedmont (85%)

Archived

54,577 Remotes Sent to Doctor (59%)

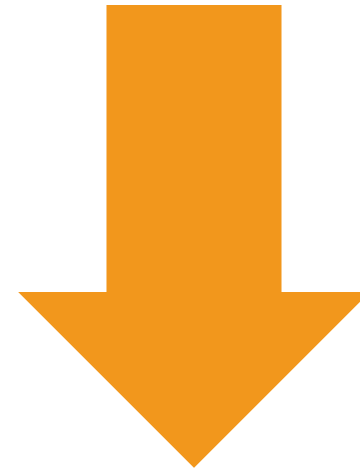
Non-billable

**51,192 e-Signed and Billable (94%)**

# Alert Management Success



**11% increase in  
device monitoring**



**9% decrease in  
alerts**

# Strategies for Success



**Quarterly  
Reviews**



**Proactive Alert  
Management**



**Efficiency in  
Communication**



# The Impact of Success

**More staff time** allocated to critical tasks, improving productivity and patient engagement.

**Enhanced Patient Care**

Urgent device concerns are reported instantly, **improving patient safety and response times.**

**Immediate Issue Notifications**

Highly effective EHR integration ensuring **seamless operations.**

**System Integrations**

# Thank You!

