Design for telemonitoring of master athletes with coronary artery disease

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Telemonitoring technologies used in cardiac rehabilitation (CR) mainly address patients who need to increase physical activity and are not used to self-monitoring. In this position paper, we discuss design implications and challenges for telemonitoring of an emerging patient population - master athletes (MAs) with coronary artery disease, at high risk of sudden cardiac death. Highly active and usually asymptomatic, MAs do not fit into traditional CR programs, and have different needs and values when it comes to technology and data interaction. Our work discusses current design guidelines for telemonitoring in cardiac care through the lens of a patient population who (i) need to "slow down" rather than "speed up", and (ii) transition from using data as measurement for athletic success to data as an indication of health.

CCS Concepts: • **Human-centered computing** → **Interaction design**.

Additional Key Words and Phrases: telemonitoring, master athletes with CAD, human-data interaction

1 INTRODUCTION

Telemonitoring technologies used in cardiac rehabilitation (CR) monitor patient symptoms and behaviour remotely through e.g., blood pressure monitors, ECG sensors, activity trackers [5]. These technologies enable personalised assessment and recommendations from clinicians and assist patient self-management [6, 7]. Current cardiac telemonitoring interventions have widely focused on patient populations with unhealthy lifestyle mechanisms (e.g., sedentary behaviours) and low data literacy [8–11, 13, 15]. Our interest lies in an emerging patient population at high risk of exercise-related death: master athletes (MAs) with coronary artery disease (CAD) [4]. MAs are recreational athletes above 35 years of age who engage in competitive athletics (e.g., cycling, triathlon, marathon) [12]. MAs do not "fit into" traditional CR programs due to a mismatch in exercise pace, goals and needs, and CR recommendation guidelines for MAs are still in their infancy [3]. Cardiac telemonitoring can offer safe and tailored conditions for the rehabilitation of MAs. However, design guidelines for telehealth aimed at this population have not yet been sufficiently investigated. In prior work, we addressed the importance of personalised cardiac telemonitoring. In our current and future work, we look at existing design challenges for cardiac telemonitoring through the lens of MAs.

2 DESIGN CHALLENGES

2.1 The emotional ambivalence of self-tracking and data interaction

Prior to their diagnosis, MAs heavily rely on commercial fitness trackers for measuring activity performance. They experience enthusiasm and reassurance when interacting with their data [2]. After the diagnosis with CAD, the same insights are perceived as metrics of both performance and health. Insights of systems trained on non-patient data, as

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well as comparing "alarming" data with previous performances (e.g., too much time in heart rate zone 4) can create feelings of anxiety and confusion. Moreover, as MAs are usually recommended to renounce intense physical activity and limit themselves to leisure-time sports [3], they might experience a lack of motivation in health-tracking post-diagnosis. Lastly, some MAs get diagnosed based on concerns about data derived from commercial heart rate monitors [4] - the association between self-tracking and unexpected, negative outcomes may prevail after being diagnosed.

2.2 Enabling co-experience and collaboration

Physical activity recommendations for MAs are based on the type of sport, performance goals of the patient and development of symptoms [3, 12]. MAs have high expectations and standards for sports activities. In order to ensure adherence and avoid appropriation of training recommendations, intelligent telemonitoring systems should allow for patient-clinician co-experience, collaboration and negotiation in creating and maintaining recommendations. Moreover, as a majority of MAs are asymptomatic, systems which contain automatic symptom-classification should always allow for clinical verification and feedback [1, 14].

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