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The new era of remote monitoring in patients with implantable cardioverter-defibrillators

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The clinical use of implantable cardioverter defibrillators (ICDs) has increased rapidly since the results of several randomized trials confirmed the efficacy of ICDs in the secondary and primary prevention of sudden cardiac death [1].

The more complex devices are leading to a rapidly increasing workload for the follow-up of these patients in specialized centres. According to international guidelines, ICD patients should be followed at intervals of between one and four months, depending on the ICD model and clinical status [2].

Increasing numbers of follow-ups for ICD patients are among the main problems for healthcare systems worldwide.

Recent advances in wireless communication, data storage and implantable electronic technologies have ushered in a new era of real-time, remote electrocardiographic monitoring using implantable devices [3].

Many studies have shown the ability of remote monitoring to reduce follow-up in patients with ICD, to detect serious ICD defects and to check on a patient's daily clinical condition [4–7].

One of the first remote follow-up options for patients with an ICD is Home Monitoring by Biotronik, a revolutionary system that allows a defibrillator to connect to the cellphone network in such a way that it can communicate directly with the physician.

Home Monitoring works with a small device called the CardioMessenger (CM), about the size of a large cellphone. CM communicates via the world cellphone network (GPRS network). The ICD contains a built-in antenna that periodically dispatches reports on the patient's heart and the functioning of the device. The CM picks up these signals and forwards them to a service center, which processes the information and posts it on a secure website for review by the doctor. Urgent matters can go directly to physicians by fax, email, SMS and telephone. The physician can review the Home Monitoring reports and if anything is wrong, he or she will call the patient to make an appointment (Fig. 1).

Biotronik's Home Monitoring system is at the moment the only one which can act completely automatically. Unlike all other telemonitoring systems, all information from the patient's device to the doctor is sent without the patient having to do anything.

Home Monitoring keeps the doctor informed as to what is going on with the heart and the implanted device. The objective is to make data available for:

— diagnosis of the arrhythmia with internal electrogram (IEGM) available on line;
— monitoring of the patient's status;
— analysis of the effectiveness of therapies delivered by the implant;

Figure 1. Biotronik Home Monitoring for follow-up patients with implantable cardioverter-defibrillators.

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— monitoring of the technical status of the implant and the leads.

The other unique feature of Home Monitoring is its capacity for atrial fibrillation and heart failure monitoring. The physician can get crucial information about patients with ICD-CRT, for example the percentage of resynchronization therapy, the left ventricular pacing threshold or the thoracic fluid status (though at present this can only be done via a special code). All those factors mean that doctors can predict an increase of heart failure symptoms and call patients in for earlier follow-up. Such complex monitoring of heart failure patients is a great innovation in telemedicine technology (Fig. 2).

Another new concept being introduced by Home Monitoring is the possibility of 'bidirectional' communication: i.e. from the patient's device to CM to the physician (Fig. 3).

In the latest CardioMessenger II, anything wrong is detected by the system, reviewed by the physician on a screen and a 'callback' function is available. The doctor can send information to the patient's CM with a yellow flashing link, indicating that he should call the cardiologist.

Last but not least, Biotronik is introducing a new website platform for Home Monitoring which

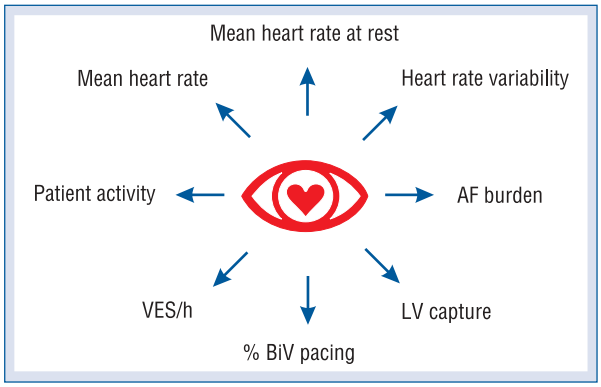

Figure 2. Heart failure parameters monitored by Home Monitoring.

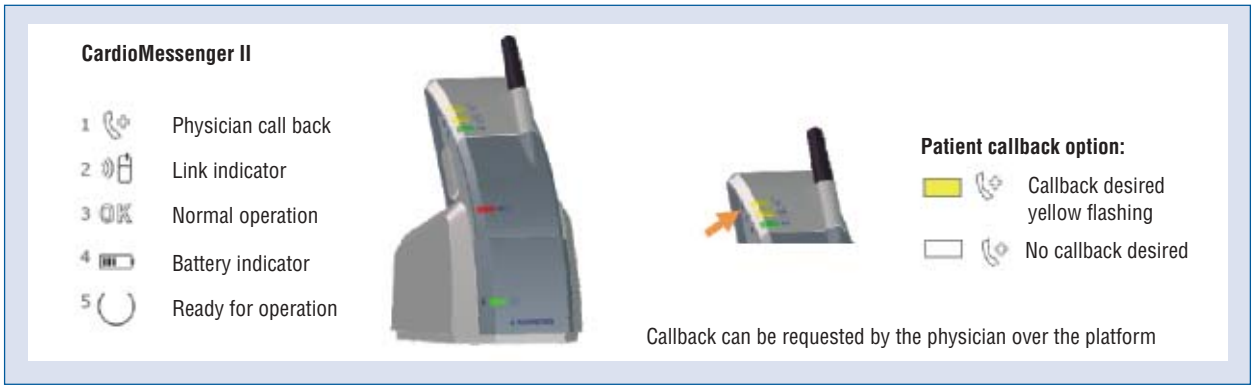

Figure 3. CardioMessenger II with bidirectional connection.

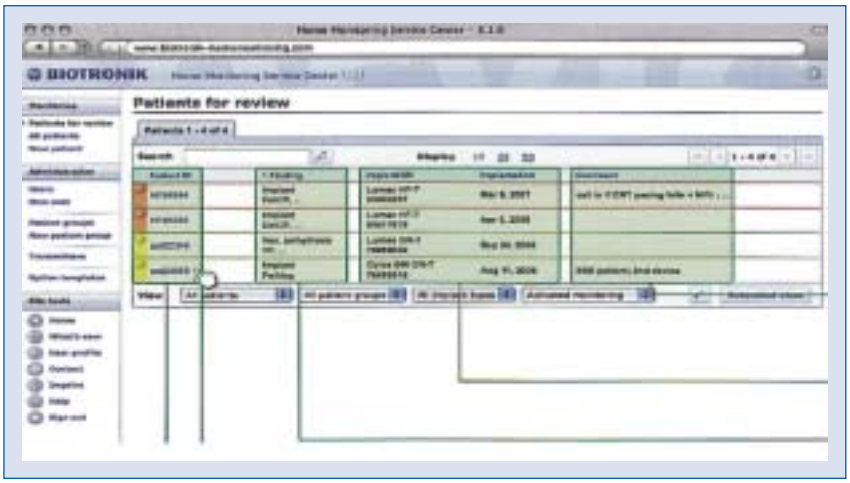

Figure 4. Patient's color status with the new Home Monitoring platform.

facilitates the follow-up. The physician can see a list of patients for review. If anything important has occurred in a particular patient, he or she will be classified as 'red'. In this way, a doctor, upon logging onto the website, can immediately see if there are patients who need attention. The color code helps differentiate clinical priorities (Fig. 4).

The launch of Home Monitoring is an important milestone in the management of ICD patients. It brings a high level of convenience for patients and clinicians and facilitates the follow-up of those patients.

References

1. Vardas PE, Auricchio A, Blanc JJ et al. Guidelines for cardiac pacing and cardiac resynchronization therapy: The task force for cardiac pacing and cardiac resynchronization therapy of the European Society of Cardiology. Developed in collaboration with the European Heart Rhythm Association. Eur Heart J, 2007; 28: 2256–2295.
2. Raatikainen MJ, Uusimaa P, van Ginneken MM, Janssen JP, Linnaluoto M. Remote monitoring of implantable cardioverter defibrillator patients: A safe, time-saving, and cost-effective means for follow-up. Europace, 2008; 10: 1145–1151.
3. Spencer Z. Rosero implantable electrocardiographic monitoring devices. Cardiol J, 2009; 16: 86–87.
4. Heidbüchel H, Lioen P, Foulon S et al. Potential role of remote monitoring for scheduled and unscheduled evaluations of patients with an implantable defibrillator. Europace, 2008; 10: 351–357.
5. Varma N, Johnson MAP. Prevalence of cancelled shock therapy and relationship to shock delivery in recipients of implantable cardioverter-defibrillators assessed by remote monitoring. Pacing Clin Electrophysiol, 2009; 32 (suppl. 1): S42–S46.
6. Spencker S, Coban N, Koch L, Schirdewan A, Müller D. Potential role of home monitoring to reduce inappropriate shocks in implantable cardioverter-defibrillator patients due to lead failure. Europace, 2009; 11: 483–488.
7. Marzegalli M, Lunati M, Landolina M et al. Remote monitoring of CRT-ICD: The Multicenter Italian CareLink Evaluation — ease of use, acceptance, and organizational implications. Pacing Clin Electrophysiol, 2008; 31: 1259–1264.