Remote Monitoring – Practical Applications to Improve Care

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Disclosures

- Medtronic – Speaker’s bureau, Consultant
- Grant support – Boston Scientific
History of Remote Monitoring

- Pacemaker Trans-telephonic checks
- ICD remote transmissions
- Clinical data transmissions
- Pacemaker remote interrogations
Why Remote Monitoring?

The number one reason I am incorporating remote monitoring into my practice is….

1. Patient convenience
2. Clinic efficiency
3. Better device surveillance
4. Improved monitoring of arrhythmia and heart failure
Remote Follow-up vs. Remote Monitoring

- Is there a difference?

- Paradigm shift:
  - Access to information in a more timely fashion allowing a more pro-active approach
  - Can we use devices as disease management tools?
  - Can we provide better arrhythmia AND heart failure care?
Demographics – The Heart Group
Lancaster, PA USA

- 19 cardiologists/ 4 EP physicians
- 12 nurse practitioners/ 3 EP NPs
- Device clinic – 8 device technicians perform interrogations
- Telephone techs - 2
Device Clinic Data 2008

- 1356 ICDs
- 672 CRTs
- 975 Carelink
- Carelink initiated in 2002
- Transmissions/ day 6 - 12
Increase in the Use of Implantable Cardioverter-Defibrillators (ICDs) in the United States

With Changes in Monitoring…

- Changes in Workflow invariably needed:

  After Remote Monitoring:
  1. Downloads assigned to staff
  2. Triage calls/ Add ons can download
  3. Wireless devices lessen adherence issues
  4. Events easily triaged and can be addressed
  5. Wireless Alerts allow for just in time intervention
Growth of Remote Monitoring – Percentage of Tests Done Remotely

The Heart Group, Lancaster PA November 2008
But I like to see my patient!!

- Fears that remote monitoring will result in treatment decisions based on technology and not based on clinical judgment
- New guidelines by HRS address remote/in-person follow-up
- Barriers to transition
  - Time to change infra-structure
  - Patient education
  - Does it help?
Remote Monitoring Systems

- Medtronic Carelink
- Boston Scientific Latitude
- St Jude Medical Merlin
- Biotronik Home Monitor
So, does remote monitoring help??

- Patients and providers want to know!
- Trials in progress
- Abstracts ongoing
- Case examples
Does it help?

- Schoenfeld et al. PACE 2004; 27:757-63

- Data showed clinically important information such as silent AF, efficacy of AAD, undersensing and VT. Patients found it easy to use, and clinicians were satisfied and found remote transmissions comparable to in-office transmissions.
Clinical actionable events in 45% of patients in the remote arm; 38% in TTM arm. CAE detected earlier in remote arm (p<0.0001). Convenient and accepted by patients.
Italian Carelink

- Marzegalli et al. PACE 2008; 31 (10) 1259-1264.

- Patients time for remote transmission 7 ±5 minutes (116 ± 90 in-office)

- Clinician review time 5 ±2 minutes (15 minutes declared in-office time)
Late Breaking Clinical Trial - REFORM

- Remote Follow-up of Patients Receiving ICDs for Prophylactic Therapy
- Cardiostim 2008
- RCT – Biotronik trial comparing 3 month in-house follow-up with 12 month follow up with home monitoring
- Follow-up visits reduced 48%
- No difference in other endpoints:
  - Time to first ICD therapy
  - Number of shocks
  - Rate of hospitalizations
  - QOL
  - Mortality (not powered to assess)

Hendricks, News Release 6/20/08 www.theheart.org
Clinical Trials – Heart Failure

RAPID-RF - Remote Active Monitoring in Patients with Heart Failure

- Evaluate use of Latitude® CRT-D Wireless technology in making treatment decisions and the impact on hospitalizations, HF events, and mortality.

TRIAGE-CRT - Telemonitoring in Patients With CHF and Indication of CRT-D

- Evaluate home monitoring parameters correlation with weight and blood pressure changes. The patient compliance rate of two telemonitoring systems will be evaluated.
Clinical Trials

**CONNECT** - Clinical Evaluation Of Remote Notification to rEduCe Time to Clinical Decision
- ICD/CRT-D trial evaluating benefits of remote monitoring on patient care and health care utilization

**TRUST** - Lumos-T Safely RedUceS RouTine Office Device Follow-up
- Evaluate effectiveness of home monitoring system
- Reduced clinic visits >40% over 12 months
- Still a delay between arrhythmia onset and clinician evaluation
Case Study 1

- 46 year old with NICM
- Hx of Afib with PVI in 2004
- CRT-D
- Mild to Moderate MR
- Shocked for AF with RVR
- Alert for AF
- EP set up repeat PVI

Case studies, Repoley, 2008, The Heart Group, Lancaster PA
Shock

 Increased AF burden and rapid ventricular rates

 Decreased CRT
Optivol

Some decline in intrathoracic impedance with increase in AF burden.
Case continues

- Echo shows moderate MR
- TEE 2+ MR prior to repeat PVI
- During PVI – Transeptal puncture, Mean LA pressure 35 mm Hg, v waves of 75 mm Hg
- Repeat PVI performed, but concern that more aggressive treatment of MR/ NICM may be needed. Reassessment of valve in NSR planned
Case 2 – Latitude Yellow Alert

- VT Shock
- Episodes showed multiple other ATP episodes and evidence of VT below cutoff
- Urgent clinic visit
- Recent decrease in diuretic due to renal insufficiency and subsequent symptoms of congestion
Case 2 continues

- PMH:
  - VT; Long term amiodarone
  - CAD, MI Previous PCIs
  - BiV ICD
  - ICM EF 30%
  - 2+ MR
  - DM, Hypothyroidism
Data obtained

Remote monitoring alerted the clinic regarding a serious change in arrhythmia status resulting in timely intervention
Treatment options and outcomes

- Admit to hospital with VT storm
- MI ruled out
- Cath showed progression of CAD
- Eventual CABG and MV repair
- Intensive HF follow up to medically manage postop
- Now Class I
Benefits to Clinic

- Increased efficiency
- Time management – an option to deal with increased number of patients, limited staff
- Streamline follow-up for regular interrogations to allow for “add-on”/ emergent visits
Benefits to Patient

- Less driving to appointments
- Less waiting
- Security in travel
- Possibility of easier follow-up when problems identified

Disease Management
System Integration Remote Devices

- HF and EP plan
- Identify devices appropriate
- Network set-up
- All devices forward? Catch up existing patients?
- Team approach – who does what?
Follow-up vs. Monitoring

- EP: Every 3 months for ICD/Pacer follow-up
- HF: Clinic dependent
- Alerts
- Telephone triage; do you need a download?
What Remote Monitoring is NOT

- Not to be used as the emergency system
- Patients and family to know that clinic is not watching 24/7
- No programming as of yet
- Alerts will not help if not activated
- Clinic infrastructure needed to address alerts and transmissions
- Patient education and adherence needed for data to be received
Unusual Wireless Transmission!

A 50-year-old man with nonischemic cardiomyopathy and congestive heart failure underwent implantation of a Medtronic Concerto (C154DWK) biventricular dual chamber implantable cardioverter-defibrillator. He was enrolled in the Carelink (Medtronic Inc, Minneapolis, MN) remote monitoring system of his wireless device. In May 2008, the device reached ERI, and the patient underwent successful generator change with a new Concerto C154DWK generator. The next day, the following alert message was received via the Carelink system (Medtronic Inc, Minneapolis, MN): “Recommended Replacement Time, Lead Warning, VF Detection Off, Wireless Alert, Patient Alert.” The transmission showed that ventricular fibrillation detection was programmed off, the battery was at ERI (2.59 V), and all lead impedances were >2500 ohms.

The patient’s physicians were puzzled until further investigation revealed that the patient had taken his old generator home and placed it in his bedroom, where the wireless monitor had detected it. Patients should be instructed not to place their wireless explained generators near their remote transmitters.

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Conclusions

- Remote monitoring of cardiac rhythm devices is a growing method of patient surveillance
- Patients and Providers report positive experiences
- Remote device diagnostics can add valuable objective information to the electrophysiology and heart failure teams
- Further studies regarding patient outcomes are indicated
Thank You

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