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Telemonitoring in arrhythmias and CRM devices: Finland

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Goals of telemonitoring

- Alleviate the burden of caregivers
- Optimize patient safety and care
- Reduce health care cost

Telemonitoring of CRM systems

- Biotronic: HomeMonitoring
- Boston Scientific: Latitude
- Medtronic: CareLink Network
- St Jude Medical: Merlin.net

AUTOMATIC FOLLOW-UP

1 Using the secure Medtronic CareLink Clinician Website, clinic staff can preschedule up to six automatic device checks for each patient – without having to make appointments or coordinate calendars with patients.

2 The device automatically "wakes up" at the scheduled time and communicates with the Medtronic CareLink Monitor, which is plugged into a standard phone line and an electrical outlet. Data are transmitted wirelessly from the device to the monitor as the patient sleeps.

3 Data are sent automatically from the Medtronic CareLink Monitor via the phone line.

4 The clinician reviews the patient's device data on the secure website.

CONTINUAL MONITORING FOR DEVICE AND PATIENT RELATED PROBLEMS

1 The implanted cardiac device detects a problem such as AT/AF or a device integrity issue. If the patient's device is programmed to notify the clinician of Medtronic CareAlert status, the heart device automatically establishes wireless communication with the Medtronic CareLink Monitor, which is plugged into a standard phone line.

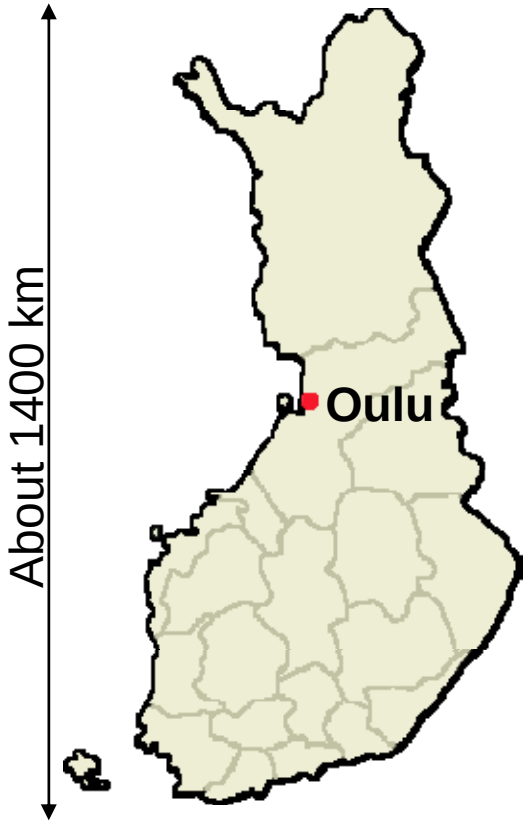
2 Device data are sent automatically from the monitor to a secure server via the phone line.

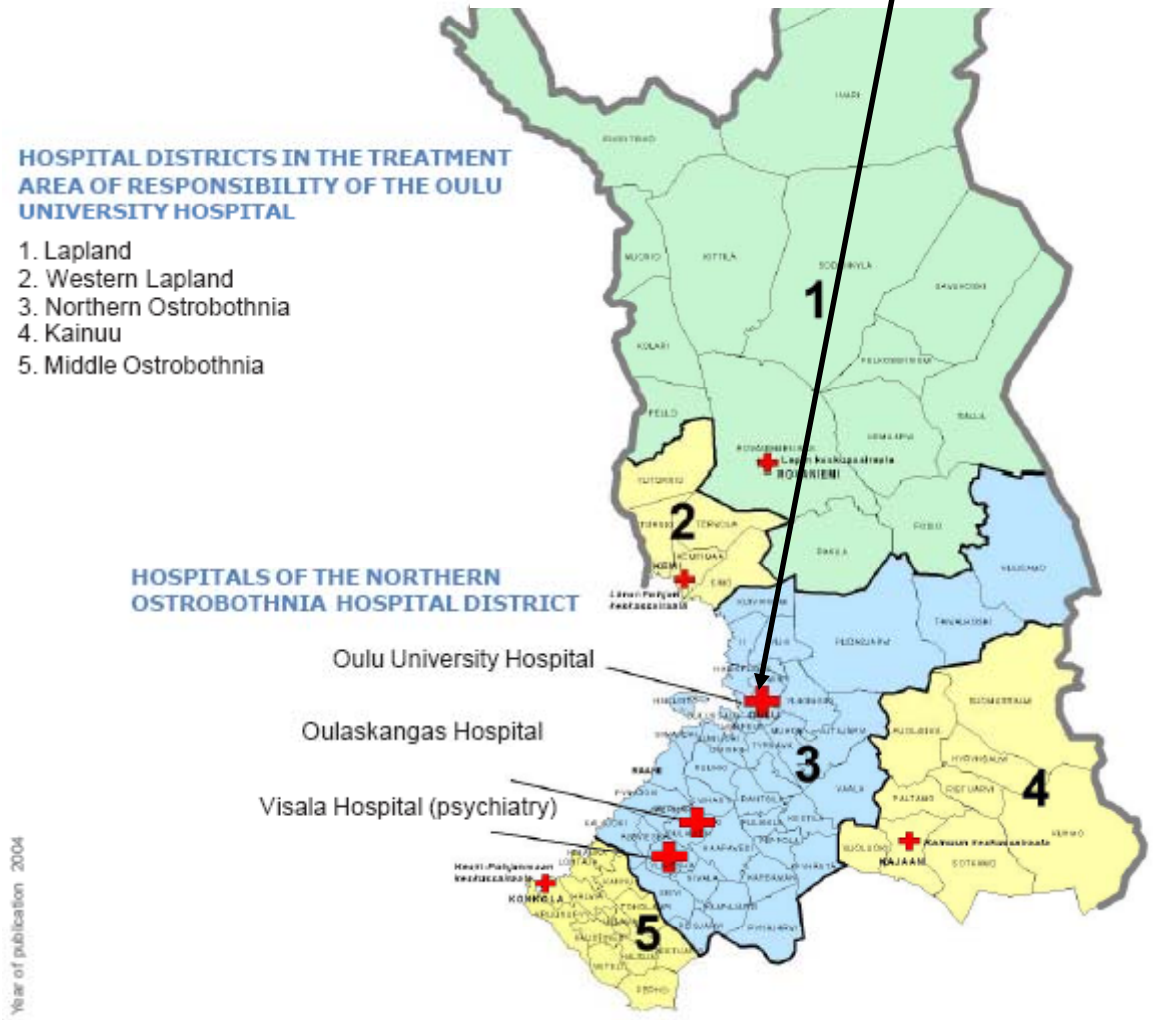
3 The clinician receives the alert via pager or voice message and checks the Medtronic CareLink Clinician Website for detailed information.

4 The clinician reviews the Medtronic CareAlert information and calls the patient to provide further instructions.

Travel burden

Distance 700 km
Travel time 8 h 45 min (80 km/h)





Patient travel burden

- Travel distance 130±96 (range 3-350) km
  - traveling with a car, train or taxi
- In 9 occasions the patient had to be on sick leave because of the FU visit
- Almost 40% of the patients (n=15) were accompanied by another person

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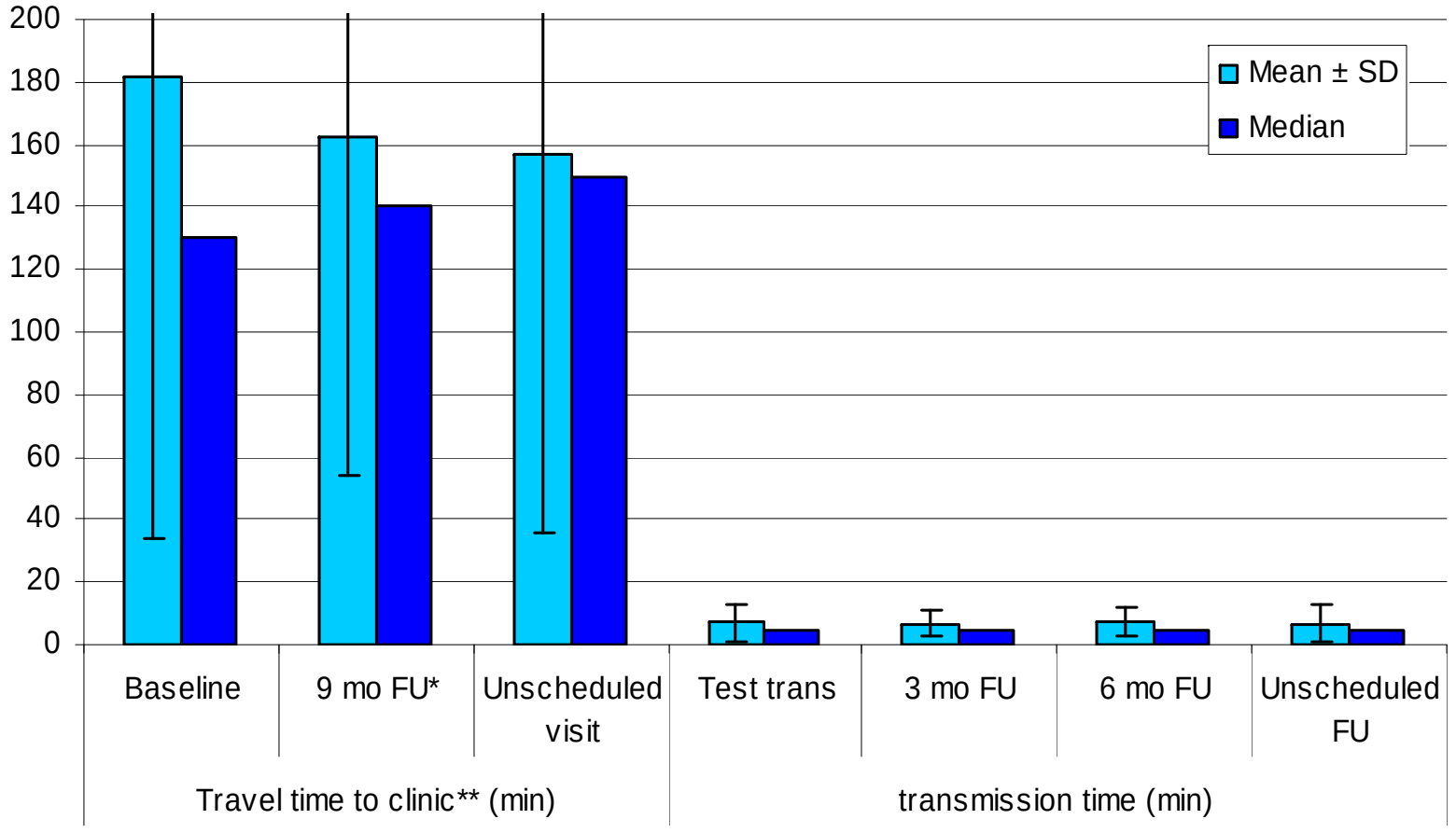
Time burden to the patients



391±282 (range 41-1346) min 6.9 ± 4.0 (range 2-18) min

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Unscheduled visits

- 18 patient-initiated transmissions during a follow up of 9 months
- All of these were resolved remotely without need for in-office evaluation!
  - reassurance of the patient
  - changes in medication etc.

Raatikainen *et al*. Europace 2008:10:1145

Cost of ICD F-U according to the generally applied follow-up scheme and the study protocol during the 9 months study period.

	Generally applied F-U scheme	Study protocol	Savings
Number of visits			
In-office visits*	164	82	
Remote data transmission**	0	82	
Direct cost			
In-office visit (210 € per visit)	34440.00 €	17220.00 €	17220.00 €
Remote monitoring (55 € per visit)	0.00 €	4510.00 €	-4510.00 €
Patient fee (22 € per in-office visit)	3608.00 €	1804.00 €	1804.00 €
Indirect cost			
Traveling (77.68 € per in-office visit)	12739,52 €	6369,76 €	6379,76 €
Accommodation (20.18 € / night)	40.36 €	20.18 €	20.18 €
Sickness allowance (44 € / day) visits)	1760.00 €	880.00 €	880.00 €

Annual saving 708 € / patient

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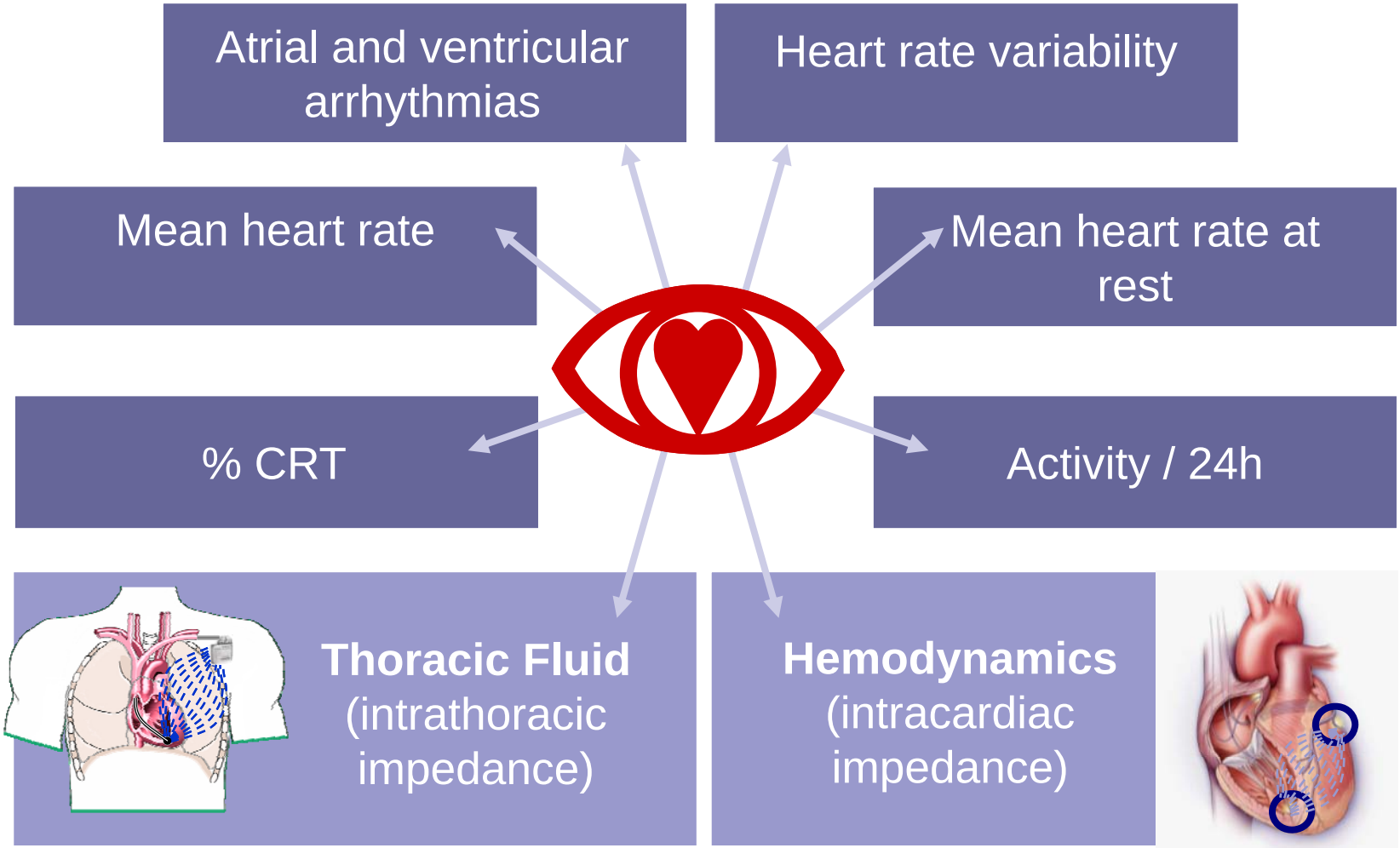
Oulu University Hospital district

1. Lapland
2. Western Lapland
3. Northern Ostrobothnia
4. Kainuu
5. Middle Ostrobothnia

OUH + 4 satellite centers

Enhanced monitoring



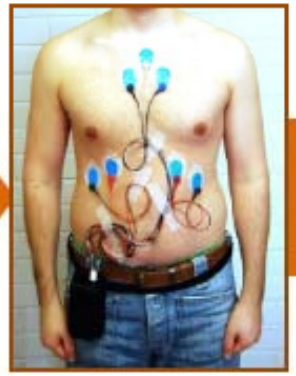
Telemonitoring in arrhythmias

- Holter analysis via the Internet brings services closer to patients and their local clinics
  - reliable diagnosis irrespective of place and time
- Low investment
  - Remote Analysis (RA) equips its customers with the registration devices and charges them on a per report-basis
- No special expertise is required from an attending doctor and administrating nurses

The attending doctor wants to test the patient.

A nurse sets a patient with a home diagnosis device.

The device gathers data in daily activities.



The patient returns the device to the clinic.

Devices and Internet portal are very easy to operate

A nurse uploads the data to the Remote Analysis server.

The specialist analyses the data by deploying the RA analysis software.

The specialist creates a report promptly .

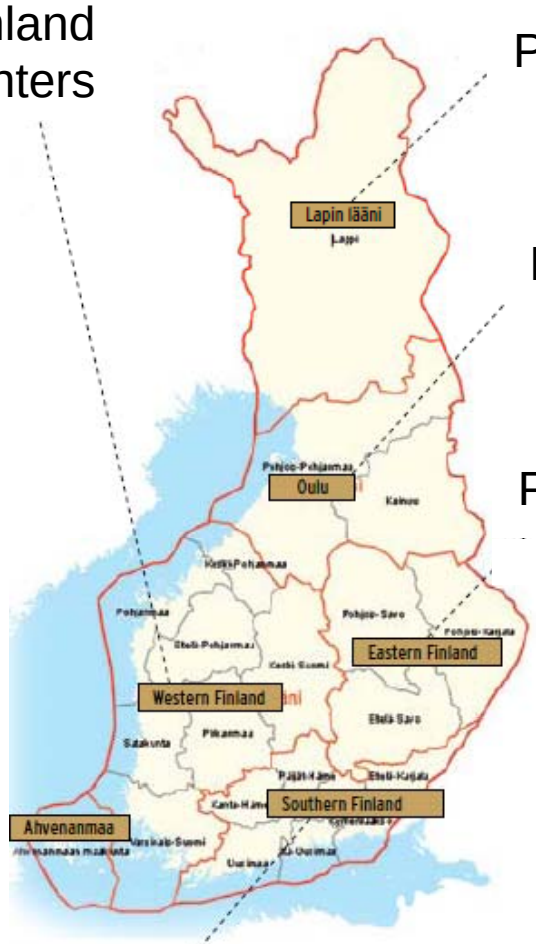
The attending doctor uses the diagnostic report to treat the patient.

Remote Holter analysis

Providence of Western Finland
34 centers

Providence of Northern Finland
7 centers

The recordings are analyzed by 6 experienced electrophysiologist



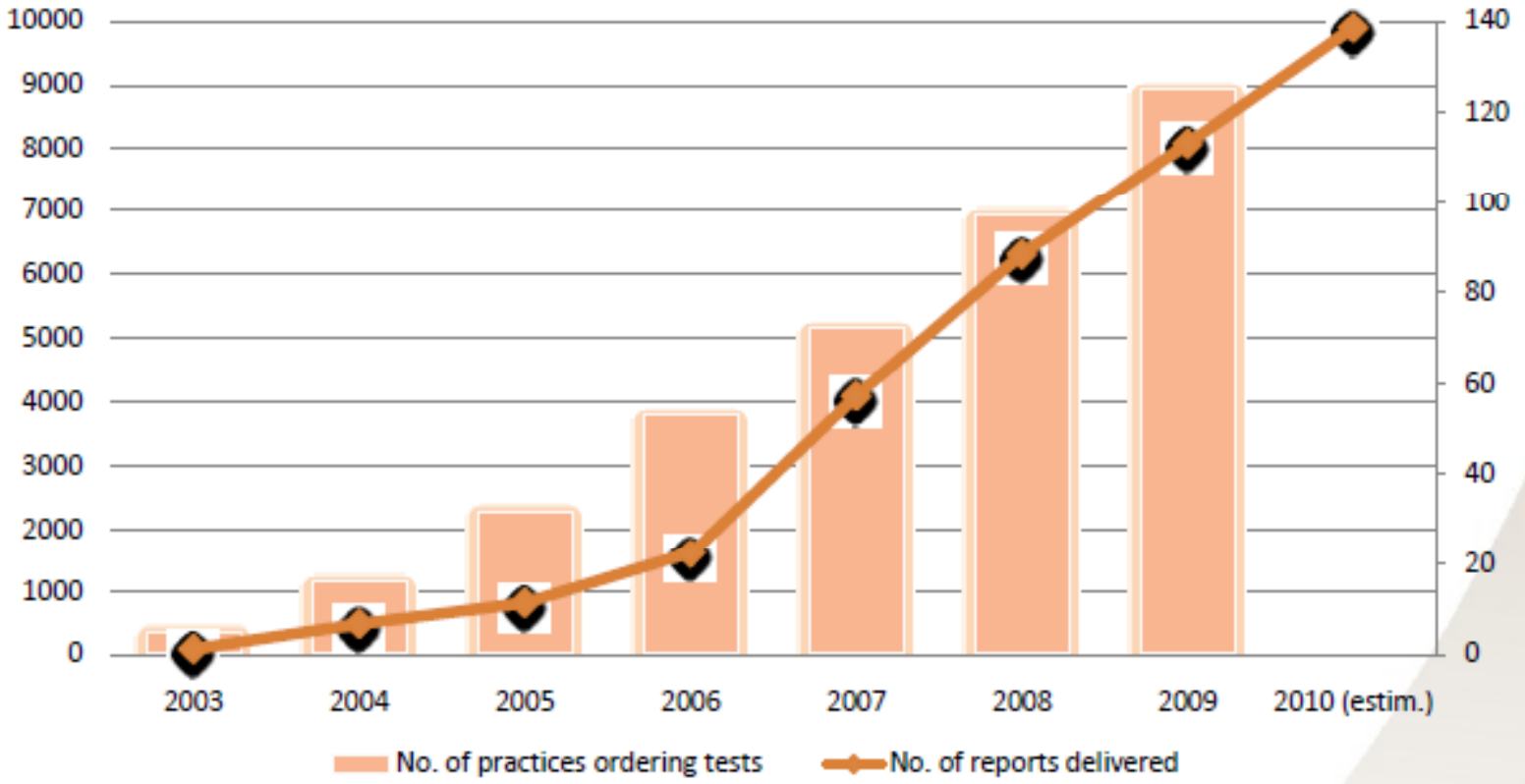
Providence of Oulu
7 centers

Providence of EasternFinland
19 centers

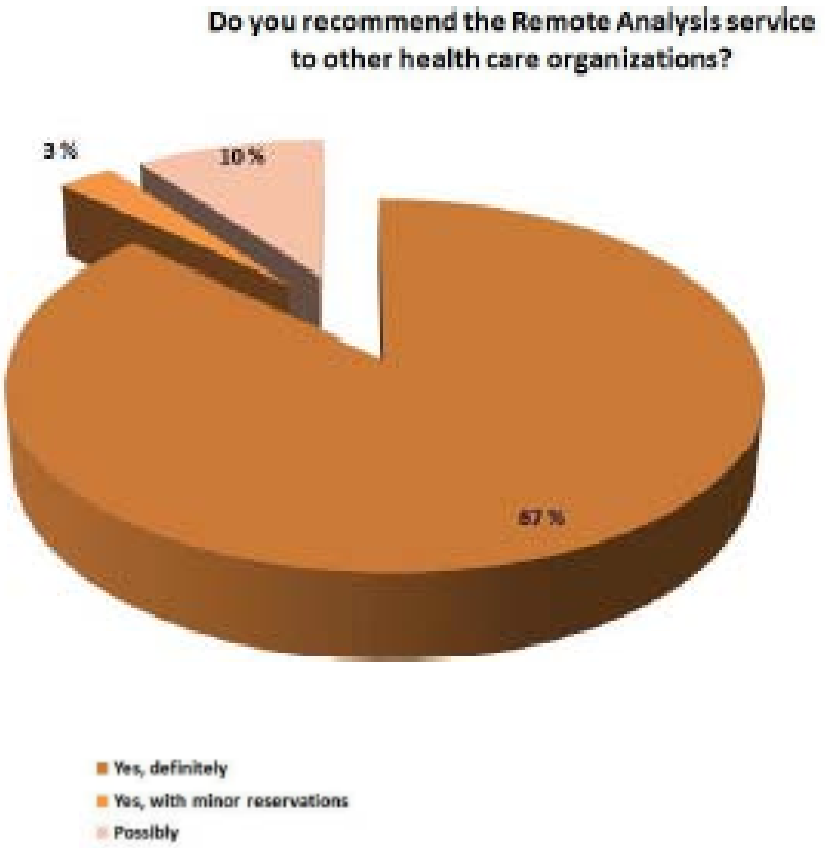
Providence of Southern Finland: 33 centers

Remote Holter analysis

Presently, 140 clinics, public health centers, hospitals, and laboratories all over Finland use the Remote Analysis services



Customer satisfaction



1. Expertise of the specialists
2. Easy-to-use and reliable service
3. Good availability of service
4. Fast and knowledgeable customer support
5. Prompt delivery of specialist statements

A Success Story in Remote Diagnostics: Better Results with Significantly Lower Costs

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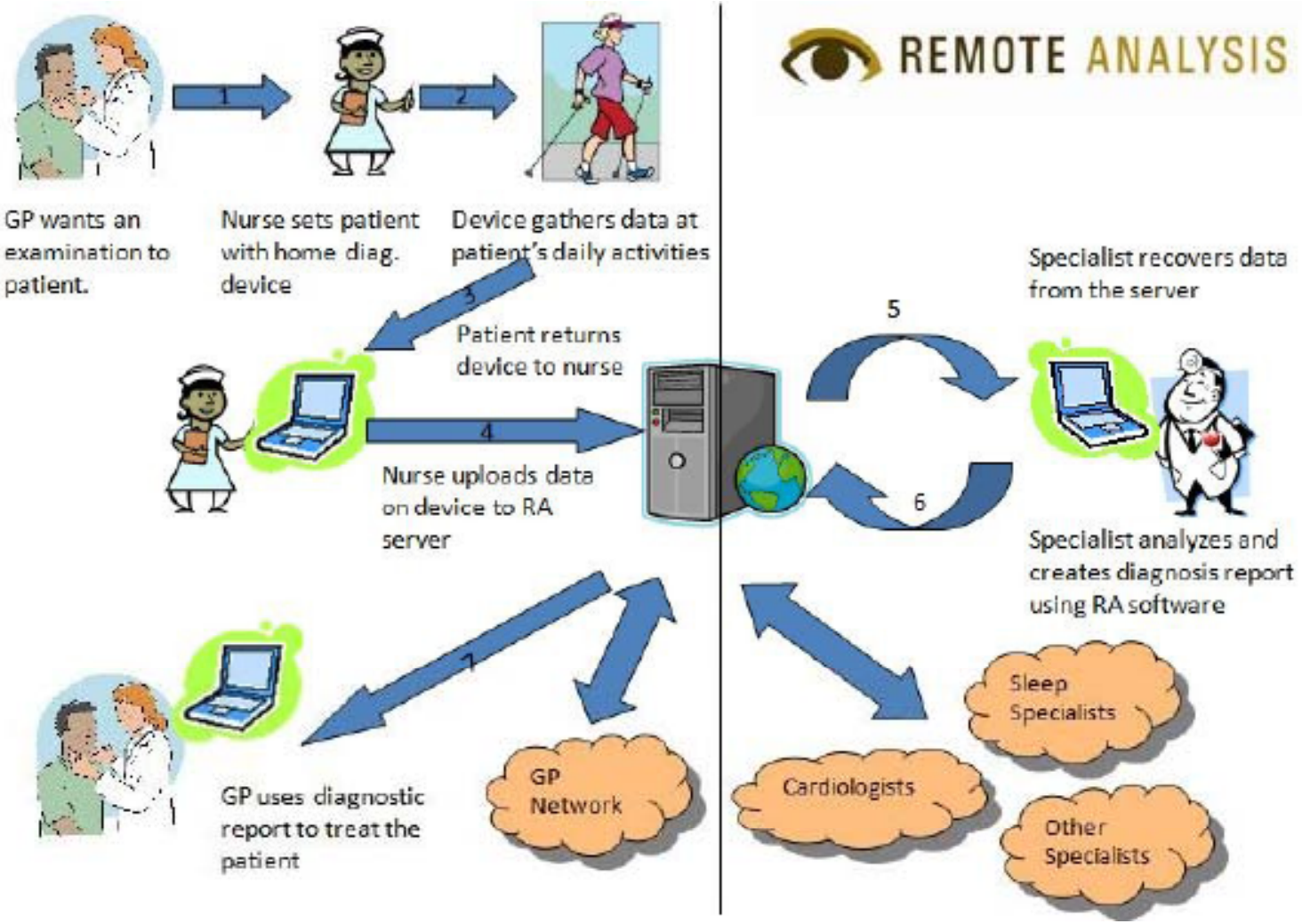
Abstract: **This paper describes how the need for a telemedicine specialist consultation service in Finland was identified, explains how the service is implemented, presents how the service helps public health care to reduce costs and discusses the benefits gained. Until now, more than 20 000 specialist reports have been channeled to over 130 practices around the country.**

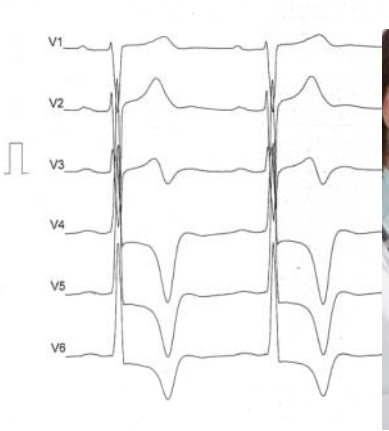
Remote analysis

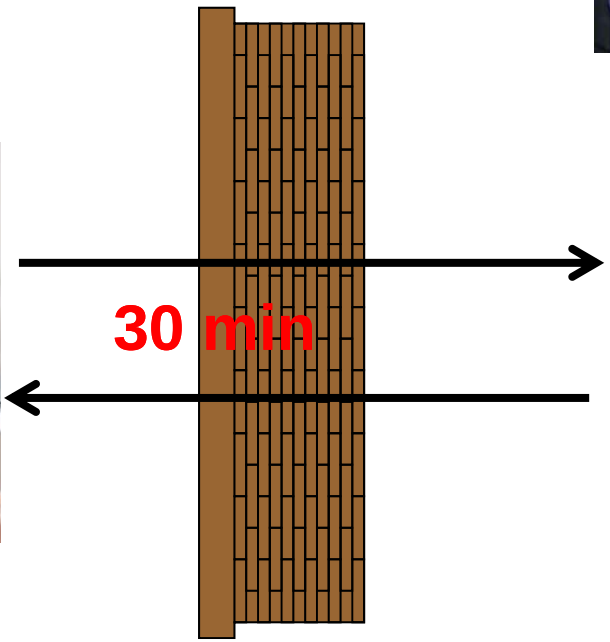


Remote cardiac consultation

Information

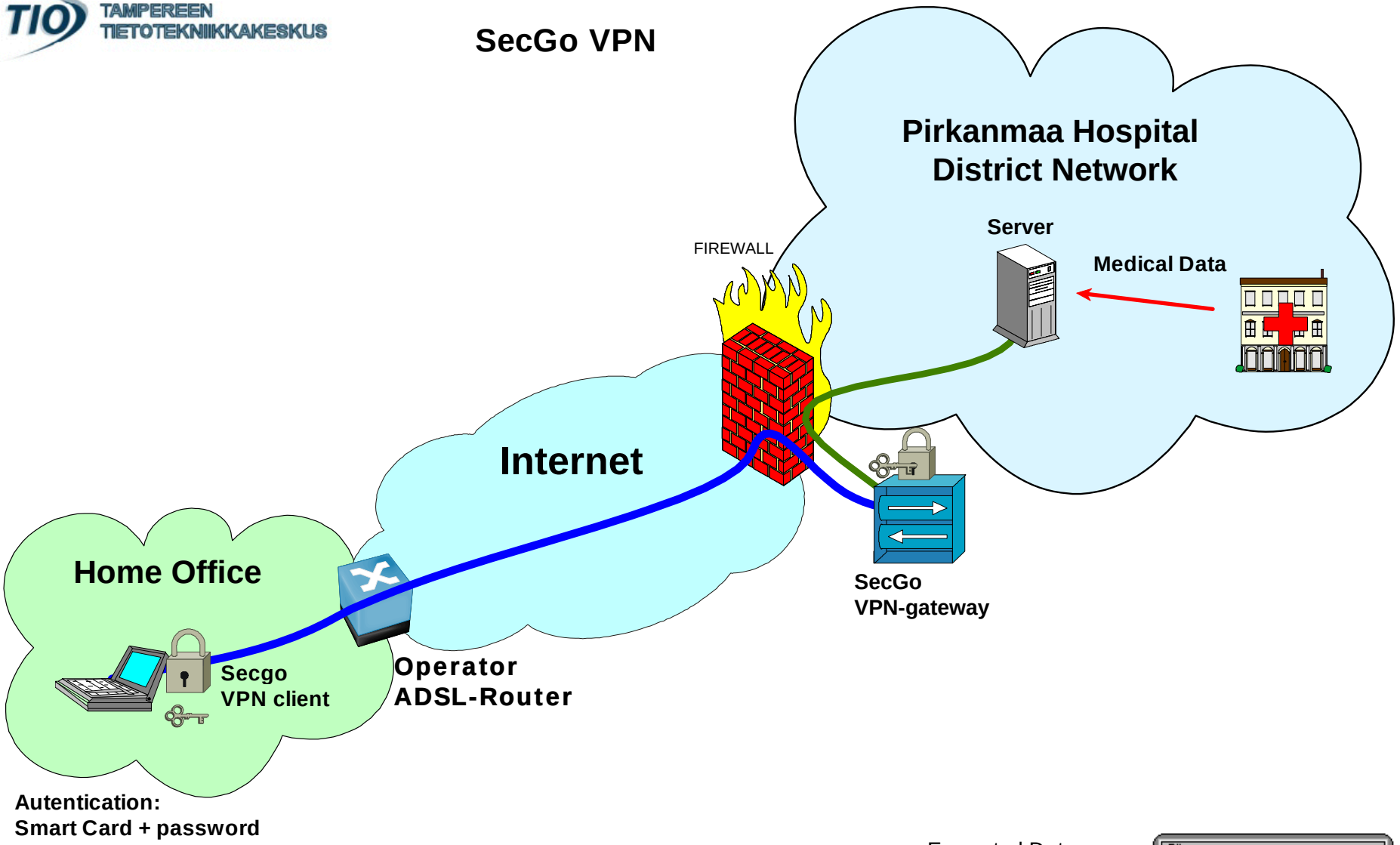
1. **History & problem**
2. **Clinical findings**
3. **ECG**



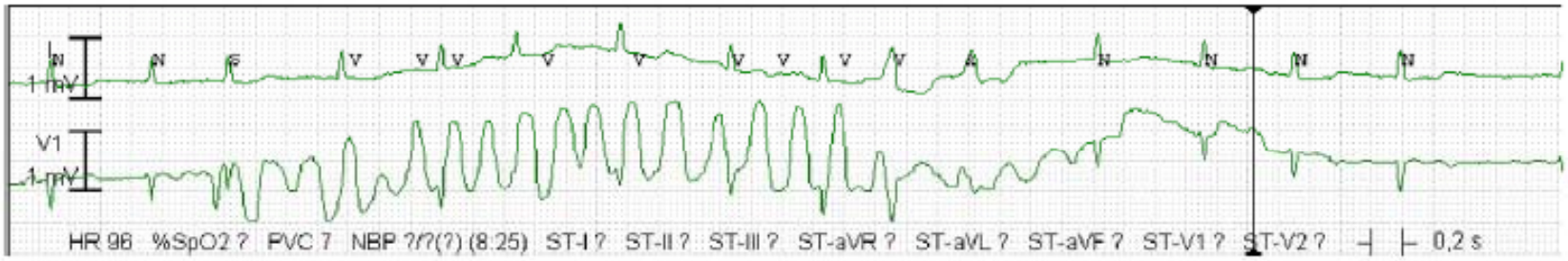


TAMPEREEN TIETOTEKNIIKKAKESKUS

SecGo VPN



Remote ECG analysis



Scientific documentation

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Available online at www.sciencedirect.com

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The role of continuous monitoring in a 24/7 telecardiology consultation service—a feasibility study

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Questions related to telemonitoring

- Regulatory and legal issues
- Technical issues
  - analog phone lines
  - several Internet sites
- Alleviate the burden of caregivers
- Reduce health care cost
  - reimbursement
- Optimize patient safety and care

Telecardiology in the future