COMARCH
Healthcare

REMOTE CARDIAC CARE

Monitoring heart activity at any place and any time

REMOTE CARDIAC CARE

With its portable ECG signal and breathing recorder, Remote Cardiac Care enables continuous monitoring of heart activity. Using integrated detection algorithms, the recorder identifies disorders in a patient's heart rhythm. The relevant parts of the ECG record are transmitted to the Remote Medical Care Center and analyzed in detail. If any anomalies are identified, a paramedic, acting in accordance with a planned operational procedure, takes a detailed medical history and refers the patient to a remote consultation with a physician, discusses the case with an on-duty physician or, where there is a threat to the patient's life or health, calls an ambulance. If the patient feels unwell, they can also initiate ECG data transmission to the Remote Medical Care Center.

BENEFITS OF REMOTE CARDIAC CARE

For the medical unit

- **Reducing duration of inpatient treatment and lowering levels of bed occupancy**
- **Observation of patient's health status and their adherence to medical recomendations**
- **Taking a load off medical staff**
- **Increasing the effectiveness of treatment**
- **Convenient access to patient's medical data**
- **Improvement of an institution's image and boost for its reputation**

For the patient

- **Full diagnostics of heart rhythm disorders**
- **Possible continuation of treatment at home**
- **Incresed sense of safety through easier and faster contact with medical staff**
- **Detection of heart rhythm disorders with automatic reporting to medical staff**
- **Shortened response time to life and health threats**
- **Comfort and convenience of medical examination**

EXAMPLES OF USE

Remote Cardiac Care services are provided in accordance with the recommendations of the referring physician. Prior to each examination the medical staff take the patient's detailed cardiac history and perform a reference ECG test. This allows individual adjustment of alarm thresholds initiating an automatic response from the Remote Medical Care Center for each patient.

ECG telemonitoring

Recording the heart rhythm at any time interval. The patient decides when and for how long the examination will be performed, under on-going supervision of medical specialists. The examination can be performed 24 hours per day, in the course of selected daily activities, or in situations when the patient feels unwell. Data is analyzed on an on-going basis by the Remote Medical Care Center. Once the examination is completed, the patient receives a telemonitoring report along with follow-up recommendations.

Holter ECG with monitoring

24-hour recording of the heart rhythm (seven or 12 leads). Thanks to the use of replaceable battery modules, the test can be performed over a long period with uninterrupted recording. In addition to data recording, the device transmits information on automatically detected abnormalities to the Remote Medical Care Center, where the appropriate response is undertaken. Thanks to the integrated GPS and GSM modules, paramedics can call an ambulance to the place where the patient currently is.

Remote ECG on request

Performing a 12-lead resting ECG at any place and at any time. The patient performs the test on their own, as recommended by the physician. The result is immediately transmitted to the Remote Medical Care Center. A test report, in the form of a textmessage, is sent directly to the ECG recording device. In emergency situations, telephone contact with the patient can be initiated. An ECG test under such a procedure can be also performed for groups of patients.

Event Holter

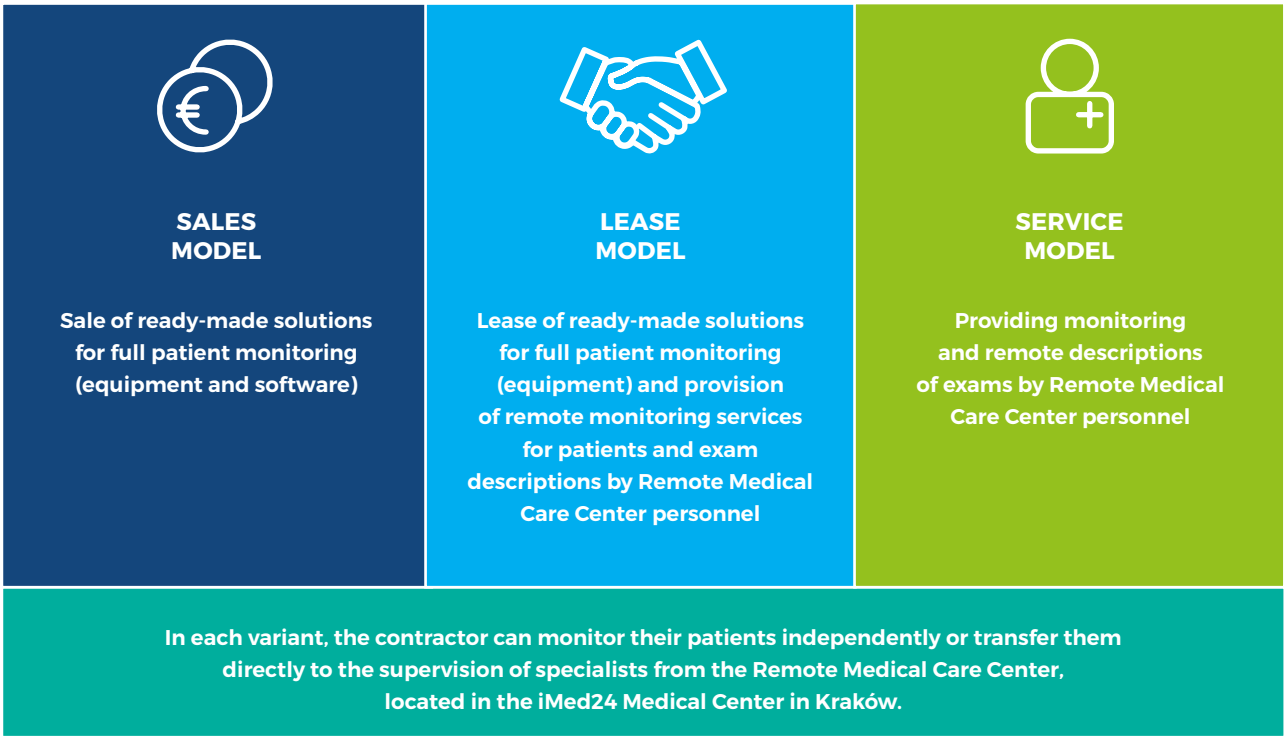
Multiple recording of short fragments of ECG pertaining to specified symptoms. The method allows an investigation into the reason for the symptoms (such as palpitations, fluttering sensations, fainting or pain) reported by the patient. Once the specific symptoms occur, the patient places the recorder on their chest to record the activity underlying symptoms that often do not occur in the course of routine 24-hour Holter monitoring. Each record is transmitted to and interpreted at the Remote Medical Care Center.

BENEFICIARIES

Remote Cardiac Care is widely used in the health market, as the solution complements traditional medicine and enables professional monitoring of patients thus allowing more thorough diagnostics and assessment of the effectiveness of administered therapy. It works well both in healthcare institutions (hospitals, outpatient clinics and specialists' surgeries) and in nursing care institutions. It can also be adopted in transformation projects developing or modernizing the medical infrastructurein hospital groups or regional platforms.

COOPERATION MODELS

The implementation model of Remote Cardiac Care and its functional scope are adapted to the needs and scale of a specific contractor. Depending on the type of activity, it is possible to use different variants:



Possible real-time detection of the most frequent cardiac abnormalities:

- Tachycardia and bradycardia
- Pause
- Atrial fibrillation
- Ventricular fibrillation
- Ventricular tachycardia
- Apnoea
- Pause in atrial fibrillation

COMARCH E-CARE PLATFORM

The provision of Remote Cardiac Care services is possible thanks to the Comarch e-Care platform, which enables permanent monitoring of the patient's life parameters on a remote basis. The platform allows medical data to be recived from measuring devices that record heart activity and cardiac events. It also supports medical staff in the performance of pre-determined procedures.

COMPONENTS OF THE COMARCH E-CARE PLATFORM

e-Care application with the Web interface

Allows connection of telemedicine equipment, receiving and managing data, graphic visualization of data consistent with medical standards, integration with HIS class systems, geographical location of patients, managing work and procedures of intervention personnel, contact with patients through audio and video channels and performing medical consultations in a workflow system.

COMARCH Holter

Application designed to precisely record and analyze cardiac data. It is based on advanced and precise algorithms allowing a thorough analysis in the area of, for example, morphological classification of QRS complexes, HRV analysis, or assessment of the ST segment and QT interval. The application manages the entire patient care process, including the analysis of test results, as well as patient data and the resources available (Holter recorders and the medical staff).

COMARCH PMA (Personal Medical Assistant)

A digital ECG recorder enabling continuous performance of multiple-day tests with a high-quality signal. The apparatus automatically detects heart rhythm abnormalities and notifies, on an on-going basis, the paramedics of the Remote Medical Care Center. Thanks to the patient geolocation function, paramedics can reach patients faster in emergency situations. Tests are performed with seven or 12 leads. The apparatus is certified as a Holter ECG and a resting ECG recorder.

CardioDial

An easy-to-use portable digital Holter event monitoring device, allowing ECG tests to be performed in comfort. The recorder is placed directly on the chest at the moment the patient feels specific symptoms. The signal is recorded and transmitted to the Remote Madical Care Center. While the signal is being recorded, it is possible to monitor current heart activity. The device records 30-second ECG signals in a single-lead mode.

REMOTE MEDICAL CARE CENTER

The key element of the e-Care system is the Remote Medical Care Center, where the medical staff provide 24-hour monitoring of patients' health status and record their heart rhythm in the course of everyday activities.

Brings together qualified medical staff: paramedics, physicians specializing in various fields of medicine: cardiologists, dietitians or physiotherapists.

Monitors patients' health parameters around the clock, including on holidays.

Intervenes in the case of automatically detected anomalies (exceeded norms and alarm values), the parameters of which are personalized for each patient, as well at the request of the patient (triggered by, for example. the use of the "SOS button" alarm device).

Uses medical workflows (procedures) to enable faster and better directed interventions.

Comarch Healthcare S.A. has implemented a certified quality management system for medical devices ISO 13485. The Comarch e-Care Platform and the cardiology devices are Class IIa medical devices certified as compliant with Directive 93/42/EEC.

TECHNICAL PARAMETERS OF DEVICES

RECORDER	7 LEADS	12 LEADS	1 LEADS
Model	PMA.P2 PECG5	PMA.P2 PECG10	CardioDial
Recording duration	Memory card capacity: 7 days	Memory card capacity: 7 days	6 records, 30 seconds each
Battery life	7 days in Holter mode 2 days in Tele-Holter mode	7 days in Holter mode 2 days in Tele-Holter mode	3 days
Patient's cable	5 cables 7 leads	10 cables 12 leads	single lead
Data transmission	wireless 2G and EGPRS	wireless 2G and EGPRS	wireless GPRS
Display resolution	320 x 240	320 x 240	none
Data archiving	SD 4GB card	SD 4GB card	possible storage of up to 6 records 30 seconds each
Input voltage range	3.6 V to 4.4 V	3.6 V to 4.4 V	4,5 V to 5,9 V
Digital resolution	effective resolution: 16-bit	effective resolution: 16-bit	16-bit
Signal sampling frequency	500 Hz	500 Hz	256 Hz
Frequency range	0,05 to 100 Hz	0,05 to 100 Hz	0,5 to 65 Hz
Voltage polarity	unipolar voltage of 3 V	unipolar voltage of 3 V	N/A
Signal amplification factor	3	3	N/A
Cardiac pacemaker detection	Amplitude: 2-200 mV; pulse duration: 0.1-2 ms	Amplitude: 2-200 mV; pulse duration: 0.1-2 ms	N/A
Power supply	3,200 mAh battery in a replaceable module	3,200 mAh battery in a replaceable module	integrated 820 mAh battery
Dimensions	PMA including the power supply and data module: 106 x 66 x 20 mm ECG module: 64 x 32 x 13 mm	PMA including the power supply and data module: 106 x 66 x 20mm ECG module: 64 x 32 x 13 mm	107 x 66 x 17mm
Weight	PMA including the power supply and data module: 170 ± 10 g ECG module in the X.ECG05P2 version: 60±5g	PMA including the power supply and data module: 170 ± 10 g ECG module in the X.ECG10P2 version: 83 ± 5 g	40 g

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FACTS AND FIGURES ON COMARCH HEALTHCARE

MORE THAN
80 HOSPITALS
USE OUR SYSTEMS

EVERY DAY
ABOUT
30 000 USERS
LOG ON OUR SYSTEMS

MORE THAN
200
OUTPATIENT FACILITIES
USE OUR SOFTWARE

WE SUPPORT
THE HEALTHCARE SECTOR
24/7
365

IN 2015
1500 PATIENTS
WERE COVERED BY OUR REMOTE MEDICAL CARE

WE PROVIDE SOLUTIONS FOR ALL
MEDICAL FIELDS

COMARCH HEALTHCARE S.A.

al. Jana Pawła II 39a | 31-864 Kraków, Poland | www.healthcare.comarch.com

Inquiries: healthcare@comarch.com
Inquiries concerning operation of medical devices: contact@telemedicine.comarch.com