e-Cardiology / Digital Health, Public Health, Health Economics, Research Methodology – e-Cardiology / Digital Health, Remote Patient Monitoring and Telehealth

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Remote telemedicine strategy based on multi-risks intervention by intelligent wearable health devices in elderly comorbidities patients with coronary heart disease

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Background: Telemedicine based on wearable intelligent health devices becomes increasingly promising for the elderly due to the accelerated aging population. Especially during COVID-19 pandemic, more elderly coronary heart disease patients with chronic comorbidities are in less secondary prevention management at home.

Objective: To explore the prevention effect on main cardiovascular risk factors and repeated hospitalization in elderly comorbidities patients by telemedicine intervention based on multi-parameter wearable monitoring devices.

Methods: Total of 337 patients with comorbidities of coronary heart disease, hypertension and diabetes, with age more than 65 years old were recruited in the study from October 2019 to January 2021. They were randomly divided into control group and telemedcine intervention group. The latter used remote multi-parameter wearable devices to measure blood pressure, glycemic and electrocardiograph at home every day. A real-time monitoring platform would alarm any abnormal data to the doctors. Both doctors and patients can read the measurement results on a real-time mobile phone APP and interact with each other remotely twice a week routinely. A medical team remotely indicated the medications, while offering guidance on lifestyle. In contrast, the control group adopted traditional outpatient medical strategy to manage diseases.

Results: A total of 306 patients were enrolled in the follow-up experiment finally: 153 in the intervention group and 153 in the control group. Patient characteristics at baseline were balanced between two groups. After 12 months, compared with the control group, the intervention group saw the following metrics significantly reduced: systolic blood pressure (SBP) (131.66±9.43 vs 137.20±12.02 mmHg, P=0.000), total cholesterol (TC) (3.65±0.79 vs 4.08±0.82 mmol/L, P=0.001), low density lipoprotein cholesterol (LDL-C) (2.06±0.53 vs 2.38±0.61 mmol/L, P=0.002), and fasting blood glucose (FBG) (6.26±0.75 vs 6.81±0.97 mmol/L, P=0.000), while the following metrics went up significantly: blood pressure control rate (77.3% vs 59.1%, P=0.039), blood lipid control rate(39.4% vs 21.2%, P=0.037), glycemic control rate (71.2% vs 51.5%, P=0.031), and medication adherence score (7.10±0.77 vs 6.80±0.73, P=0.020). Linear regression model analysis indicates that when interaction frequency $\geq$1.53, 2.47 and 1.15 times/week, the SBP, LDL-C and FBG levels would be controlled, respectively. Cox survival analysis finds that the hospitalization rate of intervention group is significantly lower than that of the control group (24.18% vs 35.29%, P=0.031).

Conclusion: The telemedicine interactive intervention based on multi-parameter wearable devices provides effectively improvement of cardiovascular risk controlling, medication adherence, while reducing the hospitalization rate of patients. A frequency of doctor-patient interactions more than 2 times/week is beneficial for disease management the elderly at home.
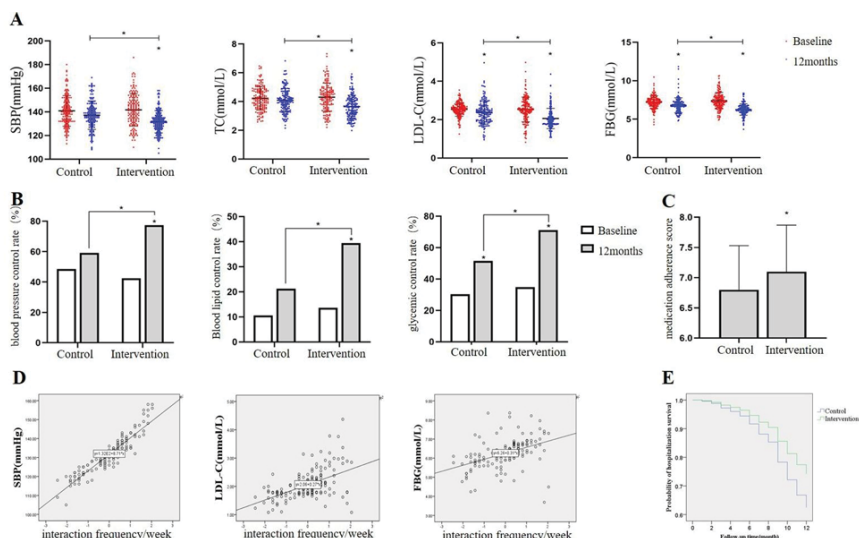
Results: Intervention effect on blood pressure, blood lipid and glycemic(A), disease control rate(B), medication adherence(C), hospitalization rate(E); Correlation between interaction frequency and SBP, LDL-C,FBG, respectively(D).
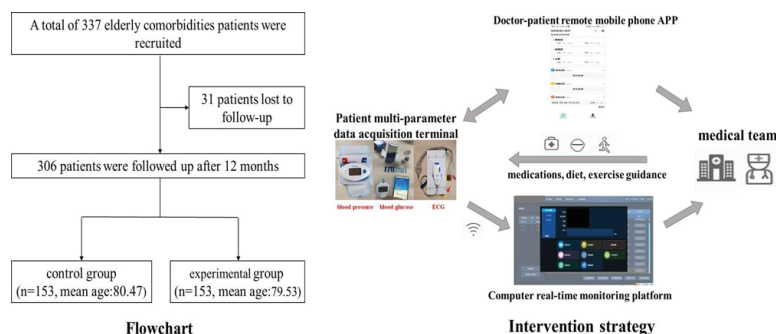
Figure 1. Results

Figure 2. Flowchart and intervention strategy