



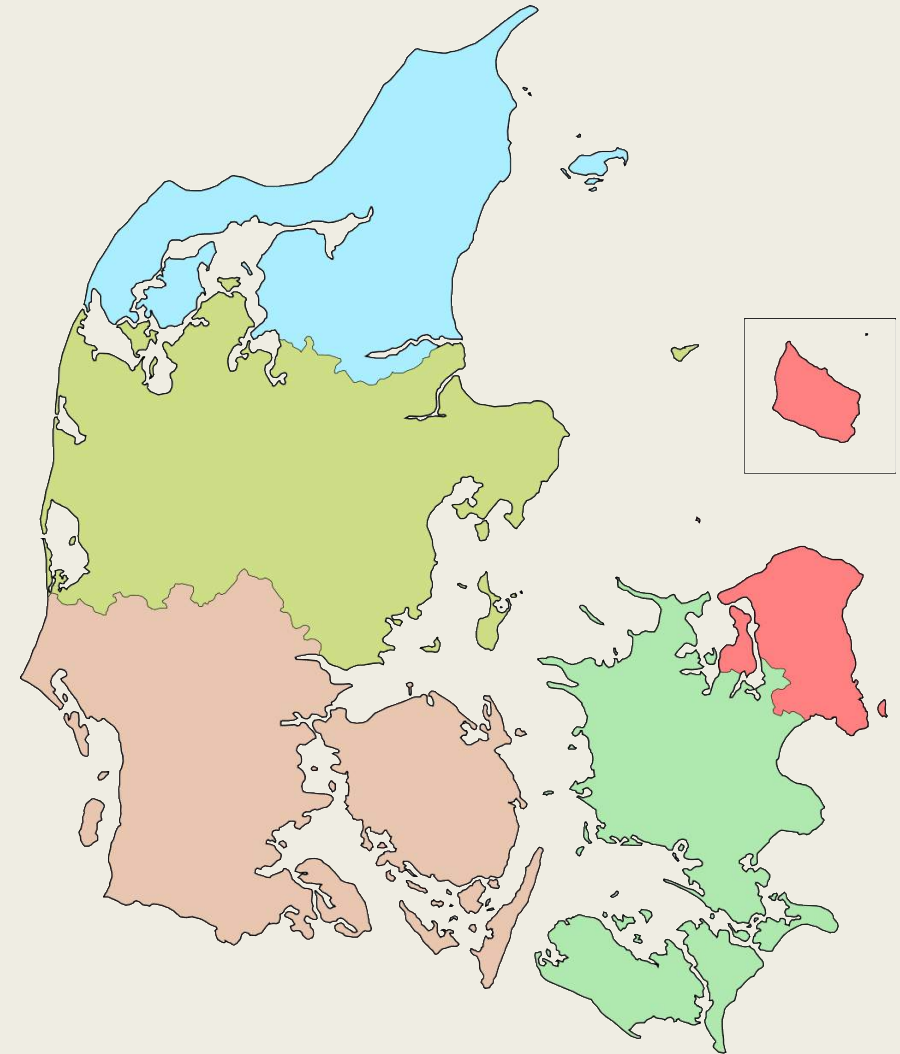
DIGITAL HEALTHCARE

The Danish Way

Jacob Thorsted Sorensen, MD, PhD
Aarhus University Hospital, Denmark

Denmark

- 5,8 mill inhabitants
- Public healthcare
- High taxes
- 5 governing regions (primarily healthcare)
- Uniform standards
- Efficient infrastructure



Prehospital care



Digital Healthcare – The Danish Way

- Prehospital
 - *Patients*
 - *Healthcare professionals*
- In-hospital
 - *Patients*
 - *Healthcare professionals*

Digital Healthcare – The Danish Way

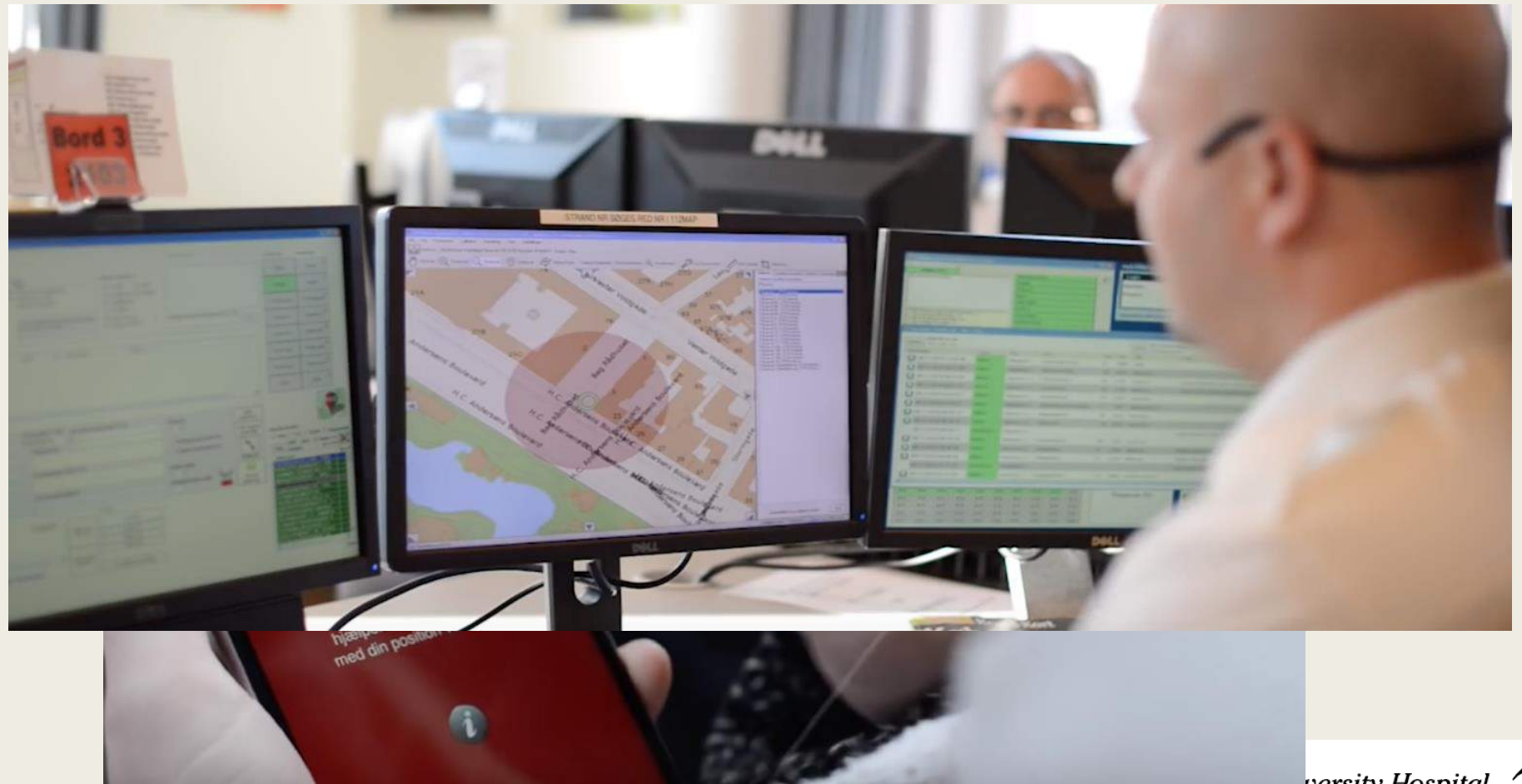
- Prehospital
 - *Patients*
 - *Healthcare professionals*
- In-hospital
 - *Patients*
 - *Healthcare professionals*

Digital Healthcare – The Danish Way

- Prehospital
 - *Patients*
 - *Apps*
 - 1-1-2
 - AED (Heart starter) map

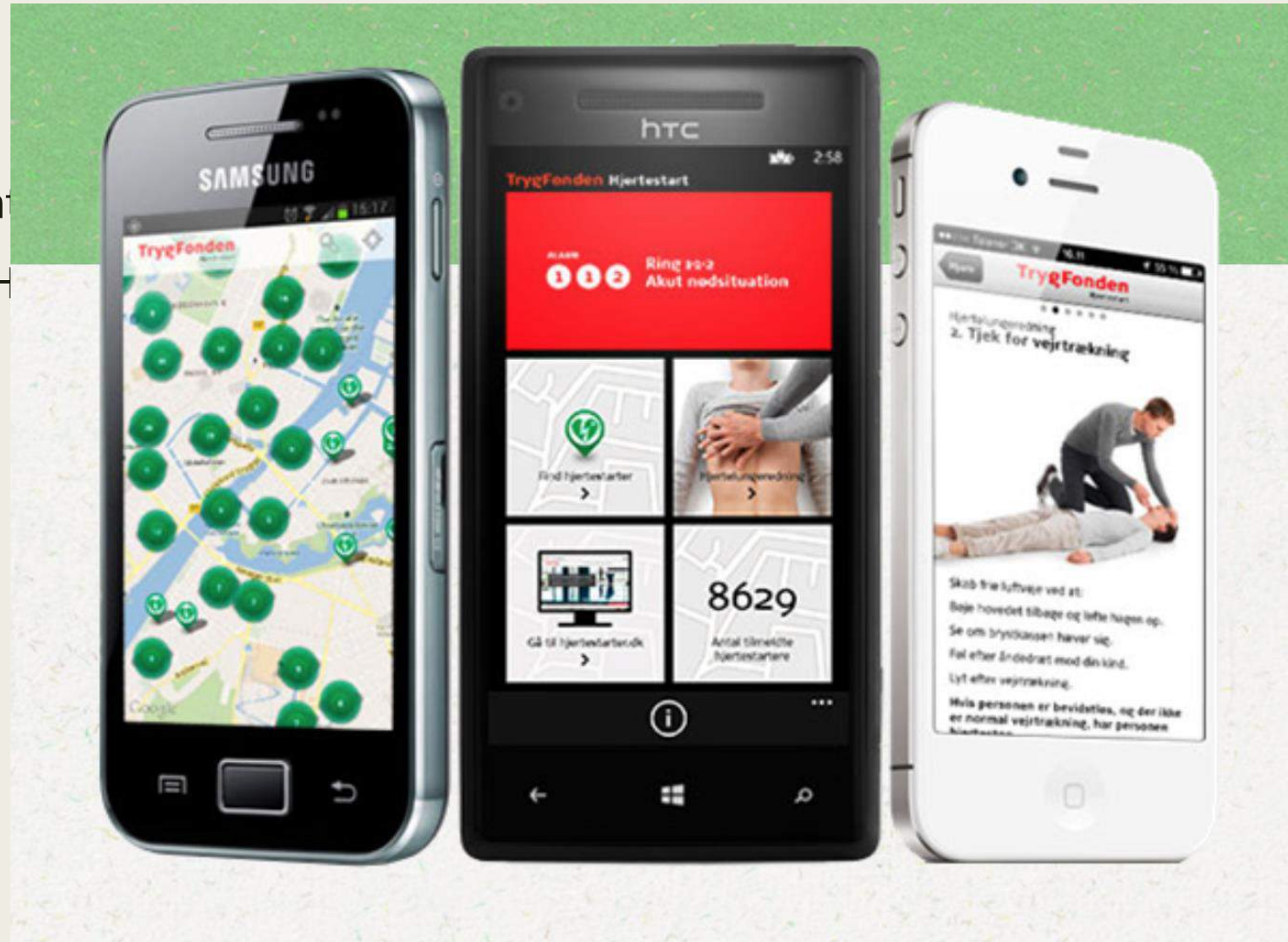
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- Patients
- 1-1-2 app

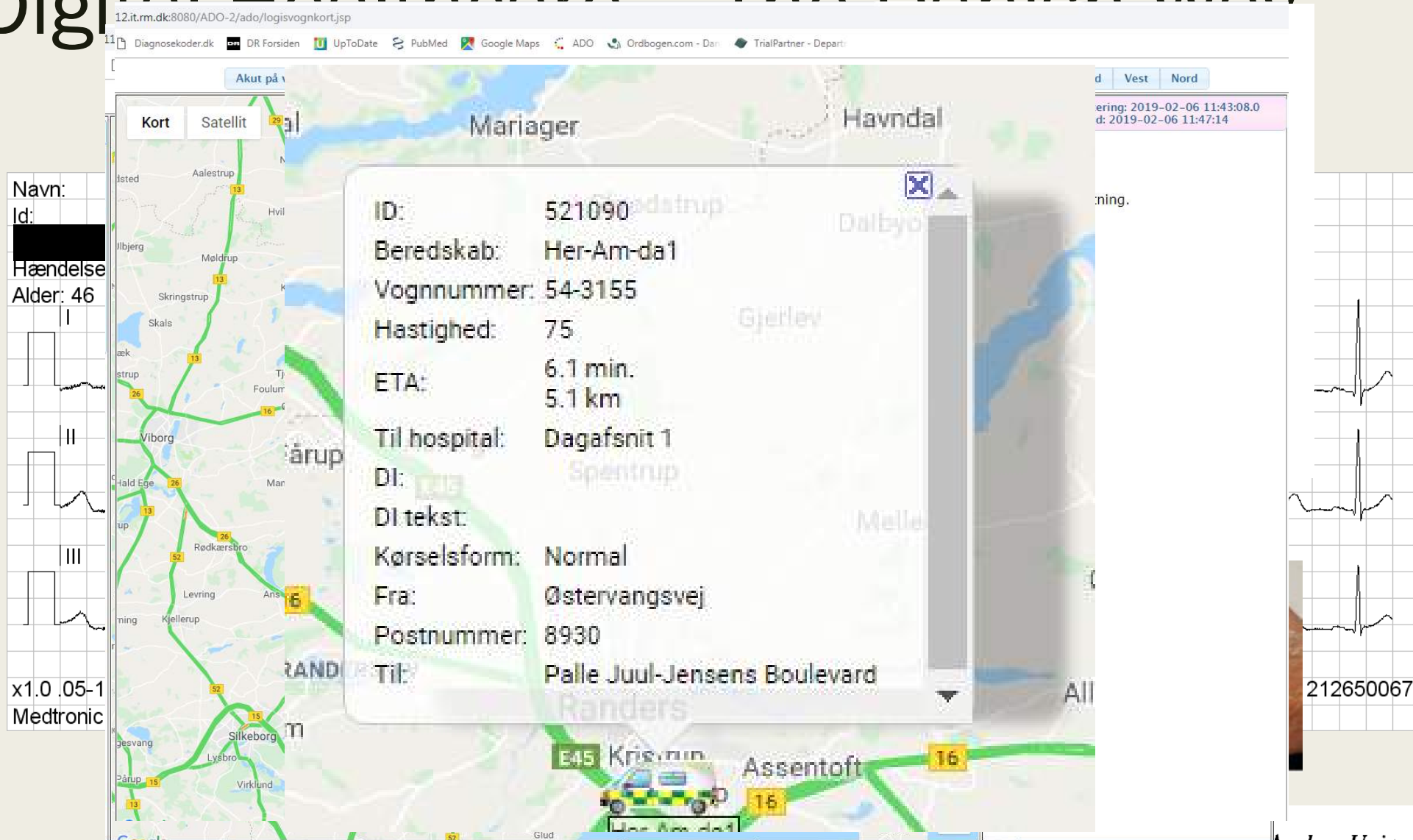


Digital Healthcare – The Danish Way

- Patient
- AED (H



Digital Healthcare - The Danish Way



In-hospital care



Digital Healthcare – The Danish Way

- Prehospital
 - *Patients*
 - *Healthcare professionals*
- In-hospital
 - *Patients*
 - *Healthcare professionals*

Digital Healthcare – The Danish Way

- Prehospital
 - *Patients*
 - *Healthcare professionals*
- In-hospital
 - *Patients*
 - *Healthcare professionals*

Digital Healthcare – The Danish Way

https://www.sundhed.dk/borger/min-side/min-sundhedsjournal/laboratoriesvar/

Apps DR Gmail Yahoo Politiken BT YouTube EB Dropbox Ordbogen PubMed Google Maps Facebook Viaplay Netflix

Borger Fagperson **sundhed.dk** Dine sundhedsdata Søg Menu

Dato fra 06.08.2018 Dato til 06.02.2019 Laboratorieområde Alle Søg

Filtrer og sorter

Fandt 1 rekvisitioner i perioden

Dato Skema

	Enhed	2018 20.11 14:10
Patologi Vis alle svar		
Klinisk biokemi og immunologi		
Hæmatologi		
Basofilocyter;B	$\times 10^9/L$	0,07
Eosinofilocyter (mask.);B	$\times 10^9/L$	0,12
Hæmoglobin;B	mmol/L	10,1
Leukocyter;B	$\times 10^9/L$	7,3
Lymfocyter;B	$\times 10^9/L$	2,23
Metamyelo.+Myelo.+Promyelocyter;B	$\times 10^9/L$	0,02
Monocyter;B	$\times 10^9/L$	0,63
Neutrofilocyter (segmk.+stavk.);B	$\times 10^9/L$	4,21

Udskriv alt Symbolforklaring Vælg udskrift Grafvisning

Digital Healthcare – The Danish Way

- In-hospital
- Healthcare professionals
 - Electronic patient chart
 - Access to test results
 - Access to medication
 - Access to vital signs
 - Access to imaging files
 - Patient logistics

Digital Healthcare – The Danish Way



SYSTEMATIC COLUMNNA eHealth platform



Columnna
Clinical
Information
System



Columnna
Clinical
Logistics



Columnna
Service
Logistics



Columnna
Patient
Logistics



Columnna
Cura



Columnna
Citizen

Columna – Integrated Electronic patient records

- Initial implementation (Pharma module) 2004
- Booking module 2006
- First version of integrated Columna 2010
- Complete implementation 2013

Columna in Central Denmark Region

- Fully implemented solution and in 24/7 use

1 Joint solution for somatic and psychiatric patients

10 hospitals in Central Denmark Region

3400+ beds in somatic and psychiatric hospitals

20.000+ different users per day

6.7 million citizens are registered
(1.7 million are patients with registered data)

2.400 admitted patients per day

>25.000 medication prescriptions per day

>40.000 lab results per day

6.500 lab results per hour in peak

> 80,000 information exchanges per. month with primary health service
and citizens to support the continuum of care

HIMMS Level 6 expected to be accredited autumn 2015



Digital Healthcare – The Danish Way

Overlæge, Jacob Thorsted Sørensen, Hjertesygdomme AHA - AUH (66.20.02.1.H5-AHA)

Filer Vis Funktioner Booking Medicinlinks Administrator Hjælp

Hjertesygdomme
Hjertesygdomme - AUH
Indl. 04.02.19 13:29, Hjertesygdomme AHA - AUH

Biokemi

Sidste uge og næste uge Fra: 30.01.2019 00.00 til: 13.02.2019 23.59 ☒ Vis rekvisitioner

Analyse	Enhed	Min	Max	01.02.19 11:30 RRA AKUT 1030419	02.02.19 12:40 AUH F2 1030419	03.02.19 12:40 AUH F2 1030419	04.02.19 13:53 AUH F2 1030421	05.02.19 07:13 AUH HS 1030422	06.02.19 21:59 AUH HS 1030425	07.02.19 07:19 AUH HS 1030428	08.02.19 07:19 AUH HS 1030428	09.02.19 07:19 AUH HS 1030428
				Svar	Svar	Svar	Svar	Svar	Svar	Svar	Svar	Svar
▼ Organmarkører												
P-Troponin T (TnT)	ng/l	<14				45	1316	1313	1781		1374	
P-Troponin I (q-HS)	ng/l	<47		47								
P-Kreatininsæ MB	µg/l	<7.0						82.3	18.2		7.3	
P-Kreatininsæ	U/l	50 270				93	946	760	318		171	
P-Kolesterol	mmol/l	<5.0				0.5		6.8				
P-Kolesterol HDL	mmol/l	≥1.0				0.97		1.1				
P-Kolesterol LDL	mmol/l	<3.0				4.9		4.9				
P-Triglycerid	mmol/l	<2.0				1.4		1.7				
P-Laktatdehydrogenase (LDH)	U/l	105 205					410					
P-Alanintransaminase (ALT)	U/l	10 70				33						
P-Basisk fosfatase	U/l	35 105				Udgået						
P-Basisk fosfatase	U/l	35 105				63						
▼ Endokrinologi												
P-Glukose	mmol/l	4.2 7.8		8.9								
P(Hb)-Glukose	mmol/l	4.2 7.8				0.1						
Hb(B)-Hæmoglobin A1c (HbA1c)	mmol/mol	<48				42		41				
P-Glukose, middel (fra HbA1c)	mmol/mol	5.4 7.3				5.9		6.8				
P-Thyrotropin (TSH)	10 ⁻⁶	0.300 4.50				0.791						
P-Triiodthyronin (T3)	nmol/l	1.10 2.50				1.53						
P-Thyroxin (T4)	nmol/l	60 140				100						
P-Triiodthyronin-reaktion (T3-TR)	arb. enh.	0.75 1.25				0.96						
▼ Væske- og elektrolytbal.												
P-Kalium	mmol/l	3.5 4.6		5.0		4.0		4.3				
P-Natrium	mmol/l	137 145		138		139		139				
P-Calcium	mmol/l	2.20 2.55				2.33						
P-Calcium-ion frit (pH=7.4)	mmol/l	1.16 1.32		1.22								
P-Albumin	g/l	36 45				41						
P-Kreatinin	mmol/l	0.6 1.2		0.7		0.6		0.6				

Kommentar:

Digital Healthcare – The Danish Way

Overlæge, Jacob Thorsted Sørensen, Hjertesygdomme AHA - AUH (66.20.02.1.HS-AHA)

Filer Vis Funktioner Booking Medicinlinks Administrator Hjælp

Hjertesygdomme
Hjertesygdomme - AUH
Indl. 04.02.19 13:29, Hjertesygdomme AHA - AUH

Ordinationsoversigt

Aktuelle ordinationer

Seneste gennemgang:

T	Start	Sep.	Form	ATC	Præparat	Vej	Enhed	Dosis	Godkendt	Af
F	05.02.19		TABFILM	B:01	Hjertemagnyl - 75 MG	OR	mg	75 mg x 1 dagligt	06.02.19	Ingrid Hell Mott
PN	05.02.19		SUBLSPR	C:01	Glytrin - 0.4 MGD	SL	mikg	0,4 mikg	06.02.19	Ingrid Hell Mott
F	05.02.19		TABFILM	C:10	Lipistad - 80 MG	OR	mg	80 mg x 1 dagligt	06.02.19	Ingrid Hell Mott
F	22.05.07		TABFILM	N:02	Pinex Actavis - 500 MG	OR	g	1 g x 4 dagligt	06.02.19	Ingrid Hell Mott
E	05.02.19	06.02.19	TABFILM	B:01	Hjertemagnyl - 75 MG	OR	mg	75 mg	06.02.19	Ingrid Hell Mott
E	05.02.19	06.02.19	TAB	N:02	Morfin DAK - 10 MG	OR	mg	10 mg	06.02.19	Ingrid Hell Mott

Mine favoritter

Ordinationsoversigt

Administrationsoversigt

Biokemi

Mikrobiologi

Billeddiagnostik

Plan og resultater

Diagnoseoversigt

Diktater

Epikriser

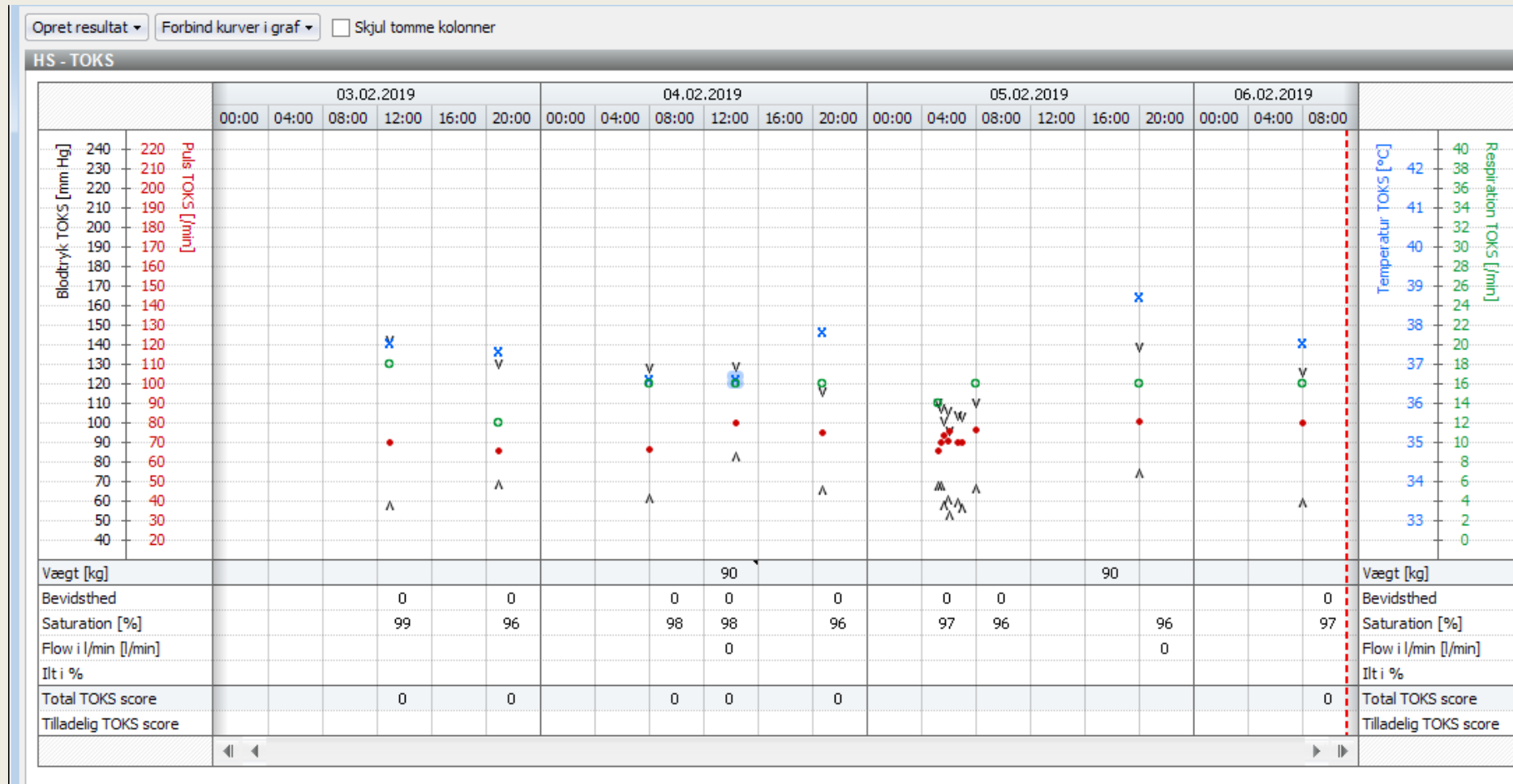
Henvisninger

Arkiv

Personoplysninger

Sygdomshistorik

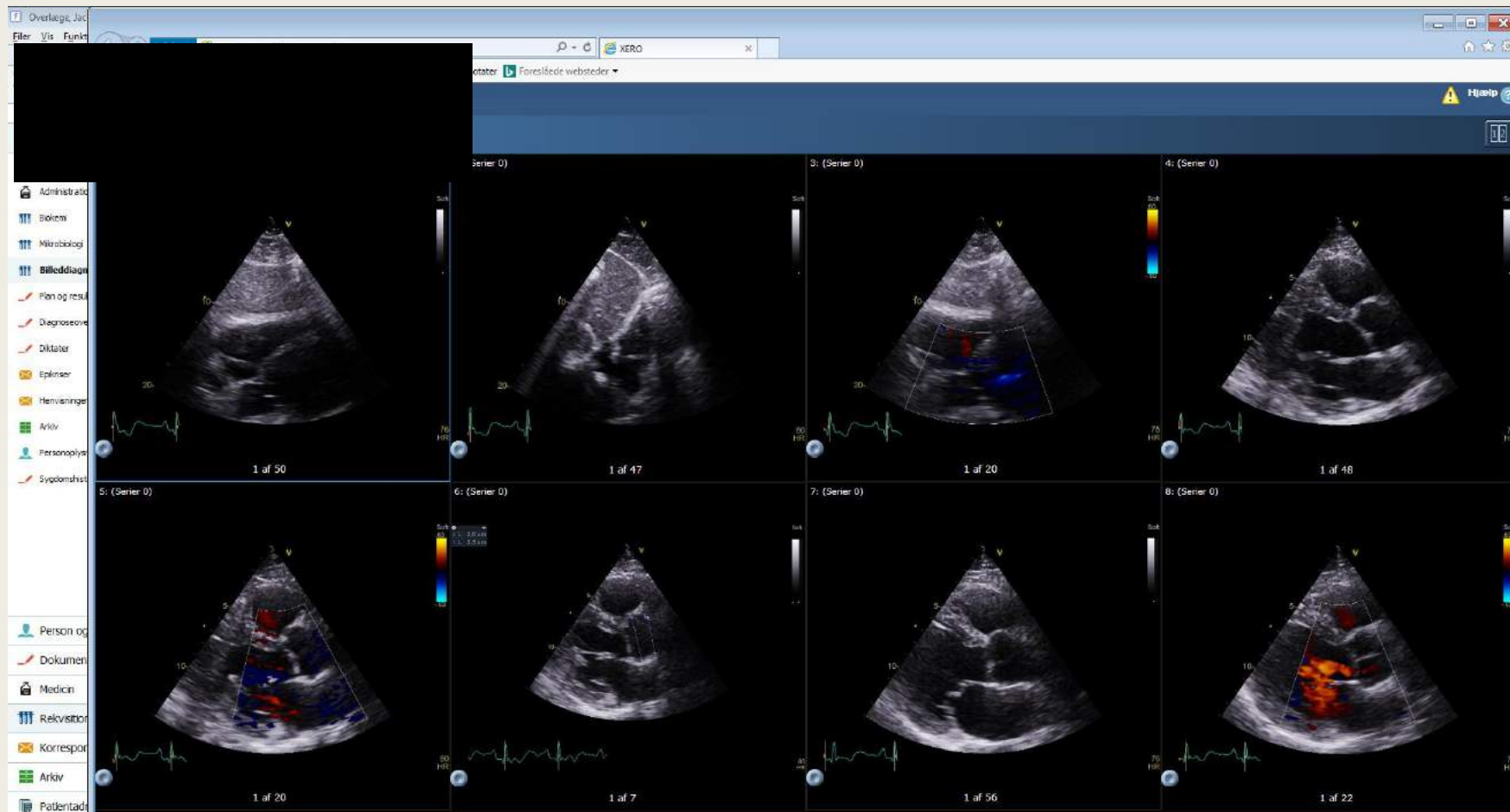
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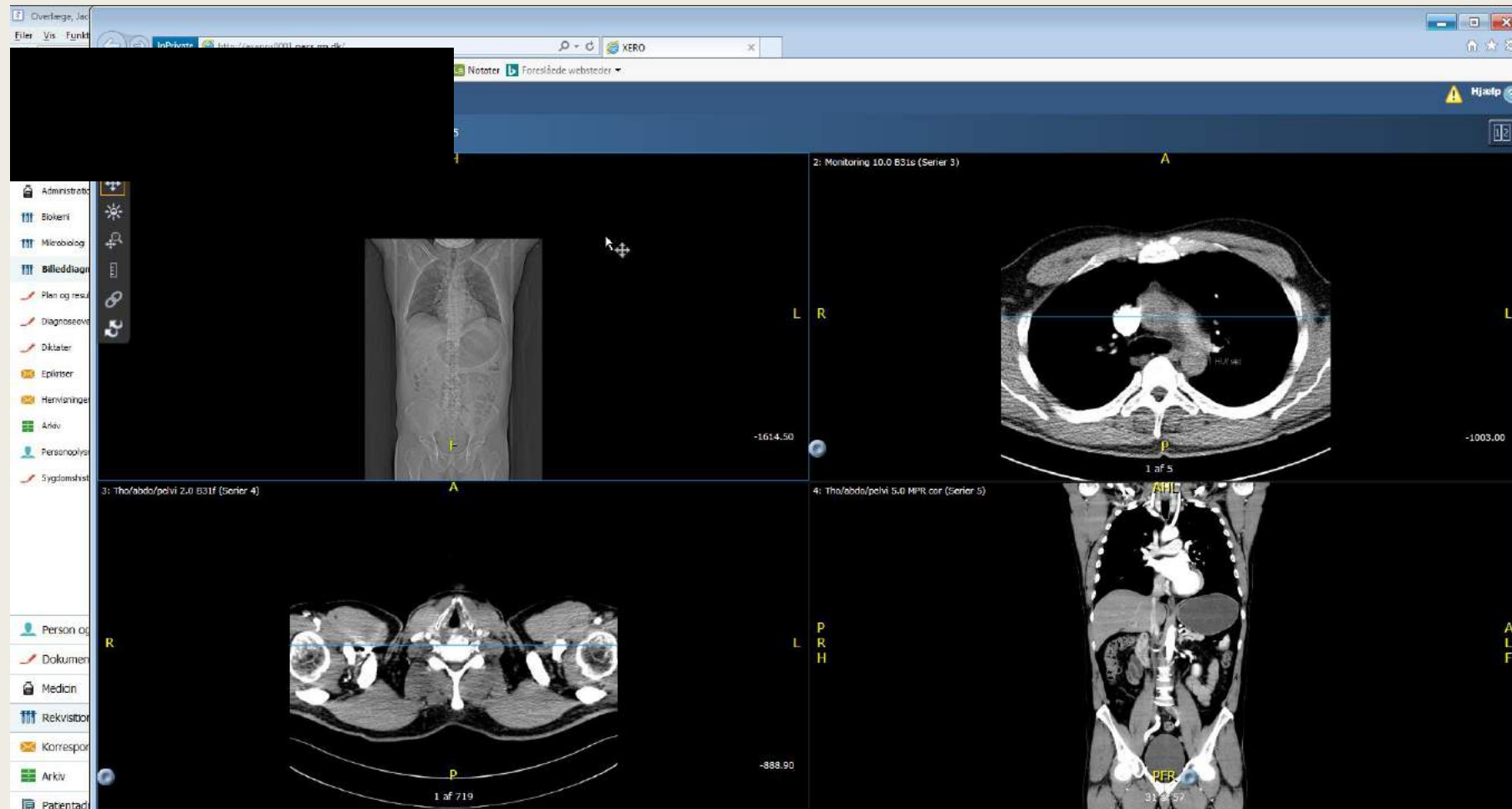
Digital Healthcare – The Danish Way



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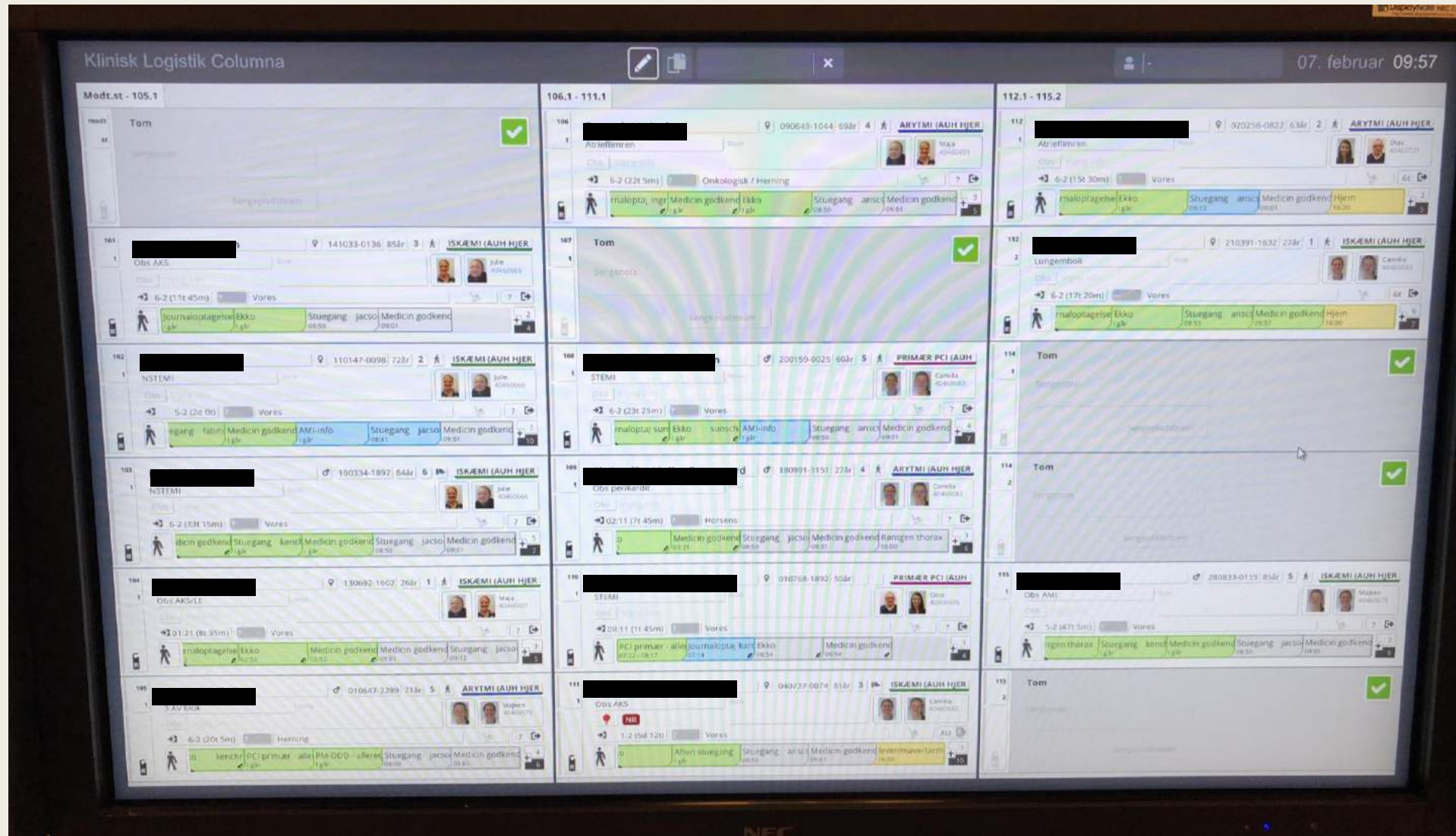
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- In-hospital
- Patient logistics
 - *Procedural progress*
 - Cetrea – Clinical logistics

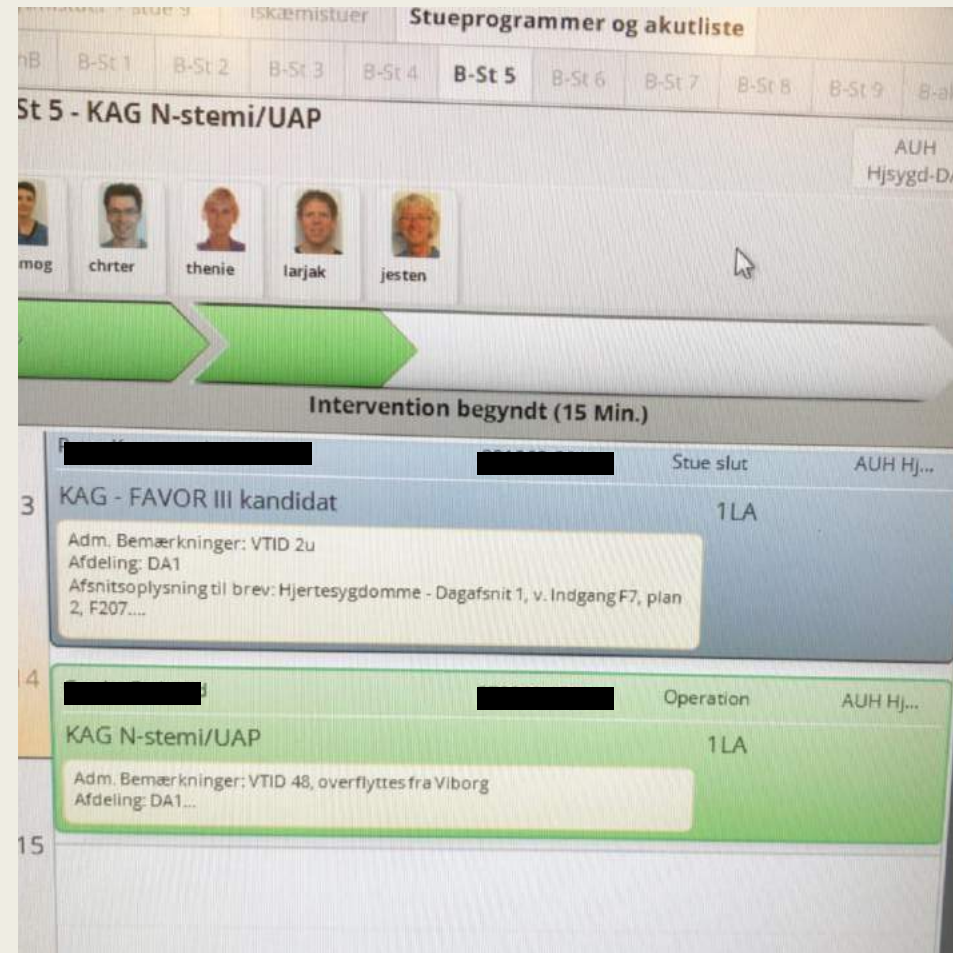
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Digital Healthcare – The Danish Way



Digital Healthcare – The Danish Way

- Follow

- Patient

 - S

 - S

The image illustrates the integration of digital healthcare in Denmark. A smartphone in the foreground displays the Sundhed.dk app, which is used for managing health data and appointments. The app interface includes a search bar, a login button, and a calendar view. The background shows a web browser with a booking page, featuring a calendar and a list of appointment times.

Appointment Times:

Time	Time	Time	Time	Time
07:40	07:45			
08:10	08:15			
08:35	08:40	08:45		
09:05	09:10	09:15		
09:20	09:30	09:35	09:40	09:50
09:55	10:00	10:10	10:15	10:20
10:30	10:35	10:40	10:45	10:50
11:00	11:05	11:10	11:15	11:20
			11:25	

Digital Healthcare – The Danish Way

- Perspectives
 - *Out-patient follow up from home*
 - *Patient monitoring via apps – data harvest*
 - Vital signs
 - Heart rhythm
 - Pacemakers
 - Weight
 - *Patient education*
 - *Efficient planning of multiple procedures*
 - *Research registries*

- Follow-up – Visits, blood samples etc.

- Patients
 - *Sundhed.dk – Secure, web-based access to health records*
 - *Smartphone-enabled*

Digital Healthcare – The Danish Way



Thank You!