

Psychiatry and Informatics – Joining Forces to Improve Mental Health

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Monitoring and analyzing physiological parameters under different conditions of health and disease is one important aspect of medical informatics with a direct impact on diagnostics and therapy. Moreover, informatics can help understand certain pathophysiological aspects of disorders. The usefulness of biomedical and health informatics is well established in areas of medicine with a close connection to basic physiology, e.g. cardiology, a fact that is underlined by the two papers in this issue of *Methods of Information in Medicine*, addressing cardiologic topics and representing improvements over current diagnostic strategies.

Rantner et al. propose a new algorithm for analyzing ECG recordings of patients suffering from the Wolff-Parkinson-White syndrome [1]. It is able to locate accessory pathways between the heart's atrium and ventricle more accurately than current algorithms by analyzing delta wave morphology. The localization of these potentially dangerous pathways, bypassing the AV node, is of considerable importance, as it may support cardiologists in planning catheter ablation therapy, in which the accessory bundle is destroyed and thus re-entrant tachycardia is avoided.

Once ventricular fibrillation occurs, instant defibrillation is the therapy of choice. Nowak et al. compare parameters based on autoregressive modeling with those cur-

rently used based on Fast Fourier transform with regard to their power to predict the outcome of countershock therapy [2]. The authors conclude that these features not only are less computation-intensive, but also perform better than established FFT-based parameters, thus optimizing the chance of identifying countershock opportunities and minimizing cardiac damage.

A less well-known medical condition is addressed in the paper by Kalicka et al. – lung microangiopathy in diabetes patients [3]. The authors present a new oxygen diffusion model based on differential equations and report its advantage of employing only parameters, which are routinely measured in lung function tests, such as diffusion capacity and alveolar volume. The new method is used for classifying patients and compared to current tests, which require a specific routine while the patient is lying and standing.

These three papers originate from disciplines of internal medicine, where the use of figures and measurable parameters is every day routine. Especially the disciplines of “speaking medicine” like psychiatry are not used to employ informatics methods so far, even though the last years have witnessed an enormous increase in physiological and biological research in this area. In the current issue of *Methods of Information in Medicine*, two papers address psychophysiology issues in healthy persons as well as in patients suffering from schizophrenia.

Akar et al. report on a study performed with schizophrenic patients [4]. Based on the observation that certain kinds of music, in this case classical Turkish music, seem to have beneficial effects on psychiatric patients, the authors followed on the idea that music as auditory stimulus evoking positive emotions might have an effect on the autonomous system and that this effect might be different in schizophrenic pa-

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tients given that these have known difficulties in processing emotions. Using the respiratory parameters breath rate and breath depth in an experimental condition with probands hearing classical Turkish music or white noise as auditory stimuli, the authors found large differences between patients and controls especially during the period of listening to music. Within the patients' group, these differences were more pronounced in patients with more severe symptoms of the disorder. Even though of pilot character, this study shows, how simple physiological measurements can give insights into disturbances of emotion processing in psychiatric disorders.

Measuring physiological signals reflecting the state of the autonomic nervous system has been proposed as a method of monitoring mental states and several studies have used signals such as heart rate variability or changes in skin conductance to measure mental tension in experimental situations. The paper by Yoshino and Matsuko has extended this approach to the daily life setting. They present a method of using continuous measurement of the heart rate variability to monitor psychological tension in healthy subjects [5]. Increased psychological tension is believed to precede unwanted incidents in mental disorders like relapse in alcohol dependent patients or suicide attempts. The use of such systems is promising, as many patients suffering from different psychiatric disorders are not well able to assess their mental ten-

sion themselves. Future studies are needed to show, if the proposed monitoring of psychological tension can help to detect critical situations for the individual and potentially help prevent deleterious consequences.

Even though not (always) deleterious, deficits in activities of daily living are a common problem for patients with cognitive or motor deficits. With people getting older, cognitive and motor deficits are increasing and assistance systems for daily life are needed. A system for monitoring activities of daily living using an unobtrusive, multi-modal sensor-based approach is presented by Matic et al. [6]. The authors combine RFID technologies with a vision system to detect dressing failures in an experimental setup, thus providing an example of how individuals with motor or cognitive deficits may be supported in their homes in the future.

These three papers are a good example for the added value of cooperation between psychiatrists and medical informaticians. In the interdisciplinary perspective, different signals can be used to identify certain disease conditions. Tailored interventions can then be used to deal with such conditions once identified. It seems that the use of monitoring techniques can not only help support patients in their daily life, but also might prevent serious events in the course of a psychiatric illness by different interventions. If, for example, it was possible to monitor suicidal tendency in a patient

using the proposed methods, and the signal would reach a dangerous level, then it would be possible to a) give a feedback to the patient, b) alarm the therapist, c) initiate a phone call to the next hospital etc. possibly preventing a suicide in this patient. Technologies supporting patients and therapists in such a way can only be developed in close cooperation between psychiatry and medical informatics.

References

1. Rantner I, Stühlinger M, Nowak C, Spuller K, Etsdashvili K, Stühlinger X, Berger T, Dichtl W, Gothe R, Fischer G, Hintringer F. Localizing the Accessory Pathway in Patients With Ventricular Preexcitation Using a Score Based Algorithm. *Methods Inf Med* 2012; 51: 3–12.
2. Nowak CN, Neurauder A, Wieser L, Wenzel V, Abella B, Myklebust H, Stehen PA, Strohmenger HU. Monitoring Prediction of Countershock Success in Patients Using the Autoregressive Spectral Estimation. *Methods Inf Med* 2012; 51: 13–20.
3. Kalicka R, Slominski W, Kuziemski K. A novel pulmonary diagnostic support – modelling of diffusing capacity measurement results in lung microangiopathy patients. *Methods Inf Med* 2012; 51: 21–28.
4. Akar SA, Kara S, Bilgic V. Respiratory Variability during different auditory stimulation periods in schizophrenia patients. *Methods Inf Med* 2012; 51: 29–38.
5. Yoshino K, Matsuoka K. Personal adaptive method to assess mental tension during daily life using heart rate variability. *Methods Inf Med* 2012; 51: 39–44.
6. Matic A, Mehta P, Rehg J, Osmani V, Mayora O. Monitoring Dressing Activity Failures through RFID and Video. *Methods Inf Med* 2012; 51: 45–54.