

ROLE OF WEARABLES IN CARDIOPULMONARY DIAGNOSTICS AND TREATMENT

Rüdiger Siekmeier¹, Angela Patricia Moissl², Jürgen Hannig¹

¹Drug Regulatory Affairs, Pharmazeutisches Institut, Universität Bonn, ²Institut für Ernährungswissenschaften, Friedrich-Schiller-Universität Jena, Jena, Deutschland

Introduction: Wearables are important in lifestyle control and medicine serving for control of activity, fitness, and pulse rate (e. g. sports) and diagnostics/control of heart rate/arrhythmia, blood pressure, blood oxygenation, sleep apnea and lung function. Most devices available for lay people are not CE certified (Europe) or approved/cleared (USA) medical devices. Results of various devices can be combined/processed by algorithms/artificial intelligence and are used by physicians for patient diagnostics/monitoring.

Materials and methods: Study aim was an overview of wearables for use in cardiopulmonary medicine/rehabilitation including technologies, indications for use and regulatory status.

Results: Wearables allow short time/continuous monitoring of cardiopulmonary parameters. Technologies differ in respect to technology and biomarkers [e. g. triaxial accelerometers (activity control), electrocardiogram/photoplethysmography (heart rate/arrhythmia), impedance (thoracic fluid), spectroscopy (pulse oximetry), flow measurement (sleep apnea, asthma), sound recording (digital stethoscope)]. Obtained data are transferred (e. g. Bluetooth, WLAN), combined with data of electronic health applications (apps, questionnaires) and processed by algorithms/artificial intelligence. Advantages of wearables are rapid detection of large data amounts, broad availability, use for patient diagnostics/monitoring (e. g. asthma, COPD). Disadvantages are requirement of patient education, dependency on patient compliance/adherence, the large amount of data for analysis and data safety.

Conclusions: Typical wearable indications are activity control, diagnostics/surveillance (e.g., heart frequency/rhythm, electronic stethoscope, sleep apnea) and disease monitoring/rehabilitation (e.g., asthma, COPD). Algorithms/artificial intelligence improve wearable use and distribution. Handling and safety of obtained data in clinical diagnostics (including data transmission) and patient compliance are of great importance and should be further optimized.