Remote monitoring: coming close?

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At the 2010 Scientific Sessions of the American College of Cardiology, the *Clinical Evaluation of Remote Notification to Reduce Time to Clinical Decision (CONNECT)* trial was presented as a late-breaking clinical trial. The purpose of the study was to demonstrate that remote monitoring with automatic clinician notifications reduces the event-to-decision time in response to arrhythmias, cardiovascular disease progression, and device malfunctions as compared with standard in-office care. A second purpose was to assess the rates of cardiovascular health care utilisation between treatment groups. The trial was based on the hypothesis that remote monitoring in patients with implantable cardioverter defibrillators (ICDs) and cardiac resynchronisation therapy defibrillators (CRT-Ds) improves patient care and reduces healthcare utilisation. The CONNECT trial was performed in 1997 patients at 136 sites in the USA. The mean age of the patients was 65 years, and 71% were men; CRT-D comprised 35% of the total devices. The patients were implanted with Medtronic ICDs equipped with the Conexus telemetry system that can send regular reports and immediate alerts of potential problems to the patient's doctor through Medtronic's CareLink network. The 1014 patients in the remote-monitoring group visited their doctor one month after their device was implanted and again after 15 months. In between the patients were followed by their doctor only through CareLink. The 983 patients in the control group were not connected to CareLink and had regular doctor's office visits about every three months for 15 months. At follow-up, there were a total of 317 events (172 in remote monitoring arm and 145 in routine in-office care) triggering clinical decisions. It was shown that the median time from event-to-decision was significantly shorter in the remote-monitoring arm compared with the in-office arm (4.6 vs. 22 days). The median time to decision following two ICD shocks in the same episode was zero days in both groups, as was the median time to decision when the ICDs ventricular-fibrillation detection or therapy shut off. During the 15-month follow-up, patients in the remote-monitoring group had on average fewer than four office visits (3.92) while the in-office group patients had on average more than six times (6.27). Remotely monitored patients who were hospitalised had a shorter average length of hospital stay, 3.3 vs. 4.0 days, and a statistically significant 18% reduction saving of about 1659 US\$ per hospitalisation per patient. The presenter of the trial, Dr George Crossley (University of Tennessee College of Medicine, Nashville), concluded that the CONNECT trial for the first time showed that remote follow-up actually creates reliable outcome measures which improves care. The reduction in hospitalisation was most likely due to the ability of remote monitoring to catch atrial fibrillation, especially in people with atrial fibrillation with a rapid ventricular response. However, there was a four-day period from the onset of atrial fibrillation to an appropriate doctor's decision. Therefore, the delay to hospitalisation for new-onset atrial fibrillation, even in the remote-monitoring group, was a disappointing finding in the study, something which has to be improved. It is also important to note that the effect of remote monitoring on battery life and device cost is not fully clear at the present time. With these problems still to be solved, it is fair to say that remote monitoring in patients with ICD and CRT-D results in a significant reduction in time from onset of events to clinical decisions in response to arrhythmias and device issues. In addition, remote monitoring seems to reduce overall healthcare utilisation including decreased number of clinic visits and short hospital stay. These data support the use of remote monitoring in patients with ICD and CRT-D.

Along those lines, home monitoring might become of increasing importance, not only in patients with arrhythmias but also in those with congestive heart failure (see also the abstract by Knotter et al. at our NVVC spring meeting 2010), coronary artery disease, hypertension, and congenital heart disease. Even digital tele-echocardiography and mobile monitoring systems are already around the corner. Of course, more data are needed to determine the ideal patient population, the appropriate technology parameters, frequency and duration of tele-monitoring, and the exact combination of patient management and close monitoring, in particular the responsibility of individuals in call centres, which would assure consistent and improved outcomes with cost reductions. However, one can and may not hold major technological advances with the aim to directly improve patient care. Therefore, remote monitoring will come closer and closer. ■

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