Central Manchester and Manchester Children's University Hospitals NHS Trust

A Physiologists Perspective: How Home Monitoring has Contributed to Patient Management and Clinical Outcomes

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www.heartrhythmcongress.com

Pacemaker Diagnostics

- Pacemakers can help answer key clinical questions regarding device status, clinical status and arrhythmia status of the patient.

- Pacemakers can give useful insight into disease progression and long-term patient management questions.

Evolution of pacemaker diagnostics

15yrs ago

Rate Response Histogram

Today!

HRV, Fluid monitoring, AF, Ve's....etc etc!

Pacemaker Diagnostics

- Modern day pacemakers have advanced diagnostics which can be a useful tool in diagnosing and monitoring disease progression
- Pacemaker diagnostics will inevitably increase in both number and sophistication
- The challenge for the device companies is to ensure that diagnostic data can be easily interpreted

Follow-up Care After Implantation

- Appropriate follow-up care for the patient and device is critical for achieving maximal clinical benefit and for preventing and managing significant events
- Advanced Devices store diagnostic information which forms the basis for improving patient management and patient outcomes – a lack of continuous monitoring of the device **may result in suboptimal patient care**

Follow-up care needed for the device:

To document appropriate functioning and correct abnormal behavior

To identify device end-of-battery life and organize replacement in advance

Follow-up care needed for the disease:

To document the nature and frequency of symptoms and appropriateness of device response

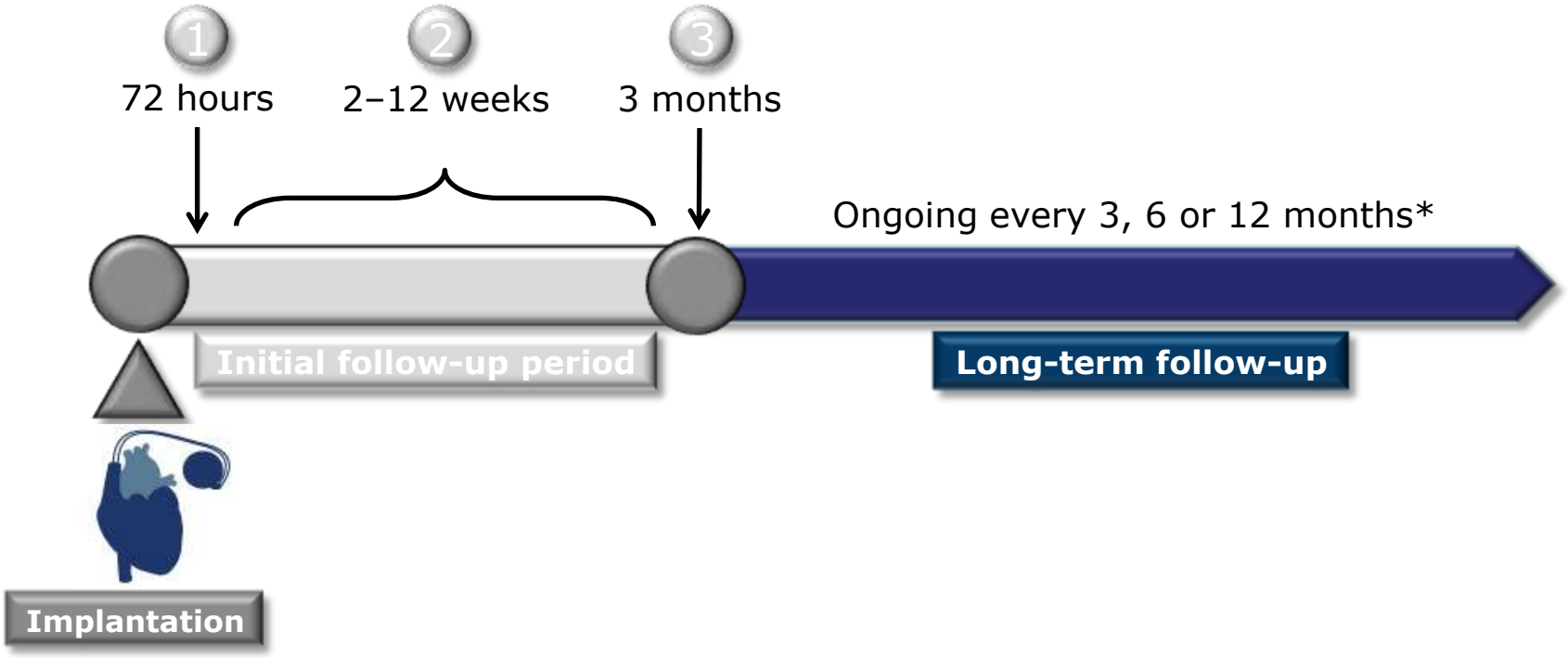
To detect symptomatic and asymptomatic events

To monitor response to therapy

Wilkoff BL *et al*. Heart Rhythm 2008;5(6):907–25

Current Guidelines and Practice

- **Scheduled in-office follow-up visits are recommended to maximize the functionality of devices, and to optimize patient management and safety**



*Follow-up frequency is dependent upon device and patient need

Wilkoff BL *et al*. Heart Rhythm 2008;5(6):907–25

Development of device follow up

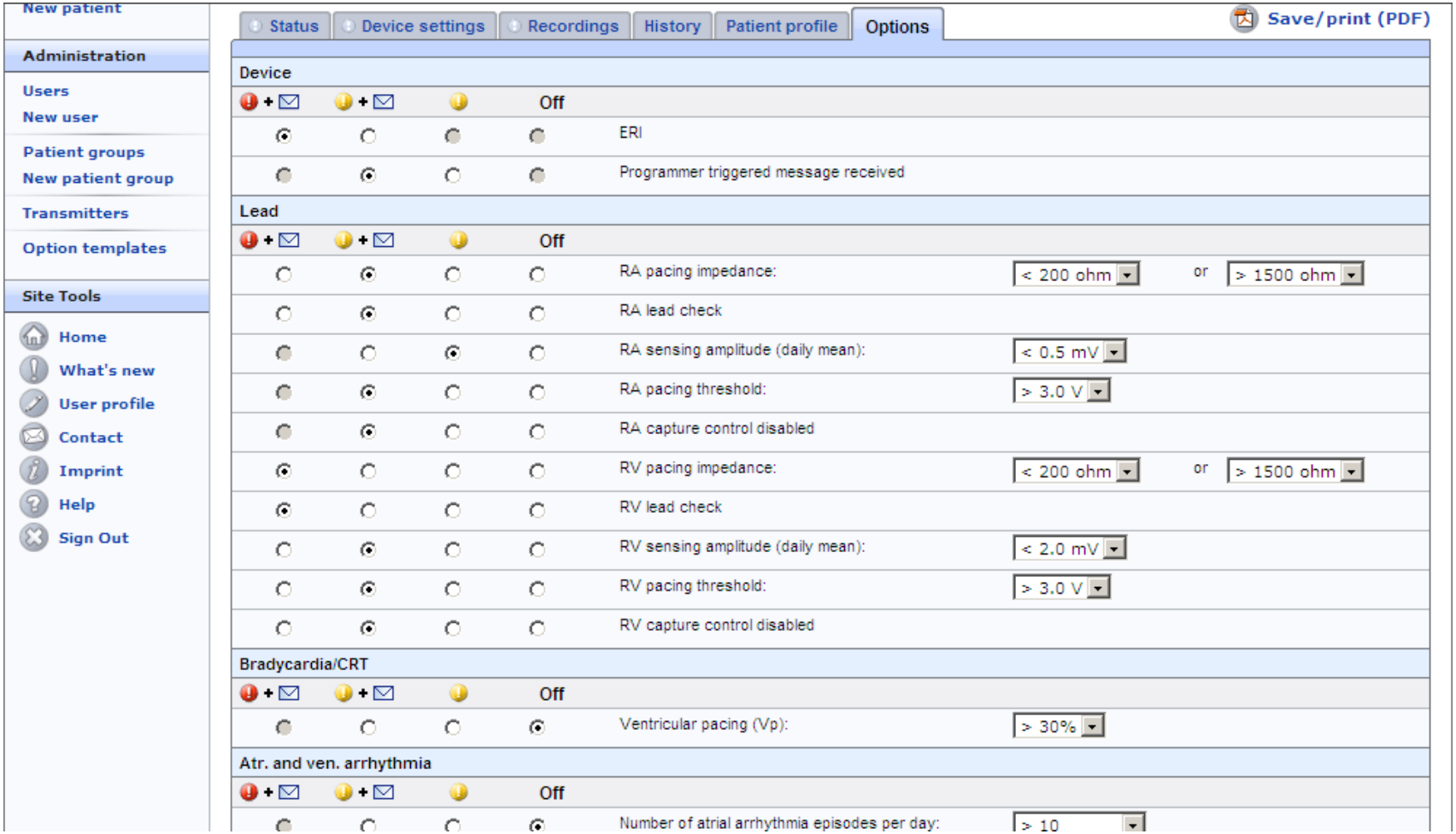
Calendar-based in-office follow-up visits could be supplemented and/or replaced by:

Calendar-based remote monitoring + No continuous monitoring	Calendar-based remote monitoring + Continuous monitoring	Need-based remote monitoring + Continuous monitoring

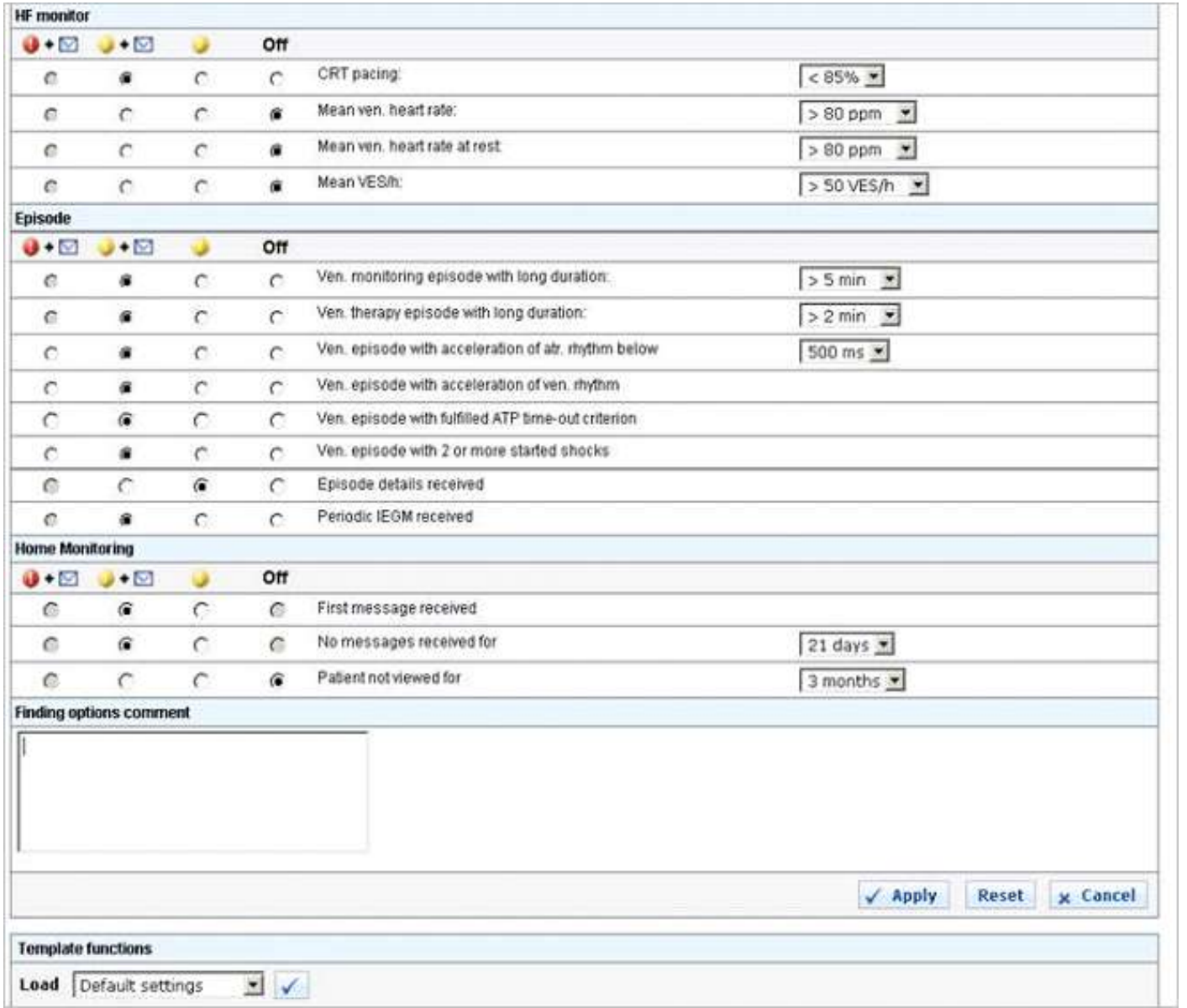
What are the challenges of changing the model of follow up compared to the traditional calendar-based in-office follow-up

?

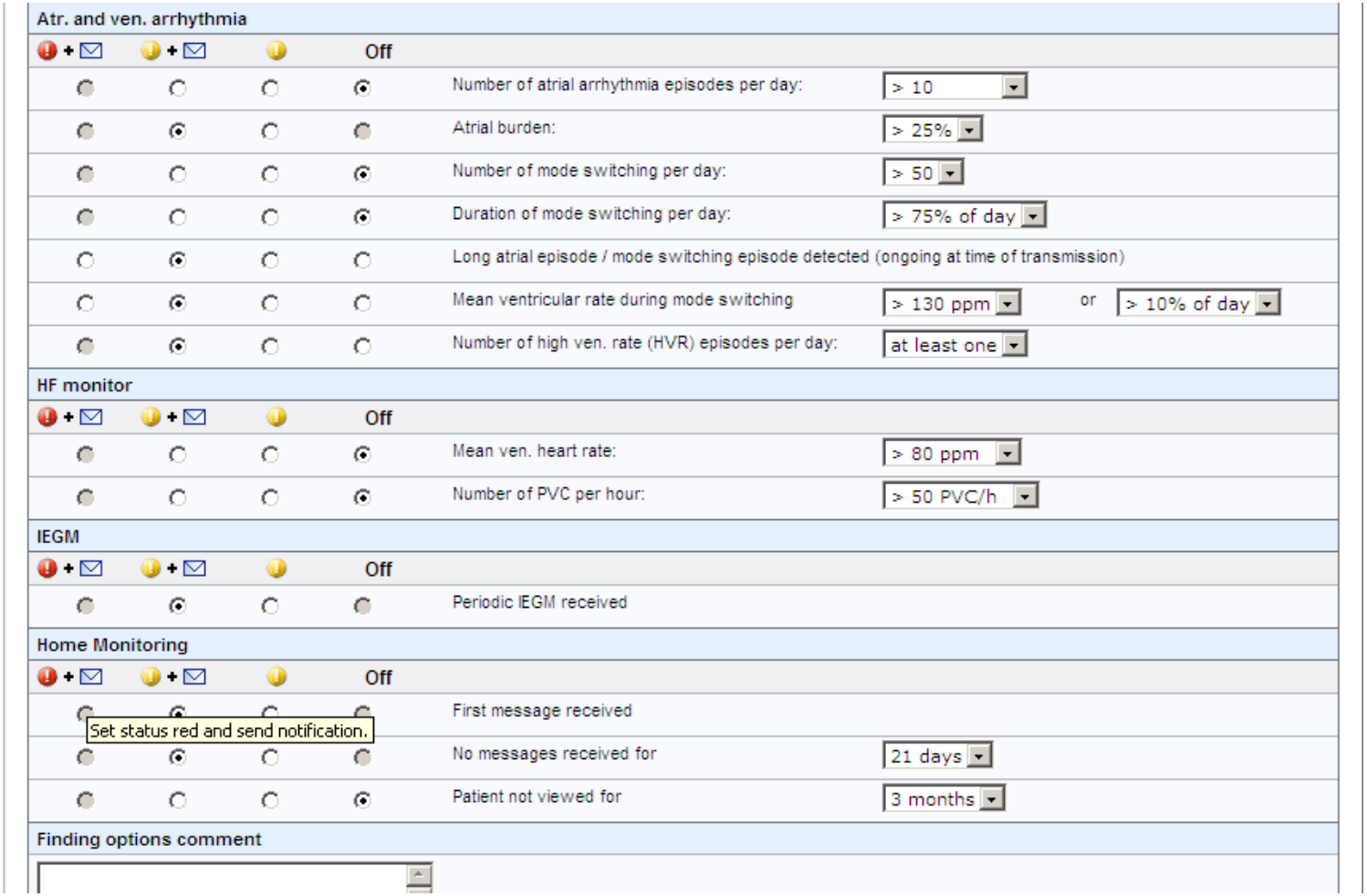
Create a Template



Template

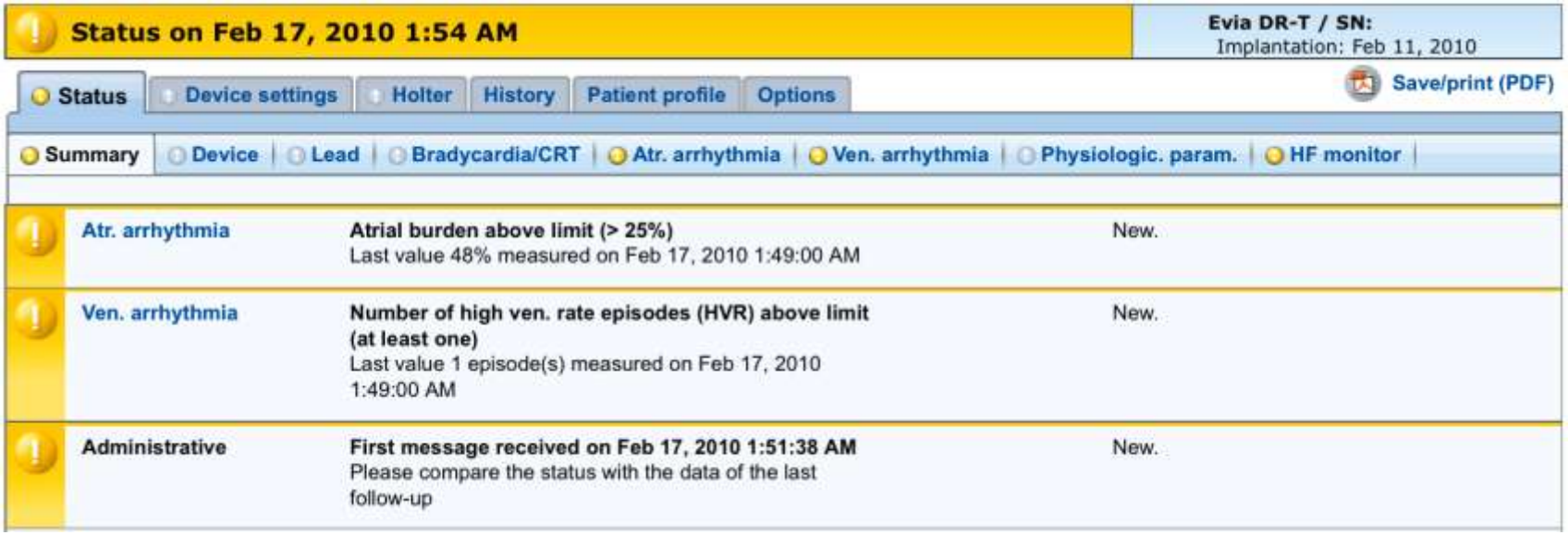

HF monitor
Off
CRT pacing:
< 85%
Mean ven. heart rate:
> 80 ppm
Mean ven. heart rate at rest:
> 80 ppm
Mean VES/h:
> 50 VES/h
Episode
Off
Ven. monitoring episode with long duration:
> 5 min
Ven. therapy episode with long duration:
> 2 min
Ven. episode with acceleration of atr. rhythm below
500 ms
Ven. episode with acceleration of ven. rhythm
Ven. episode with fulfilled ATP time-out criterion
Ven. episode with 2 or more started shocks
Episode details received
Periodic IEGM received
Home Monitoring
Off
First message received
No messages received for
21 days
Patient not viewed for
3 months
Finding options comment
Apply
Reset
Cancel
Template functions
Load
Default settings

Rhythm Alert Template

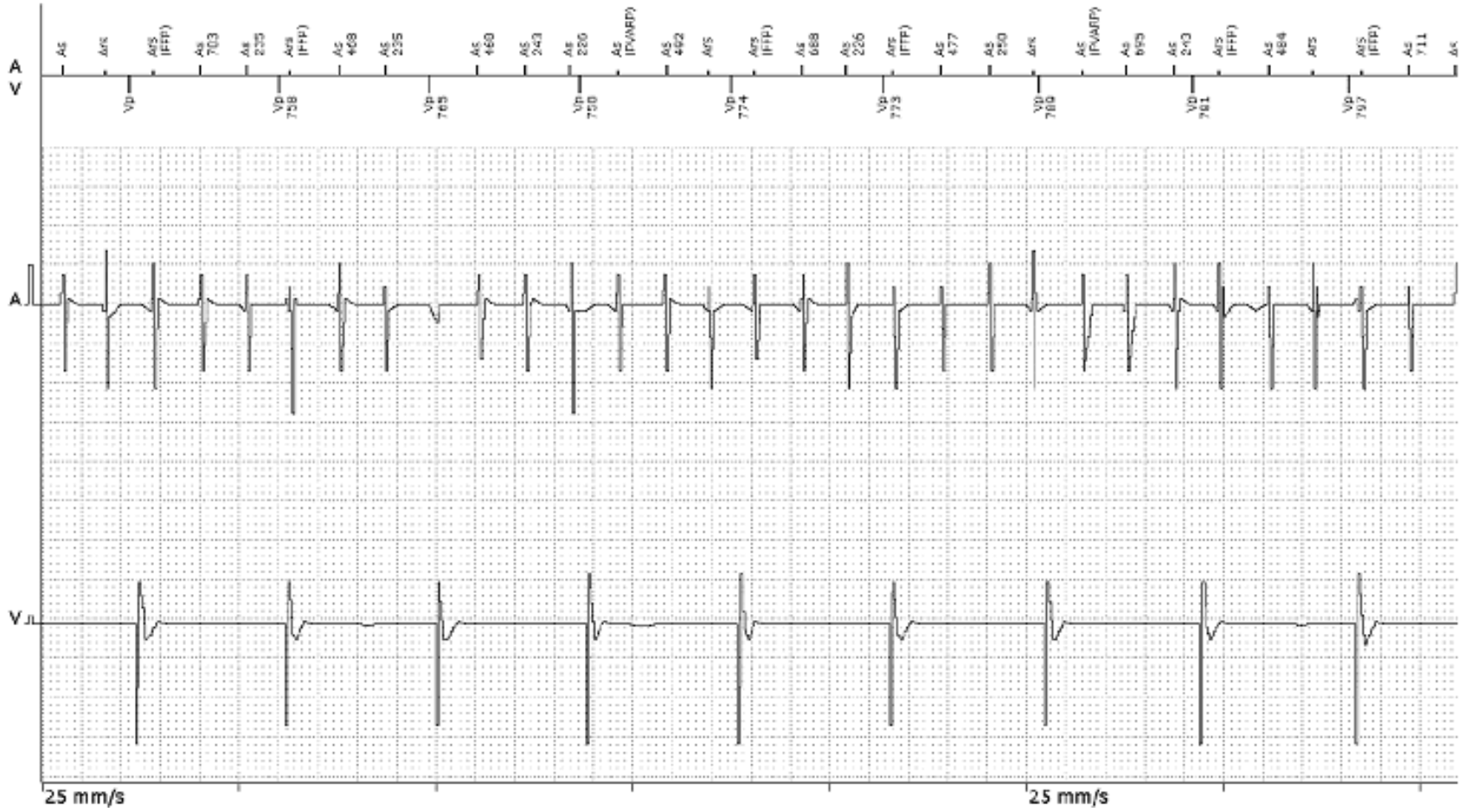


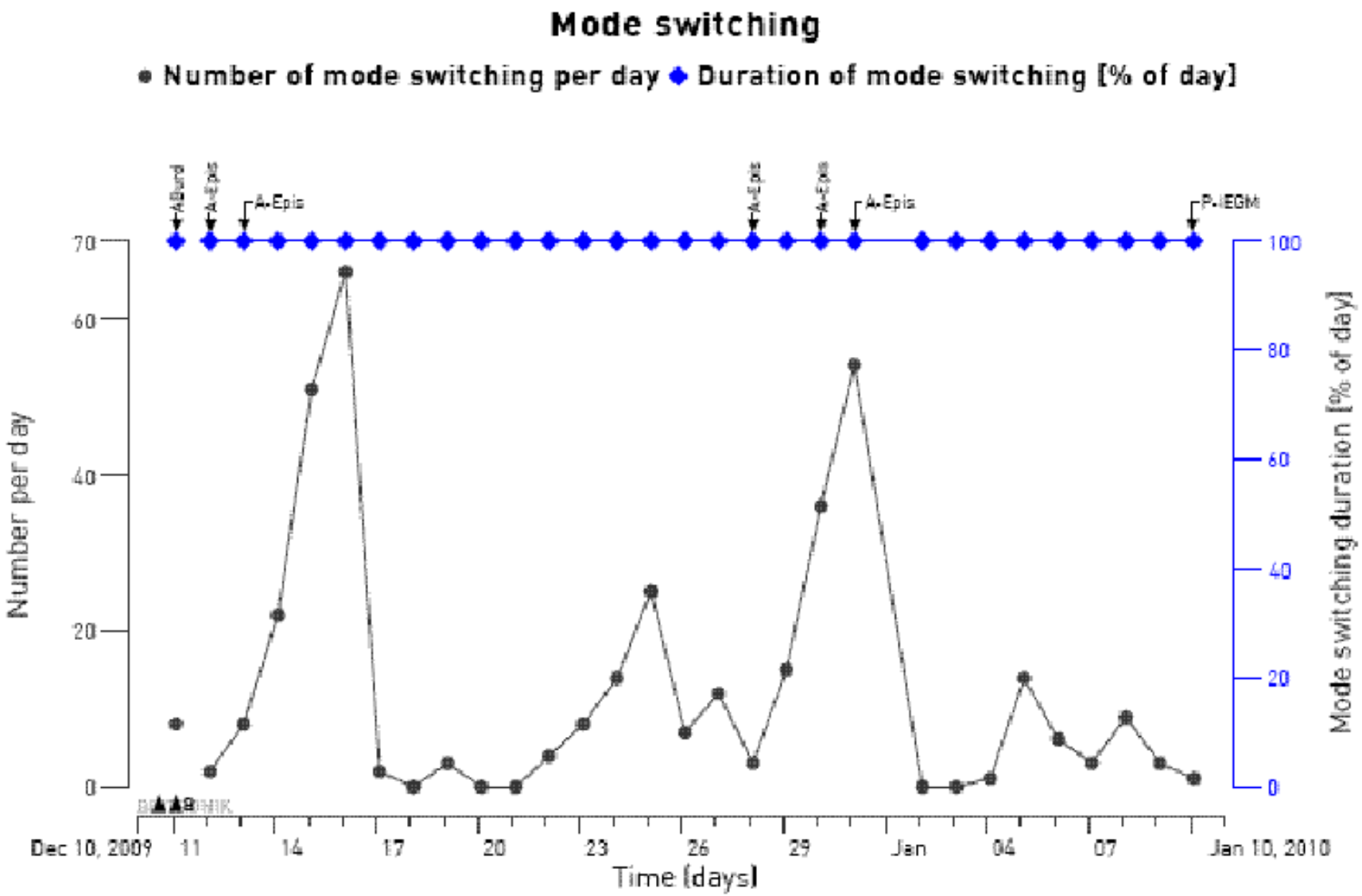
Monitoring of AF burden and Rate Control

Summary of arrhythmia alerts

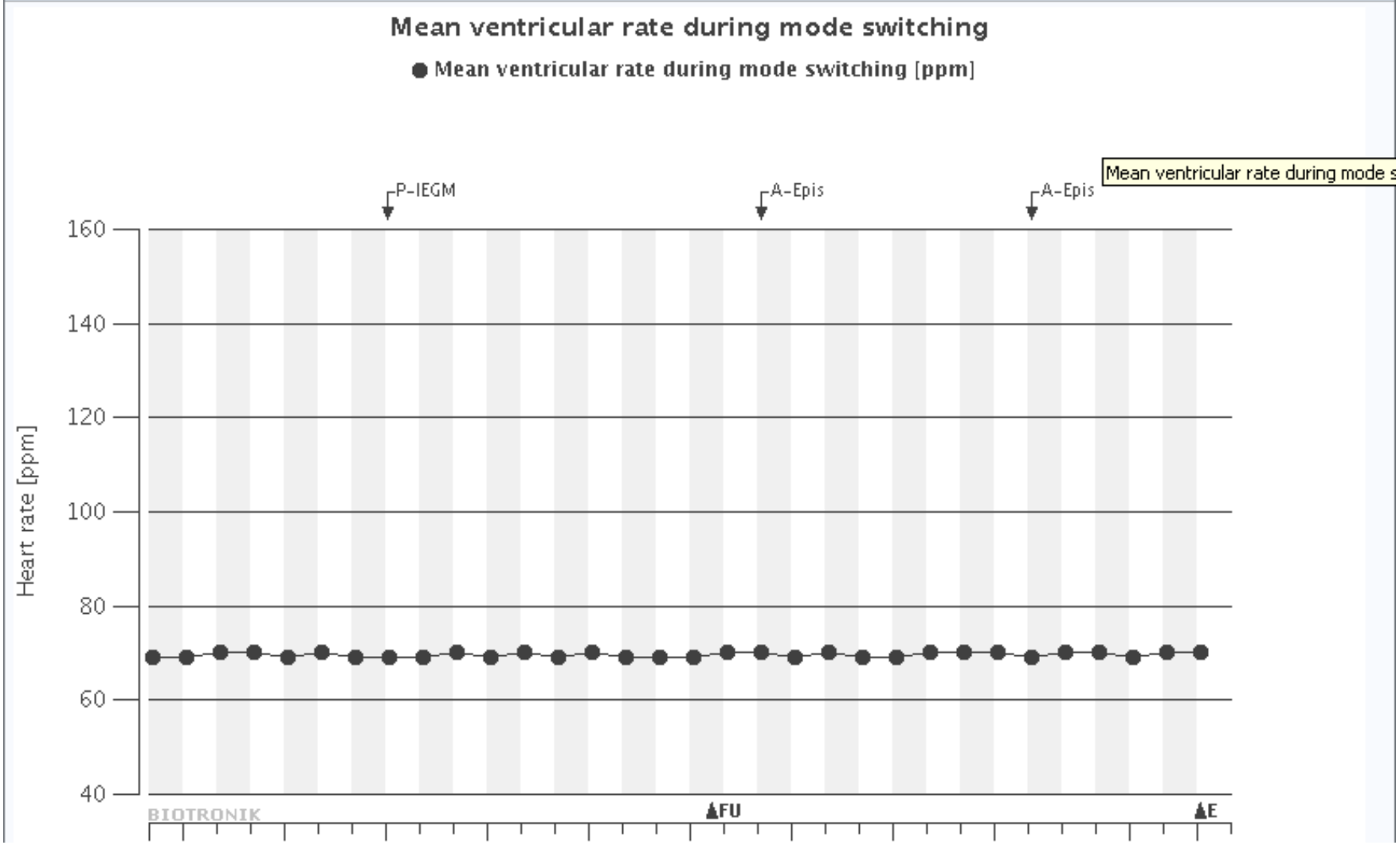


Is it better to see this <24hrs, 3+ months or 12 months?



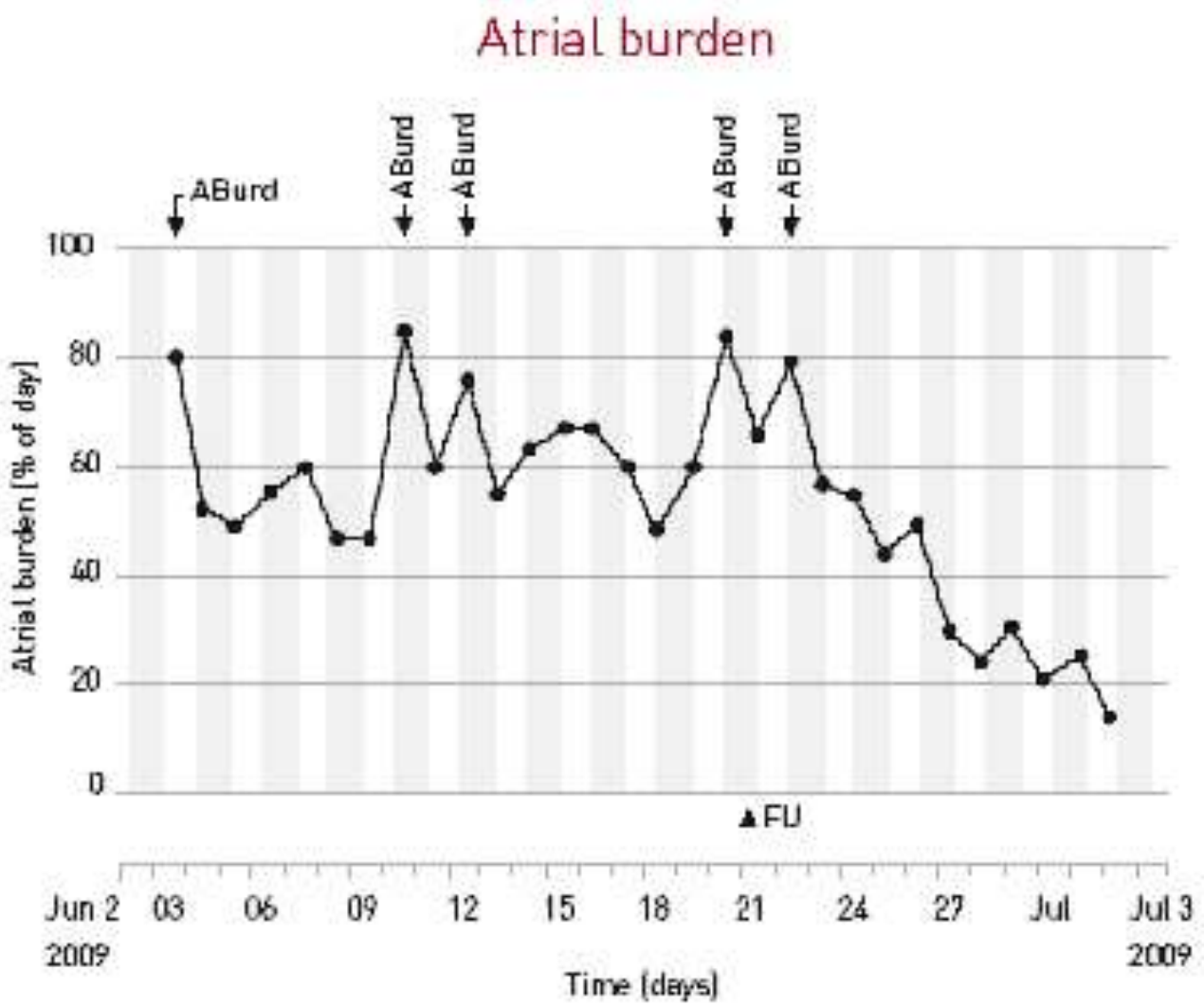

Mode switching
Number of mode switching per day
Duration of mode switching [% of day]
A-Burst
A-Epis
A-Epis
A-Epis
A-Epis
A-Epis
P-IEGM
Number per day
Mode switching duration [% of day]
0
20
40
60
70
0
20
40
60
80
100
Dec 10, 2009
11
14
17
20
23
26
29
Jan
04
07
Jan 10, 2010
Time (days)

Mean ventricular rate during mode switching



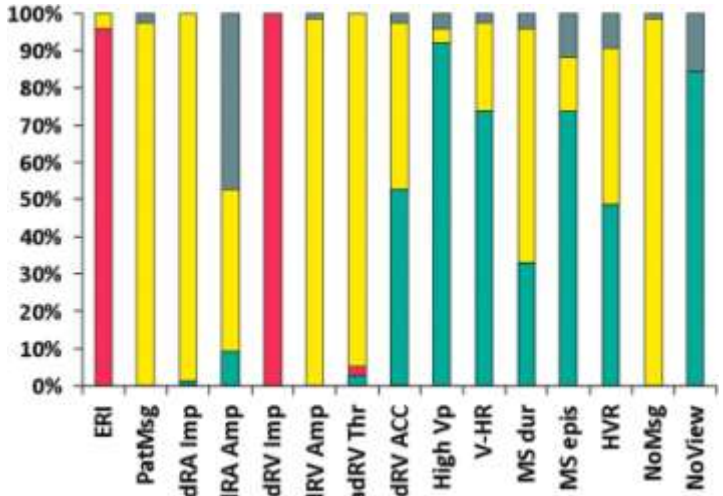
Monitoring of AF burden and Rate Control

Detailed diagnostics shows any increase or decrease in AF burden

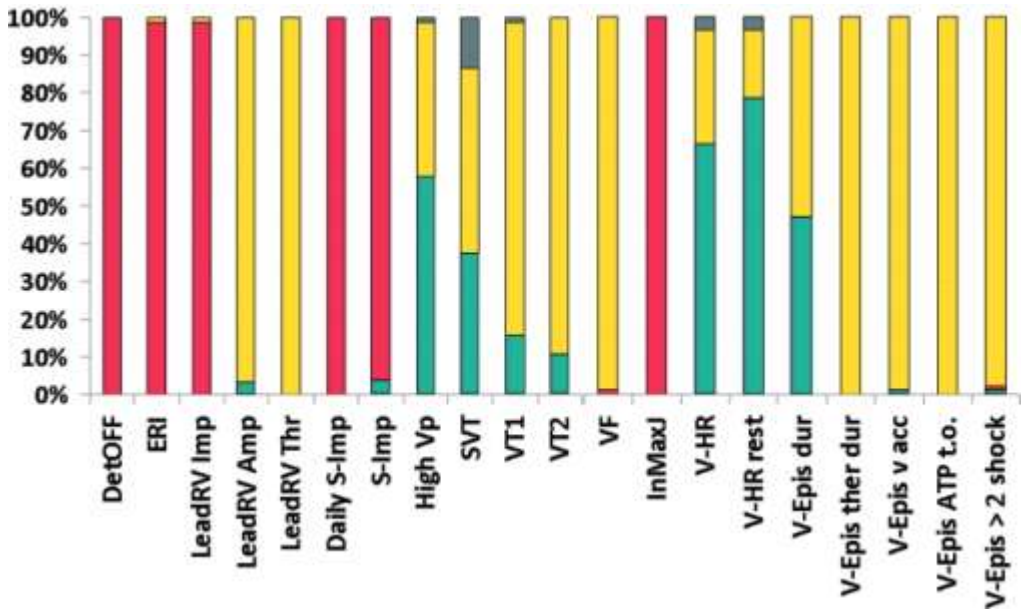


Monitoring for all?

- Historically more attention is paid to critical technical data than to patients' clinical profiles, probably to limit an excessive flow of data into the centre.
- Accurate alert settings, personalized to the patients' features, are essential for easier and more effective management of patients who are followed remotely.



Typical Pacemaker Alerts

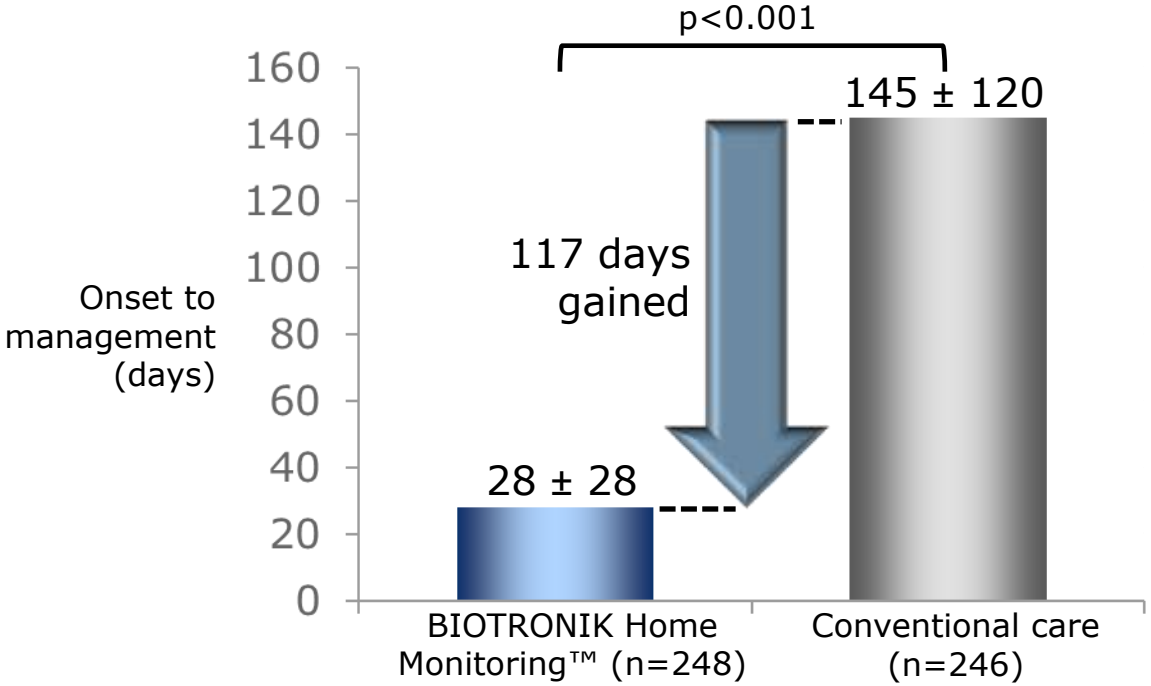


Typical ICD Alerts

Folino A F et al. Europace 2011;europace.eur154

Early Detection of Events COMPAS

Time from onset to cardiac event management in patients with PMs



Data taken from COMPAS RCT for patients with PMs[1]

- **The ability of BIOTRONIK Home Monitoring™ to detect cardiac events earlier than conventional care is supported by observational studies of PM and ICD populations, where events were detected up to 154 days earlier[2, 3]**

RCT=randomised controlled trial; PM=pacemaker; ICD=implantable cardioverter defibrillator

[1]Mabo P. Cardiostim 2010;Jun 16–19 2010; [2]Lazarus A. Pacing Clin Electrophysiol 2007;30(Suppl 1):S2–S12; [3]Ricci RP *et al.* Europace 2009;11(1):54–61

Common Feedback from Physiologists

- Majority of centres focused on the critical technical data, particularly concerning lead integrity, battery depletion, and wave sensing. In contrast, less attention was paid to the clinical data such as AF and HF diagnostics
- Device clinics are often too busy....15 mins (or less!) may not be enough to focus on all the diagnostics available

Folino A F et al. Europace 2011;europace.eur154

Patient Management

The main potential advantage of remote control application in atrial fibrillation management is represented by **early detection** and **early reaction** to the arrhythmia occurrence.

The current device diagnostics are very sophisticated and may give the physiologist/ physician full information about arrhythmia episodes: number and duration, date and time of occurrence, onset mechanism, arrhythmia burden and heart rate during the arrhythmia.

Unfortunately, this information is available only during in-hospital follow-up, usually scheduled every 6 or 12 months, significantly delaying the reaction to atrial fibrillation. This represents a great limitation, mainly for symptomatic patients and for those with mild symptoms.

Impact of Home MonitoringTM on the detection and management of AF
online publish-ahead-of-print 16 November 2008 Renato Pietro Ricci*, Loredana Morichelli, and Massimo Santini

Genuine Questions Remain Today

- Remote monitoring: a cost or an investment?
- Potential increase in workload related to alert messages needs to be offset by improved patient outcome.
- It is still not clear as to whether remote device and patient management should be proposed to all patients or only to a subset that is most likely to benefit from this technology.
- Patients at increased risk of developing adverse clinical events that may benefit from early detection (e.g. atrial fibrillation, heart failure, lead dysfunction, etc.).
- What is the future of the traditional pacing clinic?

European Society of Cardiology. 2011. Burril;Heidbuchel;Jung;Brugada

My Conclusions as a Physiologist

- Home Monitoring is an investment – Allows you to better manage the inevitable increase in device follow up

- Accurate settings of the alerts, tailored to each patient, although requiring more time be spent in the first period of remote monitoring activation, are necessary for simpler and more effective management of incoming data.

- To perform a simple and reliable analysis of the information that arrives at the hospital, the correct settings and proper administration of alert messages must be implemented. Many parameters can be adjusted and tailored to the clinical characteristics of the patient, allowing prompt notification of relevant clinical events and technical issues.

Management of alert messages in the remote monitoring of implantable cardioverter defibrillators and pacemakers: an Italian single-region study Folino et al ***Europace*** *(2011) doi: 10.1093/europace/eur154 First published online: June 3, 2011*

Thank You

Questions?