EP News: Quality Improvement and Outcomes: Remote monitoring of pediatric cardiac implantable electronic devices

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Remote monitoring of pediatric cardiac implantable electronic devices (CIEDs) has become an important tool in outpatient management. Recent guidelines (Shah et al, JACC Clin Electrophysiol 2021;7:1437, PMID 34794667) from the Pediatric and Congenital Electrophysiology Society (PACES) have recommended remote monitoring of CIEDs every 3–12 months for pacemakers and every 3–6 months for implantable cardioverter-defibrillators, with an increase in frequency when the device is approaching elective replacement indicators. Compared with their adult counterparts, pediatric and adult patients with congenital heart disease have a higher frequency of epicardial devices that carry an elevated risk of lead fracture, which may lead to adverse outcomes, especially in pacemaker-dependent patients (Post et al, Neth Heart J 2011;19:331, PMID 21567217). CIED remote transmission remains a vital modality to ensure safe monitoring and assessment of temporal CIED trends, especially battery longevity and lead functionality. Furthermore, advances in remote monitoring foster a sense of disease-specific knowledge, improved self-management, and shared decision making (Walker et al, Int J Med Inform 2019;124:78, PMID 30784430).

The PACES Quality Improvement (QI committee) has designed a QI project to address gaps in adherence to recommended remote transmissions and potential barriers. Since there is a large range of device volume by center, the project is designed to allow for different measures of success that will be defined by each individual center. This project will focus on 3 specific, measurable, achievable, relevant and time-bound (SMART) aims:

1. *Initial transmission:* The initial setup and pairing for CIED remote transmissions is vital to ensure long-term success. For families, limitations can include a lack of equipment, connectivity/infrastructure, and knowledge gaps. Provider issues may include lack of industry support, location of implantation (electrophysiology suite vs operating room), lack of administrative/staff support, and a lack of end-user confirmation. *The goal is to increase initial enrollment, defined as a remote transmission within 14 days of new CIED implantation or generator change, by 25% or to a total adherence of 80% over a 90-day period.*
2. *Total enrollment:* There are patients with CIEDs who either were never enrolled in a remote program or have been lost to follow-up without remote transmissions for more than 12 months. These patients may comprise a significant proportion of an individual center's device volume. The limitation in many cases is related to a lack of equipment or outdated equipment that is no longer supported by current technologies (such as requiring a landline telephone connection to transmit). Similar to our other metrics, provider challenges center around an inability to identify patients that are not transmitting and a lack of end-user confirmation. *The goal is to increase overall center enrollment by 25% or to a total center enrollment of 80% over a 90-day period.*
3. *Adherence to guidelines:* Despite successful enrollment at the time of surgery, adherence to published remote transmission guidelines is impeded by a multitude of barriers. Examples of such barriers include but are not limited to lack of a cellular signal, nonfunctioning equipment, poor connection, knowledge gaps, and inadequate insurance coverage. Providers (physicians, advanced practice providers, nurses, and technicians) are limited by a lack of end-user confirmation to demonstrate the absence of adherence. *The goals for improvements within this domain are both time and longitudinally based: with either an increase in 20% of total adherence or a goal of 75% adherence over a 180-day period.*

Although the specific intervention will vary by institution, the PACES QI Committee has developed resources to facilitate success. The committee will provide resources for each individual company, including company-specific remote monitoring tip sheets to address potential knowledge gaps and highlight troubleshooting solutions for patients, families, and providers. Providers will have access to a CIED implant checklist that details postimplant steps to ensure successful initial enrollment and transmission. Each institution will have the option to enter into a PACES-approved remote monitoring agreement with the patient and family designed to enhance the understanding of the importance of remote transmissions and the consequences of poor adherence. Each center will plan for 90-day cycles to institute and reassess interventions for future Plan, Do, Study, Act cycles.

Currently there are 24 participating centers (including 1 international), and the first application of interventions is planned for fall 2022. The PACES QI Committee is excited to launch its first society-sponsored QI project and looks forward to collaborating with these and additional centers throughout the world.

Funding Sources: The authors have no funding sources to disclose. Disclosures: The authors have no conflicts of interest to disclose. **Address reprint requests and correspondence:** Ms Anne Marie Smith, Heart Rhythm Society, 1325 G St, NW, Suite 400, Washington, DC 20005. E-mail address: amsmith@hrsonline.org.

1547-5271/$-see front matter https://doi.org/10.1016/j.hrthm.2022.07.007