

TELEKOM HEALTHCARE SOLUTIONS

Telemedicina en Prevención y Monitorización de Enfermedades Cardíacas

Barcelona, 19 de Octubre de 2015



HEALTHCARE SOLUTIONS

CHARITÉ-UNIVERSITÄTSMEDIZIN BERLIN

The Charité is one of the largest university hospitals in Europe. 3700 doctors and scientists heal, do research and teach at the top international level. More than half of the German Nobel Prize winners in medicine and physiology come from the Charité, among them Emil von Behring, Robert Koch and Paul Ehrlich. The Charité also has an international reputation for excellence in training. It extends over four campuses with almost 100 clinics and institutes bundled under 17 Charité Centers. With 13,100 employees, the Charité generates about 1.400 Million euros in sales per year and is one of the largest employers in Berlin. In 2010, the Charité could look back and joyously celebrated its 300-year anniversary

The infographic consists of three colored boxes on the left, a map of Brandenburg an der Havel in the center, and a photograph of the Charité building on the right. The top box is orange and contains the text 'Fundada en 1911'. The middle box is green and contains '11 Nobel laureates', '12.922 employees', and '7.112 students'. The bottom box is blue and contains '103 departments', 'Turn-over 2009: 1.200 M€', and 'Scientific budget 2009: 127M€'. The map shows the state of Brandenburg an der Havel with various districts labeled: Prignitz, Ostprignitz-Ruppin, Uckermark, Barnim, Oberhavel, Märkisch-Oderland, Havelland, Berlin (highlighted in red), Potsdam-Mittelmark, Teltow-Fläming, Dahme-Spreewald, Oder-Spree, Elbe-Elster, Spree-Neiße, and Lausitz. The cities of Brandenburg an der Havel and Cottbus are also highlighted in red. The photograph on the right shows a tall, modern brick building with 'Charité' written on the top, set against a clear blue sky.



CHARITÉ-CENTRE FOR CARDIOVASCULAR TELEMED.

Division of the Department of Cardiology (Prof. Dr. med. Gert Baumann) :

- ✓ Founded: 1st April 2008
- ✓ 16 Employees (7 doctors, 5 nurses, 2 study nurses, 1 scientist, 1 student)



Telemedical care of patients

Education

Research Projects:

- Partnership for the Heart (PfH)
- Health Region of the Future Northbrandenburg - Fontane
- Nanoelectronics for Mobile AAL-Systems



HEALTHCARE SOLUTIONS



– Streng vertraulich, Vertraulich, Intern – Reference Center Charité

20.10.2015

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TELECARDIOLOGY

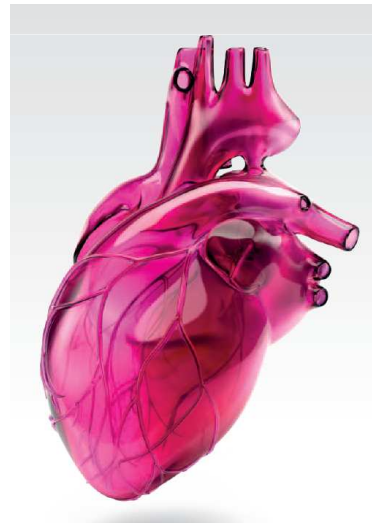
Telecardiology = Telemedicine in Cardiology

Remote patient monitoring, diagnostics and therapy using modern information and communication technologies (ICT)

Basic Scenarios

„doc2doc“ systems

Connectivity between health care providers



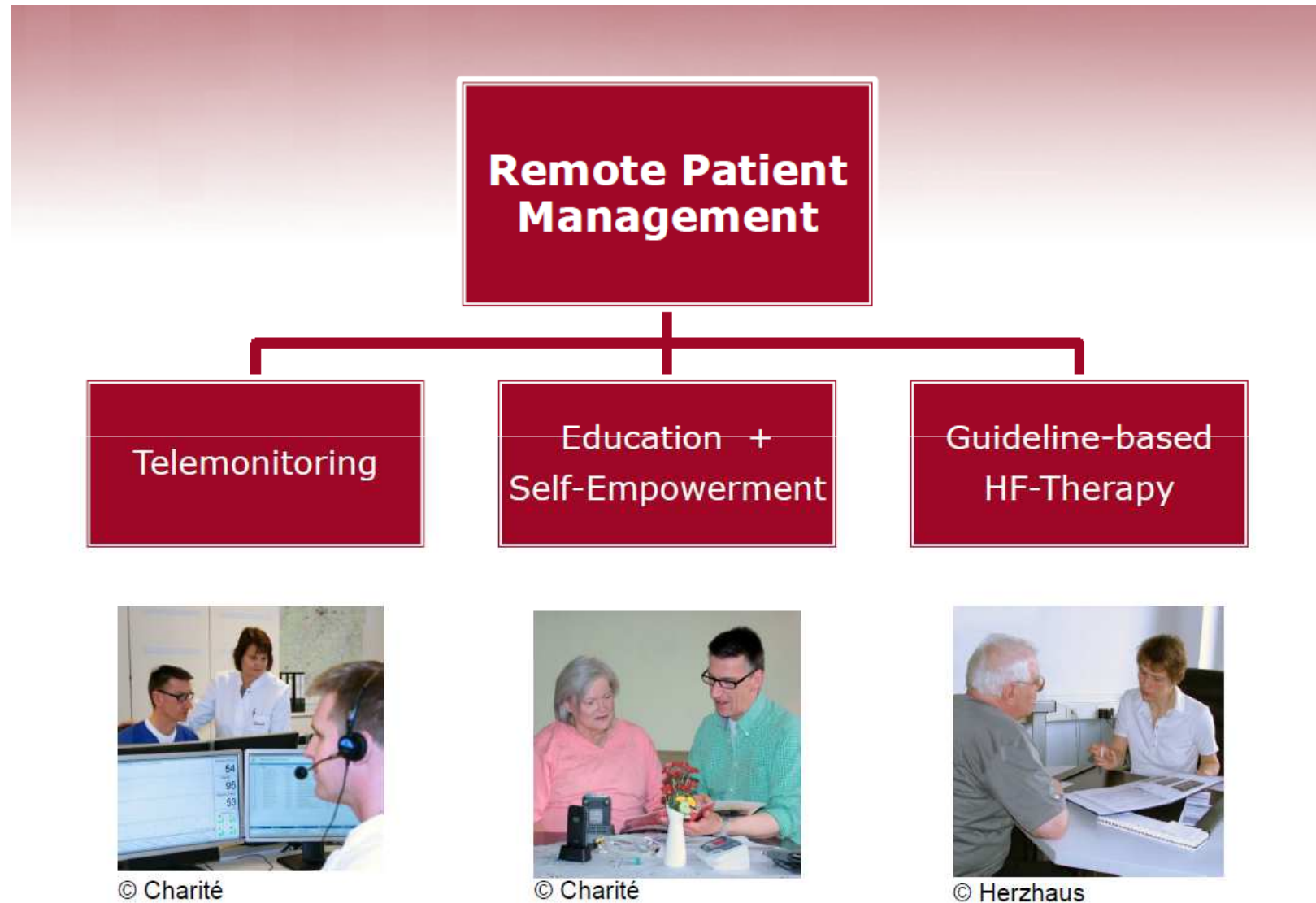
„doc2patient“ systems

Connectivity between doctor and patient (remote patient management)

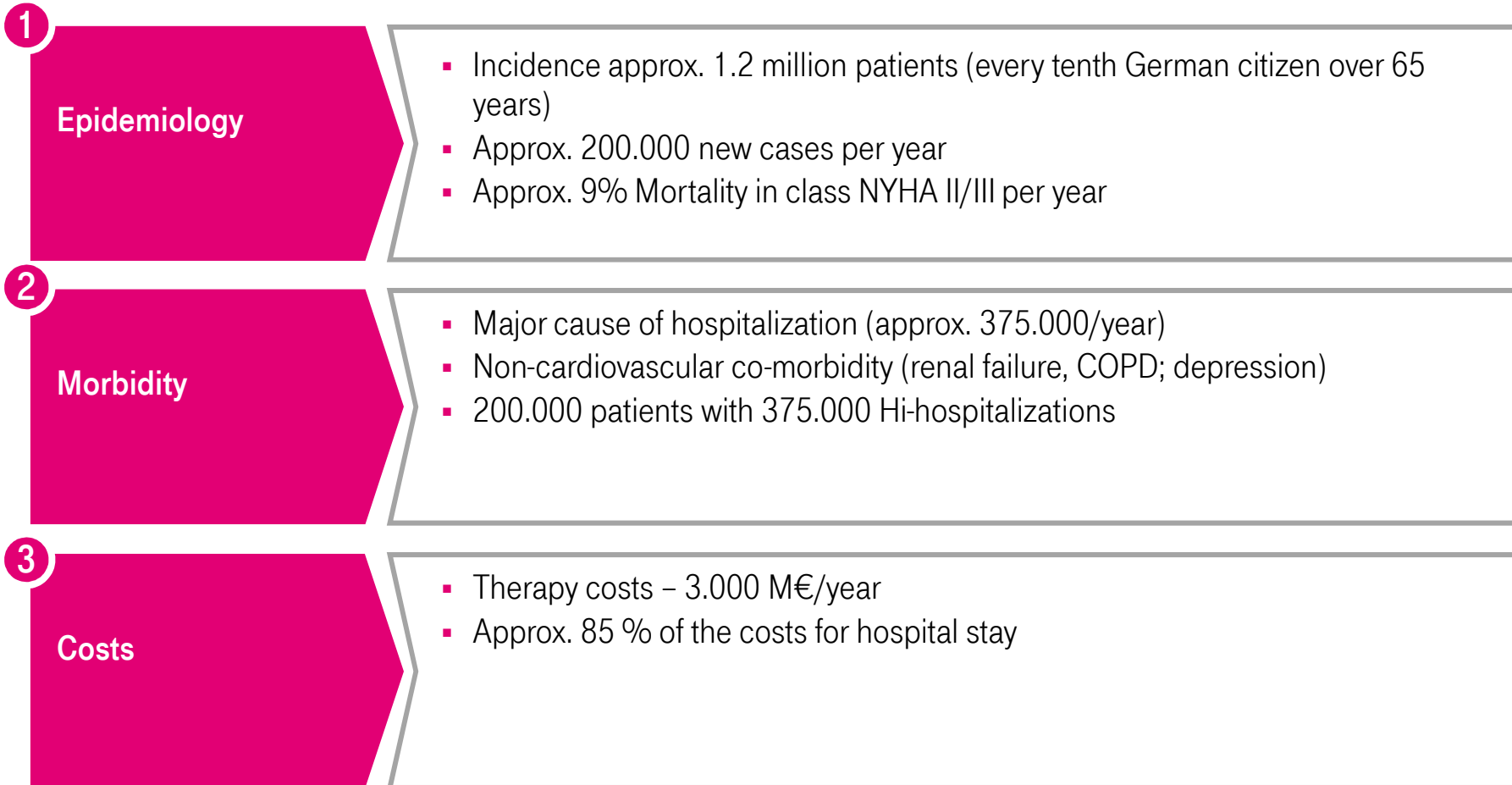


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CONCEPT OF REMOTE PATIENT MANAGEMENT

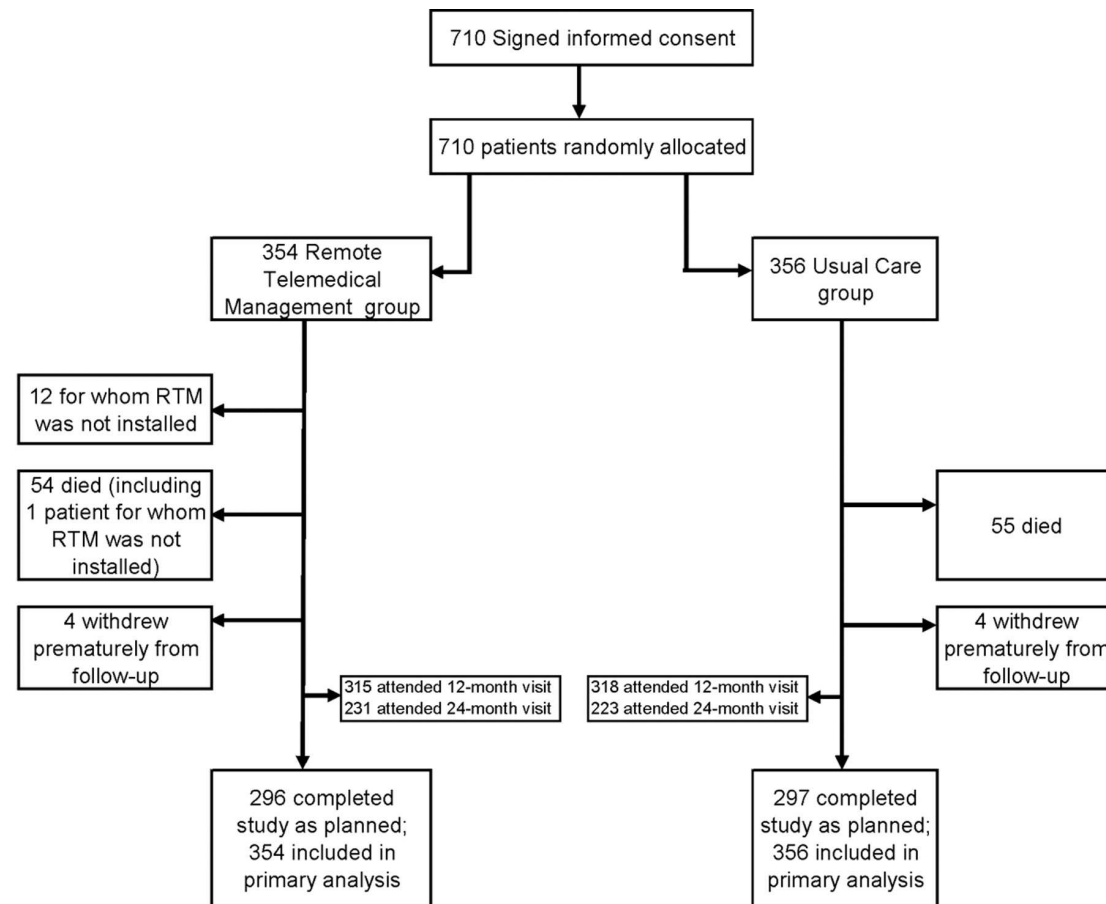


CHRONIC HEART FAILURE – A DEMOGRAPHIC BURDEN



TRIAL DESIGN AND OVERSIGHT

The numbers of patients for each group who were randomly assigned to remote telemedical management (RTM) or usual care, and who were analyzed for the primary outcome.



Koehler F et al. Circulation. 2011;123:1873-1880

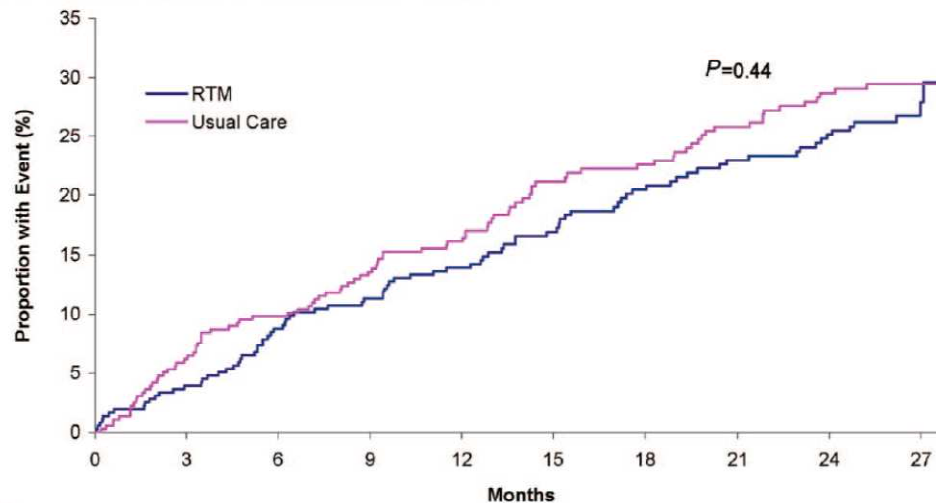


INCREASING EVIDENCE FOR BENEFICIAL EFFECTS OF TELEMEDICINE IN HF-PATIENS

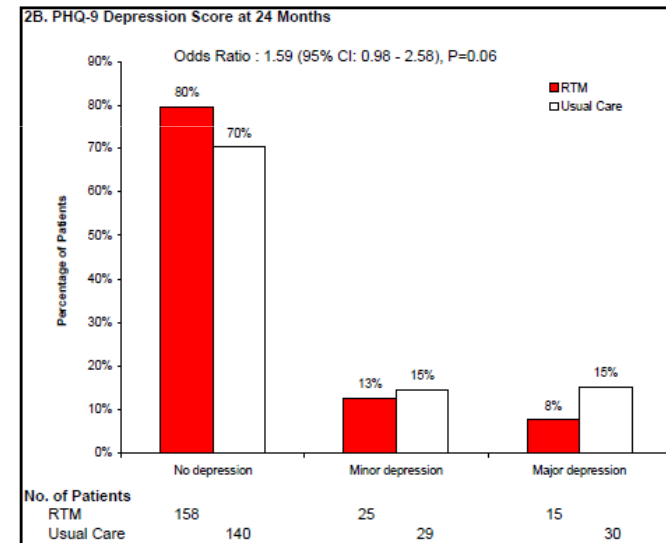
FOR RECENTLY HOSPITALISED HF-PATIENS ONLY (1/6 OF THE TOTAL HF-POPULATION):

1. Reduction of HF-hospitalisation („Champion Trial“)
2. Improvement of quality of life („TIM-HF“, „Champion Trial“)
3. Potential for reduction of CV-mortality („TIM-HF“ Subgroup)

B Cardiovascular Death or Hospitalization for Heart Failure



No. at Risk :		0	3	6	9	12	15	18	21	24	27
RTM	354	340	322	311	283	223	209	56			
Usual Care	356	333	318	304	275	217	198	53			



1) Abraham, WT., et al. *Lancet*. 2011 Feb 19;377(9766):658-66

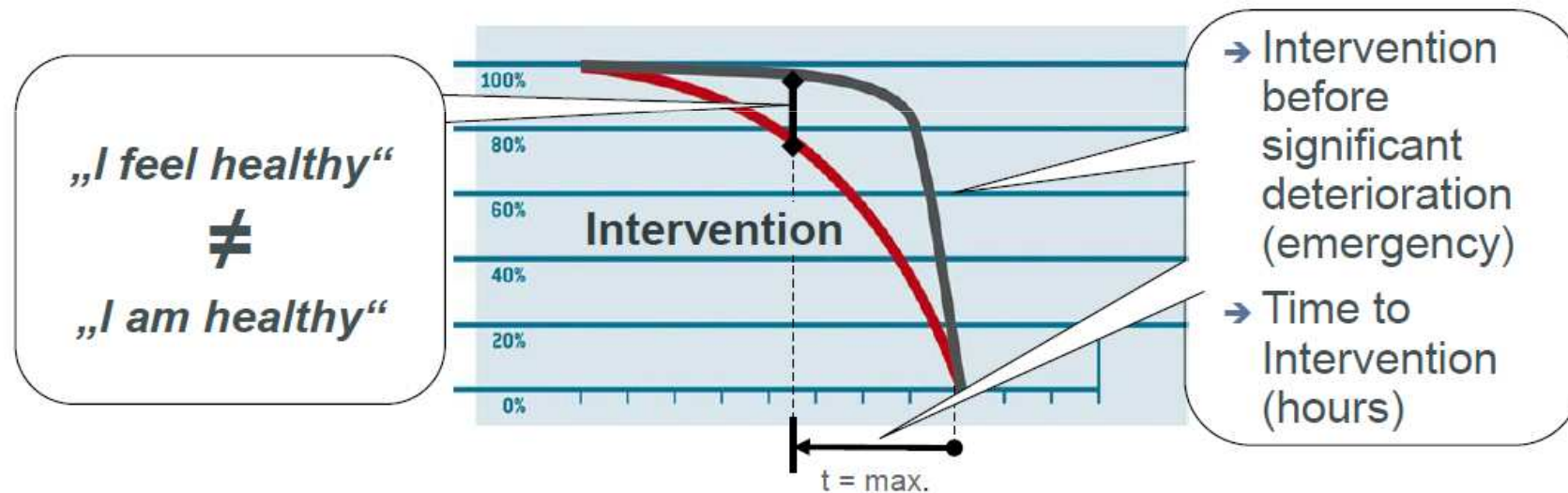
2) Koehler et al., *Circulation* 2011 May 3;123(17):1873-80

3) Koehler et al., *Int J Cardiol*. 2012 Nov 29;161(3):143-50

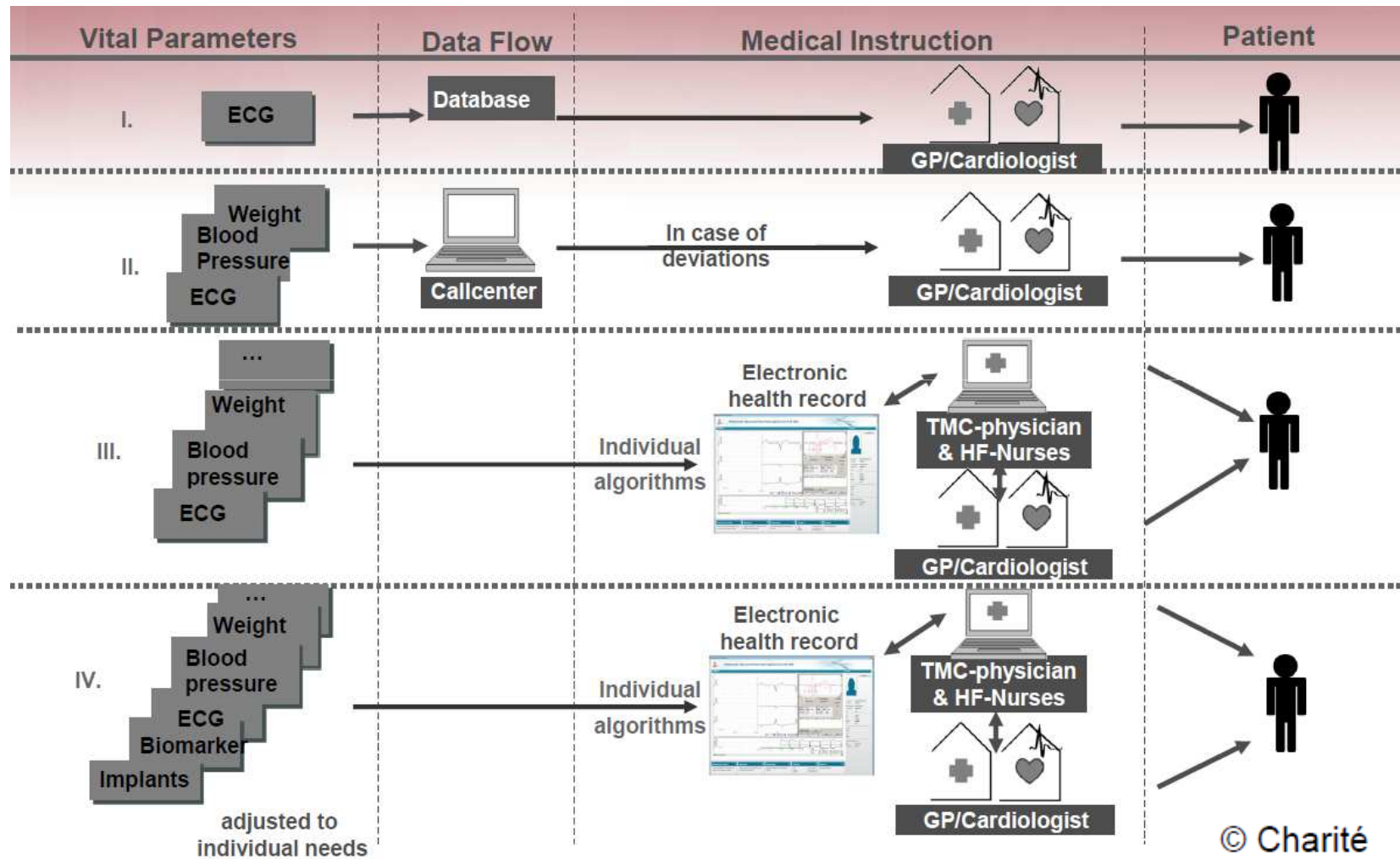


BENEFITS OF REMOTE PATIENT MONITORING IN CHF?

GAP BETWEEN OBJECTIVE DETERIORATION AND SUBJECTIVE PERCEPTION OF CARDIAC FUNCTION



FOUR GENERATIONS OF REMOTE PATIENT MANAGEMENT SYSTEMS



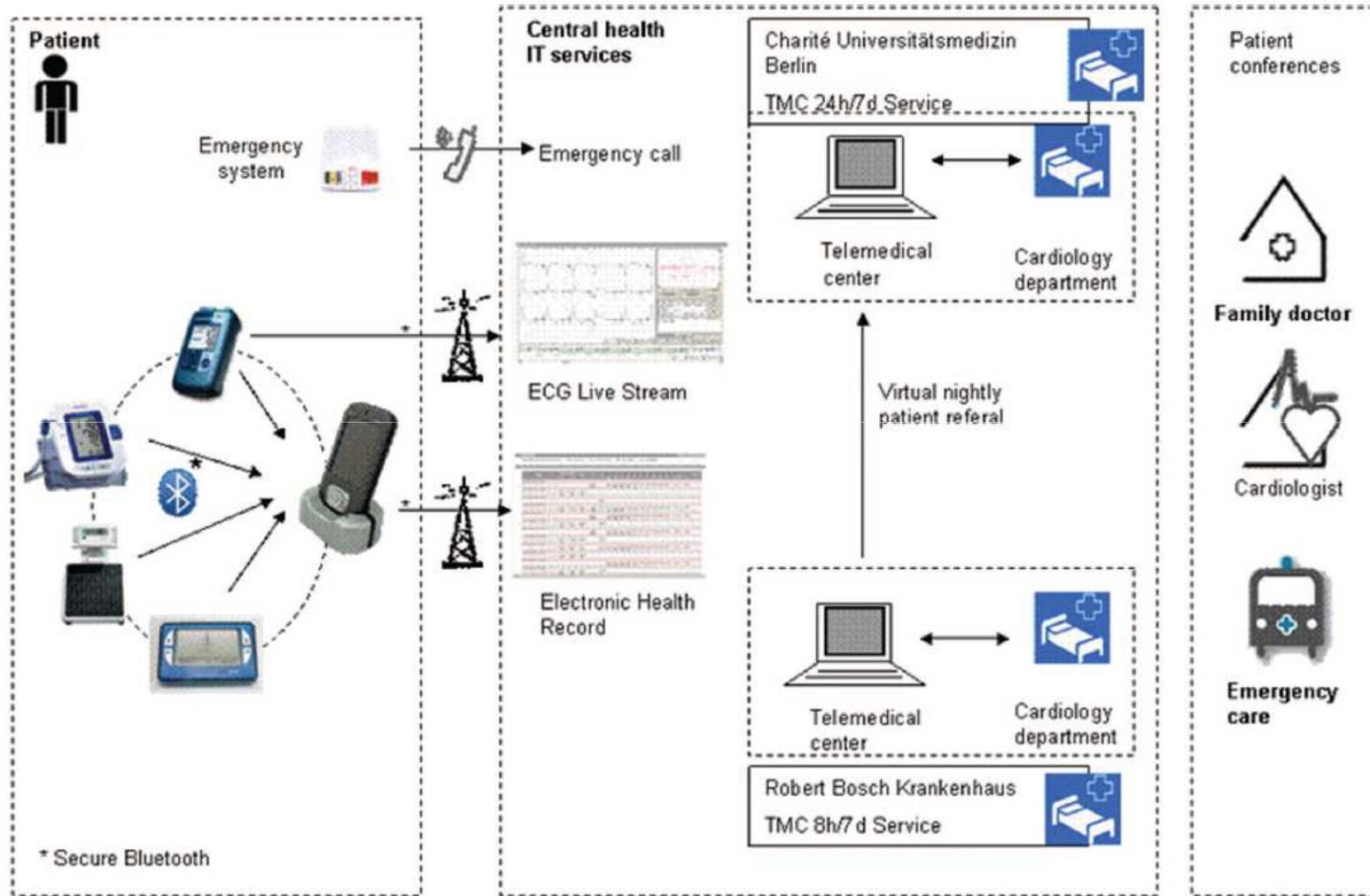
STANDARDS FOR REMOTE PATIENT MANAGEMENT

1. Remote patient management as part of established health care structures
2. Professional standards for telemedical staff
3. Telemedical Homecare Devices – robust and easy to handle even for elderly people
4. High standard in patients' data and privacy protection
5. Data transfer of vital parameters via mobile technology (e.g. „EDGE“-Protocol) Continua Based



- Development of a Remote Patient Monitoring System including mobile sensor platform and electronic patient record for cooperated telemedical care of chronic heart failure patients
- Clinical Trial: Telemedical Interventional Monitoring in Heart Failure (TIM-HF, NCT00543881)
- Funded by the Federal Ministry of Economics and Technology (Project number: 01MG531)

ARCHITECTURE OF THE „PFH-SYSTEM“



TIM-HF - PROFILING OF PATIENTS WHO MAY BENEFIT (SUBGROUP ANALYSIS)

Patient profile of responders to telemedicine

- after a HF-hospitalization;
- without depressive symptoms;
- cardiac function not too weak (LVEF > 25%)

333 (47%) of the 710 TIM-HF patients

Results for the risk group

- ~ 50% lower cardiovascular mortality due to telemedicine
- ~ 50% reduction in the number of days lost due to cardiovascular mortality and HF hospitalization



IMPLICATIONS ON HEALTH ECONOMY



HF-Epidemiology in Germany:

- 1.2 million HF-patients in GER (NYHA stages I - IV NYHA)
- 200.000 HF-patients causing approx. 375.000 HF-hospitalizations per year

Prevalence for telemedicine in heart failure patients:

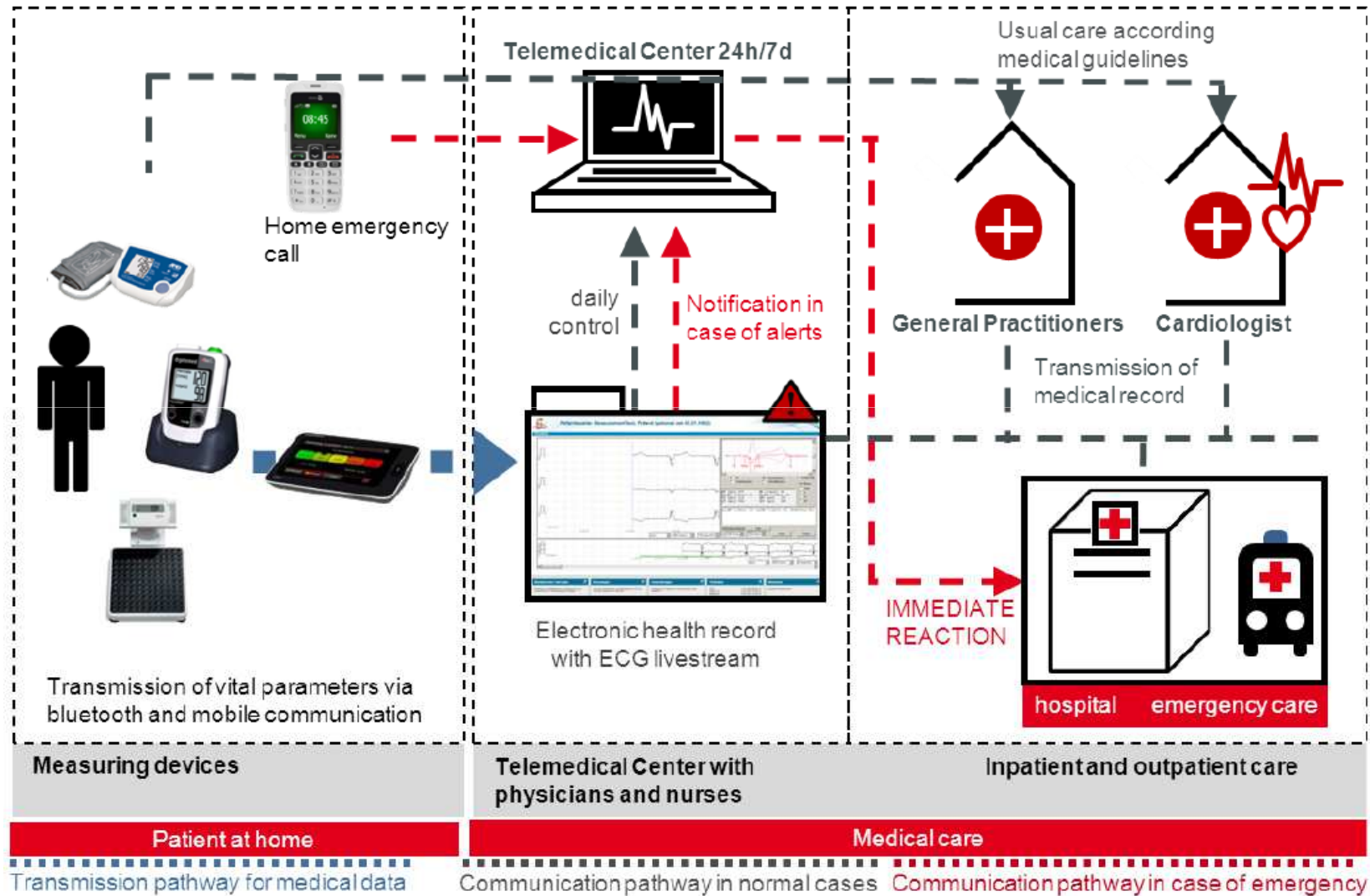
- approx. 150.000 telemedicine patients per year in GER
- reduction of HF-hospitalizations by 20%
- (health economics is currently under analysis)
- annual constant savings potential of € 150 million (5% of the total treatment cost)

TELEMEDICINE RURAL AREAS (REGIONALIZATION) NORTHERN BRANDENBURG – FONTANE-PROJECT

- **Aim of the project:** Improvement of the quality of medical services in rural, structurally weak areas by trans-sectoral use of modern information technologies and biomarker-based diagnostic and therapy control with Northern Brandenburg as an example“
- **Phase I (2009-2012):** Development of a Remote Patient Management System of the 4th generation including a electronic patient record for the (daily) data exchange between 1st level and 2nd level telemedical centers within the region
- **Phase II (2013-2015):** Clinical trial „Telemedical Interventional Management in Heart Failure II (TIM-HF II)“
- **Funding:** German Federal Ministry of Education and Research, European Regional Development, Federal State Brandenburg



THE REMOTE TELEMEDICAL SYSTEM USED IN TIM-HF II



STUDY DESIGN TIM-HF II

- **Region:** Berlin/Brandenburg (Germany)
- **Study Design:** randomised, prospective, controlled, open, parallel, multicenter
- **Study-Population:** 1,500 HF-Patients with HF-hospitalisation max. 12 months prior randomisation, PHQ-9<10, LVEF \leq 40%
- **Individual Follow-Up:** 12 months
- **Sites:** 400 GPs / 56 Cardiologists
- **Telemedical Centers:** Berlin (4th Generation) + Satellites
- **Intervention:** Remote Patient Management (including implant data monitoring) + emergency support

Primary Endpoint:

- Days lost due to unplanned cardiovascular hospitalisation or death.

Secondary Endpoints:

- Non-inferiority of HF-Remote Patient Management in rural areas compared to the metropolitan area in terms of the unplanned cardiovascular hospitalisation or death.



COMPARISON OF TIM-HF (PFH) AND TIM-HF II (FONTANE)

	TIM –HF	TIM-HF II
Patients	HI (cardiologists) n= 710	HI+ Co-morbidities (GP) n= 1,500
Type of study	RCT	RCT
Study phase	II	III (IV)
Telemedical system	III. Generation	IV. Generation
Intervention	Telemonitoring + emergency	Biomarker-guided therapy + telemonitoring + emergency + Implant data
Primary endpoint	Mortality	Days lost due to unplanned cardiovascular Hosp or Death
Secondary endpoint	Days lost due to HF hospitalization or death	Non-Inferiority of HF- Telecare in rural compare to metropol / other
Study duration	2008 – 2010	2013 – 2015
Sponsor	BMW i	BMBF

CONCEPT OF TELEMEDICAL CENTERS - 1ST&2ND LEVEL

Challenge:

Need for a 24/7 RPM (2/3 of the emergency calls occur during night time and bank holidays) vs. high cost and need for appropriate TMC workload during nighttime
network between Telemedical Centers of 1st and 2nd level

1st level Telemedical Center

Working hours: Mo-Fr; 9-5 h

Workload: ca. 200 Patients

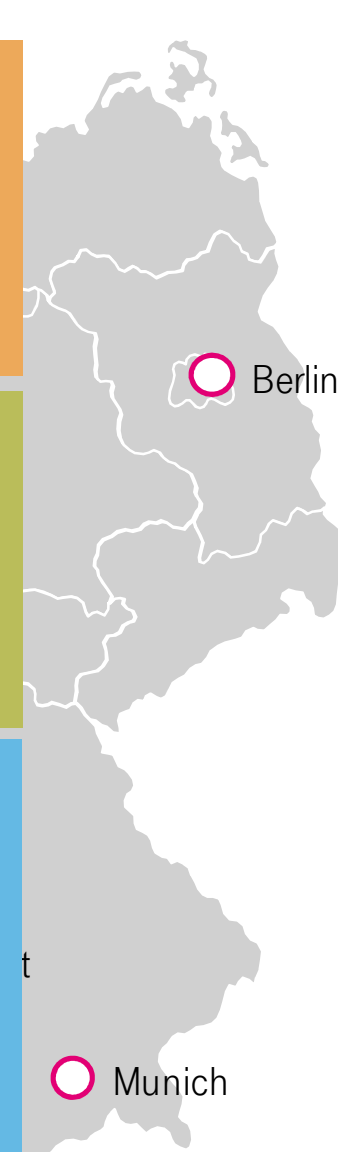
During nighttime RPM provided by 2nd level Telemedical Center within the Region

2nd level Telemedical Center

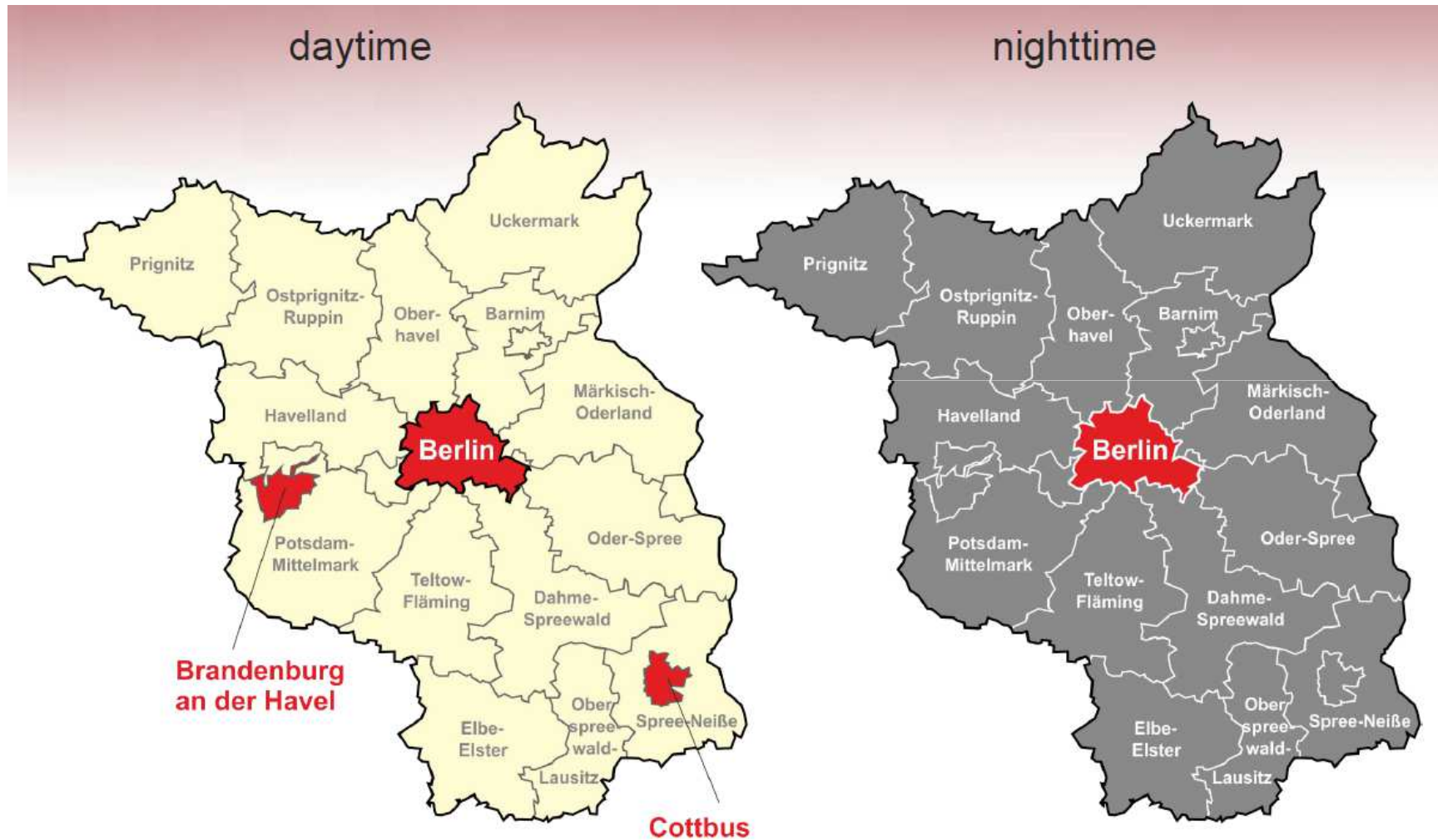
Working hours: 24/7

Workload: daily Remote Patient Management of the own patients (500 Patients)

During nighttimes: management for the own patients + management of the patients from different 1st level TMC 's (approx. 1,000 patients)



TELEMEDICAL CENTERS IN BERLIN AND BRANDENBURG



CONCLUSION

- 1/6 of the total HF-population needs telemedicine as a „bridge to stability“ (12 months after HF-hospitalisation), afterwards self-empowerment strategies should be carried out lifelong for all HF-patients.
- Remote Patient Management has to be organized within the regions with a network of TMCs of the 1st level and 2nd level.
- Need for 2nd level TMC for approx. 5 Mio. inhabitants.
- The outcome of telemedicine in rural areas is currently under investigation.
- Remote Patient Management allows individualized patient monitoring (e.g. diabetes, COPD, depression).

