

13,549 men (mean age 57±13) have utilized our telematic network (for symptoms such as palpitations, syncope, dizziness, atypical chest pain, testing of antihypertensive therapy response, detection of hypertension/hypotension). We analyzed 28,282 performances: 18,087 ECG; 5,094 ABPM; 5,101 ECG Holter. Among a total of 18,087 ECG, in 3,436 (19%) we found abnormalities of the electrocardiographic track. Among the 5,094 ABPM recording, in 2,190 (43%) it was detected an abnormal 24h pressure trend, according to the classification of European Society of Hypertension: in 1833 (36%) we found systo-diastolic hypertension; in 356 (7%) isolated systolic hypertension; in 203 (4%) isolated diastolic hypertension. Among the 5,101 subjects undergoing ECG Holter monitoring, in 1,673 (32.8%) were detected arrhythmias such as atrial fibrillation (563 patients), ventricular arrhythmias (413 patients), and advanced atrial-ventricular blocks (219 patients); in 413 cases (8.1%) the arrhythmias were life threatening. In case of detections of abnormalities the subjects were referred to their General Practitioner (GP) or cardiologist for further evaluation or diagnostic investigations; in the cases of life threatening conditions the patients were referred to the closest Emergency Department (ED).

**Conclusion:** Our data confirm the important role of a telematic network in the primary and secondary prevention of CV diseases, by increasing the early diagnosis and treatment, improving the appropriateness in the admission to the ED and hospitalizations for CV events, then resulting in a probable positive impact on health care costs.

#### P5204 | BEDSIDE

##### Preliminary usability assessment for a novel robotic interface for remote Doppler-echocardiography

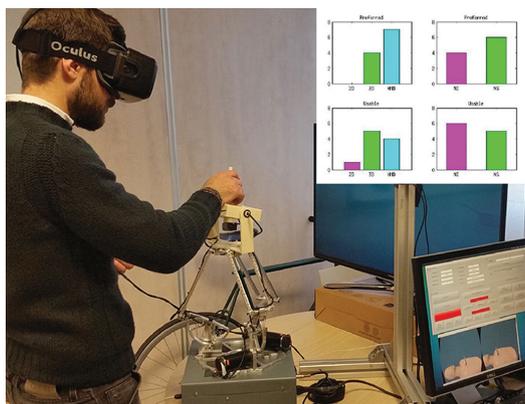
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**Background:** The progressive lack of physicians is leading medicine and robotics researchers to develop systems that allow examinations to be carried out remotely. Echocardiography is one of the most frequent examinations and its remote availability may be crucial for timely and effective diagnosis.

**Aim:** The ReMeDi project aims at developing a telediagnosis system that allows the doctor to effectively perform ultrasonography remotely. The system is composed of a robot at the patient site that holds the probe and that places and orients the probe on the patient according to the sonographer's commands. At the sonographer site a robotic interface provides the necessary feedback for the examination. This paper shows the preliminary results of the usability study for sonographer's interface. Navigation and force feedback were the main features that we investigated.

**Method:** Eleven sonographers were asked to carry out two tasks in a Virtual Environment (VE) by using the robotic interface. They interacted with a virtual patient and could perceive his ribs under the skin thanks to the force feedback. They were asked to place the virtual probe on five points placed on the virtual patient. They experienced two navigation modalities, namely indexing (NI) and scaling (NS) used to overcome the difference in workspace between the haptic device (20cm per axis) and the larger patient's thorax. NS consists of a scaling of the device position, while NI provides a way to shift the device virtual workspace by moving on the border of the physical one. The VE was shown either on a LCD screen (in 2D or 3D stereo with glasses) or on a head mounted display (HMD). After each task and at the end of the experiment the sonographers had to answer a questionnaire.

**Results:** The questionnaires show that the preferred visualization by sonographers was by HMD system with NS modality, although the easier system (patient visualization and probe positioning) was in 3D with NI modality. The effective accuracy of the system was good, the error in the probe positioning was greater for NS system (mean value 0.0165 m) than NI (mean value 0.0076 m). The average error is for all trials about 1 cm, which is a great result considering that is calcu-



System setup and questionnaires results

lated between the center of the probe and the center of the sphere, which has a diameter of 1 cm.

**Conclusions:** The navigation system is really effective when is used in NI modality and 3D visualization and it is felt as easy to use. Further studies are needed to establish the effectiveness of the interface robot-real patient.

**Acknowledgement/Funding:** ReMeDi European Project

#### P5205 | BEDSIDE

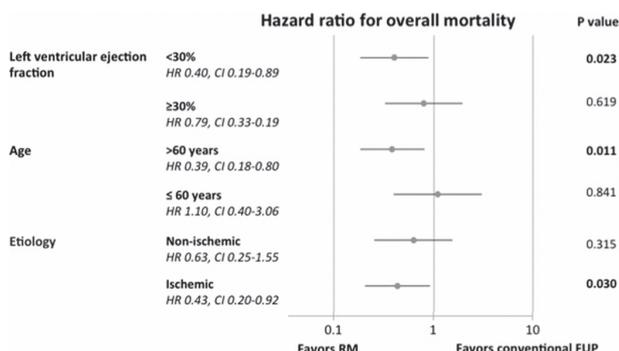
##### Higher risk patients derive the most benefit from device-based remote monitoring

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**Background:** Device-based remote monitoring (RM) has been linked to improved clinical outcomes and increased survival in cardiac device recipients. However, there is no insight on which patients may receive the most benefit from this intervention.

**Methods:** Retrospective cohort study of consecutive patients who underwent cardioverter-defibrillator (ICD) implantation for primary prevention between 2002 and 2015. RM was initiated with patient consent according to availability of RM hardware at implantation. Patients with concomitant cardiac resynchronization therapy were excluded. Data on hospitalizations and mortality was systematically assessed using a nationwide healthcare platform, and patient records were analyzed to determine the cause of hospitalization or death. A Cox proportional hazards model was employed to estimate the effect of RM on mortality; we performed an additional pre-specified subgroup analysis for left ventricular ejection fraction (LVEF), age, etiology and device brand.

**Results:** A total of 312 patients were analyzed, with a median follow-up of 37.7 months, range 1 to 146 months (12.2 years). One-hundred and twenty one patients (38.2%) were under RM since the first outpatient visit post-ICD (RM+) and 191 were in conventional follow-up (RM-). No significant differences were found regarding age at implantation, LVEF, heart failure etiology or NYHA class. Patients under RM had significantly higher long-term survival (hazard ratio[HR] 0.50, CI 0.27–0.93, p=0.029). After multivariate survival analysis, the variables independently associated with increased survival were younger age, higher LVEF, NYHA class lower than 3 and RM. Subgroup analysis showed that this survival benefit was observed in patients with LVEF <30%, age >60 years and ischemic etiology (Figure 1).



**Conclusions:** Remote monitoring was independently associated with a survival benefit in ICD recipients. This benefit was largest in higher risk patients

#### P5206 | BEDSIDE

##### Transforming the experience for patients living with congestive heart failure: the United4Health project

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**Introduction:** Despite of the progress in the management of heart failure (HF), it remains a major healthcare problem because of its high prevalence, mortality and increased cost. A number of randomized controlled trials (RCTs) have identified a potential role for telemonitoring in selected patients with HF, but there is no evidence about the real-life effectiveness of these services.

**Purpose:** The United4Health is a European project which aims to demonstrate that telehealth services already validated in previous RCTs and projects can be successfully transferred to other regions and deployed at scale.

**Methods:** More than 10,000 patients with diabetes, chronic obstructive pulmonary disease or HF have been recruited from 2013 to 2015. The evaluation of the telehealth services has been conducted using the MAST (Model for AS-