BMVIT - Ambient Assisted Living (AAL) - FORUM '09 Vienna 28.9.2009 – 1.10.2009

Health@Home

Home-based exercise therapy – an important step towards healthy aging

ProjectNr: 820967
3.te Ausschreibung des Benefit Programmes
Introduction

- Project details
- Motivational aspects
- Cardiac rehabilitation
- Home based Training / Resistance Training
- Health@Home System overview
- Project milestones
- Training exercises
- Next steps and future perspectives
Project Partners

Project in the 3rd Call of the Benefit Program

**Titel:** Heimbasiertes Krafttraining für ältere Personen als Fortsetzung der Herz-Kreislauf Rehabilitation

**Project Nr:** 820967  
**Begin:** 1.5.2009  
**End:** 31.1.2012

- **FHK MedIT**  
  Fachhochschule Kärnten, Studienbereich Medizinische Informationstechnik

- **ZARG**  
  Zentrum für ambulante Rehabilitation Graz GmbH, Krankenanstalt für ambulante kardiologische Rehabilitation und Physiotherapie

- **Ilogs**  
  Information logistics GmbH

- **AIT**  
  Austrian Institute of Technology

- **Joanneum**  
  Institut für Nichtinvasive Diagnostik

- **UNIQA**  
  Uniqa - Vital Club
Motivation

- Heart and Cardiovascular diseases are worldwide one of the most common cause of morbidity and mortality. In Austria the mortality of cardiovascular diseases is about 38 %. (Source: Statistics Austria)

- The World Health Organization (WHO) has defined cardiac rehabilitation as the “Sum of activity required to ensure cardiac patients the best possible physical, mental, and social conditions ...”

- Structured, regular exercise sessions are the most important pillars to the prevention and rehabilitation of society’s most widespread disease – metabolic syndrome¹ (Pedersen and Saltin)

- Continuous exercise and muscle development can reduce health problems -> Exercise is Medicine

¹ Metabolic syndrome is seen today as the deciding risk factor for coronary heart disease
According to the guidelines of the AUSTRIAN SOCIETY OF CARDIOLOGY (OKG)

4-Steps Rehabilitation Model

PHASE I: inpatient mobilization; designed primarily after an acute event

PHASE II: supervised residential or ambulant program; individually prescribed exercise with continuous or intermittent ECG monitoring, daily

PHASE III: long term ambulant program (6 – 24 month); includes clinical and intermittent ECG and blood pressure measuring 2x per week

PHASE IV: ongoing long-term program beyond phase III; generally does not include clinical supervision or ECG monitoring, 1x per week
Currently in Austria about 9 institutes are practicing ambulant cardiac rehabilitation to provide services all over the country.

Institutes are accredited and have a contract according to the guidelines of the Austrian Society of Cardiology.

Institutes offer Phase II and Phase III rehabilitation.

Problems:
- Too few institutes offering phase III, IV rehabilitation
- Insufficient contingent
- No nationwide offer
 Demand for in/out patients  
Cardiac Rehabilitation in Austria

<table>
<thead>
<tr>
<th></th>
<th>Patients 2007</th>
<th>Capacity of Rehabilitation 2007</th>
<th>Clinical Need</th>
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<tr>
<td>Inpatient Phase I</td>
<td>27.075</td>
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<tr>
<td>Inpatient Phase II</td>
<td>14.746</td>
<td>9 institutions</td>
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<tr>
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<td>~2500</td>
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<tr>
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<td>-</td>
<td>-</td>
<td>~14000</td>
</tr>
<tr>
<td>Phase IV</td>
<td>?</td>
<td>?</td>
<td>?</td>
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</tbody>
</table>

Ambulante kardiologische Rehabilitation. HTA Projektbericht Nr. 15, 2009. Ludwig Bolzman Institut
Physical Activity Guidelines

Physical Activity:
Consistently encourage patients to accumulate 30 – 60 minutes per day of moderate-intensity physical activity on < 5 (preferably most) day of the week. Explore daily schedules to suggest how to incorporate increased activity into usual routine (e.g. Parking farther away from entrance, walking during lunch break)

Exercise Training:
For aerobic exercise:
Frequency: 3 - 5 days /week;
Intensity: 50 – 80 % of exercise capacity
Duration: 20 – 60 minutes
Method: walking, treadmill, cycling, rowing, stair climbing, etc

For resistance exercise:
Frequency: 2 – 3 days / week;
Intensity: 10 – 15 repetitions per set to moderate fatigue
Duration: 1 – 3 sets of 8 – 10 different upper und lower body exercise;
Method: calisthenics, elastic bands, hand weights, wall pulleys, or weight machines.

DAILY Systematic TRAINING!

Resistance Training

- Resistance Training can lead to an increase in muscle mass and/or improve coordination and metabolism.
- Based on its numerous health-promoting factors, moderate resistance training is recommended for persons of all ages as an important component of a comprehensive fitness program.
- In certain patient groups increasing muscle strength and function can lead to significant improvements in quality of life.
- Resistance exercises lead to a gradual improvement in coordination and balance. -> reduces the danger of falls!
- Resistance training positively influences bone density in both women and men.


Training Exercises at Home?

Training Phase III/IV
- twice a week / one session per week
- about one year / ongoing

Training session example
- 30 min endurance cycle ergometer training
- 25 min moderate physical training (resistance training, coordination training)

HOME BASED TRAINING
(Health@Home)

Goal

Daily Training Phase III, IV

Home based Training - A Benefit for End-Users

- Continuous supervised training at home
- Flexible time schedule
- Personalized training exercises
- Support by therapists
- Reduce the costs of therapy
- Continuous training data acquisition and analysis
- Establishment of a nationwide phase III, IV rehabilitation
Project Milestones

- Establishment of a phase III, IV rehabilitation program
- Development of a simple, low cost, novel therapeutic process performed in one’s own four walls (Home based Training)
- Increase motivational aspects for end users
- Continuous monitoring of vital signs and training progress
- Training exercise repository
- Decision Support System for therapists and doctors
  - Adapt training exercises to end-users
  - Visualize training data and trends -> motivation
  - Training Analysis
- Extensive study with over 80 end-users
Health@Home System Overview

Trainings Monitoring
- Vital signs
- Strength Measurement

Trainings Decision Support System

Multimodal Monitoring

Internet

Feedback

Training-Coach

Trainings Data Repository

Extensive Tests with 80 end-users are planned in 2011
Acquisition of Reference Training Exercises

- Using a flexible band for all exercises
- Minimal cabling
- No complex dangerous application on the band itself
- Acceleration + pulse sensors
- Stereo Image acquisition of the training
Study with End-Users

- About 80 end-users will attend this study
- Extensive tutorial with the end-users at the beginning of the study in small groups
- Rehabilitation experts are supporting the end-users during their training exercises
- Tests are performed over a minimum period of 2 month
- Consideration of ethical aspects

Questions to be answered:
- Is the system easy to use?
- Are the users motivated to use the system?
- Are there any fears to use the system?
Summary and Future Steps

- Project started in May 2009
- Low cost „Home based Training System“ for Phase III, IV cardiac rehabilitation and prevention
- Training Exercise Repository
- Continuous monitoring of vital signs and strength
- Online analysis and decision support for therapists and doctors
- Extensive study at the end of the project with over 80 end-users

Planned activities in the near future

- Acquisition of reference training exercises planned in October 2009
- Sensor data acquisition ongoing
  - Vital signs
  - Strength
- Planning of the study
Thank you for your Attention

Keep moving!