

CARDISTA and other telemedical applications

**“Climate Change Mitigation and Adaptation
policies - in the health sector”**

Workshop

22 Jan 2013

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Tele-echocardiography: Is it the future?

- **Why tele-echocardiography?**
- **Why real-time tele-echocardiography?**

The general background in the North of Sweden:

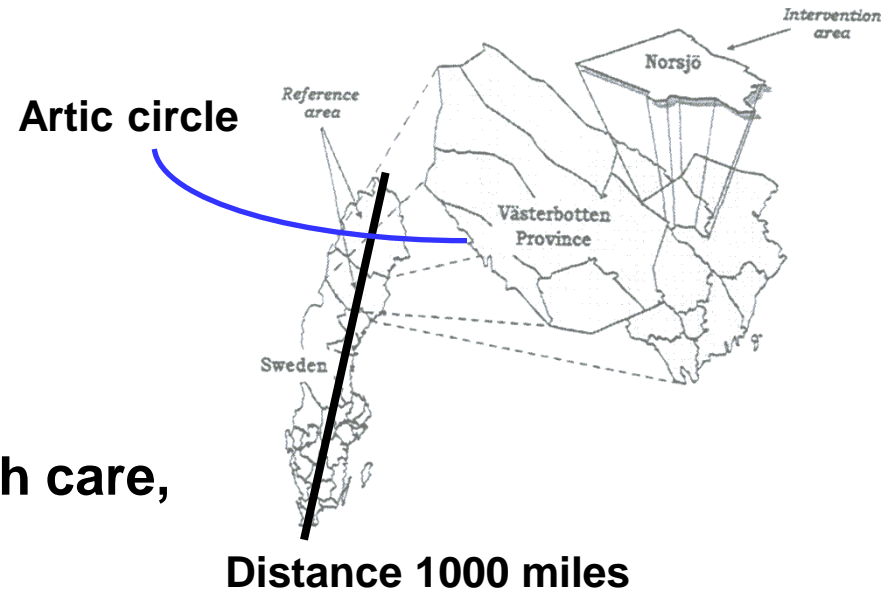
Long distances.

Expensive transports

Limited access to cardiac experts

More elderly people will need health care, nursing and rehabilitation.

New kinds of hospitals, smaller but more specialized towards acute treatment.

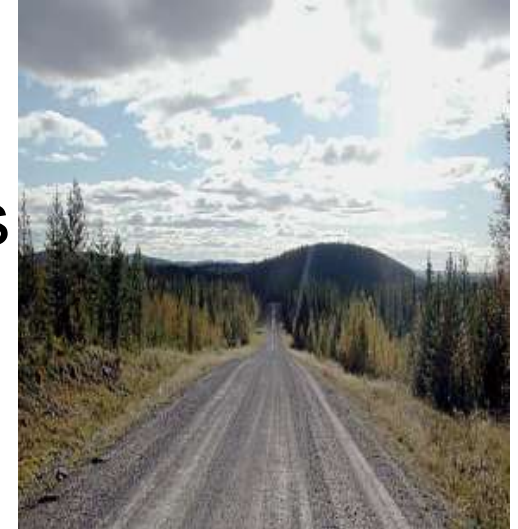


Demografi

- More elderly → more need of care

Society

- Less hospitals
 - Increased health care charges
 - Limited economy
- Rural areas
- Fair and equal healthcare
- More people want to live at their homes
- More treatment and rehabilitation of patients at their homes.



The CHF background in Sweden: :

CHF is the only cardiovascular condition in which both the prevalence and the incidence continue to rise. ¹

CHF is the leading cause of hospitalisation amongst the >65 year age group³

Annual inpatient and outpatient expenditure on CHF in Sweden has been estimated at SEK 2.6 billion²



**1Yamani & Massie (1993);
2Rydén-Bergsten et al (1999);
3Graves & Bilium (1996);**

Clinical goals for patients in rural areas.

- **Correct diagnosis.**
- **Early diagnosis**
- **Optimal treatment**
- **Managed care**
- **Follow-up of selected patients.**
- **Improved prognosis**
- **Lower cost**

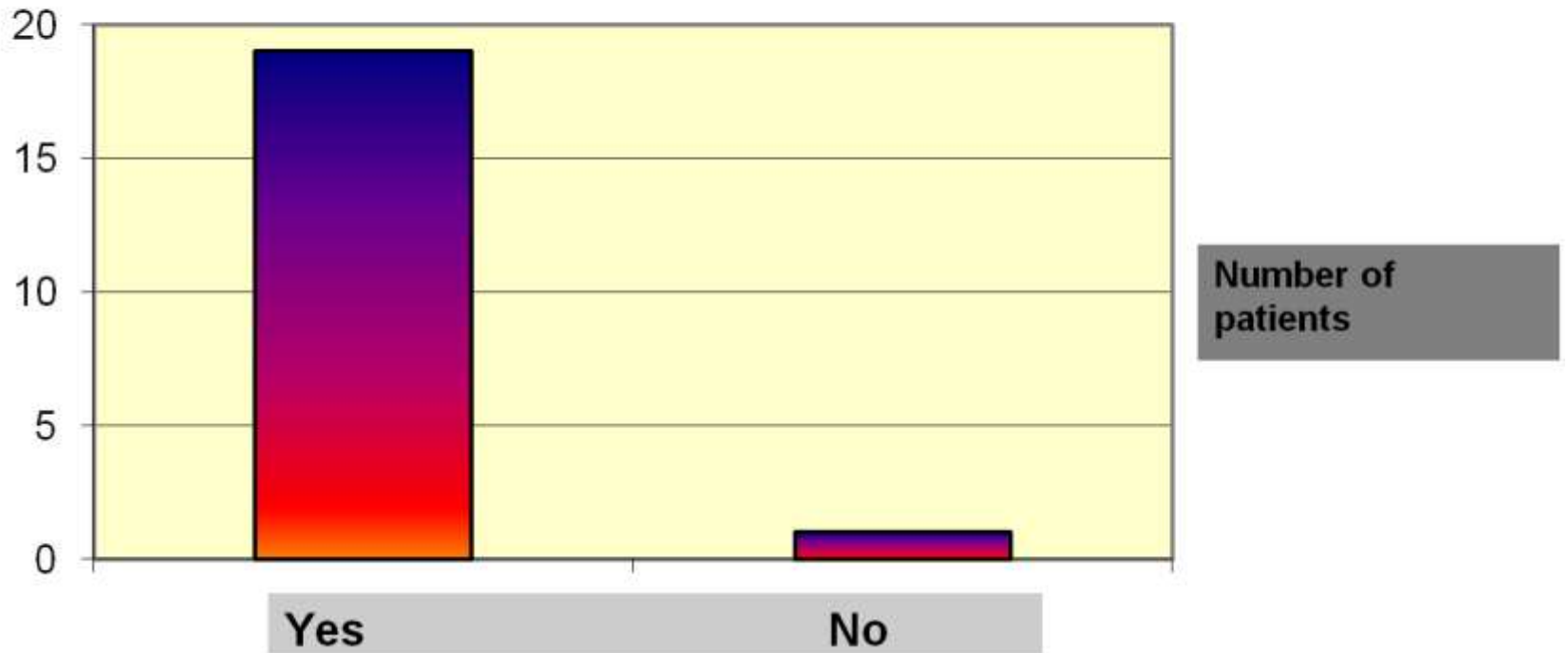


Telemedical consultation in cardiology

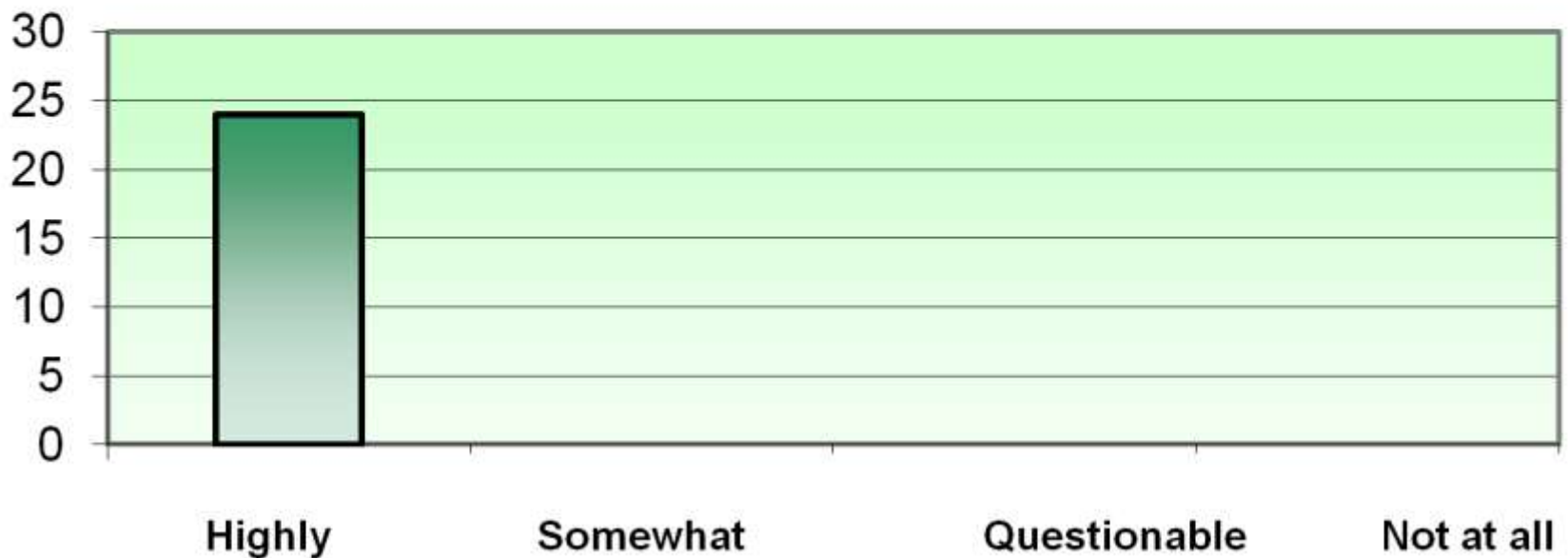
1. Prespecified heart failure record
2. Echocardiography
3. Cardiological consultation
4. Teleconference: Patient
General practitioner
Sonographer
Cardiologist



Are there any advantages of this examination compared to that at the hospital?



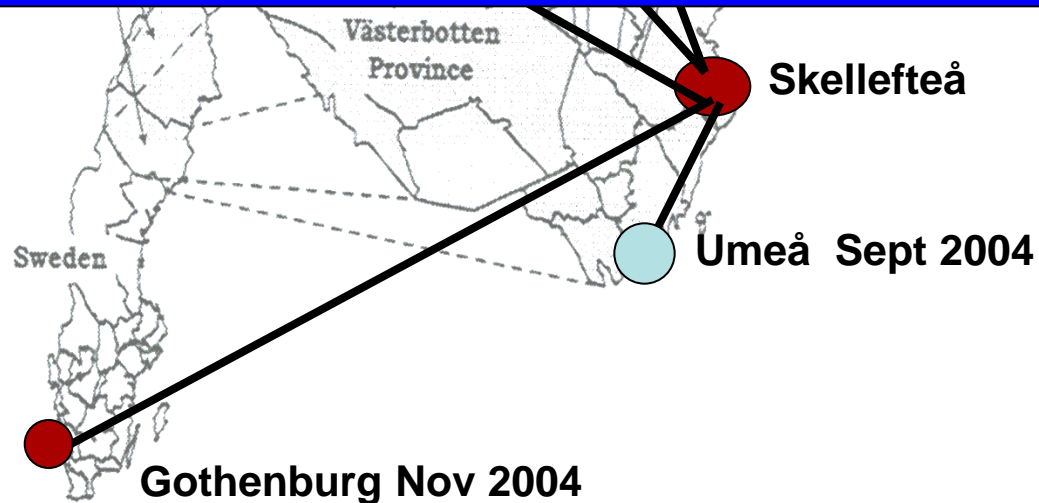
Does this technology bring additional value to you patients with heart failure?



Performed and planned tests

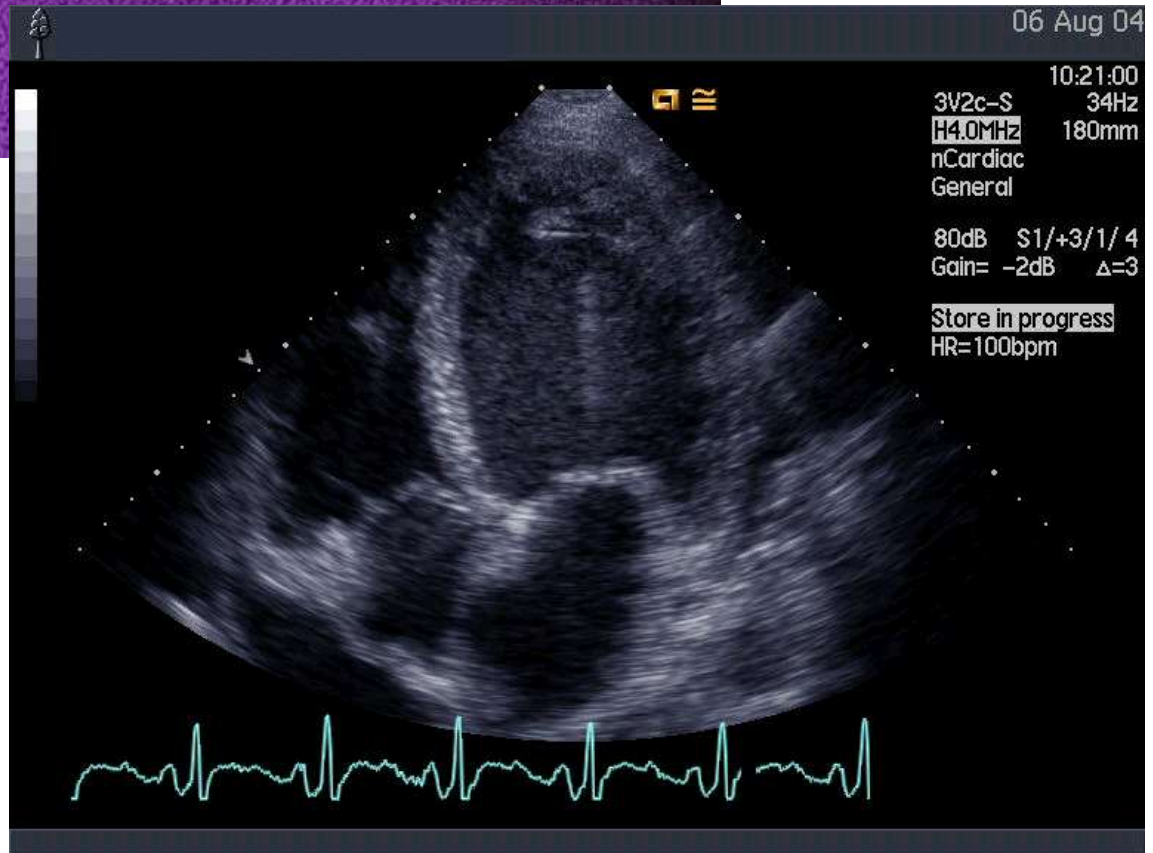
Umeå, May 2005

CARDISTA - concept





Sändare och mottagare av ultraljudsvågor





09:37:01

4V1c-S 38Hz

H4.25MHz 160mm

CARDIAC

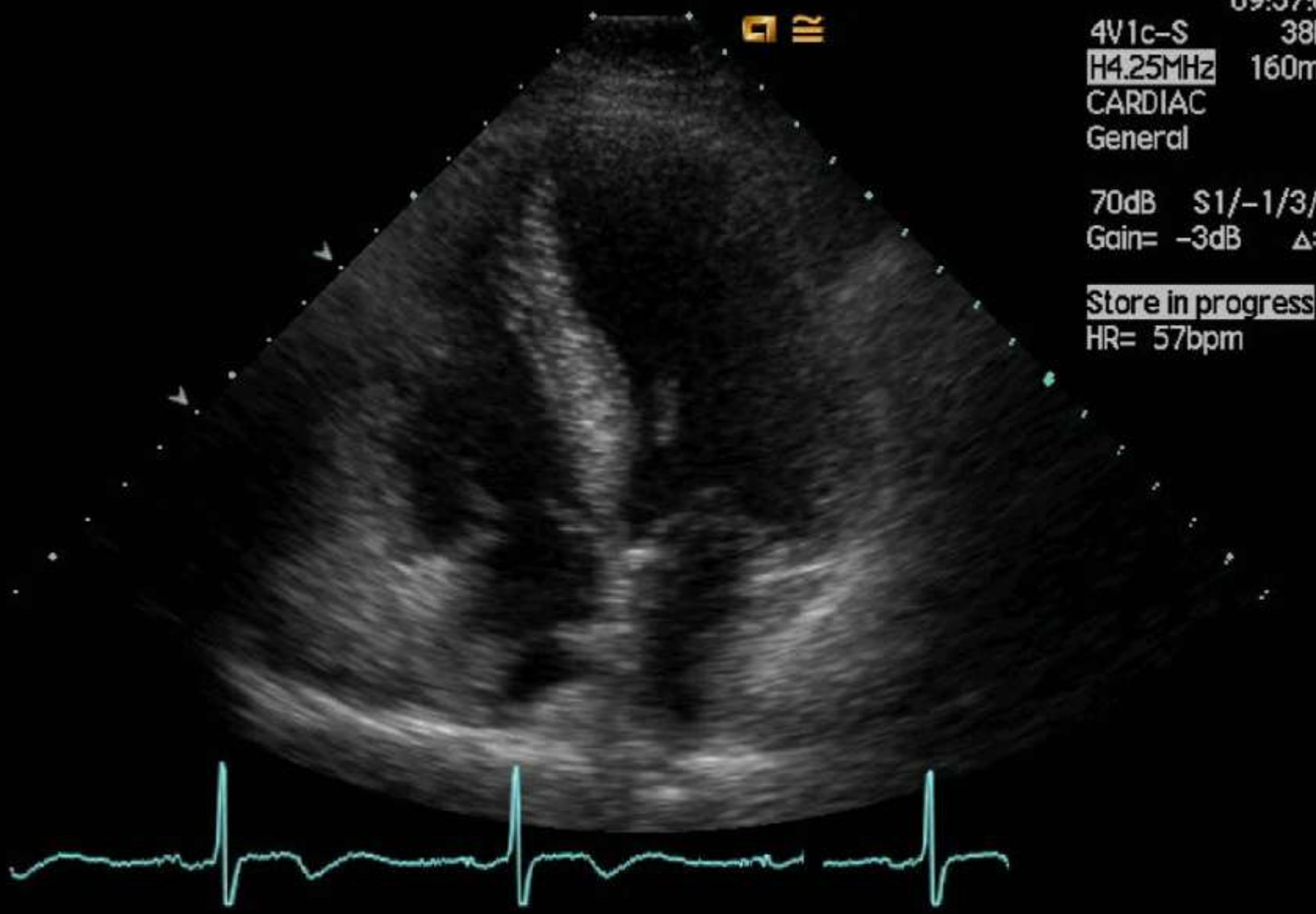
General

70dB S1/-1/3/4

Gain= -3dB Δ=3

Store in progress

HR= 57bpm



02 Oct 09

06:39:45

4V1c-S 31Hz

H4.25MHz 200mm

CARDIAC

General

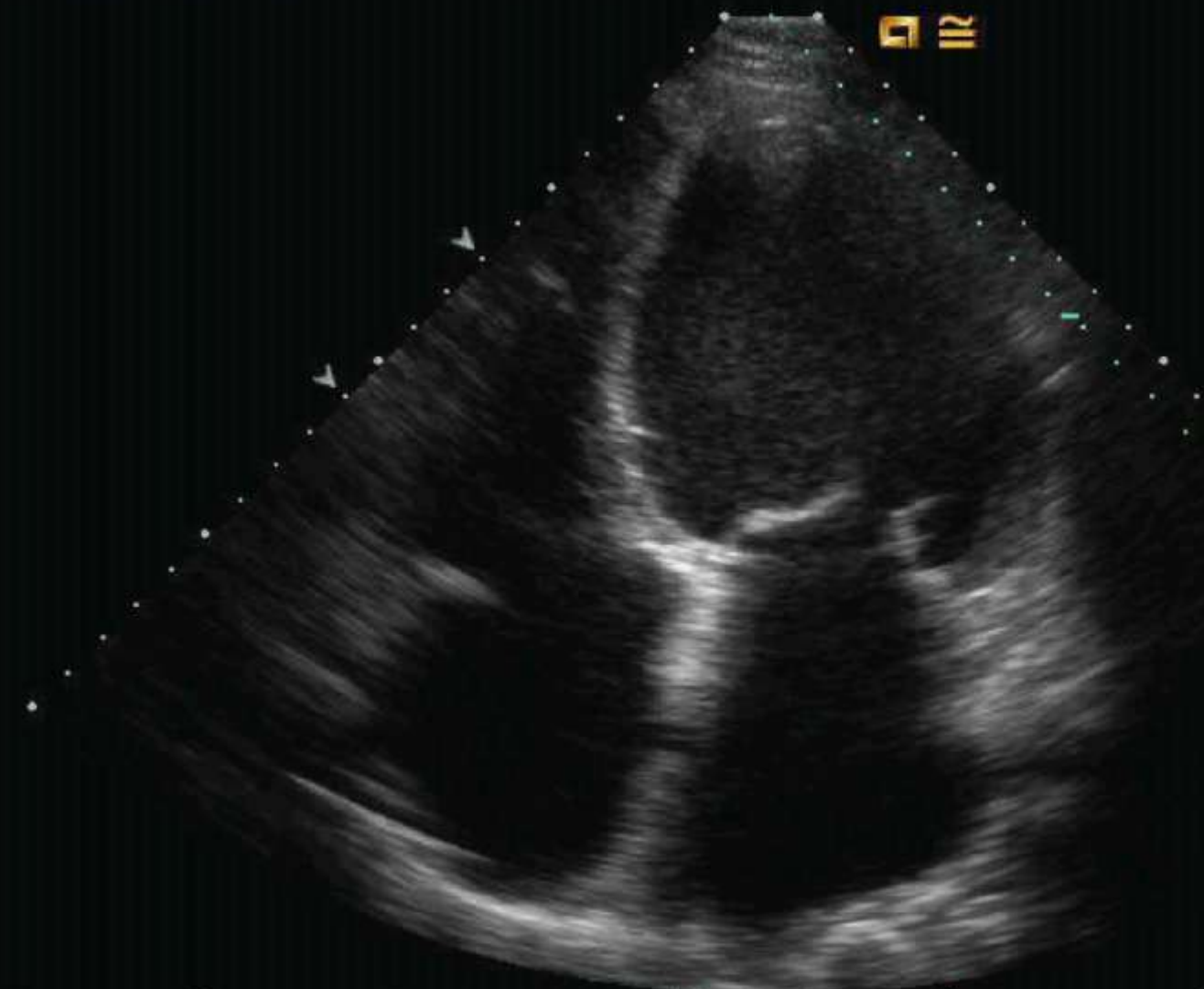
70dB S1/-1/3/4

Gain= 1dB $\Delta=3$

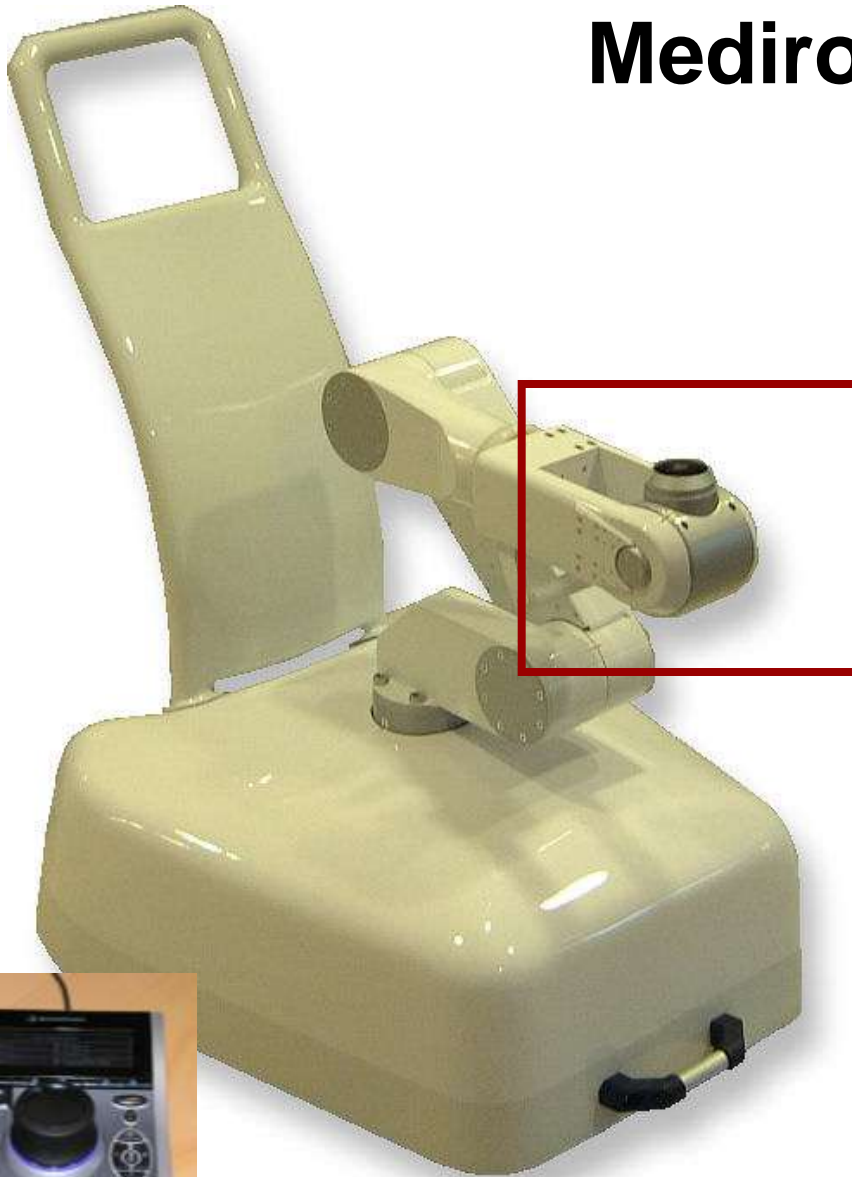
$\theta=60^\circ$

Store in progress

HR= 78bpm



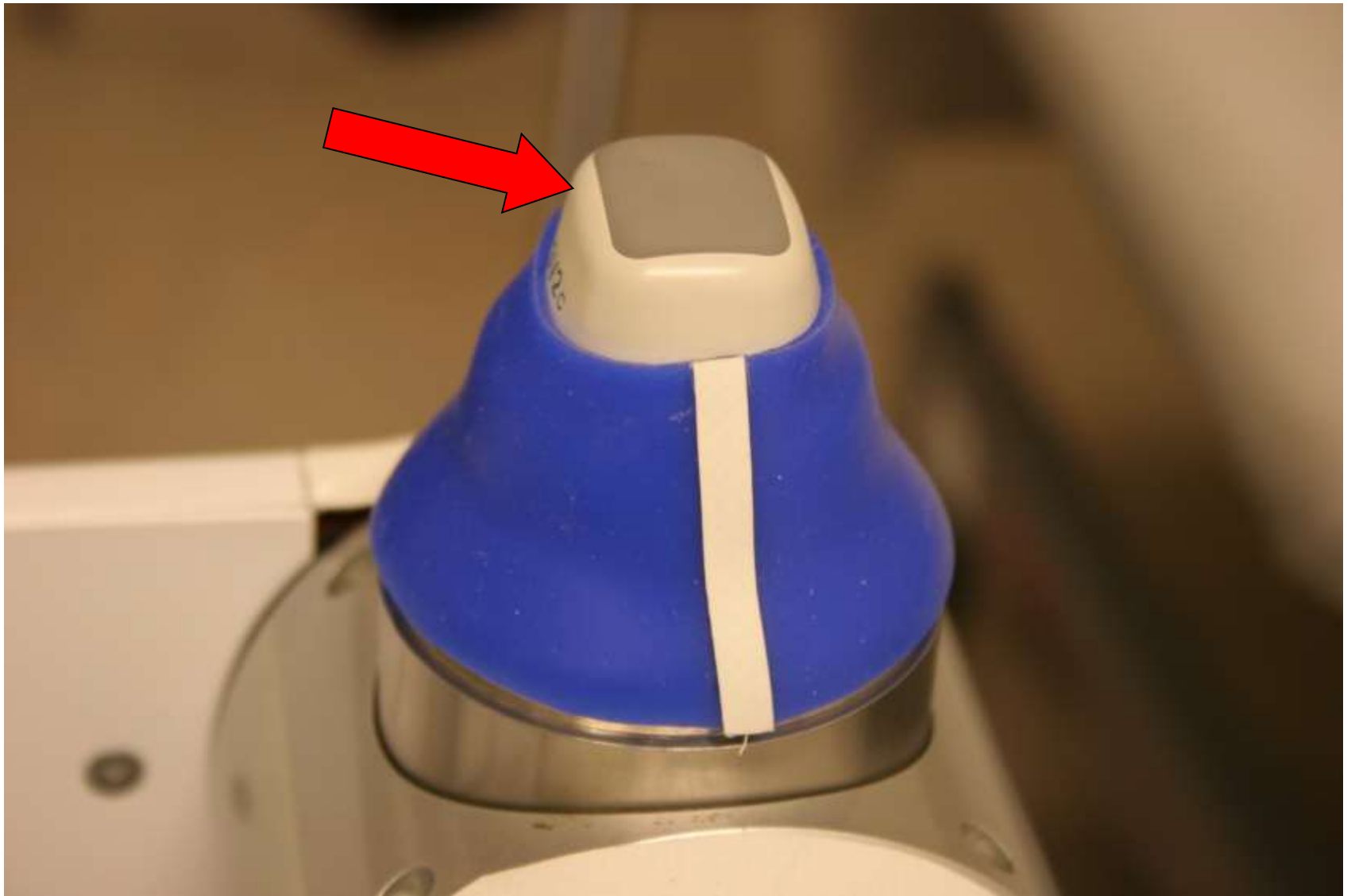
MediRob



A Mobile remote controlled robotic arm that holds the transducer during the ultrasound examination of a patient.

(Mobile Robotics AB)





”Eko-apparat”
på
distans





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Echo-examination



Trackball





Following consultation



CARDISTA - advantages

- The patient feels safety with his ordinary GP and PHC.
- At the consultation both patient and GP share the same information

Advantages with consultation by telemedicine

- Right diagnose
- Right treatment
- Right treatment level
 - If the patients can be managed by the GP or if they need a specialist ?
- Communication
- Large value of education
- Short time of consultation for the specialist

CARDISTA CONCEPT

At the PHC

Cardiological real-time consultation with patient, GP, sonographer and cardiologist

At the hospital

1.Echocardiography



2.Consultation
Patient and GP



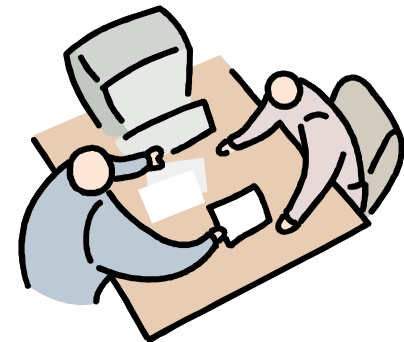
Broadband

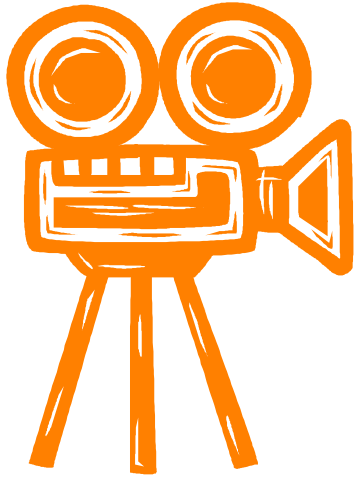


1.Echocardiography



2.Consultation
Cardiologist, sonographer





And now it is
film-time.....



Storuman
224 km

Skellefteå

Arvidsjaur

Malåträsk

Norsjö

LYCKSELE

CARDISTA-study

Aim: To see if CARDISTA can reduce the waiting time towards traditionell care until the patient get the results.

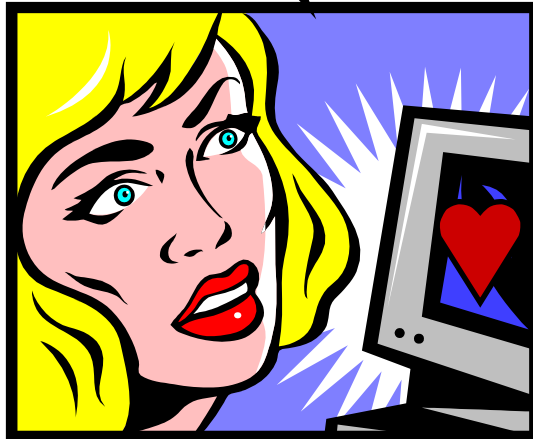
The manuscript work is started

participator

40 patients randomised to traditionell echo examination at hospital or CARDISTA

The Future?

Expert



Patient



Broadband

Echocardiography
+
Consultation

CARDISTA

Other telemedical applications in remote areas

Cardiology

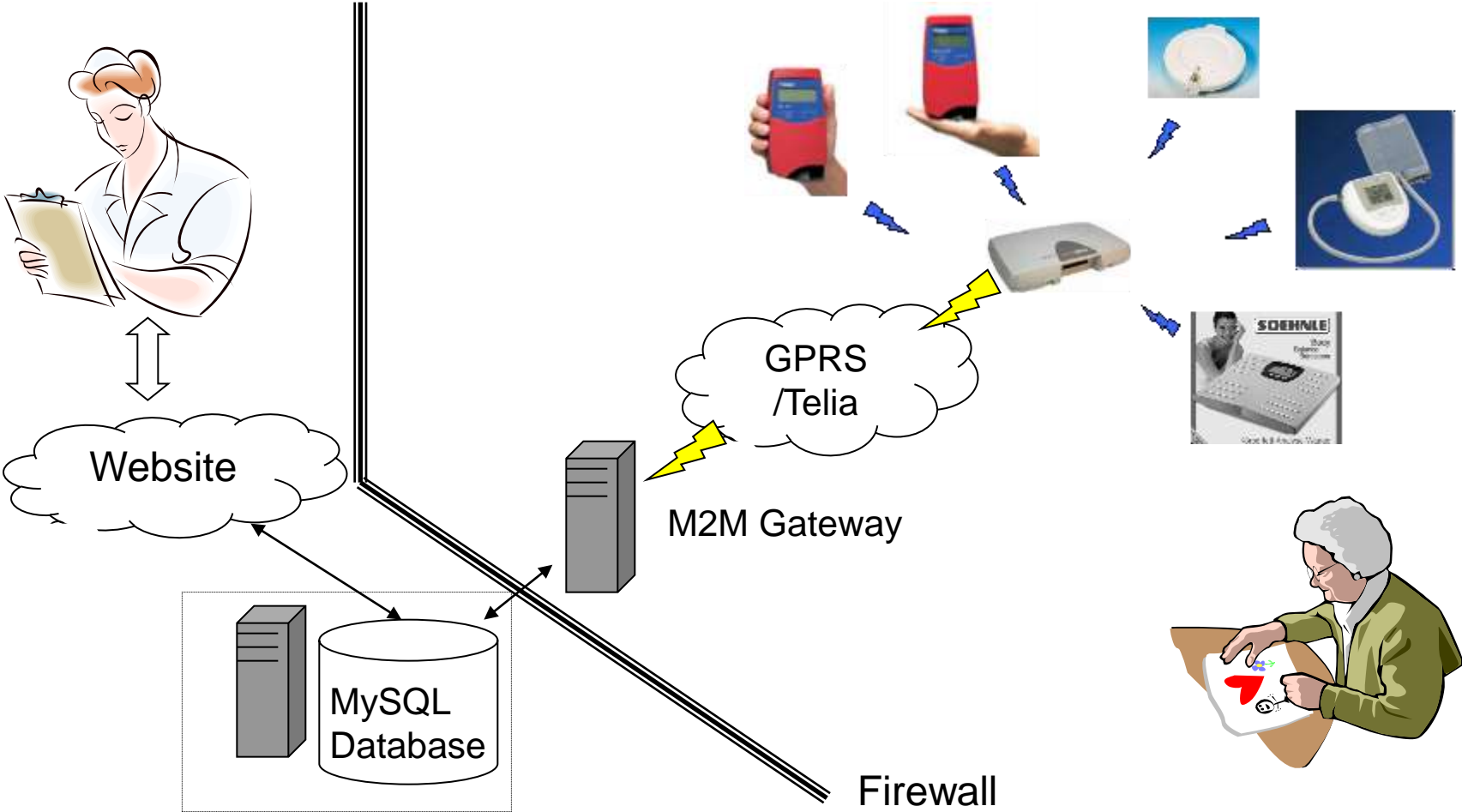
- Control of blood pressure
- Pulse
- Weight
- Hemoglobin, blood glucose
- Anticoagulation - INR



How can it be performed?

Caregiver

Patient



Telemedicine makes monitoring
of anticoagulants more effective

The GINA-study

Background - advantages

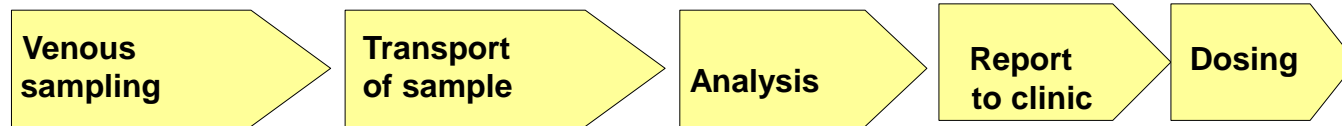
- Treatment with Warfarin is very common and effective as thromboembolic prophylaxis.
- Treatment with Warfarin saves many lives and suffering.
- International Normalization Ratio (INR)-controls in patients with warfarin in Sweden are of high class internationally

Background - disadvantages

- Treatment with Warfarin is also potentially dangerous and may cause deaths and severe bleeding complications.
- INR-controls are currently time-consuming but extremely important

Models of anticoagulant treatment monitoring.

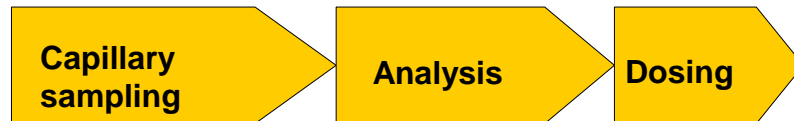
Laboratory-based model



CheckUp-based model



Self-management with Check Up



CheckUp - Includes

- The Bag
 - Patient card
 - Communication solution
 - Chosen measuring tools
 - Weight
 - Blood pressure
 - HB
 - INR
 - etc.
- Database
- Presentation tool (Web)





GSM/
GPRS



Internet

F
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Database

Bluetooth



Gina - study

- **Objective:** To compare the INR monitoring process using a telemedical system (CheckUp) with usual care (UC).
- **Design:** A randomized, prospective, controlled trial with open evaluation.
- **Setting:** Two primary healthcare centres (PHCs) and a hospital outpatient anticoagulation clinic (AC).

- ***Intervention:*** INR monitoring process performed with either CheckUp or UC.
- ***Patients:*** Forty patients on chronic

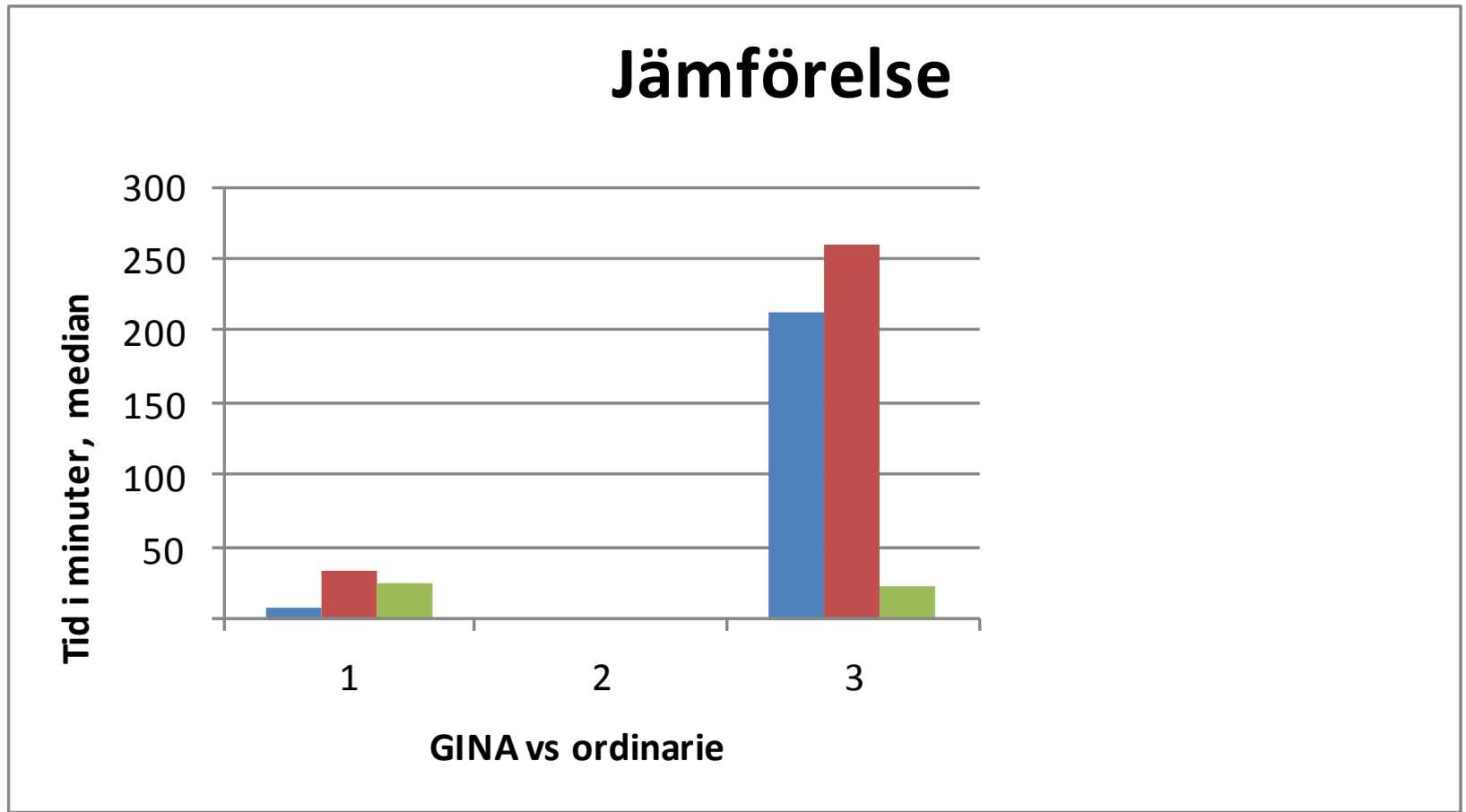
and the results.....

processing time was measured from blood sampling until warfarin dosing was performed in the Auricula database.

Resultat

CheckUp system	Traditionell vårdprocess	P-värde
Total processtid Medelvärde Medianvärde 44 min 34 min	Total processtid Medelvärde Medianvärde 351 min 260 min	<0,0001
Maxvärde för CheckUp systemet 113 min	Maxvärde traditionell vårdprocess 1401 min	
Transporttid Medelvärde Medianvärde 8 min 7 min	Transporttid Medelvärde Medianvärde 312 min 212 min	<0,0001
Doseringstid 36 25 min	Doseringstid 39 22 min	0,918

Jämförelse GINA vs ordinarie



Conclusion

- CheckUp reduced the total processing time for INR monitoring, mainly through the rapid transmission of INR value from each PHC to Auricula.
- CheckUp may improve the practical management of patients undergoing anticoagulant treatment at PHCs.

Published online in Journal of Telemedicine and Telecare

- The National Board of Health and Welfare recommends (2008) selftesting (prio 3)
- The patients comments were positive:
 - "Easier sampling, quick answer"
 - "It is difficult with venous sampling on me, therefore I like blood test from my finger"



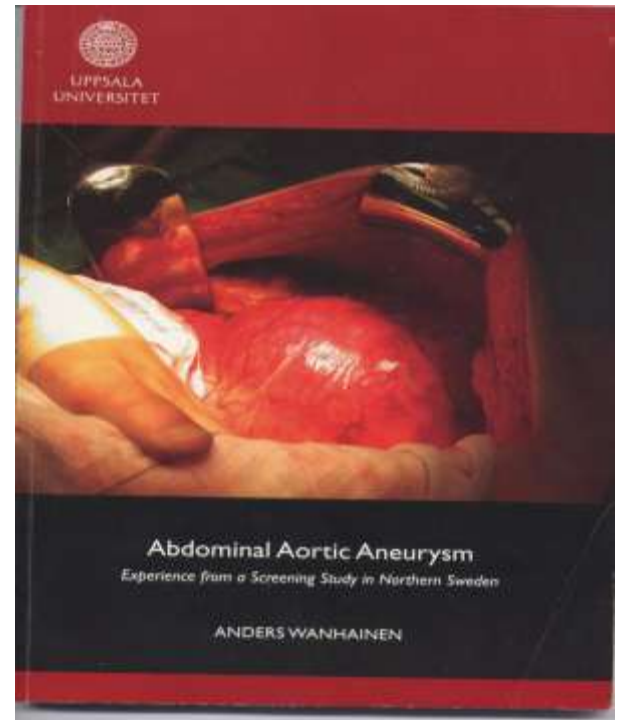
Thank you!

Fördelar ekonomi CARDISTA

- Förkortad vårdprocess beräknas minska kostnaderna för patienten och förkortar tiden för hjärtspecialisten.
- Om fler undersökningar på andra organ tillförs, förbättras ekonomin ytterligare.
- Minskade resor - mycket gynnsamt ur miljösynpunkt. Ju längre resor till specialist undersökningar ju större potential för besparingar av resor och på miljön.

Kliniska framtidsscenarier

- **Klinisk användning i glesbygd och med stora avstånd till specialist**
- **Telemedicinska konsultationer utanför kardiologi.**
- **Bukaortascreening i varje län**
- **Ergonomiska fördelar**
- **Miljömässiga fördelar**



Bakgrund - självtest

- **Socialstyrelsen rekommenderar (2008) självtestning och egenvård (prio 3).**
- **En Cochrane review (18 studier med 4723 patienter) visar att självtestning och egen dosering ökade kvaliteten.**
- **Trombo-emboliska händelser halverades**
- **Dödsfall minskade med 36 %.**
- **Begränsningen i studien var att endast cirka hälften av patienterna använde självtest.**

Hälsoekonomiska konsekvenser

- CheckUp systemet kostar 30.000 kr
- CoaguChek® XS Pro system kostar 15.900 kr
- Dockningsstationen 4.850 kr
- Driftskostnad 950 kr/månad för support, felrättningar etc.
- Årlig kostnad för systemet beräknat till 21.550 kr/hälsocentral.
- Teststicka 30 kr
- Givet 1920 kontroller årligen (120 patienter för 16 kontroller) ger en

Patientkommentarer

”Enklare provtagning. Snabbt svar”

”Jag är svårstucken på vanliga venprover, så jag tycker detta är jättebra.”

”Checkup passar mig mycket bättre, ingen tidsbokning och slipper nål i armen - Checkup betydligt snabbare dessutom.”

”Checkup bra pga att ej behöva tidsbeställa.”

”Bättre på grund av direktsvar, dessutom ingen tidsbeställning.”

Hälsoekonomiska konsekvenser

- Analys av INR kostar 42 kr i medeltal
- Värdet på eventuella inbesparade resor, personalkostnader vid dessa resor är inte inberäknade.
- CheckUp på hälsocentral bedöms som minst kostnadsneutral.
- Potential finns för besparingar om patienten själv utför testen

- Patienter

- Aktuella värden
- Vikt
- Blodtryck
- Puls
- Glukos
- Hemoglobin
- Tablettdosering

Testversion för telematiskt stödd vård - presenterat av



HEARTNET



Maria Skoglund, 610117-8587

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Telefon 0910-702434 **Mobil** 072-555 44 22
Epostadress maria.skoglund@patient.se

- Sjukdom
- Läkemedel
- Anhöriga
- Vårdpersonal
- Sensorer

	Aktuella värden	Datum/Tid	Rek. värden	Graf	Historik
Vikt [kilo]	72.5	04/11/30 11:36	65.0 - 80.0		
Blodtryck [mmHg]	142/95	04/11/30 11:37	100/60 - 120/85		
Puls [bpm]	64	04/11/30 11:37	50 - 100		
Glukos [mmol/l]	5.7	04/11/30 12:46	5.0 - 10.0		
Hb [g/l]	157	04/11/30 12:46	110 - 140		

Följsamhet läkemedel

Inställd tid: 08:00	09:00	11:00	12:00
Uppmätt tid: 08:01	09:02	11:29	12:02

- Doseringstider
- Historik

Inställningar

Fördelar vårdkvalitet CARDISTA

- Vid konsultationen- tid för mer uttömmande frågor och svar genom att både patient, distriktsläkare, ultraljudsoperatör och hjärtspecialist samverkar vid ett och samma tillfälle.
- För patienten - en oerhörd trygghet att få vara kvar på sin vårdcentral och sin ordinarie doktor.