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Original research article

Remote monitoring of patients with implantable cardioverter-defibrillators: Perception of the impact of monitoring and selected determinants of quality of life

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ABSTRACT

The number of patients with implantable cardioverter-defibrillators (ICDs) has been continuously rising. Telemonitoring care (Home Monitoring™ – HM) has been increasingly used during the monitoring of these patients.

Methods: 150 patients with ICDs who were monitored using the HM system (HM+), and 150 patients with ICDs who were monitored using standard outpatient check-ups (HM−) were included. A questionnaire, which focused on the quality of life (QoL) (EQ5D-3L), level of anxiety and depression (HADS), and a custom questionnaire examining the subjective approach of patients to the HM system and telecare workflow, was sent out to all patients.

Results: The method of ICD monitoring did not directly influence the QoL (p = NS). A non-significant trend towards better QoL in HM+ compared to HM− patients was recorded. It was based on total QoL scores (68.6 ± 19 vs. 64.6 ± 16.5, $p = 0.09$). Regarding anxiety and depression, statistical testing also failed to find any difference between HM+ and HM− patients. The most striking difference between HM+ and HM− patients was recorded in the preference for the type of monitoring. 54.9% of HM− patients were interested in remote monitoring, 45.1% said they preferred outpatient check-ups, and only 6.7% ($p < 0.0001$) of HM+ patients were interested in switching to outpatient check-ups from remote monitoring. HM+ patients were more inclined to use remote ICD monitoring ($p = 0.007$) and had a positive approach towards the telecare system ($p = 0.034$).

Conclusion: The method of device monitoring does not significantly affect QoL in patients with ICDs, nor does it affect levels of anxiety and depression. Generally, patients with ICDs monitored using the HM system were very satisfied with telecare and would prefer not to lose remote ICD monitoring.

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Introduction

The quality of life of patients with cardiologic implants who are monitored using the systems of remote monitoring has become an attractive issue. The number of patients with implantable devices is still growing, which evokes the need for safe, quick and effective outpatient care. Today, cardiovascular implantable electronic devices (CIEDs) include pacemakers (PMs), cardiac resynchronization therapy devices, implantable cardioverter-defibrillators (ICDs), implantable ECG recorders and implantable haemodynamic monitors. They are fully programmable devices that are charged by a battery and implanted in a patient's body [1]. Technical parameters of CIEDs are improving offering better conditions for the patients to have a better quality of life. Thanks to contemporary technology, we can use the modern communication methods in outpatient monitoring. We can use telemonitoring (TM), which is monitoring a patient's health condition when a patient and his or her doctor are in different places, i.e. remotely. The most advanced system (which is also used in the Czech Republic the most) is the Home Monitoring^{TM} system (BIOTRONIK SE & Co. KG, Germany).

Most large-scale clinical trials in ICD patients have shown that TM significantly reduced visits to a physician's outpatient clinic without compromising patients' safety [2]. Usual check-ups of patients with ICDs are run in a specialized outpatient department (mostly in an implantation centre) minimally once in 6 months. In case of an approaching depletion of ICD source or other technical problems, the check-ups are run once in 3 months or more frequently. The number of patients with an ICD is increasing, as well as the load of these professional outpatient departments. TM offers a potential solution to these problems [3]. Most ICDs are equipped with a TM function and several expert institutions recommend the regular use of TM in clinical practice [4,5] as a standard part of care for patients with CIEDs. In recent years, the view of the positive factors of TM care of patients with CIEDs has become one of the main interests to researchers. Previous studies showed that especially patients who were not used to the TM system consider classic clinical check-ups in specialized CIED outpatient departments to be positive. They also prefer doctors to technologies regarding their health condition [6]. There have been few published studies which assess the patients' acceptance of technologies. They are also afraid of the TM system of care [7–10]. Similar to health care payers, the providers also understand the need to include the patients' preferences, and they are aware of the need to consider the contribution of new technologies in decision-making. We are still waiting for the results of a large study called REMOTE-CIEDS, which should include about 900 patients. It should assess the views of patients on the TM technology, including the effort to find subgroups of patients who most benefit from this type of care [11]. In the Czech Republic, this issue has not been studied so far. Furthermore, there are still certain disputes about the feelings of patients who are monitored by the TM systems. Especially, when it comes to personal integrity or an unintentional establishment of a stress factor, such as the system of monitoring patients' health condition 24 h a day [9]. Such disputes will probably last until research results convincingly prove that TM has a positive effect even under these circumstances [9,12]. Although TM can provide patients with the feeling of safety, it can also be a constant reminder of their implants and their illness [13].

The goal of our pilot study was to learn whether the patients with an ICD who are monitored by the Home Monitoring (HM) system have a higher quality of life than those who are monitored using standard techniques. Our goal was not to study the quality of life on the whole. We focused on simple measurable areas of physical independence in five assessed domains (mobility, self-service, daily activities, pain and concerns). We also focused on the basic possibility to influence the mental experiencing of anxiety and depression. Another goal was to learn whether the monitored patients are more satisfied than those who are monitored using standard techniques, and also, what their opinion on TM care was (including the possible financial contribution towards it).

Materials and methods

This pilot study was carried out between December 2016 and March 2017. The written approval from the management of České Budějovice Hospital was acquired before the beginning of the research. České Budějovice Hospital was chosen for the research because the Department of Cardiology, along with the Department of Cardiac Surgery, is a complex cardiovascular centre, which provides diagnostics, treatment and preventive care to people with cardiovascular illnesses in South Bohemia and its surroundings, which includes almost 1 000 000 people. From the perspective of arrhythmological care, the hospital's Cardio centre is the third largest care provider in the Czech Republic. From the hospital information system, we gained 150 consecutive patients with ICDs who were monitored using the HM system (intervention group), and 150 consecutive patients with ICDs who were monitored using the standard technique of periodic outpatient check-ups (control group). The number of 300 respondents was based on the qualified estimate of the number of respondents who participated in similar researches. The consecutive inclusion of patients was ensured by the representativeness of the sample group in the given period. Both groups included only those patients who had an ICD implanted between 2009 and 2015, and who had not any procedure related complications within the first 30 days. The hospital information system was the source of the basic clinical data. The patients were sent three types of anonymous questionnaires. All questionnaires were sent in a sealed envelope.

To learn the level of anxiety and depression, we chose the HADS (Hospital Anxiety and Depression Scale) questionnaire because it is a simple but reliable tool for practical use. The term ''hospital'' implies that it is valid only in such an environment, but a number of studies confirmed that it is also valid when used in communities and primary care [14]. It is necessary to emphasize that the levels of self-assessing anxiety and depression were only valid in screening. The final diagnosis must depend on the process of clinical