Knowledge Discovery from Lifestyle Profiles to support Self-management of Chronic Heart Failure

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During recent years, significant effort has been directed towards the development of tele-monitoring systems in smart home environments to support independent living. Nevertheless, limited research has been conducted in relation to the analysis of a users lifestyle profile in conjunction with long term chronic health conditions. In this paper, we present the details of an investigation into the analysis of the lifestyle of persons suffering from chronic heart failure (CHF) monitored by a set of home based sensors in conjunction with health status. The aim of the analysis was to extract knowledge from a users lifestyle profile to provide guidance for the self management of their condition. The lifestyle dataset was collected from 5 subjects living in single occupancy environments over a period of twelve months. The data included (1) activity based data recorded by sensors installed in the rooms, furniture and domestic appliances; (2) vital sign data including information such as weight and blood pressure; (3) health status data including self reporting on breathlessness and tiredness. In the first instance, analysis was directed towards the trend analysis of vital signs. Secondly, user activity profiles based on sleeping patterns were analysed, along with patterns of inactivity (for example watching TV) and appliance usage (for example kettle, fridge). Key information such as total sleep time, sleep episodes, total inactivity time, inactivity time period, number of appliance usages and time length of each usage were computed and extracted over the entire time period for all 5 subjects. During these instances the related health status was compared to investigate the possible cause of the abnormal behaviours. The results demonstrated that the lifestyle profile can be a useful indicator to assist sufferers of CHF managing their condition and can be used as an objective reference for behaviour change.