Title: Wrist actigraphy predicts outcome in patients with pulmonary hypertension

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Body: Rationale: Pulmonary hypertension (PH) impairs quality of life, exercise and survival. Simple measures to monitor the disease are needed. We tested whether actigraphy by a wrist-worn device in the patients home reflects disease severity in PH patients. Methods: We studied 23 outpatients with precapillary PH (15 females) in WHO functional classes II-IV. Evaluations comprised clinical examination and actigraphy during 2 weeks while patients pursued their usual life at home. Actographies were correlated with clinical data and mean pulmonary artery pressure (mPAP). Deaths, lung transplantations and pulmonary endarterectomy were recorded during 4 years. Results: Actographies revealed a mean±SD day-time with activity of 14:57±1:14 hours, activity counts were 146±125/min. Very severely impaired patients (mPAP 50±7 mmHg) rested more time immobile during nights (8:25±1:18h) and were less active during days (54±44 counts/min) compared to modestly impaired patients (mPAP 33±7 mmHg; night-time immobile 6:58±0:39h; day-time activity 229±148 counts/min, P<0.05 all instances). Of 19 patients followed for 4 years, 5 died, 1 underwent lung transplantation. Kaplan-Meier analysis revealed a shorter survival without lung transplantation in patients being active for less than 15h per day compared to patients with more than 15h of activity per day (log-rank P=0.026). Conclusion: A long nocturnal rest and reduced day-time activity recorded by actigraphy are associated with severe hemodynamic impairment and reduced survival in patients with PH. Therefore, wrist actigraphy performed during everyday life in the patient's home holds promise as a simple tool for assessment of disease severity and prognosis in patients with PH.