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## Defining patients needs and expectations for eHealth-based cardiac rehabilitation in Germany and Spain: living lab data from the TIMELY study

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On behalf of The TIMELY Consortium

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**Background:** eHealth innovations have set the stage to optimize personalized care and provide assistance for disease control to patients with CAD. TIMELY is the first artificial intelligence (AI)-driven eHealth approach that employs internet of things devices and is based on cardiac rehabilitation (CR) components. To guarantee acceptance and usability of eHealth solutions, patients are actively participating in development through a Living Lab approach.

**Purpose:** To define patients' needs for an eHealth-based lifestyle intervention and self-care support.

**Methods:** The Living Lab approach included a guided survey conducted among CAD patients at CR centers in Germany and Spain during inpatient or outpatient CR, respectively. Questions referred to current use of technology and patients' opinion on the usefulness of suggested features of a future eHealth application. Ratings for usefulness/importance were recorded on a 5-point Likert scale reported as median score.

**Results:** 79 patients (20% female) were interviewed (DE, n=49; ES, n=30). Patients' mean age was 57 years (range 37–79), educational level was 87% ≤ high school and 13% > high school. All patients owned a smartphone that they also used for information (76%) and documentation (43%). Patients rated the importance of all CR components (regular exercise, healthy diet, stress management, smoking cessation, risk factor reduction) along the continuum of care as “very high” (5/5). Individual need for regular

exercise support after structured CR was rated “high” (4/5). Exercise reminders, suggestions on activities, update of recommended training heart rate, evaluation of training progress, and achieved goals were rated “useful” (4/5) to “very useful” (5/5). The importance of support for diet, stress management, overall risk factor management, and medication was rated 3/5. Usefulness of a learning/education tool was rated 4/5, while motivational messages scored 3/5 and individual feedback of a person or virtual agent scored 4/5 and 3/5, respectively. The availability of electronic health records was evaluated as “very useful” (5/5) remote ECG monitoring and blood pressure management were rated as “useful” (4/5). The range of all items accessed was 1–5, indicating large interindividual differences. No significant differences existed between female and male patients or German and Spanish patients, though the importance of sharing training progress with family/ friends was rated higher by men (3/5) compared to women (1/5) and higher by Spanish (4/5) compared to German patients (2/5).

**Conclusions:** CR patients expressed a strong need for individual support of regular physical exercise and updated training recommendations. The observed inter-individual differences regarding usefulness and acceptance indicate the need for a highly adaptive system to prevent exclusion from eHealth access. CR patients from Germany and Spain showed equally high acceptance of eHealth components for the management of CAD.