WELCOME

Innovative Integrated Care for COPD patients with Co-morbidities

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May 6th-7th ETSI eHealth Workshop on Telemedicine
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Introduction

- Chronic obstructive pulmonary disease (COPD) is a major public health problem.
- The WHO anticipates that by 2030, COPD will become the fourth cause of mortality and seventh cause of morbidity worldwide.¹
- COPD is often associated with several co-morbidities such as cardiovascular disease (such as CHF), metabolic syndrome (including diabetes), osteoporosis, mental health diseases (depression and anxiety) and lung cancer.
- Maintaining adherence and lifestyle management is another important aspect of COPD management.²
- Coordination of services is often inadequate, especially at the time of the COPD exacerbation.
- The successful management of COPD patients requires a multidisciplinary approach.
- Improvements in quality of life, reductions in hospitalisations and in total healthcare costs could be achieved with the use of integrated care (IC) via Mhealth in the management of COPD.

Integrated Care

- Integrated care can be defined as “a continuum of patient-centered services organized as a care delivery value chain for patients with chronic conditions with the goal of achieving the optimal daily functioning and health status for the individual patient and to achieve and maintain the individual’s independence and functioning in the community.”

- Current evidence from a systematic review of integrated disease management programmes shows improvements in quality of life and reductions in hospitalisations.


Framework for analysing Integrated Care – Integrated Levels approach

Micro Level
- Service Integration
- Professional Integration

Meso Level
- Functional Integration
- Organizational Integration

Macro Level
- System Integration

Person centred Care
Public centred Care

Integrated Framework for WELCOME

- The WELCOME system will target;
  - Functional level (as an ICT platform),
  - Personal level (as a patient and informal carer centric platform),
  - Service level (bringing healthcare and social care together),
  - Professional level (requires the cooperation and the communication of the different Healthcare professionals responsible for the COPD patients and other co-morbidities).

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WELCOME’s focus and aims

• **WELCOME** aims to create a technology solution enabling a step-change in the integrated care of, and self-management by, patients suffering from Chronic Obstructive Pulmonary Disease (COPD) with co-morbidities including Chronic Heart Failure, Diabetes, Anxiety and Depression

• The technology solution combines a smart vest with sensors to measure and monitor specific COPD patient indicators. Combined with other patient and environmental information, real-time data can be automatically uploaded to highly secure cloud-based patient medical records.

• From this hub, patients, clinicians and community health professionals can better monitor and manage integrated personalised healthcare plans.

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Consortium partners

- Exodus AE, Greece
- Centre Suisse d’Electronique et de Microtechnique, Switzerland
- Kingston University, Great Britain
- Aristotle University of Thessaloniki, Greece
- Inventya Ltd, Great Britain
- Christian Albrechts University of Kiel, Germany
- Royal College of Surgeons in Ireland, Eire
- Smartex Srl, Italy
- Centre of Expertise for Chronic Organ Failure, The Netherlands
- Kristonics GmbH, Germany
- University of Coimbra, Portugal
- Croydon Health Services NHS Trust, Great Britain
Data concerning environmental trends like pollution levels and temperatures in patients' areas that can affect COPD and comorbidities

- Exploit them as a source of informal data

Applications taking into account the structure and the involved parts of each country's health care system

- Each involved stakeholder will have access to the relevant content according to its role in the healthcare system

- The process output will be evaluated accordingly and feedback to the patient will be generated

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Countries Scenarios

- The WELCOME IC system will be tested in five countries with different health-care systems (Germany, Greece, England, Netherlands and Ireland),
Welcome - England Use case scenarios

Community Care
- District nurse
- Community respiratory teams
- Physiotherapist
- Nutritionist

Chronic management services
- Acute exacerbation management services
- Rehabilitation
- Lifestyle Management

Healthcare
- Physician
- Respiratory nurse
- Physiotherapist
- GP
- Practice nurse
- Nutritionist

Intelligent decision support
- Patients records data storage
- Disease management
- Lifestyle management
- Webservices to access by Patient/ Patient’s representative and HCP from secondary, community and primary care

Measured patient data
- Heart Rate, SpO2, EIT, Chest sounds and ECG
- Adherence patterns
- Glucose level, Blood pressure and Weight measurement
- Patients dialogues

Secure Integrated Healthcare Hub

Informal carer’s Social network

Web 2.0 Gateway

Lifestyle information, Weather advice, Treatment plan, Alerts, Motivational dialogue, Diary, Reminder

Welcome - Patient Hub
WELCOME vest & patient hub

User-centred design
- Define patient and clinical needs across UK, Greece, Germany, The Netherlands & Eire to identify ideal remote monitoring conditions and likely use scenarios
- Analyse different national COPD care pathways and typical patient experiences
- Feed these findings into a whole-system design

Whole-system design
- Develop use scenarios, design technical architecture & hardware-software components, design of signal processing software for vest sensor data, design of software applications for patients & clinical users

Vest and sensor prototyping and manufacture
- Design and develop sensors & circuit boards for electrical impedance tomography (EIT) and monitoring chest sounds, create vest prototype with integrated sensors

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Restful based application development

Welcome Web Cloud

- Restful API
- Web server
  - Welcome - Application Hosting Device (AHD)
- BT API
- Wifi-P2P API

Temperature
Diabetes Kit
Inhaler
Vest
WELCOME monitoring systems & central hub

Signal processing
- Develop algorithms for detecting COPD indicators (coughs, crackles, dyspnea), lung function and volume, inhaler events & patient self-medication
- Develop methodologies for reporting symptoms and indicators to clinicians and patients so that each patients’ current condition can be clearly understood and assessed

Decision support & diagnostic software (Aristotle University)
- Design of a decision support system to record and integrate real-time patient data with environmental data and medical history, to enable timely clinical decision making

Cloud data storage, management and security (Exodus)
- Develop data management systems for storing & retrieving vest data and for supporting software applications for patients & clinicians

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WELCOME’s country-specific e-health applications

Personalised patient & carer applications Patients and their carers will be able to access vest-generated data and other relevant medical information, obtain reminders & advice on their medication regimes, and better manage their own health condition

- Wellbeing and healthy living guidance is crucial for those living with chronic disease - an application will be designed to guide patients and their carers in terms of how to manage their weight, exercise, & nutrition for optimal health

- Social communications to reinforce patient self-management and carer networks will also be an important part of the e-health applications focus

Clinical & medical applications

- Customisable software applications will be created to support all healthcare professionals involved in the treatment & management of COPD patients

- Real-time data generated by patients can be reviewed and compared against historical data trends, appointments and decisions made can be recorded and integrated e-health records can be sustained.

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In WELCOME design we consider:

- Software development - HL7/ISO 18308 for the requirements gathering related to the EHR architecture part.
- Data modeling - HL7 RIM
- Apply pseudonymization techniques (ISO/TS 25237) for the protection of personal sensitive data.
- Investigate the Continua Alliance guidelines for sensor communication
- Implement https RESTful services for our network communications
- Overall development lifecycle - ANSI IEC 62304:2006 standard which relates to the medical software lifecycle processes
- Risk Management - ISO 14971
WELCOME’s engagement

The WELCOME consortium is keen to engage with stakeholders across the EU in medical and health technology sectors.

- If you are interested in WELCOME’s work, we encourage you to join with us! We are keen to hear your thoughts and opinions on this important area of health technology innovation.

- [www.welcome-project.eu](http://www.welcome-project.eu)

- Follow us on Twitter @ProjectWELCOME

- Like us on Facebook [www.facebook.com/pages/Welcome/600240796710778](http://www.facebook.com/pages/Welcome/600240796710778)

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Thank You

Any Questions?

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