



Transforming Cardiac Device Management

St. Elizabeth Healthcare's Journey to Enhanced Staff Satisfaction, Improved Patient Connectivity & Optimized Efficiency



The Arrhythmia Center
Florence Wormald Heart & Vascular Institute
St. Elizabeth Healthcare,
Edgewood, Kentucky

5 Electrophysiologists
4 Device RNs & 3 Techs

Key Findings

- CIED patient connectivity soared from 68% to **88%***
- Achieved consistent CIED patient **compliance rates >95%†**
- Patient satisfaction reached **98.8%**
- Streamlined workflows saved clinic staff over **21,630 hours**



Overview

While CIED remote monitoring offers significant benefits for patient health, low patient connectivity rates and staff burden hinder its effectiveness. This case study outlines the challenges and presents a model for overcoming them.

Key Problem

Data deluge and resource limitations restrict clinics' ability to manage high remote monitoring device data volumes and maintain CIED patient engagement.

Solution

St. Elizabeth Healthcare's cardiac device clinic partnered with Vector Remote Care, leveraging proprietary software technology and dedicated, certified personnel to streamline remote monitoring workflows, improve patient engagement, and optimize clinic efficiency.

Conclusion

St. Elizabeth's success demonstrates a replicable model for overcoming the challenges of remote cardiac care, paving the way for improved patient outcomes and a more efficient healthcare system.

I CARE, We Connect: A Model for CIED Monitoring Success

St. Elizabeth Healthcare is an organization built on the mission to provide comprehensive and compassionate care that improves the health of the people served.

The organization's vision is to lead the communities they serve to be the healthiest in the nation, leveraging its fundamental values, "I CARE", outlined below:

● Innovation

We seek better ways to perform my work, find creative solutions, and embrace change.

● Collaboration

We understand that mutual respect and teamwork are critical to accomplishing goals. I work with others to achieve the best individual and collective outcomes.

● Accountability

We use resources efficiently, respond to others promptly, face challenges in a timely manner, and accept responsibility for my actions and decisions.

● Respect

We respect the dignity and diversity of our associates, physicians, patients, family, and community members. I promote trust, fairness, and inclusiveness through honest and open communication.

● Excellence

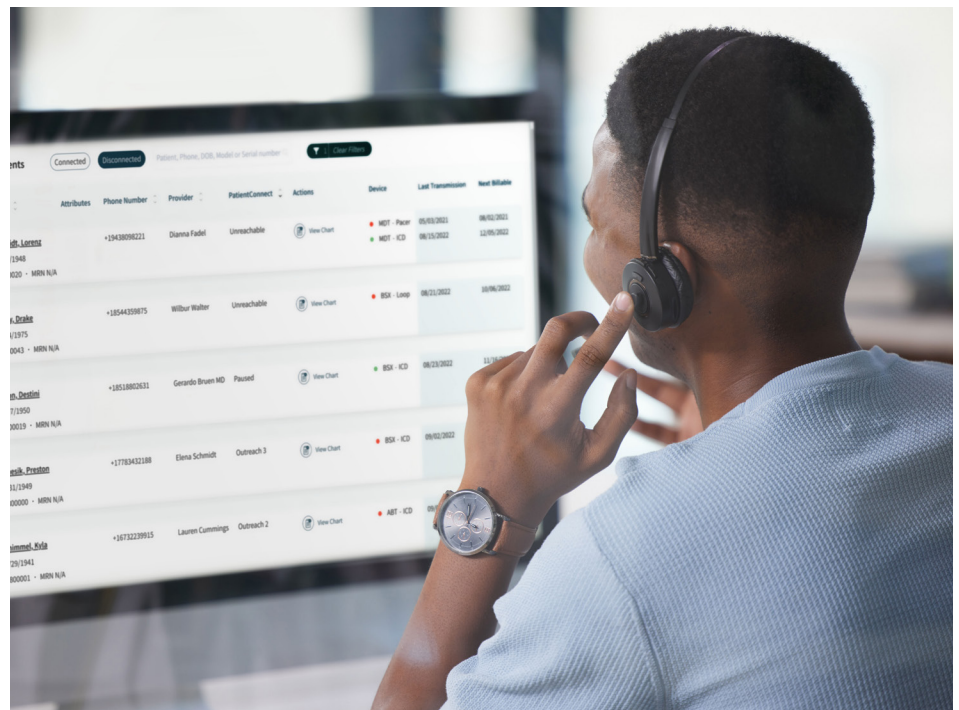
We believe in serving others by pursuing excellence in healthcare. I compassionately care for the mind, body, and spirit of each patient.

Background

Data Deluge & Resource Drain Limit Remote Monitoring's Potential

The healthcare industry recognizes that continuous CIED remote monitoring improves outcomes, such as patient mortality rates, healthcare intervention, and quality of life.^{1, 2} However, only **45% of patients receiving an implantable cardiac device with remote monitoring capabilities are connected to the service.**³

Moreover, for those CIED patients who are initially connected, maintaining patient connectivity presents time-intensive and resource-draining challenges for the clinical team.



Thus, the 2023 Heart Rhythm Society (HRS) expert consensus statement presented guidance for device clinics to support the increase in high-volume patient data, outlining that clinics allocate **3 FTEs to every 1,000** patients to satisfy appropriate staffing requirements.⁴ Furthermore, the statement provides practical guidance for leveraging third-party resources as an economical and necessary solution with measurable financial and operational benefits for device clinics facing high-volume patient device data and patient connectivity challenges.

The complexity and volume of individual data reports limit the device clinic's ability to manage CIED remote monitoring patients effectively. The data burden inflicts additional constraints that hinder attempts to balance in-clinic patient care with operational efficiency and implement appropriate scheduling and billing procedures to maximize clinic revenue.

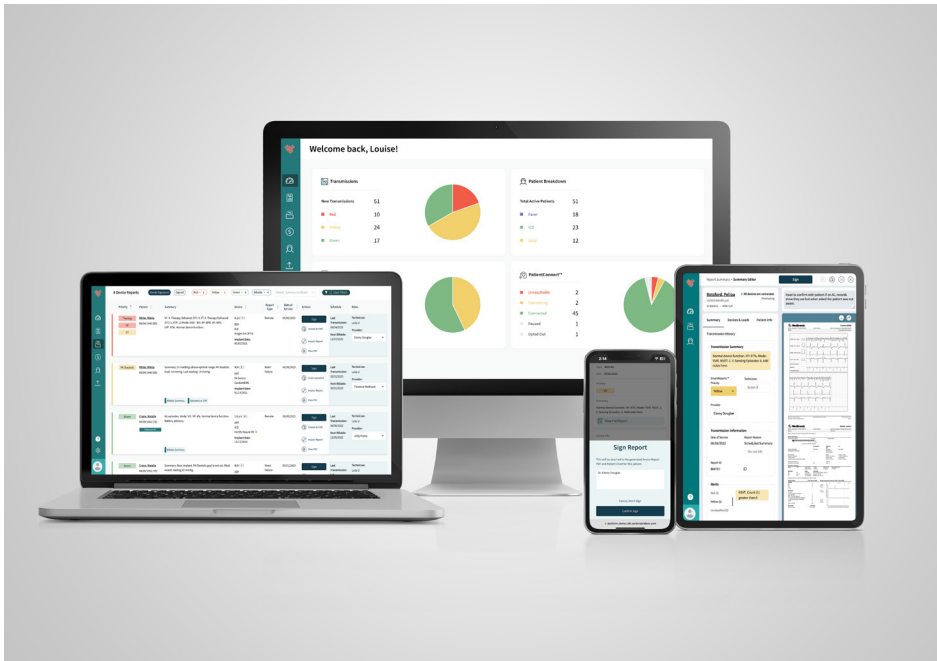
As patient volumes increase, device data management and connectivity challenges will become more substantial.

Addressing the Challenge

In November 2021, the St.Elizabeth cardiac device clinic managed 2,412 cardiac device patients via remote monitoring. Onboarding patients from all clinics within the broader health system was a persistent challenge, and the estimated 68% connectivity rate meant that **32% of patients remained disconnected** from their monitoring service and were at risk. The number of patients disconnected from their home monitors also presented significant **missed revenue opportunities**.

The cardiac device clinic was diligent and attentive to the CIED remote monitoring program, but the pathway to resolution seemed insurmountable with the internal resources available to the team. They understood the success of a remote monitoring program was predicated on keeping patients engaged, but without a way to streamline staff workflows, reduce manual processes, and increase individualized support for disconnected patients, they would be unable to ensure their patients achieve the full benefits of CIED remote monitoring.

To overcome these challenges, the team sought new avenues to increase connectivity, reduce an unsustainable manual workload, and implement a sustainable solution that could scale to support an increasing patient population.



Identifying a Sustainable Solution

The cardiac device clinic needed a partner who could ensure compliance with their remote transmission and patient safety protocols, review routine and acute CIED transmissions while generating detailed reports to alleviate an overwhelmed device clinic staff, and promptly notify the medical team of clinically actionable data. Additionally, the ideal solution for their clinic would assist in generating billing charges for their services, integrating report data with the electronic health record, and helping troubleshoot and reconnect patients disconnected from their remote monitors.

Why Vector Remote Care?

The Vector Platform™ is a comprehensive, device-agnostic solution that automates CIED remote monitoring and supports in-clinic device checks.

● Efficiency & Integration

The platform automates data collection and review, triages reports and alerts, and integrates directly into the Electronic Health Record (EHR), simplifying workflows and reducing manual tasks.

● Proprietary Features

SmartReports and **PatientConnect** offer crucial advantages to alleviating staff burden and facilitating program expansion to all eligible patients.

● Resource Optimization

The platform's standardized scheduling and billing capabilities help optimize clinic resources and revenue.

● Critical Support Services

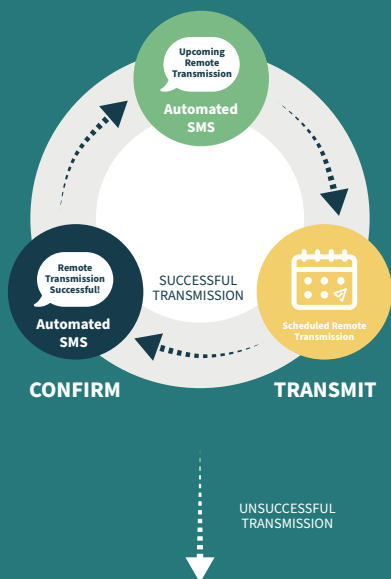
Vector's IBHRE-certified technicians act as an extension of the clinic staff, providing expert review, processing, and archiving of cardiac device remote transmissions.

● Patient Reconnection

Automated patient reconnection support, along with a dedicated live support team, ensures CIED devices remain connected to remote monitoring.

PatientConnect enhances patient connectivity and engagement by proactively engaging patients in the remote monitoring process and automatically attempting to reconnect those who have become disconnected.

Enhancing Patient Engagement



The diagram illustrates the Nudge Cycle with three nudges arranged in a circle, connected by arrows indicating a clockwise flow. Nudge 1 (top) is labeled 'Automated Phone Call or SMS' and features a phone icon. Nudge 2 (bottom left) is also labeled 'Automated Phone Call or SMS' and features a phone icon. Nudge 3 (bottom right) is labeled 'Mailed Letter' and features a mail icon. The cycle is represented by a large circle with a dashed line and arrows indicating the sequence of nudges.

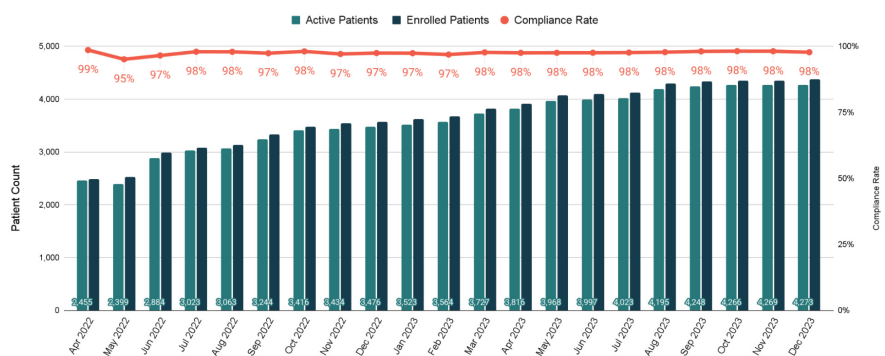
Vector Remote Care offered a software solution and ancillary patient engagement and reconnection services (both automated and live), comprising the ideal combination of clinical, administrative, and patient reconnection support needed to address the complex and growing challenges associated with CIED monitoring. The device clinic team also opted into ongoing, personalized support through the Vector Remote Care patient and clinic support service.

Figure 1. Patient Connectivity Rates Over Time

Month	Connected Patients	Total Patients	Connectivity Rate
Apr-2022	1,800	2,700	68%
May-2022	1,900	2,700	70%
Jun-2022	2,300	3,300	70%
Jul-2022	2,400	3,300	71%
Aug-2022	2,400	3,300	72%
Sep-2022	2,700	3,700	73%
Oct-2022	2,700	3,700	74%
Nov-2022	2,800	3,700	75%
Dec-2022	2,800	3,700	76%
Jan-2023	2,900	3,700	77%
Feb-2023	3,000	3,700	78%
Mar-2023	3,100	3,900	79%
Apr-2023	3,200	4,000	80%
May-2023	3,400	4,100	81%
Jun-2023	3,500	4,100	82%
Jul-2023	3,600	4,200	84%
Aug-2023	3,800	4,300	85%
Sep-2023	3,900	4,400	86%
Oct-2023	3,900	4,400	87%
Nov-2023	3,900	4,400	87%
Dec-2023	3,900	4,400	88%

Prior to leveraging Vector Remote Care as a partner in remote monitoring, the device clinic had an estimated 68% compliance rate.[‡] Throughout the partnership, the cardiac device clinic consistently maintained a patient compliance rate above 95%, achieving a **consistent 98% compliance rate by March 2023**. This is a vital metric for success because it denotes that patients connected to remote monitoring stay connected, directly impacting clinic productivity and revenue (Figure 2).[†] It is important to note that this consistent patient compliance rate of 98% was achieved with no additional infrastructure or FTE investments.

St. Elizabeth Healthcare & Vector Remote Care

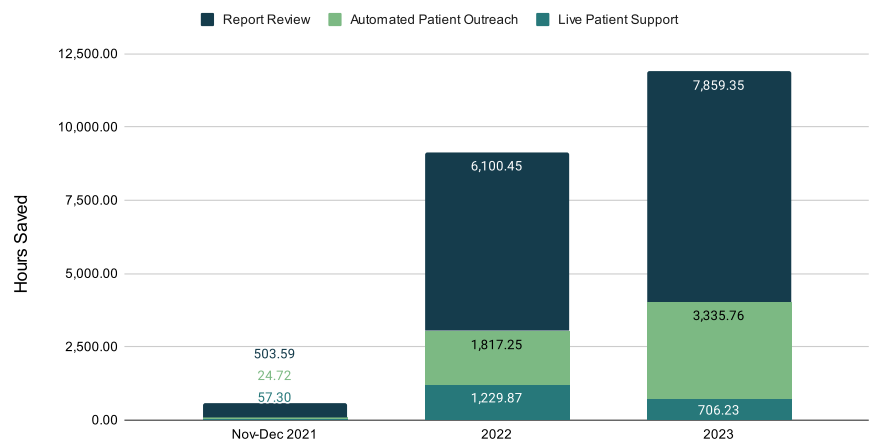


4

A Strategic Partnership

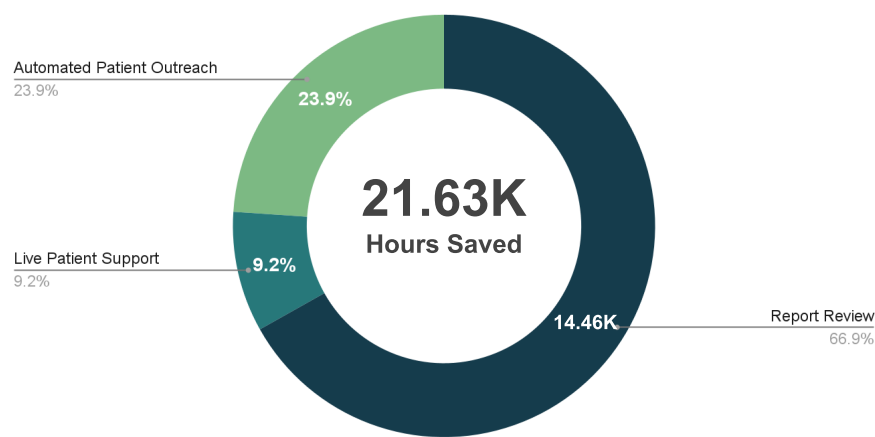
Vector Remote Care’s software and service support have significantly boosted the cardiac device clinic’s operational efficiency. By leveraging Vector’s trained ancillary reporting and support teams that include IBHRE-certified reporting technicians and patient staff dedicated to patient engagement and reconnection, the device clinic effectively **saved a cumulative of 21,635 hours** across their CIED rhythm management teams (Figures 4 and 5) over 26 months.

Figure 3. Time Savings Since Partnership
St. Elizabeth Healthcare & Vector Remote Care



Since the start of the partnership (November 2021), the cardiac device clinic has saved 21,635 hours through Vector Remote Care’s reporting technicians, automated software communications, and live patient support.

Figure 4. Time Savings by Task
St. Elizabeth Healthcare & Vector Remote Care



Over half of the time savings observed by the cardiac device clinic are attributed to Vector’s IBHRE-certified reporting technicians who triage, review, and summarize CIED transmissions. Additionally, time savings also reflect Vector’s services that promote patient engagement (over 20%) and provide live support (10%) to reconnect disconnected patients.

SmartReports™

As the backbone of the Vector Platform, SmartReports is a powerful proprietary feature that streamlines device transmission review and report preparation. It combines automated report prioritization via color-coded “report cards” (sample below) with centralized, in-platform report preparation and review capabilities.

The SmartReports feature is demonstrated to reduce transmission review time by nearly 92%.⁷

Needs Signature

Signed

Therapy

Patient White, Nikita

Sign

VF

08/04/1940 (84)

Device BSX

VT

Summary: VF: 9. Therapy Delivered (VF): 9. VT:3. Therapy Delivered (VT): 3. ATP: 12 Mode: DDD - BIV. AP: 68%. VP: 96%.

ICD Inogen X4 CRT-D

Implant Date 05/02/2021

Tachy

Patient Daniels, Spencer

Sign

02/24/1946 (78)

Device MDT Loop

Summary: Tachy: 1, EGM c/w AF w/ RVR with average rates >200bpm. AF Buden: 49%, patient on AC. Normal device function.

Reveal LINQ

Implant Date 01/14/2021

Green

Patient Crona, Natalia

Sign

04/09/1951 (73)

Device ABT

Summary: No episodes. Mode: VVI. VP: 4%. Normal device function.

ICD Fortify Assura VR

Implant Date 12/12/2014

Green

Patient Harper, Andrew

Sign

05/19/1953 (71)

Device ABT

Summary: No episodes. Normal device function. Battery longevity estimates less than 3 months to ERL.

ICD Fortify Assura VR

Implant Date 01/07/2019

Note: Patient information, including name, birth date, implantable device, and summarized device transmission information is simulated for demonstration purposes only.

Scheduling & Billing, Simplified

The Vector Platform's intuitive user interface and easy-to-master workflows facilitate simplified clinic scheduling and billing practices, enabling clinic teams to easily track billing status to optimize efficiency and revenue.

It has been demonstrated to **increase annual billable revenue by nearly 70%.⁷**

Clinic Growth & Increased Staff Job Satisfaction

"It's been great having you all onboard, we used to work overtime 1-2 hours every day."

– *Brandon, Device Clinic RN
St. Elizabeth Healthcare*

The partnership's significant success created new opportunities for the growth of the CIED remote monitoring program. Specifically, the team expanded the CIED program to all patients within the broader health system, **increasing the number of patients monitored by 82.5%** (2,412 patients in 2021 to 4,402 patients in 2023).

In addition, the Vector Platform, combined with Vector Remote Care's ancillary support services, has measurably impacted the cardiac device clinic team's day-to-day workload balance allowing the team to focus on patient management rather than data management, despite the growing burden of rhythm management data.

Today, the St. Elizabeth cardiac device clinic team reports decreased burnout and improved employee satisfaction in internal employee surveys. In tandem, the clinic's patients also felt the impact of the team's partnership with Vector Remote Care, generating a **98.8% satisfaction rating** based on call-in survey data from 445 patient support tickets.⁷

A Replicable Model for Remote Cardiac Care Success

This review illuminates the considerable challenge CIED remote monitoring presents to the cardiac device management industry—particularly how the deluge of data and resource depletion significantly hamper its transformative potential in patient care. Despite the compelling benefits that underscore the necessity of cardiac remote monitoring, the Cardiac Rhythm Management industry contends with persistent obstacles, such as low patient connectivity and overstretched healthcare staff. In this context, St. Elizabeth cardiac device clinic's success illustrates a scalable and replicable model for overcoming these hurdles.

The strategic partnership with Vector Remote Care demonstrates how powerful, intuitive third-party software and specialized client and patient support services resolve the operational, administrative, and financial challenges confronting cardiac device clinics of all sizes.



“Our team’s success story in remote cardiac care is a testament to what can be achieved through strategic partnership and specialized technology. By overcoming significant barriers like patient connectivity and staff burden, we have enhanced patient engagement and satisfaction and set a new standard for operational efficiency in the healthcare industry. This model is not only replicable but essential for future advancements in cardiac rhythm management.”

– Dr. Mohamad Sinno, MD, Cardiovascular Disease
Clinical Cardiac Electrophysiology
St. Elizabeth Healthcare

Authors & Affiliation

- Mohamad Sinno, MD, St. Elizabeth Healthcare
- Melissa Mudd, St. Elizabeth Healthcare
- Mitchell Fong, Innovise Consulting
- Andrea Mejorada Malfabon, Vector Remote Care
- Sylvia Hanna, Vector Remote Care
- Shibaji Shome, PhD, Eikonal LLC
- Rhiannon Pickus, Vector Remote Care



Citations

1. Jang JP, Lin HT, et al. Role of Remote Monitoring in Detection of Atrial Arrhythmia, Stroke Reduction, and Use of Anticoagulation Therapy: A Systematic Review and Meta-Analysis. *Circulation Journal*. 2020;84(11):1922-1930. <https://doi.org/10.1253/circj.CJ-20-0633>.
2. Varma N, Piccini JP, et al. The Relationship Between Level of Adherence to Automatic Wireless Remote Monitoring and Survival in Pacemaker and Defibrillator Patients. *Journal of the American College of Cardiology*. 2015;65(24):2601-2610. <https://doi.org/10.1016/j.jacc.2015.04.033>.
3. Timmermans I, Meine M, Szendey I, et al. Remote monitoring of implantable cardioverter defibrillators: Patient experiences and preferences for follow-up. *Pacing Clin Electrophysiol*. 2019 Feb;42(2):120-129. doi:10.1111/pace.13574.
4. Ferrick AM, Raj SR, Deneke T, et al. 2023 HRS/EHRA/APHRS/LAHRS Expert Consensus Statement on Practical Management of the Remote Device Clinic. *Europace*. 2023;25(5):euad123. doi:10.1093/europace/euad123.
5. Porterfield, Christopher P., Janet K. Han, and Sylvia Hanna. "Leveraging Software as a Service (SaaS) Technology for Improved CIED Patient Connectivity and Clinic Efficiency." Poster Session II, PO-02-194, Heart Rhythm Society, May 2024(Poster Session II).
6. Glassdoor. Cardiac Device Technician Salaries. Accessed March 14, 2024. https://www.glassdoor.com/Salaries/cardiac-device-technician-salary-SRCH_K00,25.htm.
7. Vector data on file. Request for access.

Partnership Highlights

Through an effective integration of innovative technology and specialized staff, the clinic has not only navigated these challenges but also set a benchmark for exceptional outcomes in the field with:

- **Soaring Connectivity Rates**
Patient connection rates jumped from 68% to 88%
- **Consistent Compliance Rates**
Steady CIED patient compliance rates at or above 95%
- **Improved Patient Care**
High patient satisfaction scores of 98.8% confirm a positive experience
- **Reduced Staff Burden**
Streamlining workflows & data management saved clinic staff over 21,630 hours of work across 26 months

Get In Touch

St. Elizabeth's success serves as a blueprint for all device clinics seeking to overcome the challenges of remote cardiac care, enhance operational efficiency, increase staff satisfaction, and optimize revenue. Request a personalized demonstration today to discover how Vector Remote Care can support your clinic. Email Info@VectorRemote.com to get started now.



* Connectivity is the number of connected patients over the total number of enrolled patients.

‡ The compliance rate prior to Vector Remote Care was estimated by identifying the number of patients that had transmitted in the last 91 days.

§ Data prior to April 2022 is not available.

† Vector began collecting patient satisfaction data in March 2023.



(877) 293-1472
info@vectorremote.com

vectorremote.com