



IBM Health Care and Life Sciences



## ***The Danish e-health Experience***

ITAPA 2008 International Congress

„Government 2.0 – Breaking with Traditions“

***November 18-19, 2008***

Torben Hagen Britze

*IBM Strategic consultant, Healthcare*

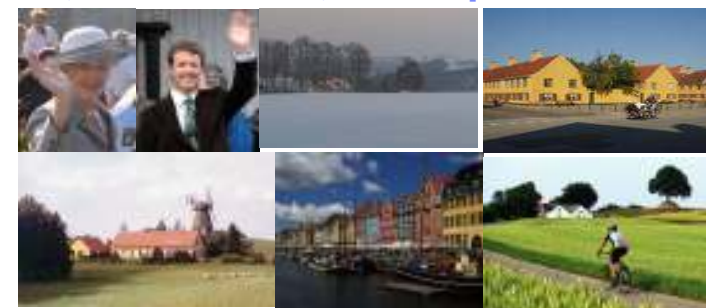


## The Kingdom of Denmark



5.5 mill. People

43,094 km<sup>2</sup> / 16,639<sup>2</sup> sq mi



63 Public hospitals – 21,000 Beds

10 private hospitals - 150 Beds

3,400 GPs (2,000 clinics)

804 Private specialists

245 Part time Private specialists

331 Pharmacies

2,700 Dentists (1,650 clinics)

1,793 Physiotherapist (550 clinics)

225 Chiropractors

546 Psychologists

5 Regions

98 Municipalities

1 Government Health Insurance

1 Private Health Insurance

## No. 1 in Healthcare in the world 2007



## The Computerworld Honors Program

Honoring Those Who Use Information Technology to Benefit Society

[Home](#) > [Laureates](#) > Recipients

### 2007 Award Recipients

**BUSINESS & RELATED SERVICES**  
**QlikTech International**  
for Business Software that Saves Lives  
*Nominated by Morgan Stanley*  
[View Recipient Video](#)  
[View Recipient Case Study](#)

**EDUCATION & ACADEMIA**  
**Defense Acquisition University**  
for DAU Datamart  
*Nominated by Informatica*  
[View Recipient Video](#)  
[View Recipient Case Study](#)

**HEALTHCARE**  
**The Danish National eHealth Portal**  
for Sundhed.dk  
*Nominated by IBM*  
[View Recipient Video](#)  
[View Recipient Case Study](#)

#### THE 21ST CENTURY ACHIEVEMENT AWARDS

In April of 2007, thirty three CIO-level distinguished judges on ten panels — one panel for each of 10 industry categories — completed their review of the case studies submitted by the Computerworld Honors Program's Laureates for the Class of 2007. Based on this review, they named 50 Finalists as guests of honor at ceremonies at the Andrew W. Mellon Auditorium in Washington, DC, on June 4, 2007. At these ceremonies, the Computerworld Honors Program is proud to announce that following 10 Finalists are recipients of the program's top honor to organizations: The Computerworld Honors Program's 21st Century Achievement Award.

[View the 2007 Recipients](#)

[View the 2007 Finalists](#)

<http://www.cwhonors.org/viewCaseStudy.asp?NominationID=299>

## EU eHealth Award Cork 2004

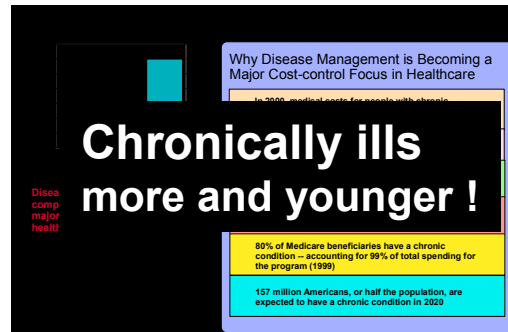
## Agenda

---

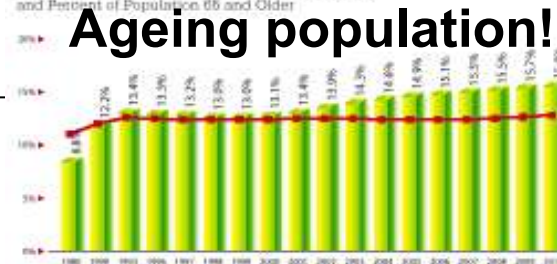
- 1. The Challenges in health care are Global**
- 2. Optimize using e-Health – an overview**
- 3. The Building blocks – some samples**
- 4. Next generation resistance**



## The Challenges in health care are global

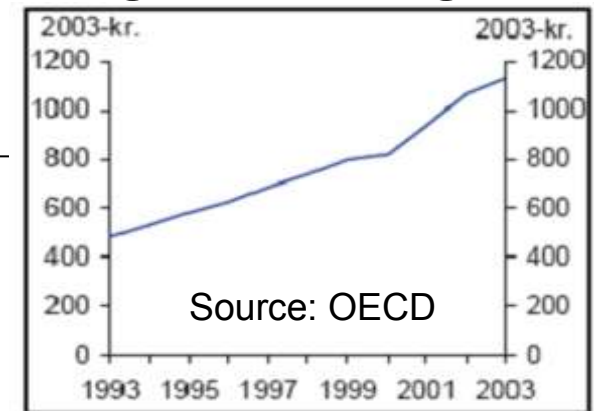


National Health Expenditures as a Percent of GDP and Percent of Population 65 and Older



Source: Health Care Financing Administration, Office of the Actuary, National Health Statistics Group (U.S. Department of Commerce, U.S. Census Bureau, 2001)

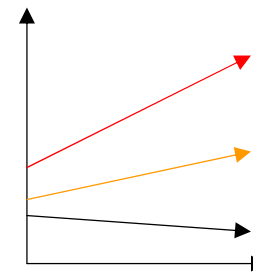
## Drugs cost rising !



	Female							Male						
	20-29	30-39	40-49	50-59	60-69	70-79	80+	20-29	30-39	40-49	50-59	60-69	70-79	80+
Diabetes	6%	14%	39%	53%	59%	52%	49%	5%	13%	37%	54%	61%	56%	45%
Hypertension	3%	7%	24%	42%	60%	63%	43%	7%	11%	25%	40%	57%	61%	48%
Hypercholesterolemia	14%	23%	40%	53%	60%	48%	48%	9%	25%	33%	39%	42%	39%	23%
Obesity	25%	42%	59%	58%	48%	37%	30%	27%	29%	34%	33%	29%	24%	21%

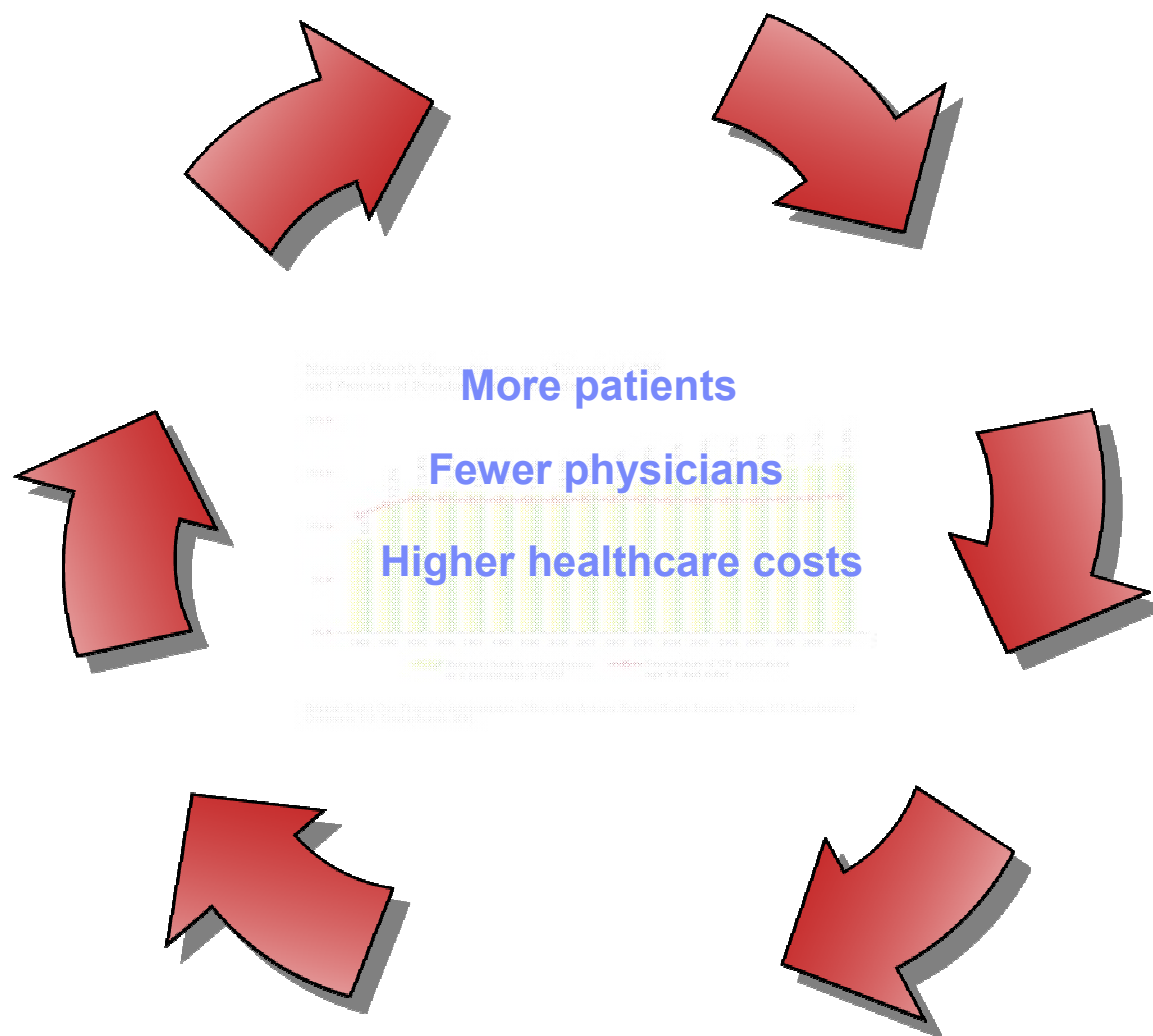
Source: UAE University Analysis

**More patients**  
**Fewer physicians**  
**Higher healthcare costs**

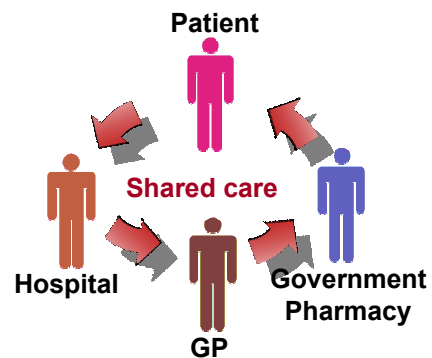




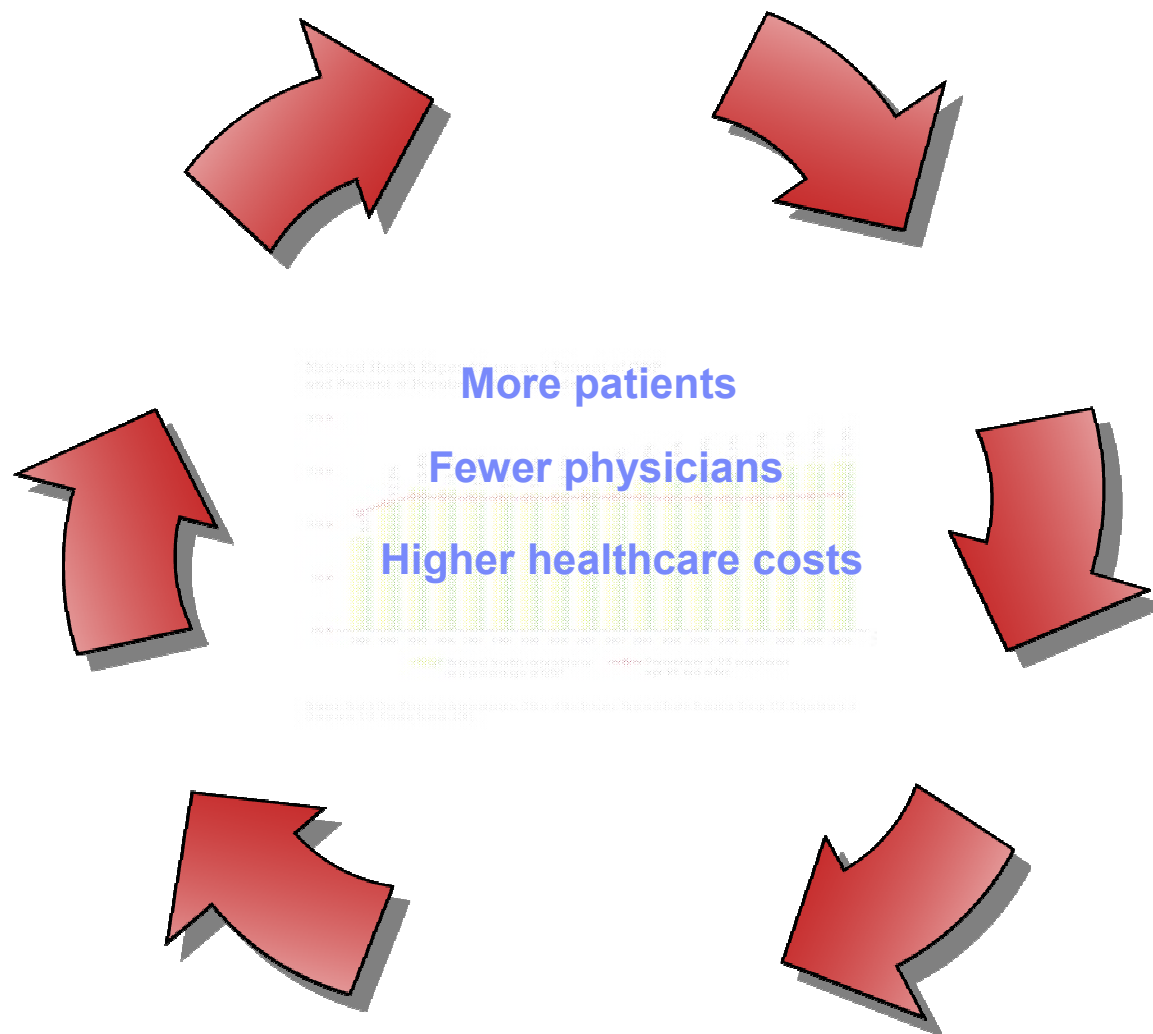
## The healthcare challenge



## The ehealth approach

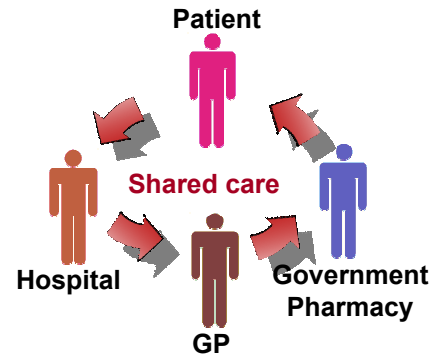


## The healthcare challenge

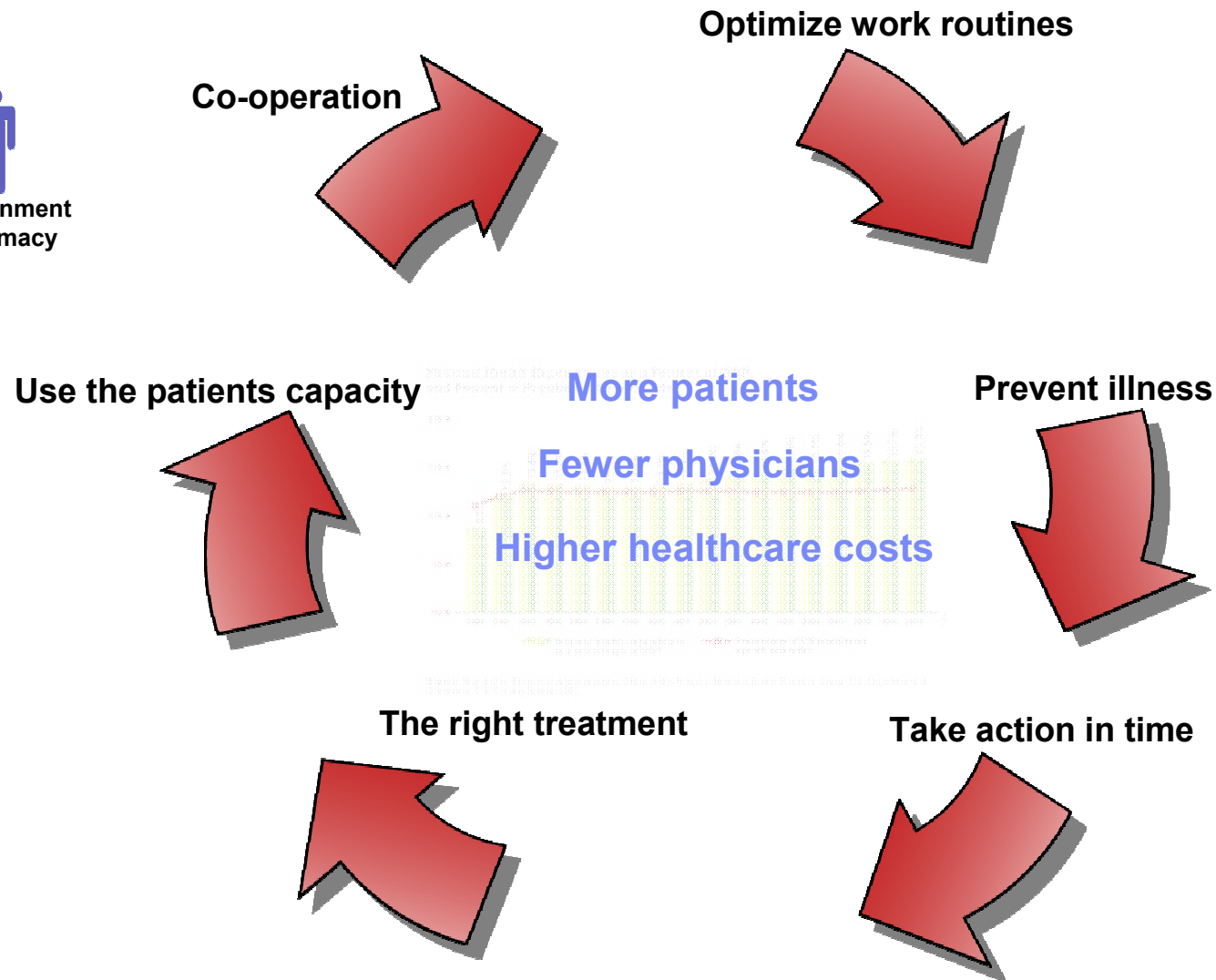


Security, privacy and confidentiality ✓

## The ehealth approach



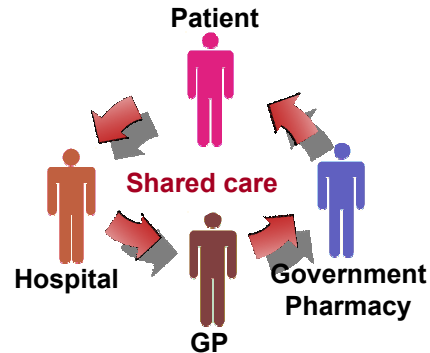
## The healthcare challenge





## Security, privacy and confidentiality ✓

### The ehealth approach



#### Co-operation

- eReferrals / eDischarges
- ePrescription
- National EHR
- eLabtest / eRadiology
- Work on same HR(pilot)

### The healthcare challenge

#### Optimize work routines

- eBooking
- eConsultation
- SMS and eMail notification
- Healthcare Yellow pages
- Support choice of healthcare organization
- eRenewal of medicine prescription
- Update own information
- eApply

#### Use the patients capacity

- Treatment information
- Shared Care
- Track own medical history
- Access to national EHR
- Track own medicine use
- Self measuring
- Targets & Risk profiles
- Patient forums

#### More patients

#### Fewer physicians

#### Higher healthcare costs

#### Prevent illness

- Disease Information
- Medicine information
- Wellness programs

#### The right treatment

- Decision support
- Medical history
- Access to national EHR
- Track medicine use
- Adverse drug reaction
- CAVE Registration
- Access lab results

#### Take action in time

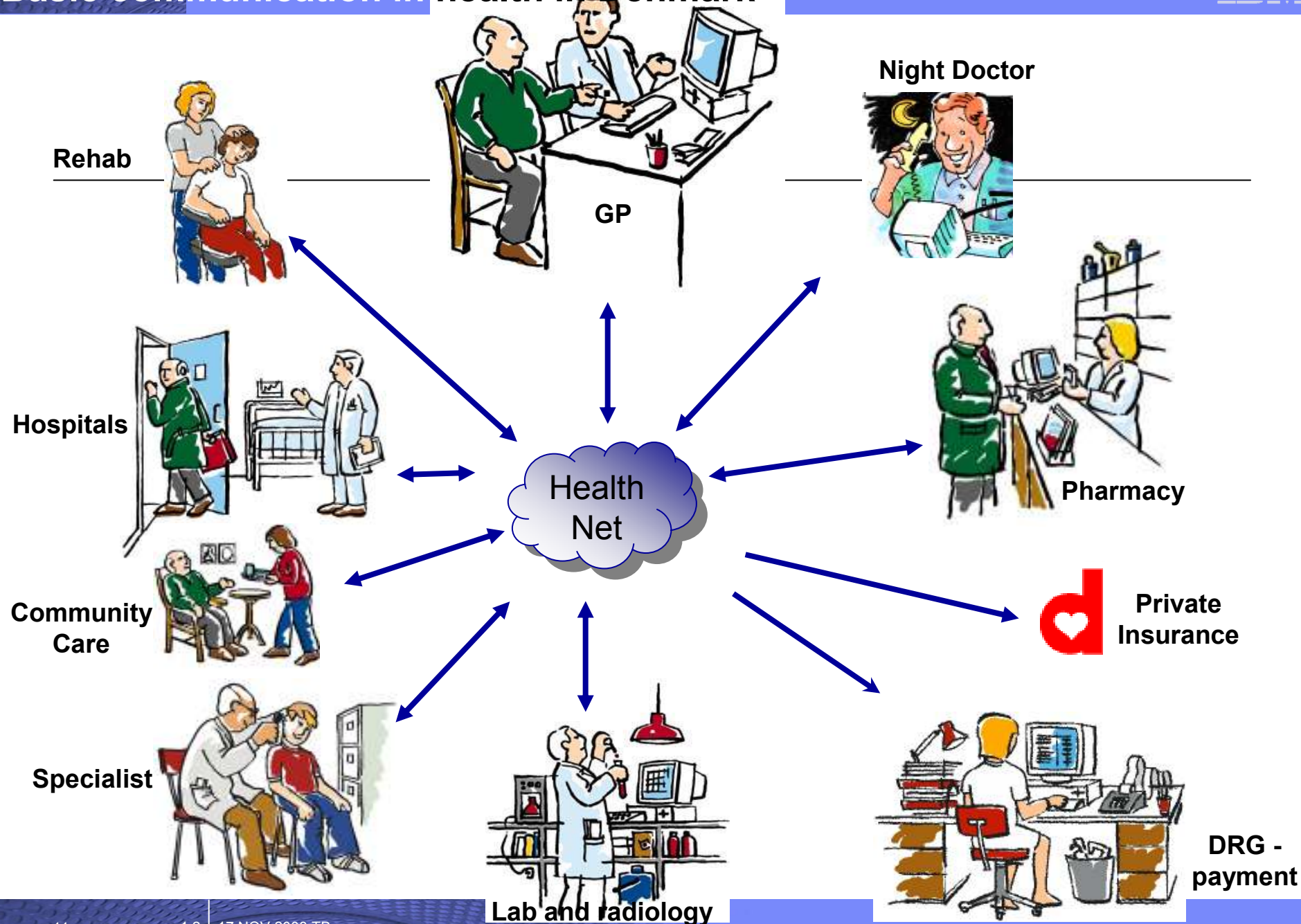
- Track medicine use
- Test yourself

## The History of the Danish eHealth experience

### The Building blocks – some samples

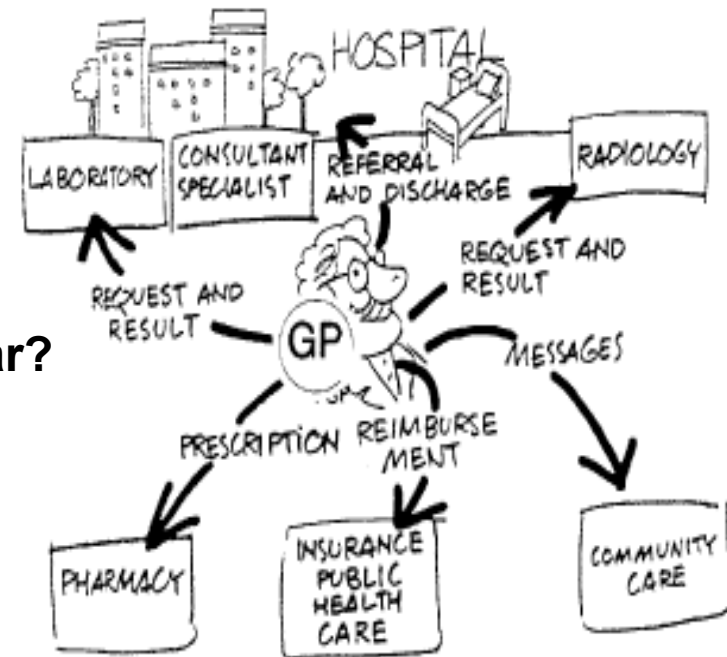
---

- Basic communication & implementation
- Shared care and patient involvement
- Self service
  
- National infrastructure
  - ▶ The HealthNet
  - ▶ National EHR
  - ▶ ePrescription Server, Medicine server and the Medicine profile
  - ▶ National Quality databases
  - ▶ Security, privacy and consent management
  - ▶ eHealth Portal



## Business Case – Basic communication

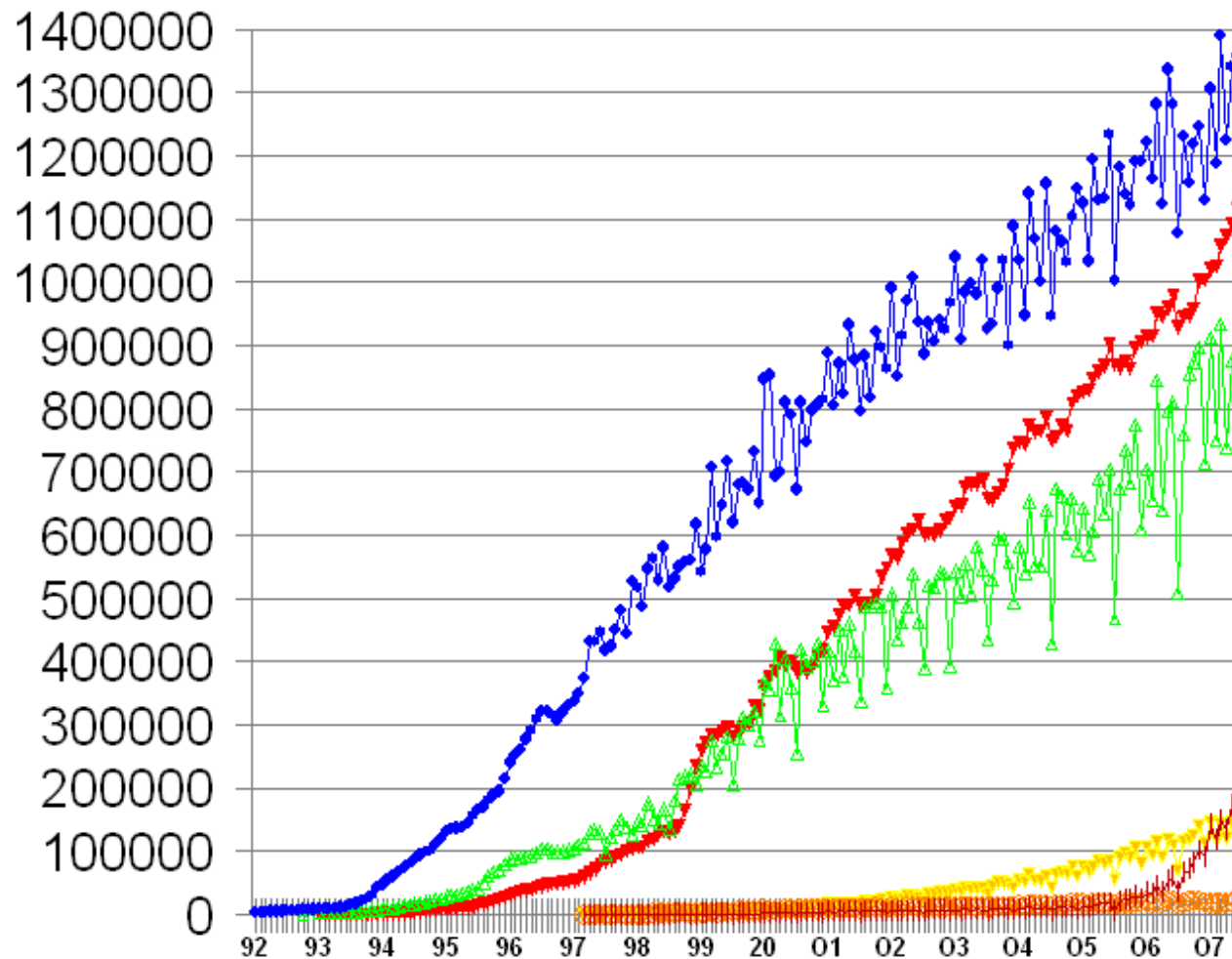
- 50 minutes saved per day in GP practice
- Information ready when needed
- No retyping, quality
- Telephone call to hospitals reduced with 66%
- Savings e-referrals: 3.5 mill. Euro
- Savings e-lab. requisitions: 2.0 mill. Euro
- 4.0 mill. messages each month
- Compared to mail...  
2,3 € saved per message...+100 mill. € per year?





# It had been a long journey

## Messages/Month



GP's: 2142 = 100%  
 Specialists: 747 = 95%  
 Hospitals: 63 = 100%  
 Doctors on call: 5 = 100%  
 Health Insurance 5 = 100%  
 102 messages / min

**Prescriptions** ●  
 1389023 = 84%

**Disch. Letters** ▼  
 1131750 = 97 %

**Lab. reports** ▲  
 988151 = 98 %

**Referrals** △  
 177525 = 65 %

**Reimbursement**  
 21049 = 98 %

**Lab Requests**  
 328434 = 75 %



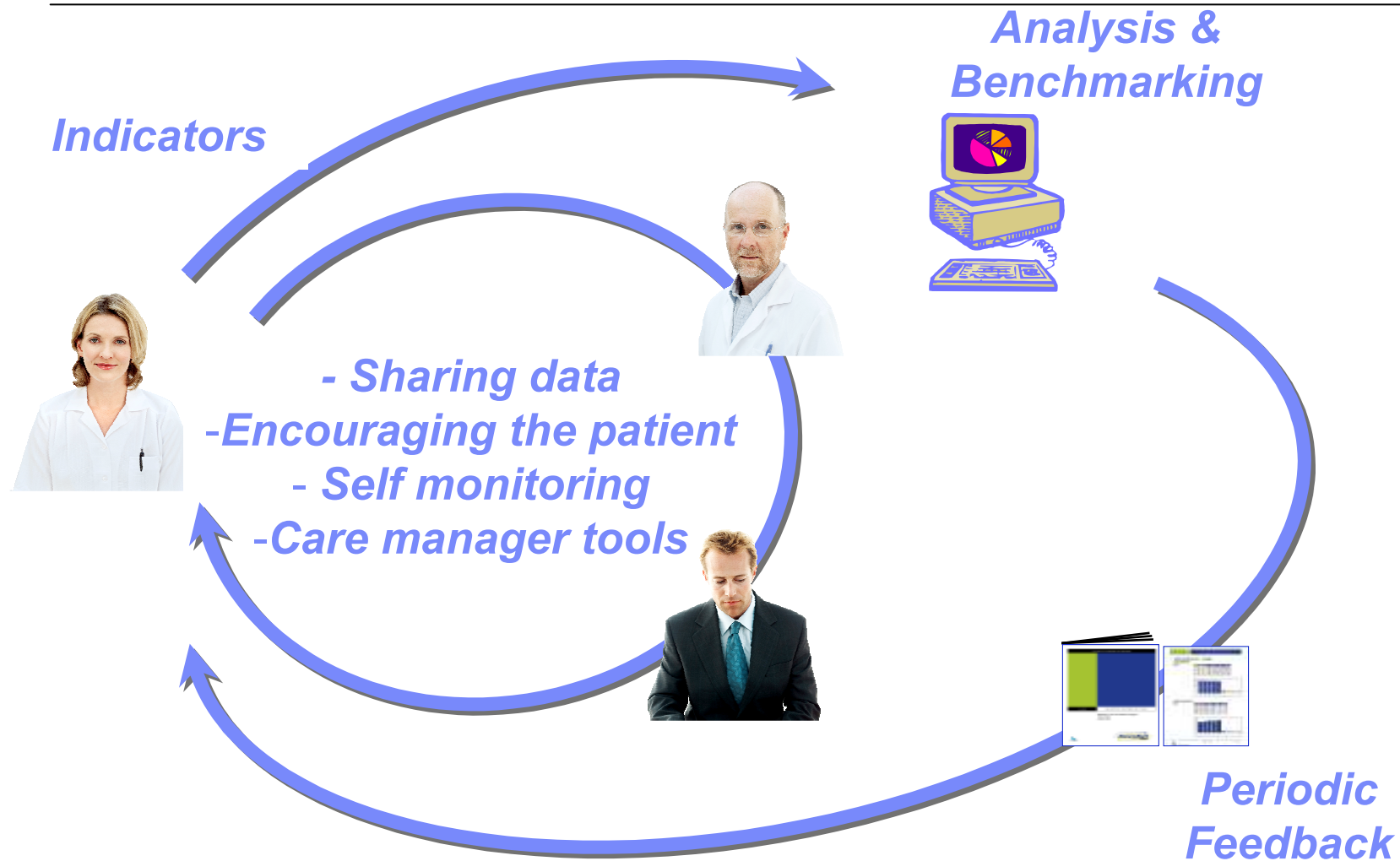
## The History of the Danish eHealth experience

### The Building blocks – some samples

---

- Basic communication
- Shared care and patient involvement
- Self service
  
- National infrastructure
  - ▶ The HealthNet
  - ▶ National EHR
  - ▶ ePrescription Server, Medicine server and the Medicine profile
  - ▶ National Quality databases
  - ▶ Security, privacy and consent management
  - ▶ eHealth Portal

# Shared Care and patient involvement



# Sharing data – among professionals and with patients



DiaLog - Microsoft Internet Explorer

File Edit View Favorites Tools Help



[Find patient](#) [Create patient](#) [Lists](#) [Profile](#) [Help](#) [Log off](#) [Administration](#)

DiaLog  
.....

Hr Laege - 210708 11:22

[Status](#) [Targets & risks](#) [Diabetes medication](#) [Graphs](#) [History](#) [Print](#) [Basic data](#)

James Campbell - Personal ID number 139158 - Age 31 - Type Type 2

Consent 050105

## Status

Encounter ? <a href="#">more</a>   <a href="#">create</a> [ALT C]			Insulin ? <a href="#">more</a>   <a href="#">create</a> [ALT I]			Eye status ? <a href="#">create</a> [ALT Ø]		
130608	Routine follow up	Laege	Humalog	8 IU/daily	210508		Right	Left
100608	Annual status	Laege	Levemir	4 IU/daily	210508	Retinopathy	Grade 2	181206 <a href="#">more</a>
100608	Routine follow up	Laege	Insulatard	18 IU/daily	210508	Maculopathy	No	291107 <a href="#">more</a>
210508	Routine follow up	Laege				Visual acuity	1,0	181206 <a href="#">more</a>
080508	Annual status	Laege				Vitrectomy		
210408	Routine follow up	Laege				Laser treatment		
120308	Other encounter	Laege						
030308	Routine follow up	Laege						
Measurements ? <a href="#">create</a> [ALT M]			OHA ? <a href="#">more</a>   <a href="#">create</a> [ALT O]			Foot status ? <a href="#">create</a> [ALT F]		
Height	180 cm	070306 <a href="#">more</a>	Biguanide	metformin	210306		Right	left
Weight	115 kg	150208 <a href="#">more</a>				Sensitivity	Normal	Reduced 080205 <a href="#">more</a>
BMI	32,41 kg per squaremeter	070306 <a href="#">more</a>				Pulse	Yes	Yes 080205 <a href="#">more</a>
BP	180/90 mmHg	150208 <a href="#">more</a>				AAI	1,0	1,0 080205 <a href="#">more</a>
Lab results ? <a href="#">create</a> [ALT L]			Other treatment ? <a href="#">more</a>   <a href="#">create</a> [ALT B]			Foot risk	No	Yes 080205 <a href="#">more</a>
HbA1c	0,150	250608 <a href="#">more</a>	Diet alone	m	080205	Foot ulcer	No	Yes 080205 <a href="#">more</a>
nU-albumin	25 microgram/min	110803 <a href="#">more</a>	For heart failure	corodil	191004	Amputation	No	Below ankle 080205 <a href="#">more</a>
U-alb./crea.	2,200 mg/mmol	210101 <a href="#">more</a>	For dyslipidemia	simvastatin 40 mg	051004			
S-creatinine	100 micromol/l	191004 <a href="#">more</a>	For hypertension	Ti. Corodil 5mg	280404			
Creatinine clearance	0,05 ml/s	070906 <a href="#">more</a>		1+0+0+0				
S-cholesterol	20 mmol/l	130608 <a href="#">more</a>		Eltroxin 100				
S-LDL-cholesterol	15 mmol/l	250108 <a href="#">more</a>	Self care ? <a href="#">create</a> [ALT E]			Acute complications ? <a href="#">create</a> [ALT A]		
S-HDL-cholesterol	4 mmol/l	250108 <a href="#">more</a>	Smoker	20 cig per day	210108 <a href="#">more</a>		Total Latest	
S-triglyceride	0,66 mmol/l	110803 <a href="#">more</a>	Smoker until	1990 year	210108 <a href="#">more</a>	Serious hypoglycemia	0 x	090306 <a href="#">more</a>
GAD			Exercise	4 hours per week	030308 <a href="#">more</a>	Ketoacidosis	0 x	090306 <a href="#">more</a>
C-peptide			Self monitoring	2 bg measurements per week	080205 <a href="#">more</a>	AMI	1 x	déc.04 090306 <a href="#">more</a>
			Individuelle mål		061008 <a href="#">more</a>	Stroke	0 x	090306 <a href="#">more</a>
Patient notes ? <a href="#">more</a>   <a href="#">create</a>			Other complications ? <a href="#">more</a>   <a href="#">create</a> [ALT N]					
beh1	the patient runs 2 h ...	070208	Angina pectoris	Yes	080205			
			Claudicatio intermittens	Yes	080205			
			End-stage renal failure	No	080205			
			Inj. infiltrates	No	080205			



# Encouraging the patients self treatments



https://9.100.101.230 - DiaLog - Microsoft Internet Explorer

File Edit View Favorites Tools Help



Find patient

Create patient

Lists

Profile

Help

Log off

Administration

DiaLog

Hr Laege - 210708 11:22

Status

Targets & risks

Diabetes medication

Graphs

History

Print

Basic data

James Campbell - Personal ID number 139158 - Age 31 - Type Type 2

Consent 050105

## Targets & risks

### Reference targets ?

Measurements	min	max	
Vægt	58,32	87,48	kg
BMI	18	27	kg per squaremeter
BP		135/85	mmHg

#### Lab results

HbA1c	0,055	0,061	
S-cholesterol		4,5	mmol/l
S-LDL-cholesterol		2,5	mmol/l
S-HDL-cholesterol	1,0		mmol/l

#### Self care

Smoker	0	0	cig per day
Exercise	4		hours per week

### Instructions

The vertical column - "Risk profile for fatal CHD" - designates the risk of dying of coronary heart disease within the next 10 years. The number to the left of the vertical line in the column is the expected number of deaths, the number to the right of the vertical line is the expected number of living (with or without coronary heart disease) out of 100 persons of the same age, gender, diabetes type and the registered measurement values, lab results and self

Hide risk profile

### Current values ?

Measurements			
Weight	115	kg	
BMI	32,41	kg per squaremeter	
BP	180/90	mmHg	

#### Lab results

HbA1c	0,150!		
S-cholesterol	20!	mmol/l	
S-LDL-cholesterol	15	mmol/l	
S-HDL-cholesterol	4	mmol/l	

#### Self care

Smoker	20!	cig per day	
Exercise	4	hours per week	

### Risk profile for fatal CHD



### Risk profile for fatal event



### Individual targets ?

Edit [ALT R]

Measurements	min	max	
Weight		115	kg
BMI		35,49	kg per squaremeter
BP		180/90	mmHg

#### Lab results

HbA1c		0,090	
S-cholesterol		15	mmol/l
S-LDL-cholesterol		15	mmol/l
S-HDL-cholesterol	4		mmol/l

#### Self care

Smoker		0	cig per day
Exercise	0		hours per week

### Risk profile for fatal CHD



### Risk profile for fatal event



### Agreements

Last update

# Anti coagulant treatment



Hasse



Out patient Clinic



Nurse



INR value



Medicine doses



Doctor





**AK-behandling**

Her kan du indtaste din INR værdi samt datoen for målingen. Målingen må højst være 3 måneder gammel og skal være nyere end den sidst indberettede.

Indtast INR-værdi:

Prøven er taget:  
31.08.2006 (1 dag)

Har du fulgt den seneste doseringsvejledning (skal oplyses)?

☐ Ja

☐ Nej, på grund af forglemmelse

☐ Nej, men det er en bevidst handling på grund af andre forhold

Angiv eventuelle komplikationer, som har krævet kontakt til sygehus og/eller læge (skal oplyses):

☐ Ingen komplikationer

☐ Blodprop

☐ Blødning

☐ Blodprop og blødning



Patient Index

INR Value

Internet



Out patient clinic

## AK-behandling

INR-værdi: **3** (målt 28. august 2006) [Ret oplysninger](#)

Anbefalet dosering: **6 tbl. Marevan om ugen**

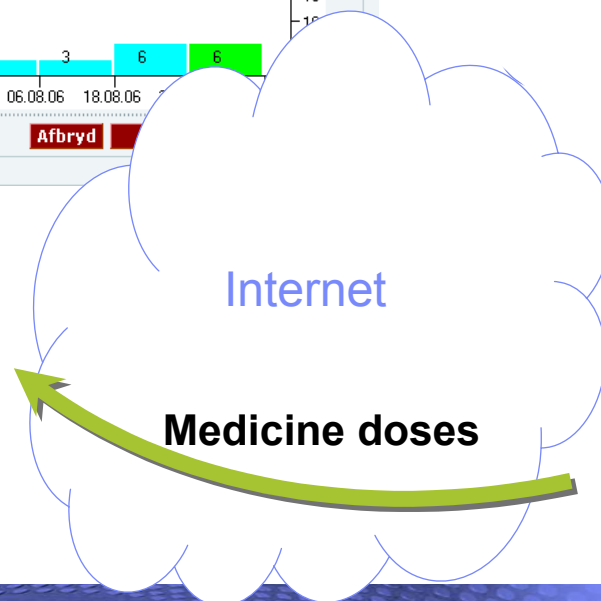
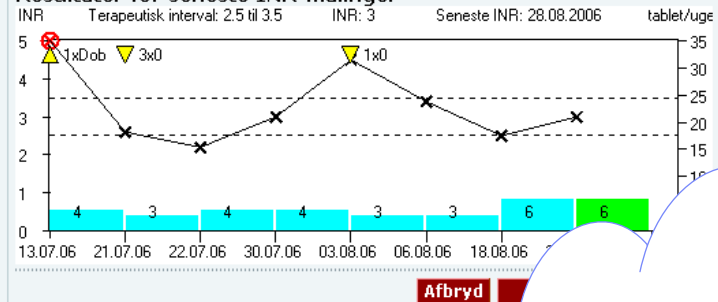
Anbefalet strakshandling: **Ingen pauser eller dage med dobbelt dosis**

[Vælg en anden dosering](#)

Du skal tage nedenstående tabletter Marevan á 2,5 mg på de anførte dage.

	Mandag	Tirsdag	Onsdag	Torsdag	Fredag	Lørdag	Søndag
Antal tabletter	1	1	1/2	1	1	1	1/2

## Resultater for seneste INR-målinger



Out Patient Clinic



## Benefits

**More frequent measuring**

**25 percent of the patients  
will skip every other visit to  
the GP**

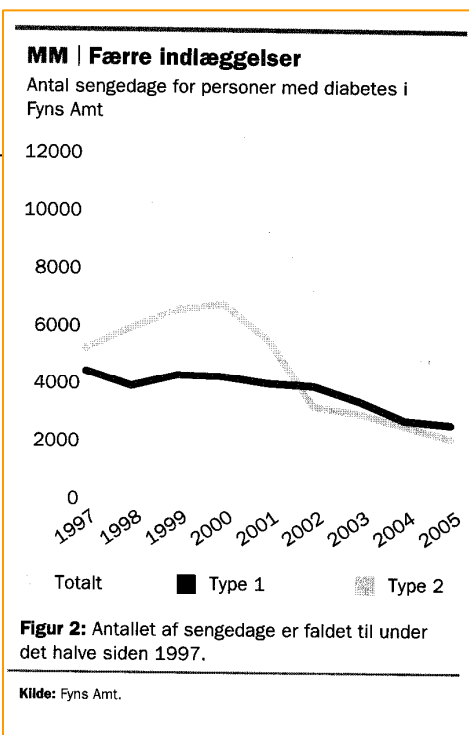
**Higher  
quality of life**

**A drop in hospitalizations**

**Fewer with critical “related” diseases  
(Leg Amputation, Blindness, Kidney failures)**

### The Care taker

- ✓ problem oriented consultations
- ✓ responsibility shown by the patient
- ✓ better own care
- ✓ patient are more satisfied



### Patient

- ✓ better consultations
- ✓ easier to follow situation
- ✓ more motivated to do own care

**Source: The County of Funen, 2007**

## The History of the Danish eHealth experience

### The Building blocks – some samples

---

- Basic communication
- Shared care and patient involvement
- Self service
  
- National infrastructure
  - ▶ The HealthNet
  - ▶ National EHR
  - ▶ ePrescription Server, Medicine server and the Medicine profile
  - ▶ National Quality databases
  - ▶ Security, privacy and consent management
  - ▶ eHealth Portal



## Self service

- eBooking
- SMS Booking Reminders
- eConsultations
- Organ Doner register
- Support free choice of Provider by Yellow pages, Waiting lists, Quality and Patient surveys

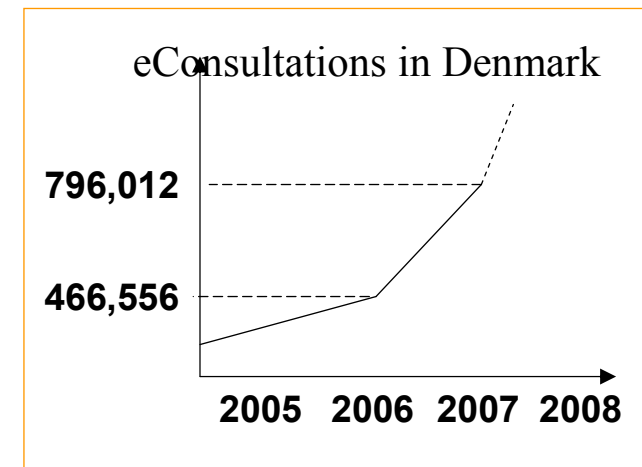


### SMS Booking reminders Business Case

Number of scheduled consultations 2005	5,332,850
Number of consultations where the patient didn't turn up in 2005	319,971
Effect by sending reminder SMS – if 30% will turn up	80,000
Savings	17,760,000 Euro

Only 25% 😊

Source: The Danish Ministry of Finance, Marts 2007



## Analysis & Benchmarking

- used for Quality surveys...
- to support free choice of HC organization
- Hospitals Own Quality measurement
- Patient Survey

### Heart failure – Death rate within 1 year

Landsgennemsnit	21,8 %
Aalborg Sygehus, Aalborg	25,8 % (G)
Amager Hospital	32,7 % (H)
Bispebjerg Hospital	36,4 % (H)
Bornholms Hospital	45,5 % (H)
Fredericia Sygehus	34,6 % (H)
Frederiksberg Hospital	23,0 % (G)
Gentofte Hospital	19,0 % (G)
Glostrup Hospital	21,3 % (G)
Haderslev Sygehus	6,4 % (L)

## The History of the Danish eHealth experience

### The Building blocks – some samples

---

- Basic communication
- Shared care and patient involvement
- Self service
  
- National infrastructure
  - ▶ The HealthNet
  - ▶ National EHR
  - ▶ ePrescription Server, Medicine server and the Medicine profile
  - ▶ National Quality databases
  - ▶ Security, privacy and consent management
  - ▶ eHealth Portal

## The History of the Danish eHealth experience

### The Building blocks – some samples

---

- Basic communication
- Shared care and patient involvement
- Self service
  
- National infrastructure
  - ▶ The HealthNet
  - ▶ National EHR
  - ▶ ePrescription Server, Medicine server and the [Medicine profile](#)
  - ▶ National Quality databases
  - ▶ Security, privacy and consent management
  - ▶ eHealth Portal

# The Medicine Profile



http://192.168.72.50 - Personlig Elektronisk Medicinprofil - Microsoft Internet Explorer

Log ud Restart | Vis nøgler

Hovedmenu > Medicinprofil søgning > Receptkøb

**Receptkøb** Hospitalsudleveringer Beregnet beholdning  
Interaktioner Cave Medicinskab Medicintilskud

**Personoplysninger**

Navn **Anita Andersen**  
Adresse **Bytoften 7, 1 tv, 8240 Risskov**  
CPR **111111-1118**  
Sygesikringsgruppe **1**

**Receptkøb** ⓘ

Fra dato Til dato Lægemiddelnavn ATC gruppe **Filtrer Nulstil**

Cave	Dato ▲	Lægemiddelnavn	Form	Styrke	ATC gruppe	Indikation	Dosering	DD
ⓘ	02-09-2004	Adurix	Tabletter	20 mg	Clopidogrel - C03BA03	Vanddrivende	1/2 tablet daglig	
ⓘ	02-09-2004	Adurix	Tabletter	10 mg	Clopidogrel - C03BA03	Vanddrivende	1/2 tablet daglig	
	01-09-2004	Coversyl Comp.	Tabletter	4 mg/1,...	Perindopril og ...	Mod forhøjet bl...	1 tablet om mor...	
	01-09-2004	Natrilix Retard	Depottabletter	1,5 mg	Indapamid - C03...	Mod forhøjet bl...	1 tablet om mor...	
	29-08-2004	Daonil	Tabletter	1,75 mg	Glibenclamid - ...	Mod sukkersyge	2 tabletter 3 g...	
	28-08-2004	Hexaglucon	Tabletter	1,75 mg	Glibenclamid - ...	Mod sukkersyge	2 tabletter 3 g...	
	27-08-2004	Antepsin	Tabletter	1 g	Sucralfat - A02...	Mod mavesyre i ...	1 tablet 4 gang...	
	26-08-2004	Izatak	Kapsler, hårde	150 mg	Nizatidin - A02...	Mod mavesyre i ...	2 kapsler daglig	
	24-08-2004	Izatak	Kapsler	300 mg	Nizatidin - A02...	Mod mavesyre i ...	1 kapsel 2 gang...	
	23-08-2004	Zanexon	Tabletter	7,5 mg	Zopiclon - N05CF01	Mod søvnløshed	1/2 tablet før ...	

Resultatsider: 1 2 3 4 5 6 7 8 9 10 11 12 13 Vis alle

Antal poster 128

Lægemiddelstyrelsen og registeransvarlig for Medicinprofil. Du kan rettes til Lægemiddelstyrelsen. ⓘ

Personlig Elektronisk Medicinprofil Test - User: hra - OK Internet

**Calculated reserve**

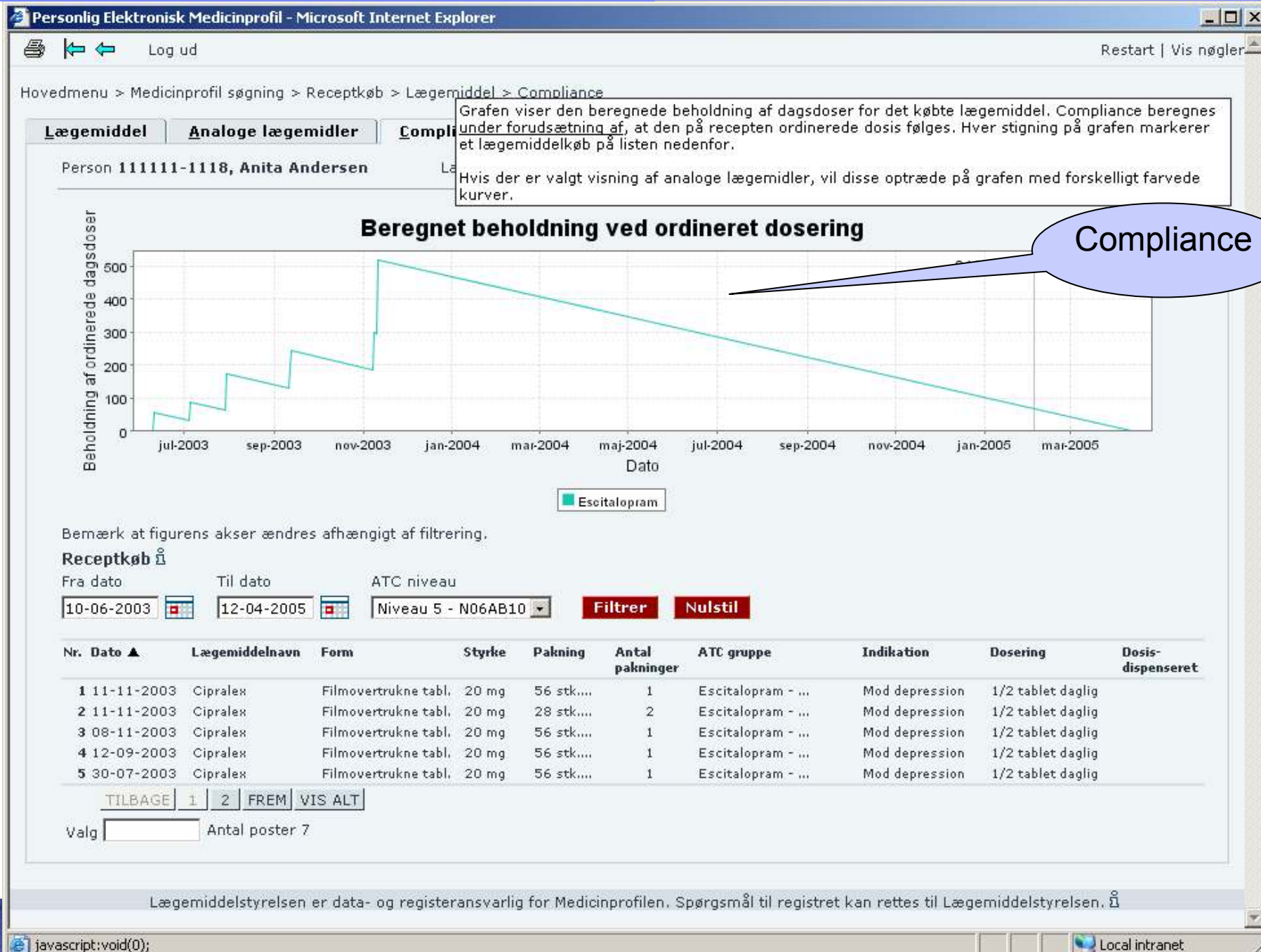
**Prescription medicine**

**Warning: Drug hypersensitivity**

**Adverse drug reactions**




# The Medicine Profile

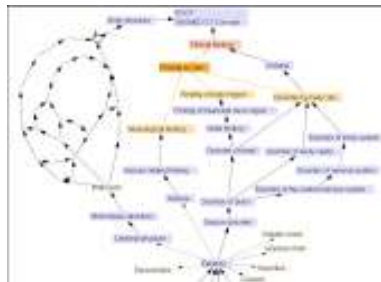


## Upcoming initiatives in Danish eHealth

# Next generation resistance: Classification, EMR's and National EHR

---

  
 450,000 Clinical Terms  
 ICPC2 10,000  
 ICD10 40,000



- Prevent Practitioners lack of IT acceptance
- Increase Data quality
- Support Patient perception
- Effective communication between patients and practitioners

3D avatar

No patient file opened  
Click here to open a patient file

Search results: null Patient Record

Search

Search Results for FLUSTOMACH

SNOMED\_CONCEPT PATIENT\_RECORD ANATOMY

1 to 10 of 568

- 1 [Fluoroscopy - stomach \(procedure\)](#) (hit:2.2)
- 2 [Excessive fluid in stomach \(finding\)](#) (hit:2.0714285714285716)
- 3 [Cholecystogastrostomy \(procedure\)](#) (hit:1.3333333333333333)
- 4 [Influenza \(disorder\)](#) (hit:1.3333333333333333)
- 5 [Esophagogastrrectomy \(procedure\)](#) (hit:1.3333333333333333)
- 6 [Esophagogastrstomy \(procedure\)](#) (hit:1.3333333333333333)
- 7 [Hepatogastrostomy \(procedure\)](#) (hit:1.3333333333333333)
- 8 [Stomach finding \(finding\)](#) (hit:1.3333333333333333)
- 9 [Paraesophageal hernia \(disorder\)](#) (hit:1.1666666666666667)
- 10 [Infectious gastroenteritis \(disorder\)](#) (hit:1.1666666666666667)

Previous 1 2 3 4 5 6 ... Next

© Copyright IBM Corporation 2008

P I L O T







## Summary and lessons learned

---

- Everyone benefits from eHealth: Providers, Payers, IT vendors, Patients, Government, Researchers
- Business cases accelerates the decision process
- Evaluate the Business case (measuring) keep the process going
  
- Get everyone around the table; the Providers, Payers, IT vendors, Government – everyone must be proactive
- Government define and push standards and facilitate implementation - Providers, Payers and IT vendors do the implementation
- Training is necessary - Providers, Payers, IT vendors – start
  
- Privacy and consent management is very important – legislation must be in place – a Government body for Privacy, consent and Misuse
  
- It is a long journey to implement everything in eHealth – but everything is much easier than in the 90's - there are a lot of low hanging fruits, standards, tools, technology, existing applications etc.

