

# 22<sup>nd</sup> WORLD CARDIOLOGY CONFERENCE

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## Evolution of remote management of cardiac devices. From the bedside to full remote interrogation and programming

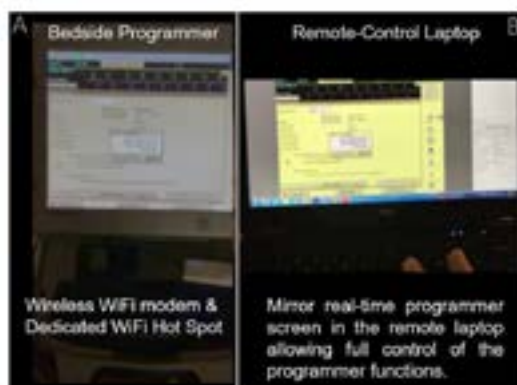
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**Statement of the Problem:** Following the moto: “if a robot in Mars can be Remote-Control from earth; we can likely Remote-Control a pacemaker in Boca Raton, Florida”; we have been pursuing this goal since 2010.

**Methodology & Theoretical Orientation:** The use of cardiac implantable electronic devices (CIEDs) has evolved exponentially over the past decade and with it the need of a prompt response to device interrogation. In 2002 home remote monitoring network was introduced. In 2012 device remote interrogation extended to Hospitals. In 2014 a new generation of wireless insertable cardiac monitors became clinically available with global connectivity and 2017 a system surfaced with direct Bluetooth connectivity of a diagnostic implanted cardiac monitor to the patient’s smart phone. The use of this technology requires a robust office monitoring system able to handle the vast incoming information and subsequently taking action accordingly if needed. The use of home remote monitoring became part of the standard of care and formal guideline established by a consensus document of the Heart Rhythm Society in 2015. In parallel to these advances we explore the real-time remote interaction and management of CIEDs. In 2010 real-time programmer screen visualization and “guided-reprogramming” using an attached laptop to a programmer and a remote iPad was tested in the Emergency Room. Since then we evolved to complete remote control of CIEDs not only with access to diagnostics but with the ability of performing programming changes as deemed necessary without a specialist at the device side.

**Conclusion & Significance:** There are different ways of interrogating remotely a CIED device and obtain alerts regarding arrhythmic and other sensors events. However, the ability of remote control in real-time the interrogation and reprogramming of CIEDs as needed opens new possibilities for service models and device interactions that have yet to be defined and developed.



**Figure 1:** Dedicated “Programmer” for remote management of cardiac devices. This computer has a connectivity modem card with options of intranet cable connection or a dedicated WiFi cellular “Hot spot” as shown (A). The session is started by a bedside technician. Once informed that the patient is ready, the remote operator logs on the remote session (B) to have remote-control functions of the programmer.

### Biography

Esteban Martin Kloosterman is the Director of the Lynn Heart and Vascular Institute, Boca Raton Regional Hospital, Florida Atlantic University, Florida, USA. At BRRH he performs an extensive variety of interventions related to cardiac devices implants and treatment of cardiac arrhythmias using the latest developments in the field including, transcatheter pacemaker, fluoroless ablations, cryoballoon and rotor mapping for the treatment of atrial fibrillation. Dr. Kloosterman invented the “remote-K-viewer”, a system that enables physicians to communicate and guide reprogram cardiac devices remotely in real time. Dr. Kloosterman leads the largest volume service of CareLink Express in the US, with a tailored service protocol. “CareLink Express and Remote Viewer in the Cardiologist Office” Exploring A New Service Model; Remote Control of Cardiac Device in the MRI setting, abstract at Asian-Pacific HRS, 2017.

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