Designing Remote Monitoring Services that work for Everyone

Ian Wright
Imperial College Healthcare NHS Trust

COVID-19

- Nearly half of CIED patients are over 80 years

- Of those who have a pacemaker:
  - 87% are over 65 and the median age is 81 years.
  - We have over 400 patients over 90 (14%)
  - 10 over 100 years

The ICD population is younger but with a high burden of chronic disease

Positive aspects

- Removed barriers (financial, bias, inertia)
- New staff introduced to HM
- Overcome reluctance to offer remote monitoring
- Started a dialog “what should the ‘new normal’ look like?”
- Focus of what activity adds value
- Introduced new processes (RM straight from implant)
- Suggested and enabled new ways of working (working from home, remote access, MS Teams – teaching training etc)
- Enhanced out of hours HM service – reduced admissions

- “Designing Remote Monitoring Services that work for Everyone”

- What does ***“that work”*** mean?
- Who is ***“Everyone”?***

That work

Value for patients is often only revealed in longer-term outcomes such as sustainable recovery, reduced need for ongoing interventions, or a reduction in treatment-induced illnesses

Porter ME. (2010) Perspective: What Is Value in Health Care? *New England Journal of Medicine* 2010

Context

- Shrinking resources and an ageing population with increasingly complex and interdependent long-term conditions
- Growing misalignment between modern patterns of disease and the traditional structure of medical specialties
- Services are not well-integrated
- Patients are not supported in caring for themselves

Personalised, integrated care: driven and supported by technology

- *… an unparalleled opportunity to inevitably and forever change the face of how healthcare is delivered"* (Topol Report)

- *"the connecting of home-based and wearable monitoring equipment will increasingly enable the NHS to predict and prevent events that would otherwise have led to a hospital admission*" (NHS Long-term plan)

- *"NHS reform is creating a different world which is more about prevention than delivery, where patients drive their own care, and services are delivered closer to home"* (Helen Bevan, director of service transformation at the NHS Institute of Innovation and Improvement)

- Initial research into RM centred on safety, feasibility, patient acceptance and non-inferiority to conventional follow-up
- RM was initially promoted to CPs as a way to improve follow-up efficiency in the face of increasing patient numbers
- Another early driver for adoption was its use to address the problem of a requirement for extra checks in ICD patients with leads that were known to have a high failure rate
- Later, the potential for reducing appropriate ICD shocks became a significant driver

Zeitler EP, Piccini JP. (2016) Remote monitoring of cardiac implantable electronic devices (CIED). *Trends Cardiovasc Med.* 2016

Braunschweig et al., Remote monitoring of implantable cardioverter-defibrillators and resynchronization devices to improve patient outcomes: dead end or way ahead?, *EP Europace*, Volume 21, Issue 6, June 2019

- Remote monitoring (RM) involves:
- *"the collection, transmission, **evaluation, and communication** of patient health data from electronic devices*"

Sanders, S.F., Stern A.D., Gordon W.J. (2020) How to make remote monitoring tech part of everyday health-care. *Harvard Business Review*

HRS Remote Monitoring Consensus Statement Recommendations

Device Follow-Up Paradigm	Class of Recommendation	Level of Evidence
A strategy of remote CIED monitoring and interrogation, combined with at least annual IPE, is recommended over a calendar-based schedule of in-person CIED evaluation alone (when technically feasible).	I	A
All patients with CIEDs should be offered RM as part of the standard follow-up management strategy.	I	A
Before implementing RM, it is recommended that each patient be educated about the nature of RM, their responsibilities and expectations, potential benefits, and limitations. The occurrence of this discussion should be documented in the medical record.	I	E
It is recommended that all CIEDs be checked through direct patient contact 2–12 weeks postimplantation.	I	E
It may be beneficial to initiate RM within the 2 weeks of CIED implantation.	IIa	C
All patients with an implantable loop recorder with wireless data transfer capability should be enrolled in an RM program, given the daily availability of diagnostic data.	I	E
It is recommended that allied health care professionals responsible for interpreting RM transmissions and who are involved in subsequent patient management decisions have the same qualifications as those performing in-clinic assessments and should ideally possess IBHRE certification for device follow-up or equivalent experience.	I	E
It is recommended that RM programs develop and document appropriate policies and procedures to govern program operations, the roles and responsibilities of those involved in the program, and the expected timelines for providing service.	I	E

CIED = cardiac implantable electronic device; HRS = Heart Rhythm Society; IBHRE = International Board of Heart Rhythm Examiners; IPE = in-person evaluation; RM = remote monitoring.

Device and Disease Management	Class of Recommendation	Level of Evidence
RM should be performed for surveillance of lead function and battery conservation.	I	A
Patients with a CIED component that has been recalled or is on advisory should be enrolled in RM to enable early detection of actionable events.	I	E
RM is useful to reduce the incidence of inappropriate ICD shocks.	I	B-R
RM is useful for the early detection and quantification of atrial fibrillation.	I	A
The effectiveness of RM for thoracic impedance alone or combined with other diagnostics to manage congestive heart failure is currently uncertain.	IIb	C

B-R = level of evidence B indicates a moderate level from randomized trials; CIED = cardiac implantable electronic device; ICD = implantable cardioverter-defibrillator; RM = remote monitoring.

HRS Expert Consensus Statement on remote interrogation and monitoring for cardiovascular implantable electronic devices

David Slotwiner, MD, FHRS, FACC (Chair),[1,#] Niraj Varma, MD, PhD, FRCP (Co-chair),[2,#] Joseph G. Akar, MD, PhD,[3] George Annas, JD, MPH,[4] Marianne Beardsall, MN/NP, CCDS, FHRS,[5] Richard I. Fogel, MD, FHRS,[6] Nestor O. Galizio, MD,[7*] Taya V. Glotzer, MD, FHRS, FACC,[8] Robin A. Leahy, RN, BSN, CCDS, FHRS,[9] Charles J. Love, MD, CCDS, FHRS, FACC, FAHA,[10] Rhondalyn C. McLean, MD,[11†] Suneet Mittal, MD, FHRS,[12] Loredana Morichelli, RN, MSN,[13] Kristen K. Patton, MD,[14‡] Merritt H. Raitt, MD, FHRS,[15] Renato Pietro Ricci, MD,[13§] John Rickard, MD, MPH,[16] Mark H. Schoenfeld, MD, CCDS, FHRS, FACC, FAHA,[17] Gerald A. Serwer, MD, FHRS, FACC,[18‖] Julie Shea, MS, RNCS, FHRS, CCDS,[19] Paul Varosy, MD, FHRS, FACC, FAHA,[20] Atul Verma, MD, FHRS, FRCPC,[5] Cheuk-Man Yu, MD, FACC, FRCP, FRACP[21¶]

Remote Monitoring (RM)— The New Standard of Care

1. Safety

a. RM is safe and effective (TRUST, COMPAS)

2. Early Event Detection

a. Fewer shocks and increased battery longevity (ECOST)

b. Accurate detection of atrial fibrillation

c. Fewer ER visits and shorter hospitalizations (COMPAS, CONNECT, EVOLVO)

d. Early detection of heart failure (IN-TIME)

3. Improved Survival

a. The degree of benefit corresponds with the degree of adherence to RM (ALTITUDE, IN-TIME, MERLIN)

Conclusions

- This consensus document reflects the wealth of recent clinical data generated by large randomized prospective trials from around the world that included patients with pacemakers, ICDs, and CRT-Ds from various manufacturers

- These consistently show meaningful patient benefits from the early detection capabilities of automatic RM

- RM represents the new standard of care for patients with CIEDs, with alert-driven IPE replacing most routine office interrogations.

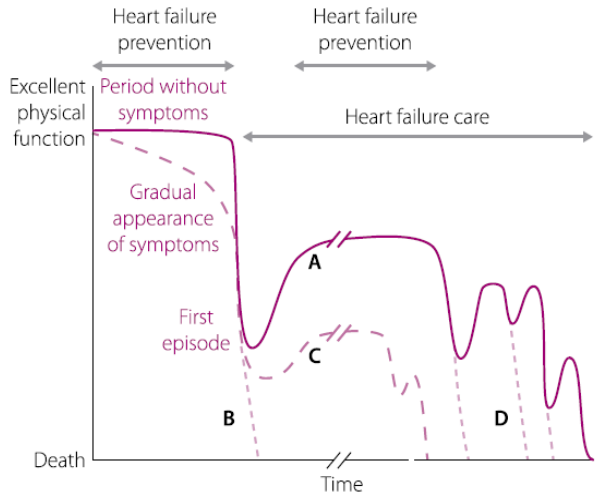
Heart failure (HF)

- Three years after implant two out of every three over 65s with an ICD will have had an unplanned admission to hospital, and one in five will have died

Akar JG, Bao H, Jones PW et al. (2015) Use of remote monitoring is associated with lower adverse outcomes among patients with implanted cardiac defibrillators. Circulation Arrhythmia and Electrophysiology 8: 1173–79

Heart Failure: a dynamic disease

- Symptoms have formed the cornerstone of medical surveillance of HF
- Physiological and behavioural compensatory mechanisms limit the impact of disease progression
- Patients reduce their physical activity, usually subconsciously, so that their symptoms do not worsen despite progressive deterioration
- Adjustment of therapy based on symptoms is often too late to avert hospital admission or death



Cowie M. et al (2014) Improving care for patients with acute heart failure Before, during and after hospitalization. Heart failure Association of the ESC

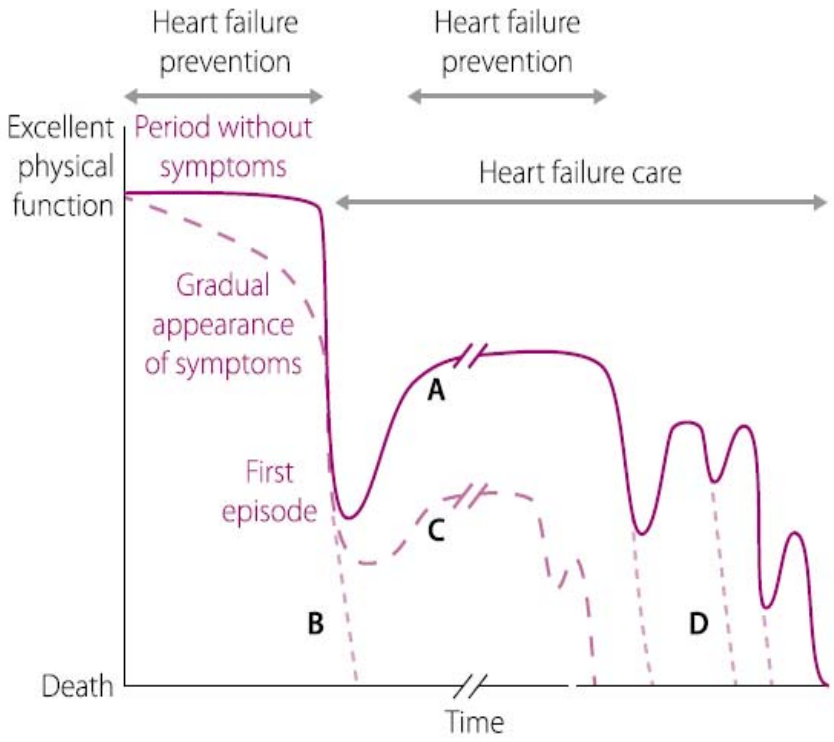
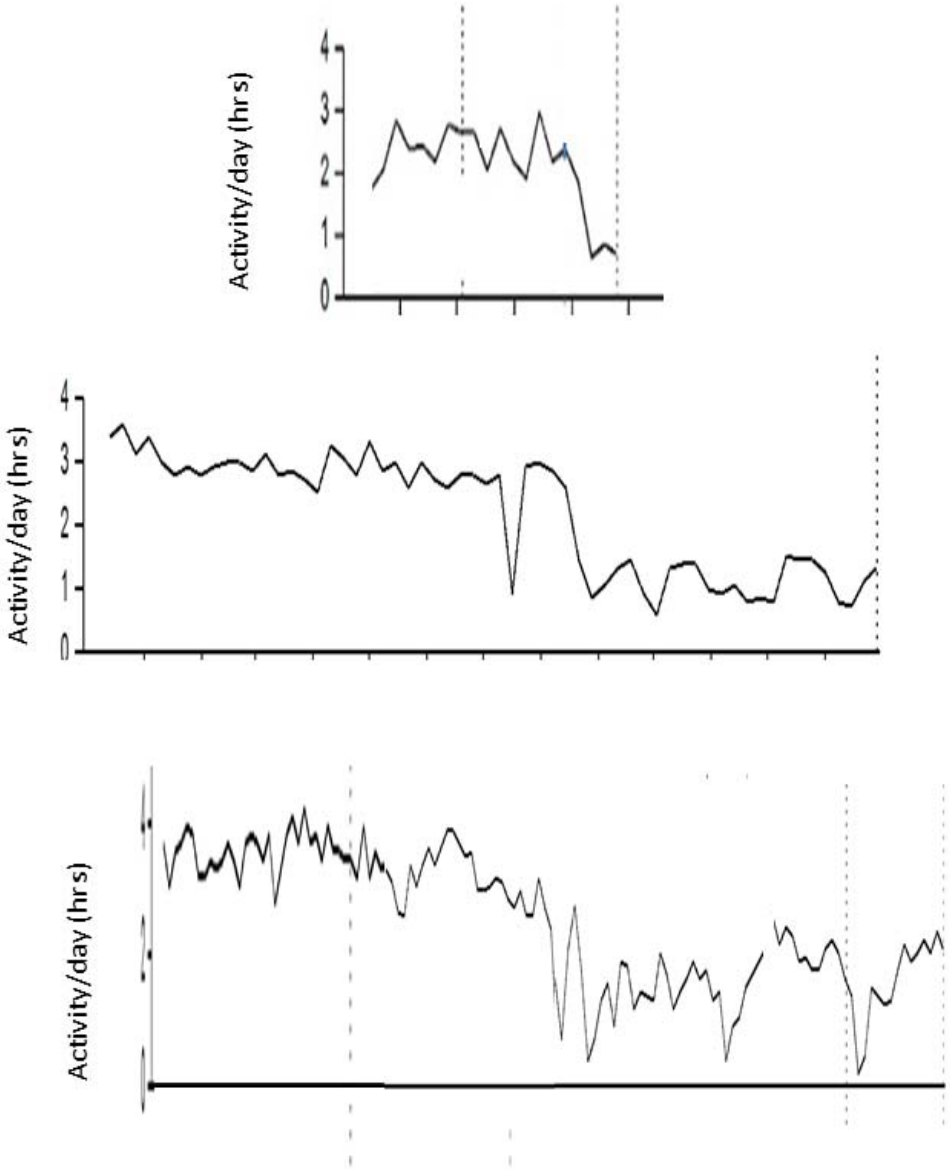


Figure 5 Typical progression of acute heart failure, showing a range of clinical courses. A, good recovery after first episode followed by stable period of variable length; B, first episode not survived; C, poor recovery after first episode followed by deterioration; D, ongoing deterioration with intermittent crises and unpredictable death point.



The circle of heart-failure management

1. *Measure physiological variables that reflect early disease progression at a time when poor outcomes can still be averted*

2. *The information must be received by personnel qualified to recommend an appropriate and effective intervention*

3. *The patient must receive the recommendation and correctly implement, or consent to, the treatment - and the intervention must be timely*

4. *Reassessment should occur to determine whether the deterioration has resolved or necessitates further intervention*

Desai, SA, Stevenson LW, (2010). Connecting the Circle from Home to Heart-Failure Disease Management *NEngl J Med* 2010

For Everyone

"We must acknowledge that those with the greatest health needs are also the most at risk of being left behind"

The future of healthcare: our vision for digital, data and technology in health and care. Department of Health and Social Care (2018)

Ethics

- An approach to medical ethics was developed by the Americans Beauchamp and Childress [1]

- **Autonomy** – the right of an individual to make their own decisions based on their personal values
- **Beneficence** – the obligation to benefit people
- **Non-maleficence** – the obligation not to cause harm
- **Justice** – fair and equitable treatment based on guidelines, practice, the law and societal norms

1. Beauchamp TL, Childress JF. Principles of biomedical ethics. 3rd ed. New York, Oxford: Oxford University Press, 1989.

Exclusion

- Due to perceived financial constraints and workforce capacity limitations RM has been viewed by CPs as a finite and limited resource
- Choices about which patients to offer RM to may be subject to conscious and unconscious bias
- Enrolment has depended on healthcare staff considering patients competent enough to manage the technological and communication commitment involved
- People are perceived to be better candidates *"if they are younger, technologically savvy, or are fluent English-speakers"*
- This has excluded many older people (particularly those >80 years), people from ethnic minorities, and people with dementia and learning difficulties
- These are the populations who experience worse health outcomes for common chronic diseases[2] and so may have the most to gain from RM

2. Varma N, Ricci RP Impact of remote monitoring on clinical outcomes. *J Cardiovasc Electrophysiol* 2015

- Disease
  - Heart failure
  - Dementia
  - Hearing loss
  - Mental health

- Demographics
  - Age
  - Ethnicity
  - Language
  - Class

- Dementia
- Learning disability
- Mental illness
- The effects of brain injury (e.g. OOHCA)
- Alcohol or drug use
- Hearing loss
- Speech/language difficulty (e.g. stroke)

What do patients want to know?

- Patients want increased access to their RM data and report a general lack of knowledge about their device

- ICD patients
  - Ventricular events and therapies
  - The integrity of their leads

- Pacemaker patients
  - Battery status

Slotwinder et al, Transparent sharing of digital health data: A call to action, Heart Rhythm, Volume 16, Issue 9, 2019

Inclusion

- An assessment that a person is not suitable for remote monitoring should not be based simply on:

- Age
- Appearance
- Assumptions about their condition, or any aspect of their behaviour

- A person must be assumed to be able to use remote monitoring unless it is established that they can’t

- They should not to be treated as unable to use it unless all practicable steps to help them have been taken without success (what is practicable?)

- All reasonable attempts must be made to enable people to communicate (what is reasonable?)

What if its not possible

- Record clearly the reasons for deciding the person lacks cannot be monitored remotely in the device notes and the medical record
- Record the efforts made to enable the person to take advantage of remote monitoring
- Keep the situation under review
- Revisit the assessment if the person or anyone interested in their welfare suggests they have improved capacity

For cardiac physiologists

- Shift towards more patient-centred communication
- Emphasis on teaching effective communication skills
- Give essential information about remote monitoring that can be easily assimilated by patients
- Greater integration of services for the benefit of patients
- Make care more timely, minimising recurrences
- Focus on value for money, not cost-effectiveness (measure outcomes meaningful to patients rather than processes)

Benefits of Working from Home

- Better Work-Life Balance
- Less commute time and stress
- Location independence
- Improved inclusivity
- Money savings
- Positive Environmental Impact
- Impact on Sustainability
- A Customizable Office

- Less time wasted commuting
- Employees will work longer hours
- More productive (?)
- Happier staff
- It will increase employee loyalty, less likely to quit
- You can hire the best, no matter where they are
- Fewer sick days
- Employees won’t constantly feel the need for a holiday
- Having employees work from home means you get to work from home

- As David Blumenthal, National Coordinator for Health IT in the Obama Administration commented recently:

- *“the past few months represent a crash course in telehealth”*

Acknowledgements

- Home monitoring team at Imperial
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