

Telemedicine Service Measurably Reduces the Costs of Healthcare

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***Abstract:* This paper explains how a telemedicine Holter ECG consultation service is organized and describes the benefits of the service model compared to the traditional procedure. Especially the cost differences between a conventional clinical pathway of an arrhythmia patient and a modified pathway where the telemedicine consultation service is in use at a primary care clinic are examined.**

Background

In continuous ambulatory monitoring of a person's electrocardiogram, or Holter ECG, the electrical activity of the heart is recorded for an extended period of time, usually 24 hours. Electrodes that connect to the monitoring device via lead cables are attached to the patient's chest area and a small digital recording device is carried around the waist. In order for the monitoring to be as realistic as possible the patient is encouraged to act and work normally during the monitoring period and to keep a diary of any symptoms and activities.

The Holter ECG method is used to detect arrhythmias, which are abnormal events in the heart rhythm. Arrhythmias can cause a wide variety of symptoms¹. Individuals suffering from arrhythmias may for example experience palpitations, sensations of skipped heartbeats or fluttering. The more severe arrhythmias may cause fainting and even death. Holter ECG is a useful tool for detecting arrhythmias that occur paroxysmally, i.e. from time to time. A paroxysmal arrhythmia might not manifest itself during the often quite short time a rest ECG is recorded for. Also, since Holter ECG allows the patient to work and act normally during the registration period it is possible to get valuable information about the function of the heart during activity and to link the symptoms in the diary to events in the monitoring data.

In Finland, municipalities are required to finance both primary and secondary care for their inhabitants. Primary care is provided by municipality health centers employing mainly general practitioners and nurses, and seldom any specialists. Therefore, when a general practitioner decides that a

patient needs specialist attention, he or she is usually referred to a larger secondary care sector hospital. This is often problematic since the municipalities cannot know in advance the costs of referring a patient to the secondary care sector. Also, the referral waiting times and the distances between municipalities and secondary care facilities can be very long.

In the telemedicine service concept featured in this study, a telemedicine center equips a clinic with one or more Holter ECG monitoring devices. A nurse initiates the monitoring at the clinic. The next day the patient returns with the device and the nurse uploads the monitoring data along with anonymous patient information onto a remote server over a secure connection. The data is checked for accuracy by technicians and put forward for specialist (a cardiologist specialized in arrhythmias) analysis. The specialist writes a report complete with treatment recommendations, which is then made available for the clinic to download.

The service charges are based on the number of delivered reports. The service model provides hospital-level specialist consultations to primary care facilities and makes it possible to refer only the patients who actually need secondary care treatment. Furthermore, with this model the specialists making the consultation reports can put their expertise to a much more efficient use than normally.

In addition to Holter ECG the system includes ambulatory blood pressure monitoring and sleep apnea monitoring services. The service model is in use in 200 locations in Finland, Sweden, Portugal and the United Kingdom. During 2012 nearly 15000 consultation reports were delivered, of which roughly 9000 were Holter ECG reports.

Objectives

The purpose of the research project was to compare the overall costs of a traditional clinical pathway where patients are referred to secondary care for Holter ECG examinations with a modified pathway where a telemedicine consultation service is in use at a primary care facility. These costs included for example prices of various tests, cost of nurse's work and cost of doctor's work.

Methodology

The two recent studies that this paper refers to were implemented by Laurea University of Applied Sciences. The studies were limited to the public sector municipality healthcare centers. Six clinics were chosen for the comparison. Three were clinics that do not use the telemedicine consultation service and the remaining three were clinics that use the service. The clinics that do not use the service were the municipality health centers of Hyrynsalmi, Puolanka and Lempäälä. The clinics that use the service were the municipality health centers of Karkkila, Taivalkoski and Saarijärvi. The basis for selecting the sample was the degree to which the clinics represent the typical primary care facility in Finland.

Qualitative interviews at the six clinics were used to clearly identify the clinical pathways in order to accurately analyze the costs. Three different patient types were identified and selected as examples to illustrate the clinical pathways:

A: A patient that has fainted multiple times.

B: A patient that experiences difficult recurrent palpitations.

C: A patient that experiences disturbing arrhythmia sensations daily.

It was estimated that each of these patient types and symptoms would lead to a Holter ECG being performed in the primary or secondary care sector.

The traditional clinical pathways for these patient types as well as the modified pathways utilizing the telemedicine service were carefully mapped, analyzed and compared. The clinical pathways were defined as starting from the moment the patients first come into contact with the healthcare system to the successful delivery of the specialist doctor's diagnosis.

Finally, a sample of the first 200 telemedicine consultation reports from May 2012 was examined to determine the incidence of referral recommendations.

Results

The results show that the costs of the clinical pathways in the three clinics using the telemedicine service are considerably lower than in the three clinics that do not use the service. For example, the maximum cost of the clini-

cal pathway at Karkkila health center (telemedicine service user) is € 279,76 whereas the maximum cost at Hyrnsalmi (non-user) is € 879,20².

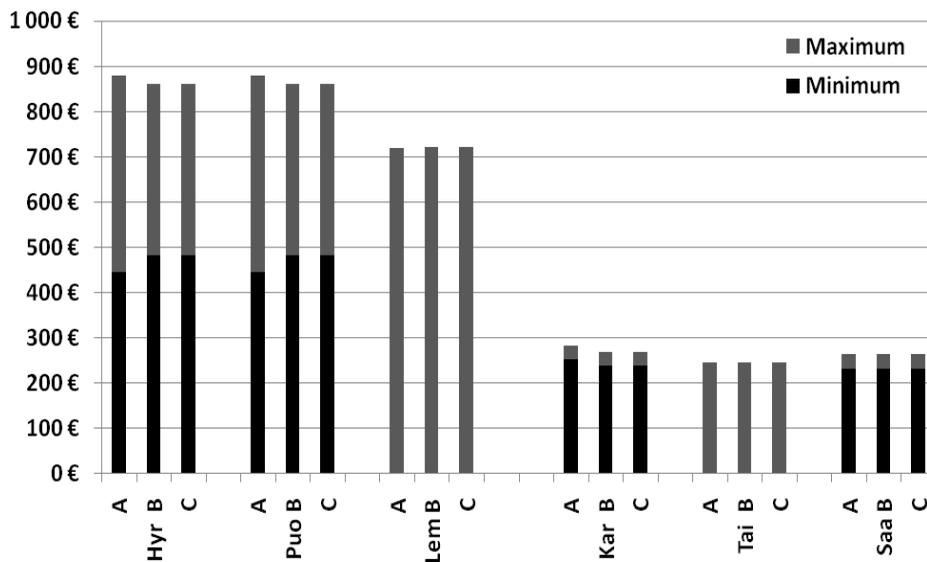


Fig 1. Costs of a clinical pathway in health centers that do not use the telemedicine service (three on the left) and in centers that use the service.

Also, out of the sample of 200 reports delivered via the telemedicine consultation service 153 did not include a recommendation to refer the patient to secondary care³.

The telemedicine service model offers significant cost savings compared to the traditional method of referring arrhythmia patients to the secondary care sector for Holter ECG and diagnosis.

Conclusions and discussion

Based on the results the telemedicine consultation service significantly decreases the costs of diagnosing arrhythmia patients.

The cost-savings associated with using the telemedicine consultation service are mostly related to lower cost for the telemedicine Holter ECG compared to the price of the study in the secondary care sector and to the fact that when a patient is referred to the secondary care sector also other tests besides the Holter ECG will be performed.

Even though also some of the patients that are diagnosed with the telemedicine service end up being referred to secondary care 153 out of 200 reports in the sample did not include a recommendation to refer the patient.

References

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About the authors

Tuomas Harju is the International Sales Manager of RemoteA Ltd, an export-oriented spinoff company of Remote Analysis Ltd. He has accumulated several years of experience in the practical applications of telemedicine consultation systems. He has collaborated with Remote Analysis Ltd since 2007.

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