Software and hardware solutions for telemonitoring and assessment of the functional state of quarantined patients.

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Compliance with quarantine requires: (a) the patient being at home permanently, (b) the lack of direct physical contacts with other people, including medical staff. Thus, patients with chronic diseases (coronary heart disease, arterial hypertension, type 2 diabetes mellitus, etc.) become deprived of the possibility of their periodic examination by medical personnel using routine methods (ECG, blood tests, thermometry, auscultation, percussion, palpation ...), which worsens the prognosis of the course of their underlying diseases. It is known that the limiting factor in the appointment of Chloroquine in patients with COVID-19 is standardized duration of ventricular electrical systole as measured by QTc index of ECG. Maximal normal values of QTc are 0,45 for men and 0,47 for women. Exceeding this indicator is associated with an increased risk of life-threatening ventricular tachyarrhythmias and sudden cardiac death. Thus, against the backdrop of the coronavirus epidemic, the problem of remote assessment of the functional state of the cardiovascular system in elderly patients with concomitant diseases of the cardiovascular and neuroendocrine systems, as well as in people of all ages with coronavirus infection who are receiving treatment at home, has become sharply relevant. Our solution to this problem is based on the following. We supply patients with ultraportable electrocardiographs for personal use which are connected via bluetooth with smartphones tablets or PC. Almost all adult patients have their personal smartphones. This facilitates and significantly reduces the cost of the signal registration module.

Equipment (Solvaig, JSC).

In Ukraine we widely use ECG recorders for telemonitoring of the 06000.X series of production by **Solvaig, JSC**, Ukraine. This series includes more than 6 different models with the ability to register from 1 to 12 leads, with various technical parameters and a wide range of applications. These are easy-to-use, highly reliable and affordable devices. Software for working with all these ECG-recorders for smartphones (Android OS) and for PCs (Windows OS) - FOR FREE. Currently under development software for iOS. The most complete description of ECG-recorders can be found on the manufacturer's website in the sections: - "Support / User Instructions" - https://solvaig.com/user-guides and "Shop / Monitoring system" Telecardian "- https://solvaig.com/monitoringovaya-sistema-tele%D1%81ardian . The manufacturer is certified according to the European quality standard ISO 13485: 2016. These ECG recorders can be used both independently, on a smartphone or

tablet, and for working with cloud telemedicine services. We have developed cloud services for both manual ECG processing by a physician (Telecardian, www.telecardian.com) and fully automatic ECG processing and heart rate variability (CardioLyse, www.cardiolyse.com). The presence of a cloud-based data analysis service significantly reduces the cost and speeds up data processing and the formation of automatic conclusions.

Cloud servise CardioLyse (www.cardiolyse.com).

We start distributing our platform services CardioLyse as a system to support decision-making and diagnostics for the ECG-derived QTc values of patients having COVID-19 treatment medication through telemedicine companies and ECG device makers. Some COVID-19 treating medications like Hydroxychloroquine and Azithromycin were detected to cause the potentially life-threatening QT prolongation effect. And within both in-hospital and out-hospital care Cardiolyse cardiac analytics cloud platform can enable the patient's QTc monitoring and analysis to detect heart conditions, manage treatment and prevent cardiac health deterioration. Our solution is already CE certified for that, particularly detecting all cardiac abnormalities. The automatically generated report for 6-channel recording consists of more than 400 generally accepted standard as well as innovative highly sensitive ECG parameters and heart rate variability (HRV). This makes it possible, with daily monitoring, to monitor negative trends and make a forecast for the development of cardiovascular complications, which is important for saving the time of a family doctor and making a quick decision on treatment correction. The use of HRV analysis, previously widely used in Soviet space medicine, allows us to assess the functional state of the autonomic nervous system, the balance of sympathetic and parasympathetic regulation, the general adaptive potential of regulation, Baevsky stress index, Baevsky regulatory systems activity index, Samn-Perelli Fatigue Level, biological age and emotional state.