

# Alert-Based Remote Monitoring for CIED Patients

Editorial | Alert-Based RM

Since the [2015 Heart Rhythm Society's expert consensus statement](#) on remote interrogation and monitoring for cardiovascular implantable electronic devices, remote monitoring for patients with (CIEDs) has been recognized as the gold standard.<sup>1</sup>

Connectivity became even more crucial during the Covid 19 pandemic, necessitating social distancing and limited in-person interactions; remote patient care had to shift from an optional, convenient solution to an essential requirement in ensuring continuous and effective healthcare provision.<sup>2</sup> Though the pandemic may be behind us, remote monitoring continues to benefit clinics with device patients.

Nearly ten years have passed since the release of the consensus in 2015. During this time, further research has reinforced the evidence that supports the benefits of remote monitoring to patients and providers. As a result, an [updated statement](#) has been issued recommending the implementation of third-party alert-based remote monitoring as part of the care provided to patients with cardiac implants.<sup>3</sup>

With only a small percentage ([6.6%](#)) of [remote monitoring transmissions resulting in clinical action](#), this guideline was a welcomed addition, as most individual transmissions may not be crucial for immediate patient care and can easily overload providers with non-critical data.<sup>4</sup>

The biggest offender of non-critical transmissions from CIEDs is those of ILRS. A 2018-2019 study analyzed 26,713 consecutive patients equipped with Cardiac Implantable Electronic Devices (CIEDs), 18.8% had an implantable loop recorder (ILR). Of the 82,797 alerts sent, ILRs were responsible for a substantial 50.1%, demonstrating their significant role in the total alert volume. The staggering volume of transmissions and increasing alerts originating from ILRs underscore the necessity for a novel strategy in managing remote monitoring. This is crucial to decrease the time expended by clinical personnel in handling data that does not necessitate any clinical intervention.<sup>5</sup>

Due to this growing need, sophisticated remote cardiac monitoring (RCM) solutions have progressed from reporting generalized device transmissions to pertinent, actionable alerts. Alert-based monitoring digitally filters patient information eliminating the deluge of data that comes with reporting on every transmission, regardless of severity to the patient. This approach to remote monitoring expends fewer clinic resources and provides a greater yield of actionable interventions.<sup>6</sup>

Continuous connectivity and clinic visits go hand in hand, with the latter done sparingly and when specific, actionable events are detected. This approach enhances the efficiency and responsiveness of patient care, ensuring timely medical intervention when necessary.

Emerging as a leader in alert-based remote monitoring, Implicity's intuitive cloud-based software enables healthcare providers to receive immediate alerts regarding any changes in patient conditions, thereby reducing the latency between the occurrence of a health event and its detection. By integrating directly with the manufacturer's portals, the AI-powered solution ensures that pertinent data is readily accessible, enabling swift, data-driven decisions.

This proactive approach to patient care fosters enhanced clinical outcomes, improves patient safety, and optimizes healthcare delivery by providing critical information as soon as it becomes available.

Alert-based RCM not only benefits patients but also greatly improves the efficiency of device clinics. In the past, patients with CIEDs needed to visit clinics for check-ups regularly. This often meant taking

time off work, waiting longer for appointments, and risking delayed detection of device-related problems.

With alert-based RCM, device clinics can optimize workflow and streamline patient management. The constant remote monitoring of CIEDs ensures that clinics receive relevant data, eliminating unnecessary clinic visits. This enables healthcare providers to focus on patients requiring immediate intervention, enhancing overall clinic efficiency and providing better patient care.

Patient connectivity is a key success factor of alert-based RCM, as it is a prerequisite for quick alert transmission. The 2023 Heart Rhythm Society's expert consensus statement highlighted the importance of device clinics in managing patient connectivity.

By identifying disconnected patients and automatically sending them an SMS, platforms like Implicity reduce the connectivity management effort for device teams while improving patient compliance.

RCM solutions such as Implicity integrate seamlessly with existing healthcare systems, providing intuitive interfaces for clinicians and reducing the data management burden. By leveraging these resources, device clinics can allocate their resources effectively, providing personalized care to patients needing it while reducing the strain on the healthcare system.

The advent of alert-based RCM systems has transformed the landscape of remote cardiac monitoring for patients with CIEDs and those who care for them. Third-party resources have emerged as invaluable tools for enhancing patient care and optimizing device clinic efficiency.

By continuously monitoring crucial cardiac parameters and automatically alerting healthcare providers of abnormalities, alert-based remote monitoring can help ensure prompt intervention, reducing the risk of complications and hospital readmissions by up to 4%.<sup>7</sup>



<sup>1</sup> Slotwiner, Varma, et al. 2015 HRS Expert Consensus Statement on remote interrogation and monitoring for cardiovascular implantable electronic devices. Published: May 13, 2015 DOI: <https://doi.org/10.1016/j.hrthm.2015.05.008>

<sup>2</sup> Varma N, Marrouche NF, Aguinaga L, et al. HRS/EHRA/APHRS/LAHRs/ACC/AHA Worldwide Practice Update for Telehealth and Arrhythmia Monitoring During and After a Pandemic. *J Am Coll Cardiol*. 2020;76(11):1363-1374. doi:10.1016/j.jacc.2020.06.019

<sup>3</sup> Ferrick AM, Raj SR, Deneke T, Kojodjojo P, Lopez-Cabanillas N, Abe H, Boveda S, Chew DS, Choi JI, Dagres N, Dalal AS, Dechert BE, Frazier-Mills CG, Gilbert O, Han JK, Hewit S, Kneeland C, Mirza SD, Mittal S, Ricci RP, Runte M, Sinclair S, Alkmim-Teixeira R, Vandenberk B, Varma N; Document Reviewers; Davenport E, Freedenberg V, Glotzer TV, Huang JL, Ikeda T, Kramer DB, Lin D, Rojel-Martínez U, Stühlinger M, Varosy PD. 2023 HRS/EHRA/APHRS/LAHRs Expert Consensus Statement on Practical Management of the Remote Device Clinic. *J Arrhythm*. 2023 May 19;39(3):250-302. doi: 10.1002/joa3.12851. PMID: 37324757; PMCID: PMC10264760.

<sup>4</sup> Varma N, Epstein AE, Irimpen A, Schweikert R, Love C; TRUST Investigators. Efficacy and safety of automatic remote monitoring for implantable cardioverter-defibrillator follow-up: the Lumos-T Safely Reduces Routine Office Device Follow-up (TRUST) trial. *Circulation*. 2010;122(4):325-332. doi:10.1161/CIRCULATIONAHA.110.937409

<sup>5</sup> O'Shea CJ, Middeldorp ME, Hendriks JM, et al. Remote Monitoring Alert Burden: An Analysis of Transmission in >26,000 Patients. *JACC Clin Electrophysiol*. 2021;7(2):226-234. doi:10.1016/j.jacep.2020.08.029

<sup>6</sup> Varma N, Love CJ, Michalski J, Epstein AE; TRUST Investigators. Alert-Based ICD Follow-Up: A Model of Digitally Driven Remote Patient Monitoring. *JACC Clin Electrophysiol*. 2021;7(8):976-987. doi:10.1016/j.jacep.2021.01.008

<sup>7</sup> Varma N, Marijon E, Abraham A, Ibnouhsein I, Bonnet J-L, Rosier A, Singh  
*Heart Rhythm Journal*, LB-456088-2, in press, May 16, 2023

The original abstract results can be found here. Differences in results with HRS presentation are due to methodological improvements.