Wunder der Technik?
Digitalisierte Ersteinschätzung im dänischen Rettungsdienst- ein Erfolgsmodell

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Zealand Emergency Medical Services

REGION SJÆLLAND
KONCERN DIGITALISERING
– vi er til for dig

Declarations

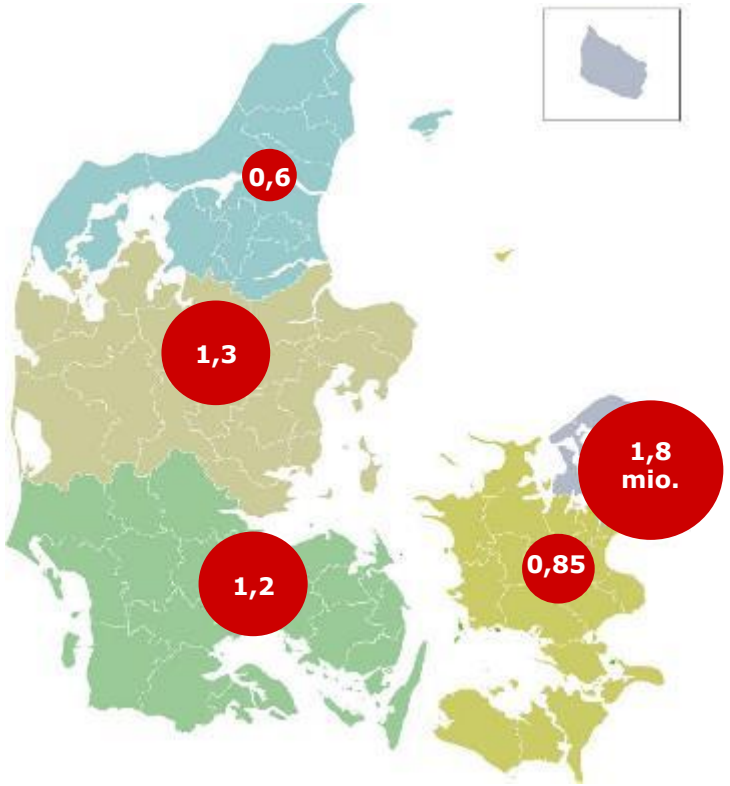
- No conflict of interests
- Affiliated to University of Copenhagen, Department of clinical medicine
- Postdoctoral researcher, Zealand Emergency Medical Services
- Employed with Region Zealand IT-department, Next Generation Technology

Health Care System in Denmark

- Population 5.8 million.
- A public Health Care System in 5 regions
- Equal and free access for all citizens
- Financed through taxes
- Emergency Medical Service (EMS) is an integrated part of the public Health Care System

Danish Emergency Medical Services

- Growing population
- More elderly patients
- More patients with more co-morbidities
- Higher expectations from community for emergency care 24/7
- Demand for patient empowerment
- More advanced diagnostic tools and treatment available
- Challenges and new opportunities that require new solutions



Emergency Health Care

WAS.....

- Emergency (1-1-2) call taking by police and triaged by police
- 13 separate ambulance services
- Different Standard Operation Procedures and differences in medical supervision
- Stand-alone emergency departments and with walk-in patients
- 13 different hospital trusts and 79 hospitals

Emergency Health Care

IS…

- Health related emergency calls (112) part of EMS - triaged by medical dispatchers (nurses and paramedics) and medical control by physician on site
- 13 -> 5 separate ambulance services
- 13 -> 5 hospital trusts and 79 -> 53 hospitals

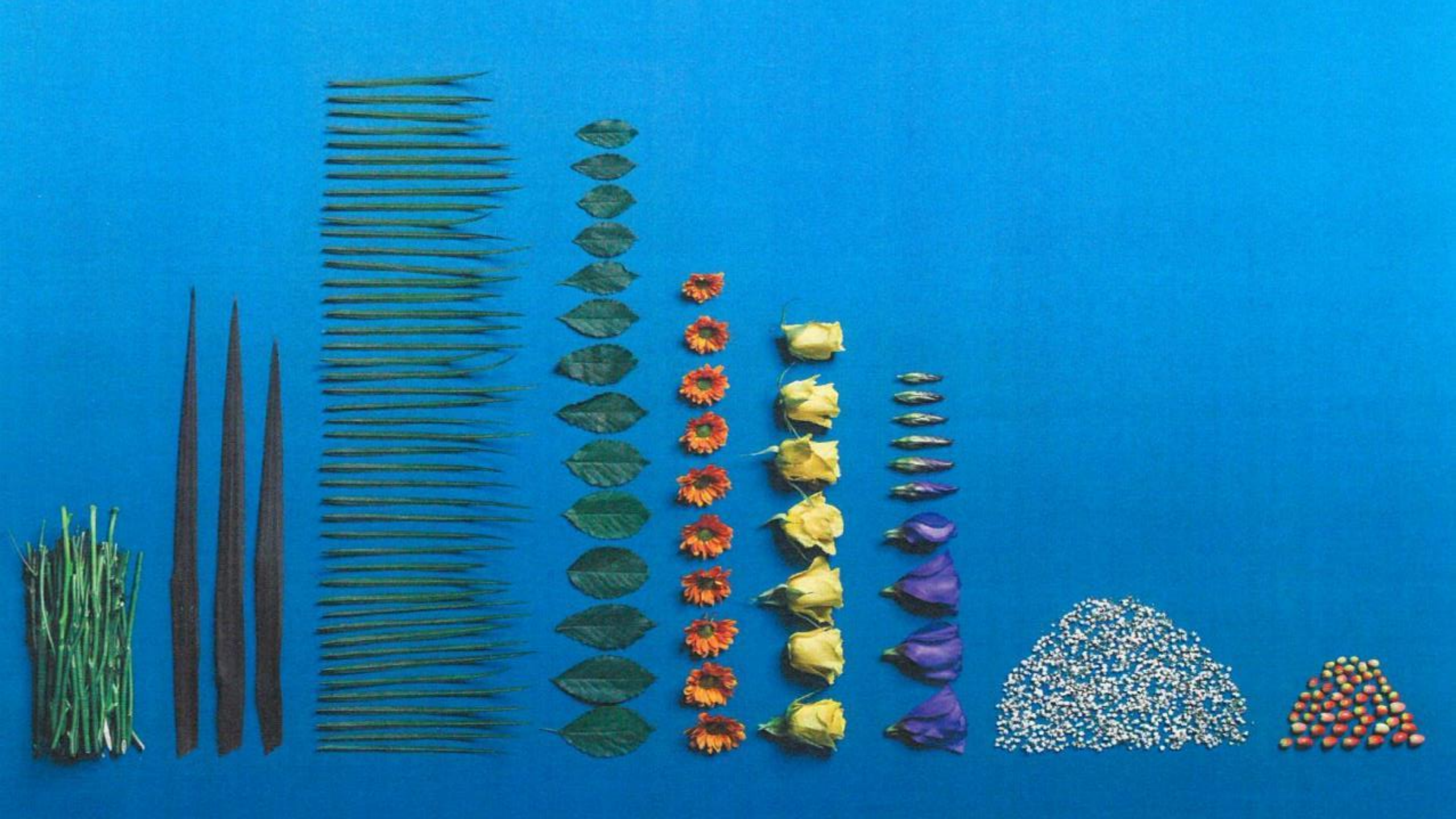
- Still free of charge (unchanged)

EMS ressources

- Ambulances
- Mobile Critical Care Units
- Non-emergency patient transport vehicles
- Helicopter Emergency Medical Services

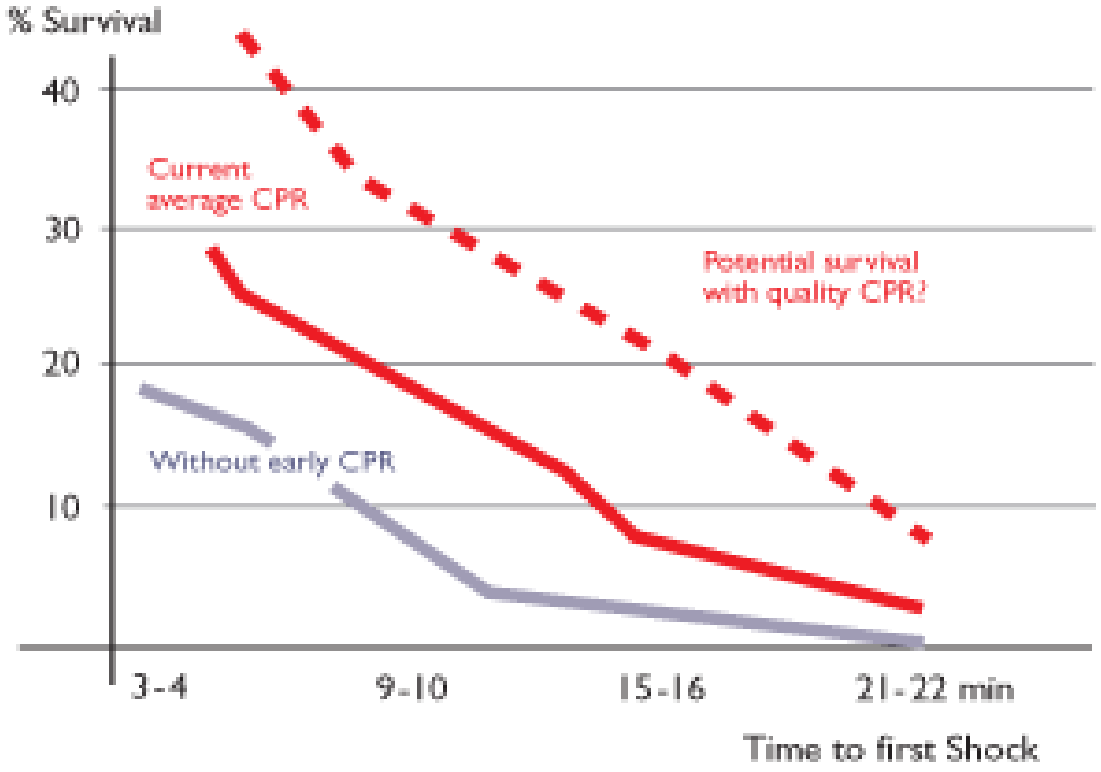
Special ressources

- Psychiatric mobile care unit
- Mobile neonatal intensive care unit
- Social-ambulance
- Tactical Emergency Medical Service
- Mobile emergency treatment facility



Emergency Medical Dispatch Center Command and Control Center

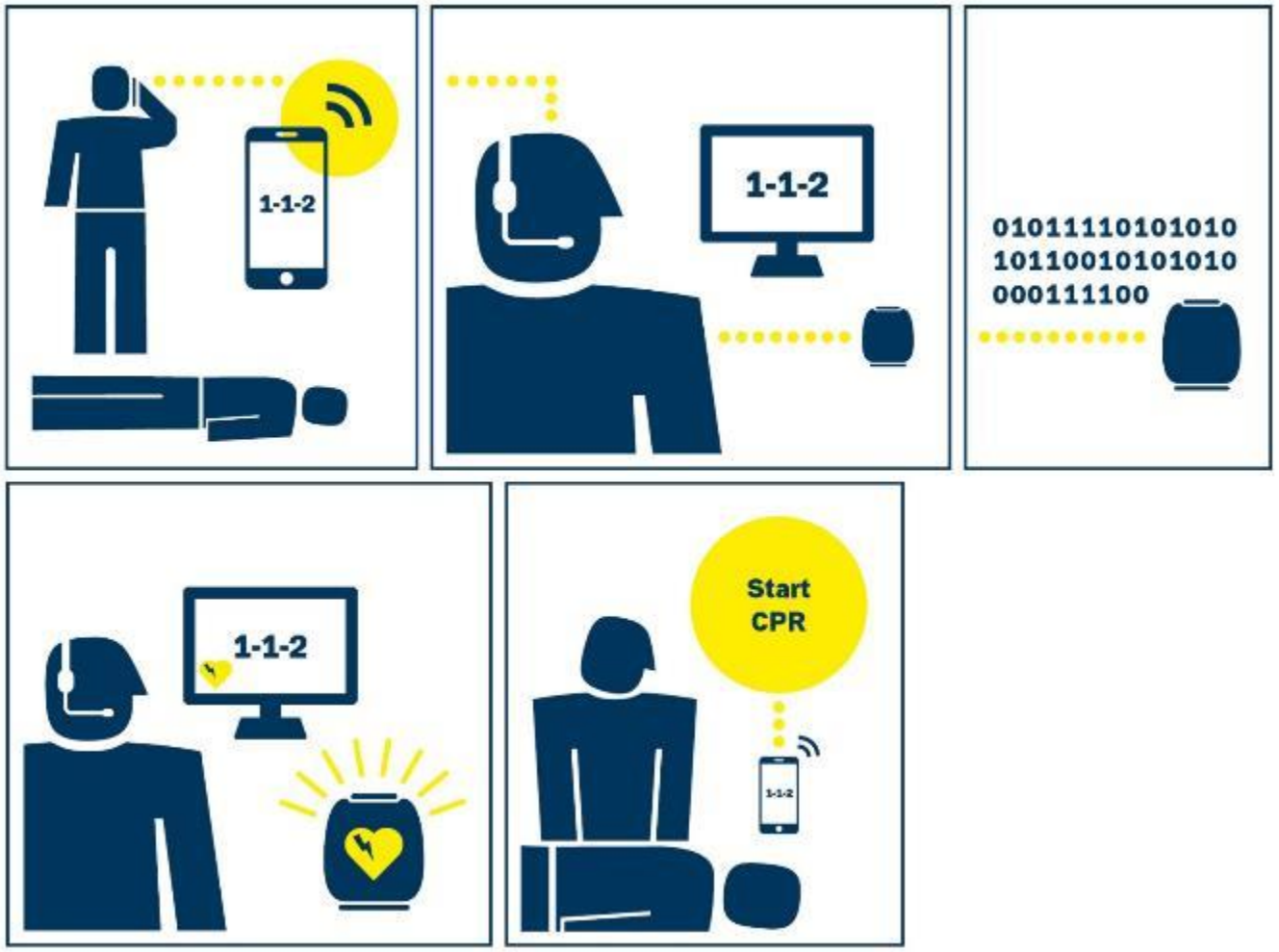
Using technology to improve cardiac arrest outcome



Who identifies cardiac arrest

- Bystander identifies 20 % of cardiac arrest before calling
- Call taker/Dispatcher identifies an additional 50-60 % - best results
- Missing 20-25% of all cardiac arrest

And with the aid of artificial intelligence



Tested before use

- 108,607 incidents with call to -1-2
- 918 calls regarding cardiac arrest
- 84.1% recognised by AI (95% CI: 81.6-86.4)
- 72.4% (95% CI: 69.4-75.3). Recognised by Dispatch
- 107 previously unrecognised OHCA recognised

Status	Medical dispatch	Machine learning framework
Recognized cardiac arrests	665	772
Unrecognized cardiac arrests	253	146
Cardiac arrest in population	**918**	**918**

Peer reviewed and published

JAMA Network | Open™

Original Investigation | Emergency Medicine

Effect of Machine Learning on Dispatcher Recognition of Out-of-Hospital Cardiac Arrest During Calls to Emergency Medical Services
A Randomized Clinical Trial

Stig Nikolaj Blomberg, MsC; Helle Collatz Christensen, MD, PhD; Freddy Lippert, MD; Annette Kjær Ersbøll, MsC, PhD; Christian Torp-Petersen, MD, PhD; Michael R. Sayre, MD; Peter J. Kudenchuk, MD; Fredrik Folke, MD, PhD

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Available online at www.sciencedirect.com

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

Machine learning as a supportive tool to recognize cardiac arrest in emergency calls

Stig Nikolaj Blomberg[a,b,*], *Fredrik Folke*[a,b,c], *Annette Kjær Ersbøll*[d], *Helle Collatz Christensen*[a], *Christian Torp-Pedersen*[e,f], *Michael R. Sayre*[g], *Catherine R. Counts*[g], *Freddy K. Lippert*[a,b]

[a] *Emergency Medical Services Copenhagen, Denmark*
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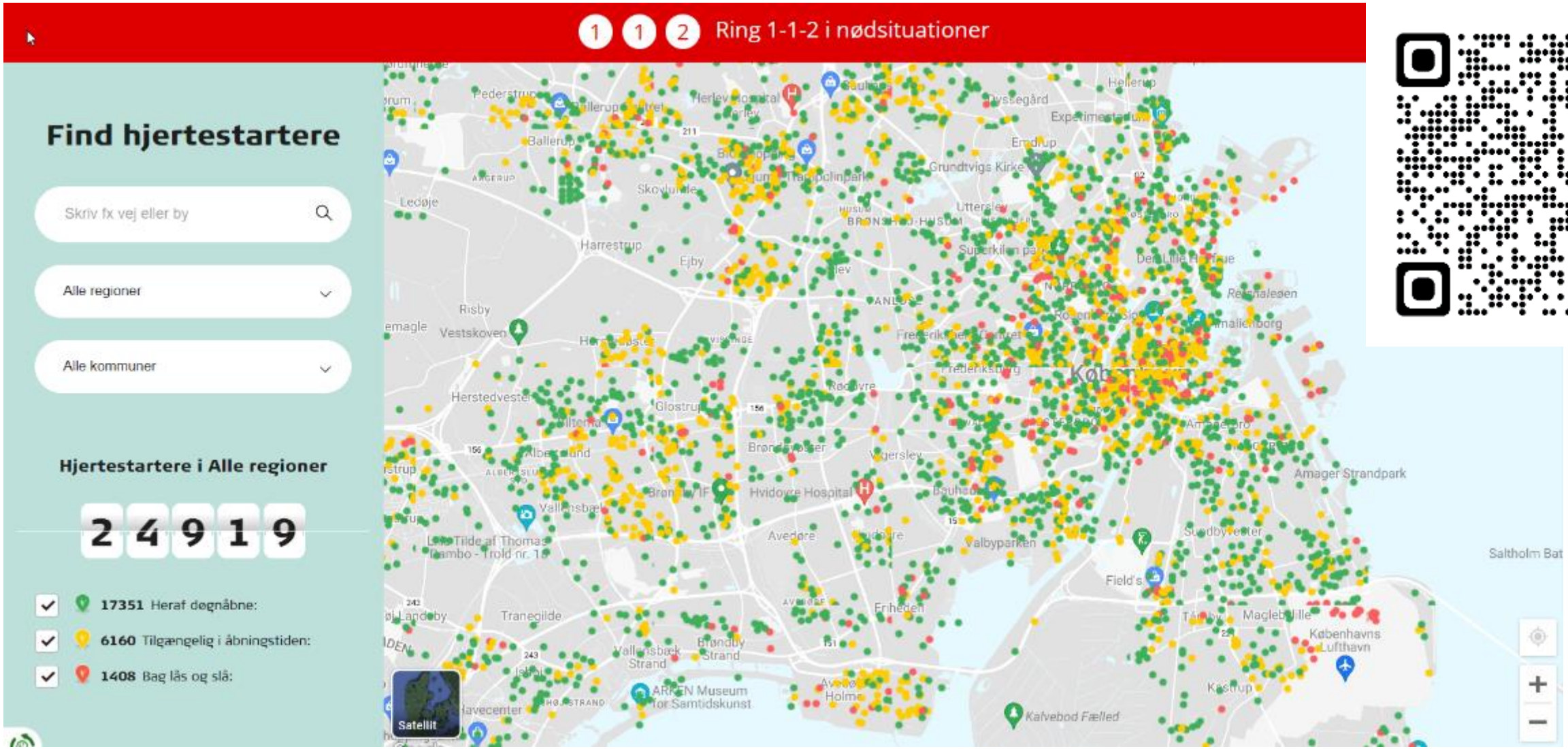
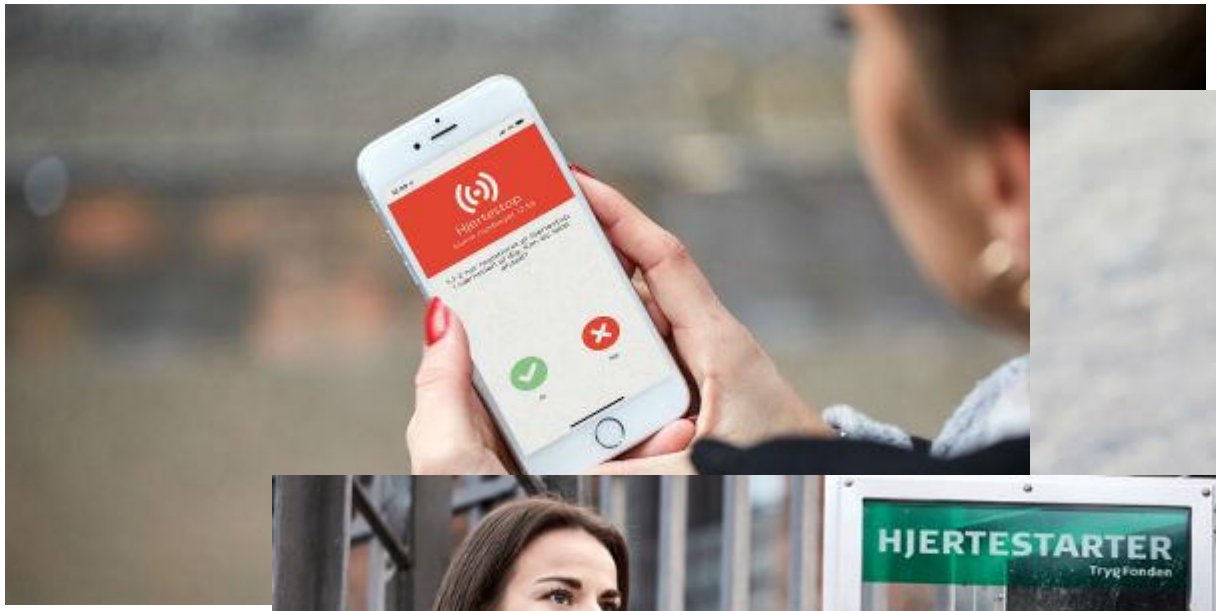
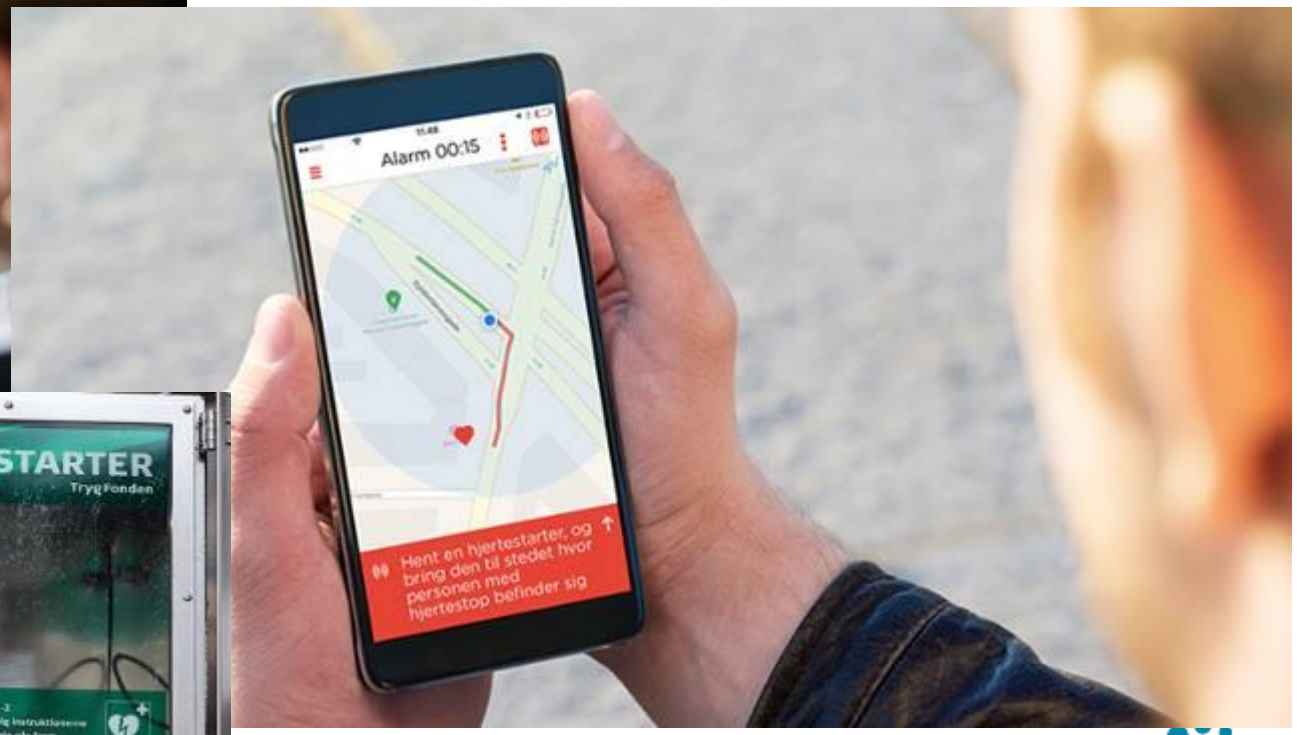
[c] *Department of Cardiology, Gentofte University Hospital, Denmark*
[d] *National Institute of Public Health, University of Southern Denmark, Denmark*
[e] *Department of Clinical Epidemiology, Aalborg University Hospital, Denmark*
[f] *Department of Health Science and Technology, Aalborg University, Denmark*
[g] *Department of Emergency Medicine, University of Washington, United States*

All AEDs are mapped and available



Citizen responders alarmed





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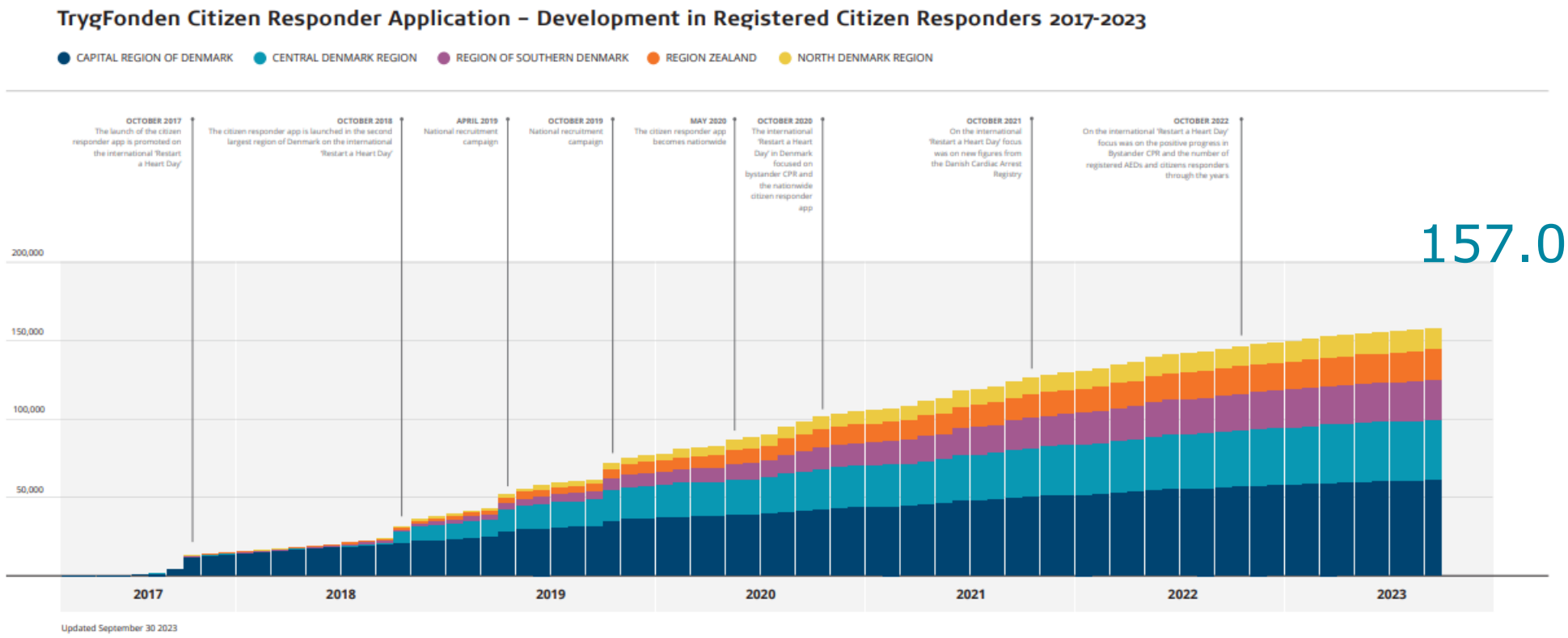
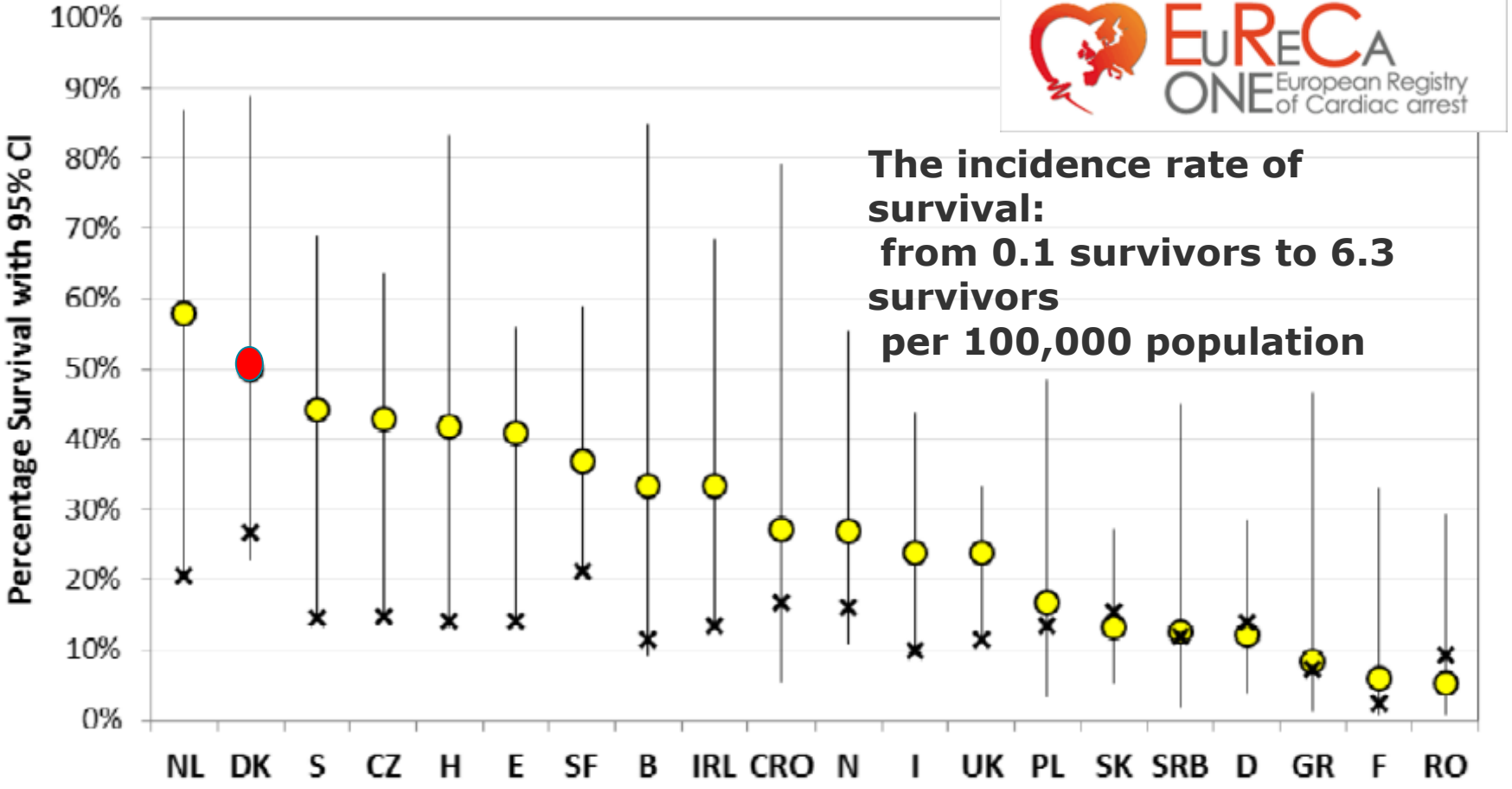


157.000

One national electronic prehospital patient medical record

EURECA One study in Resuscitation 2016

Survival to Hospital discharge in witnessed and shockable rhythm



EuReCa ONE European Registry of Cardiac arrest

The incidence rate of survival:
from 0.1 survivors to 6.3 survivors
per 100,000 population

Continous innovation

ACUTE TREATMENT OF STROKE

Stroke in Denmark

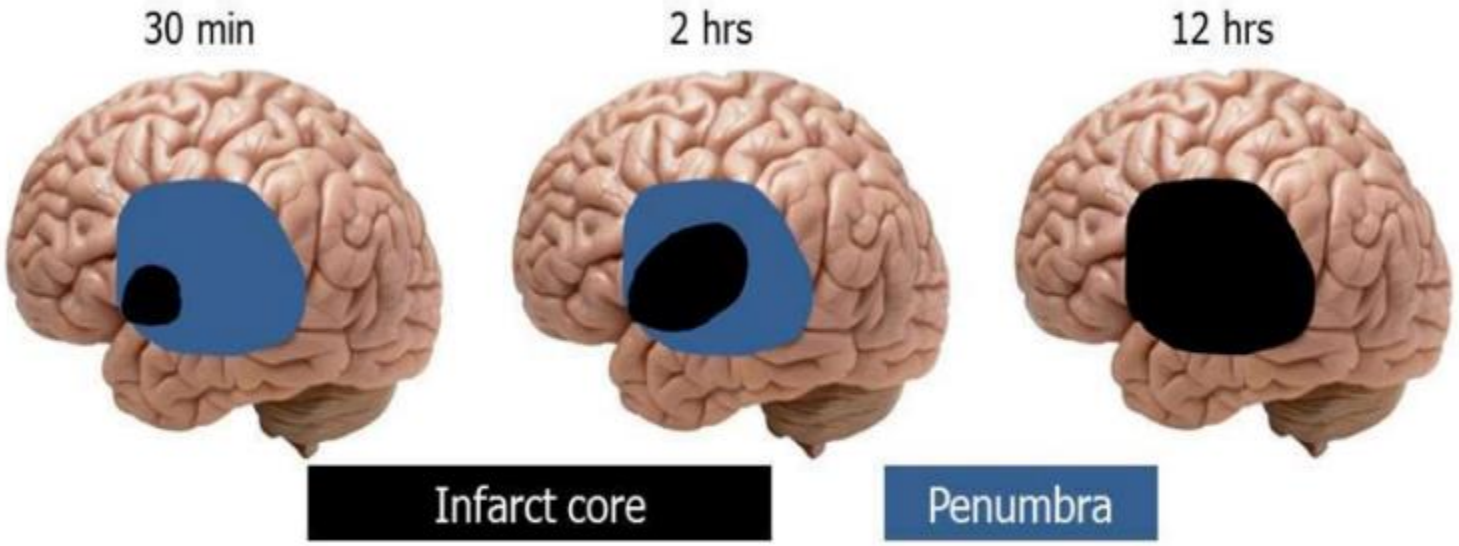
- 12.000 per year
- Stroke is the first cause of acquired disability
- One of the most costly conditions in Danish healthcare
  - Acute treatment
  - Rehabilitation
  - Loss of earnings
- Growth in stroke due to aging population

Stroke needs fast treatment

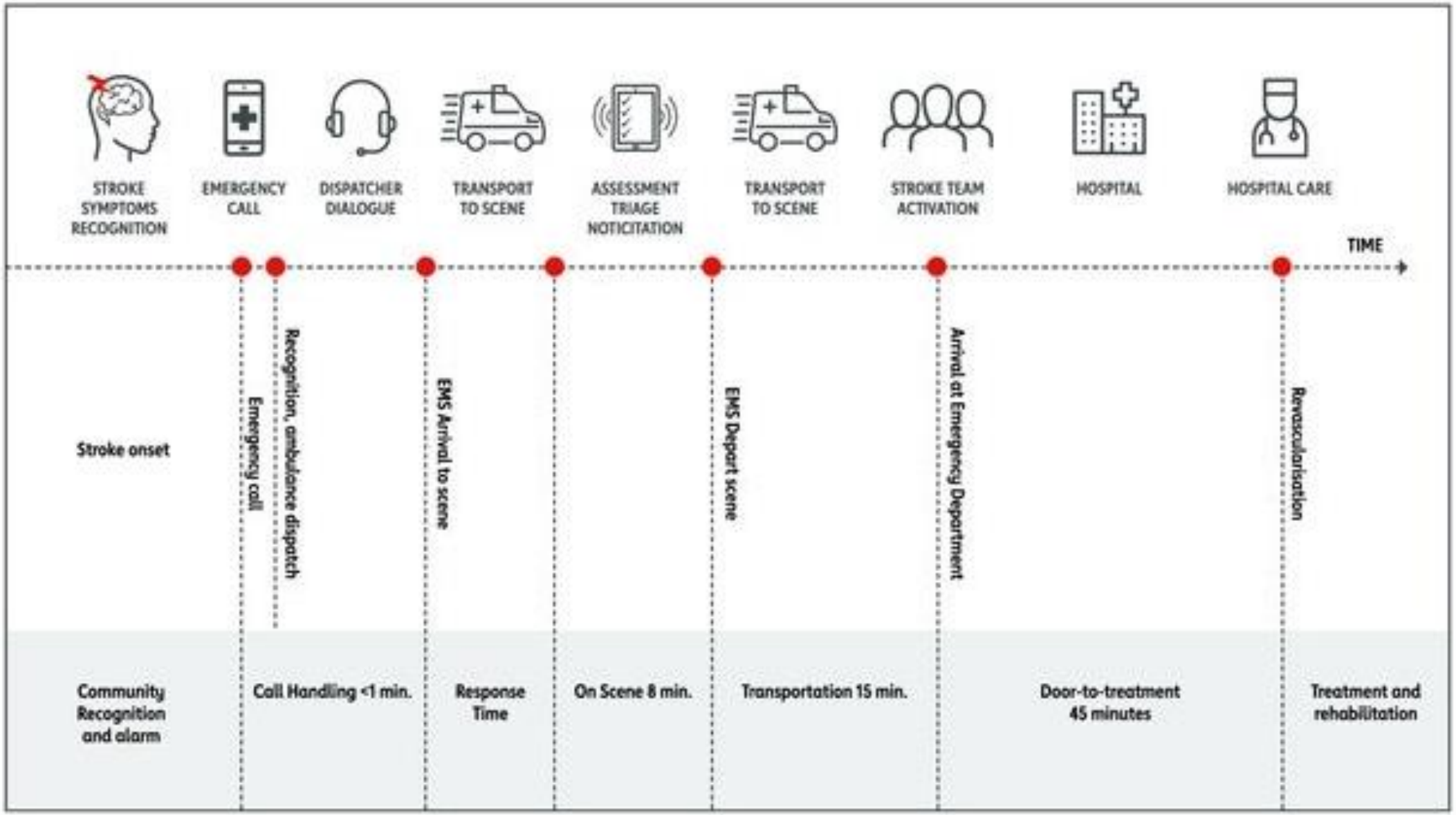
Two acute treatments have improved good quality survival

- Trombolysis
- Trombektomi

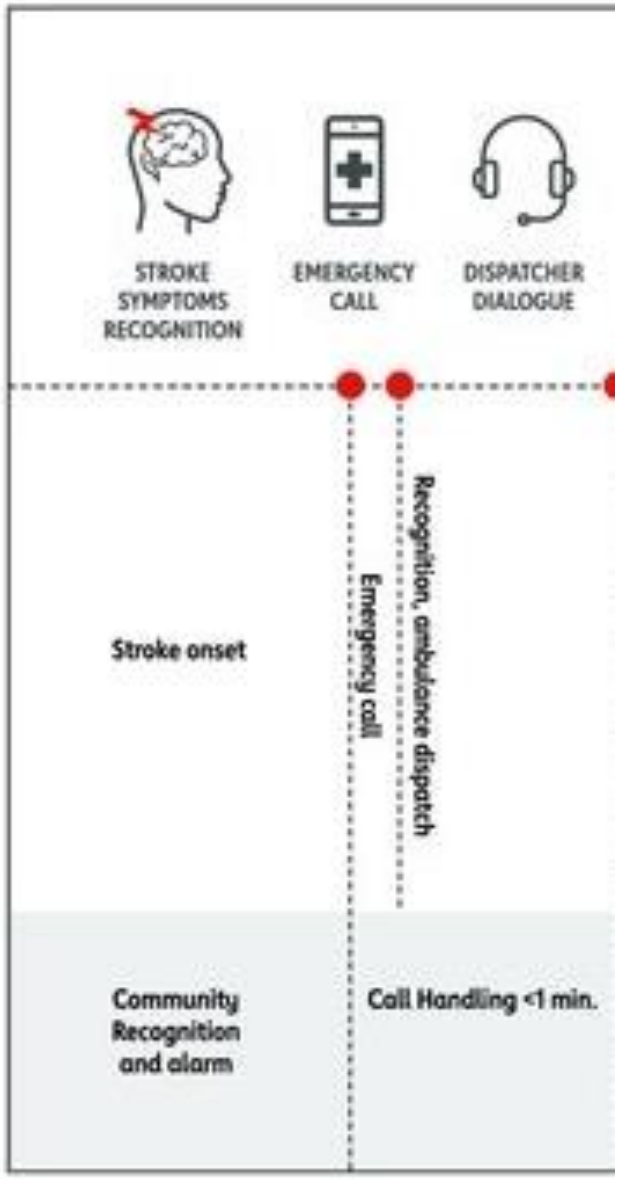
In Denmark 25% of all patients with stroke recieves this treatment



Stroke chain of survival

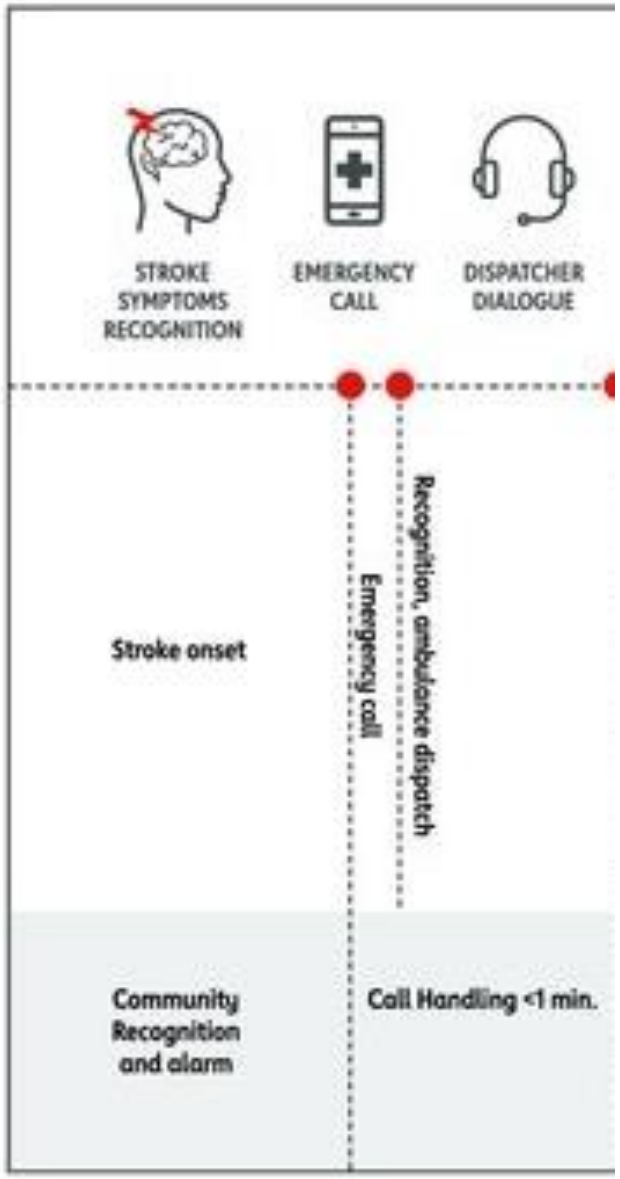


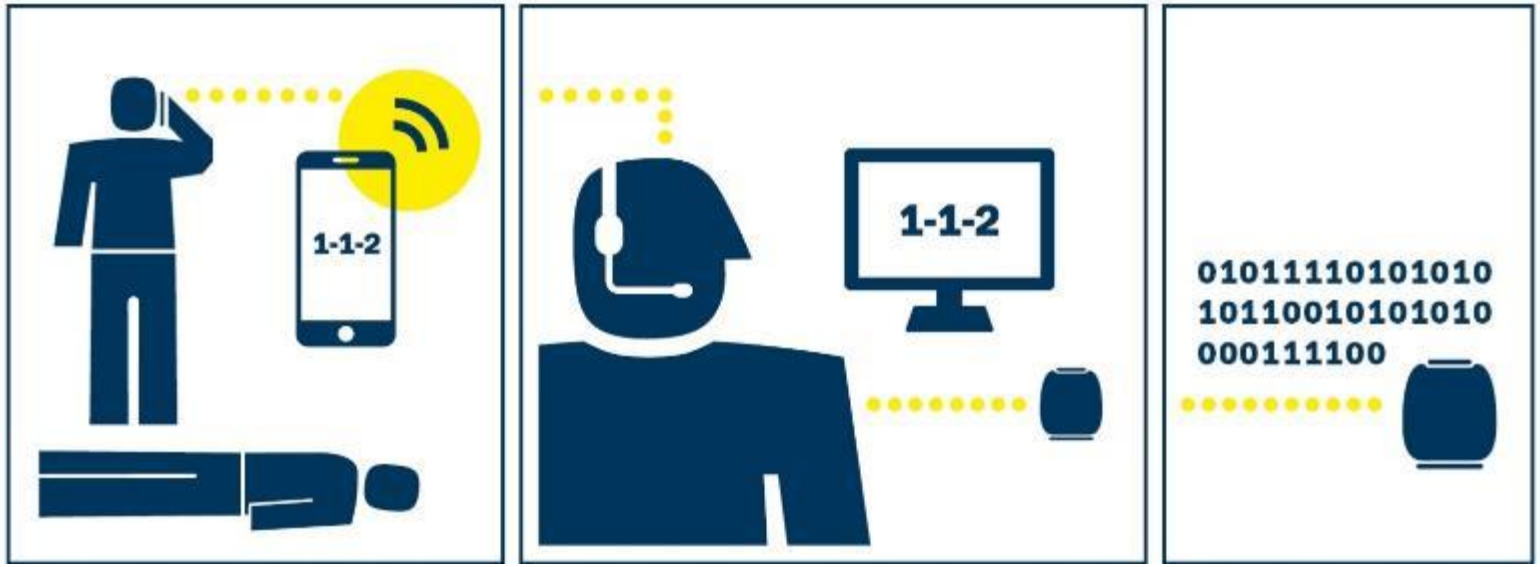
Stroke chain of survival



	Sensitivity	PPV
Dispatcher	0.527	0.171

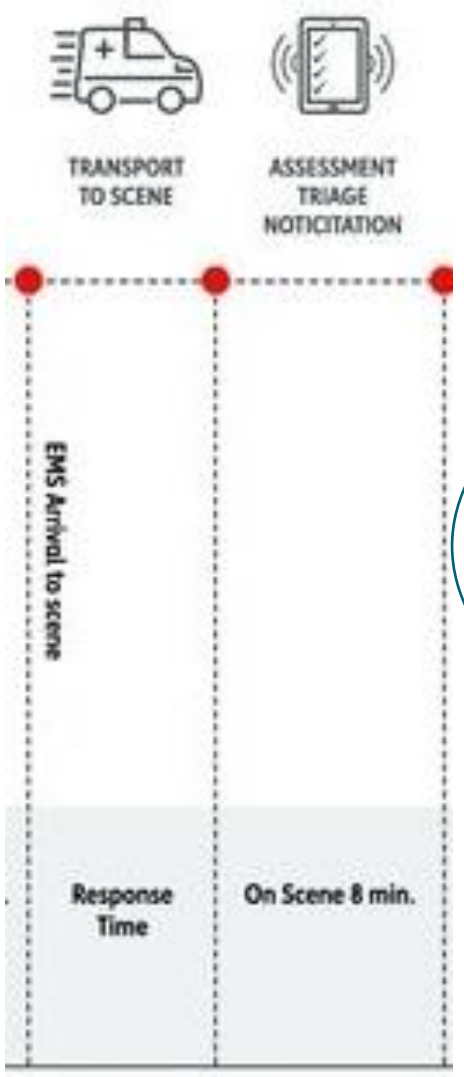
Stroke chain of survival





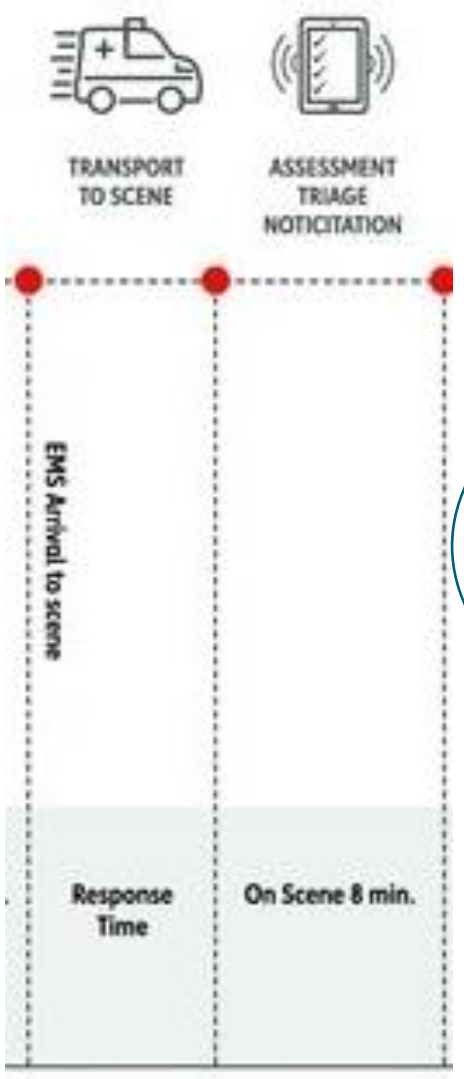
	Sensitivity	PPV
Dispatcher	0.527	0.171
Machine learning	0.630	0.249

Stroke chain of survival

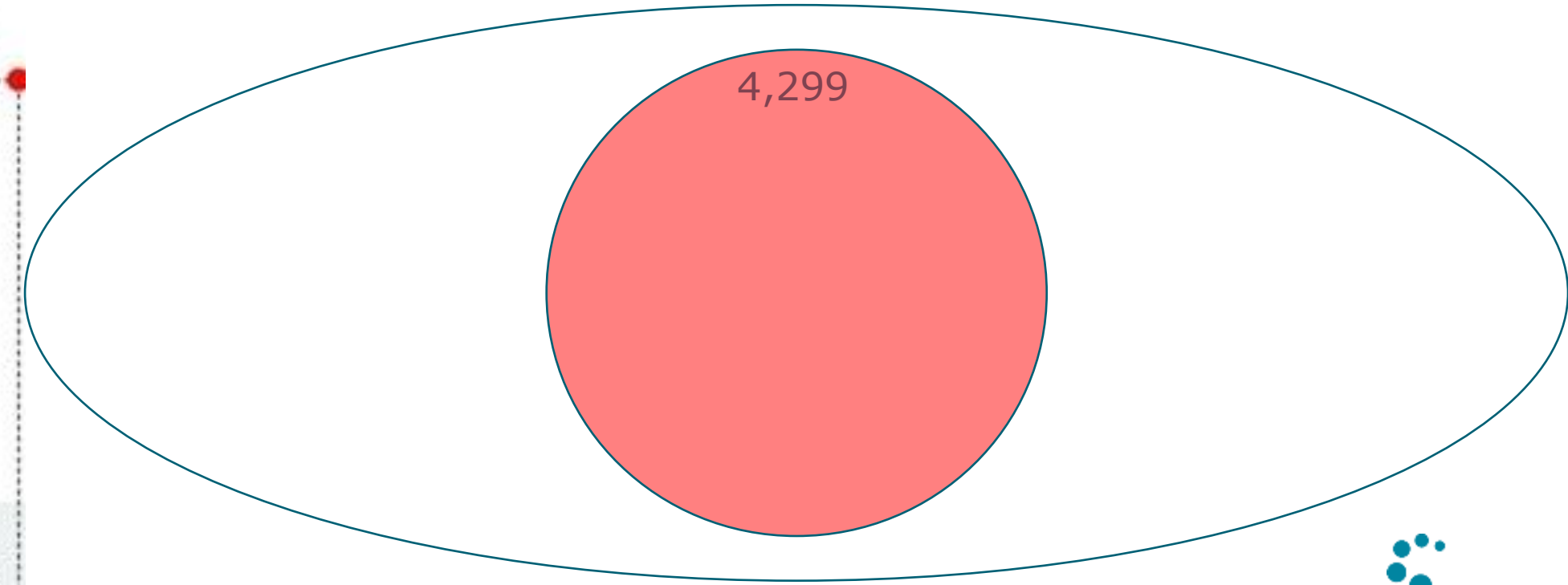


Ambulance dispatched for suspected stroke, n=18,289

Stroke chain of survival



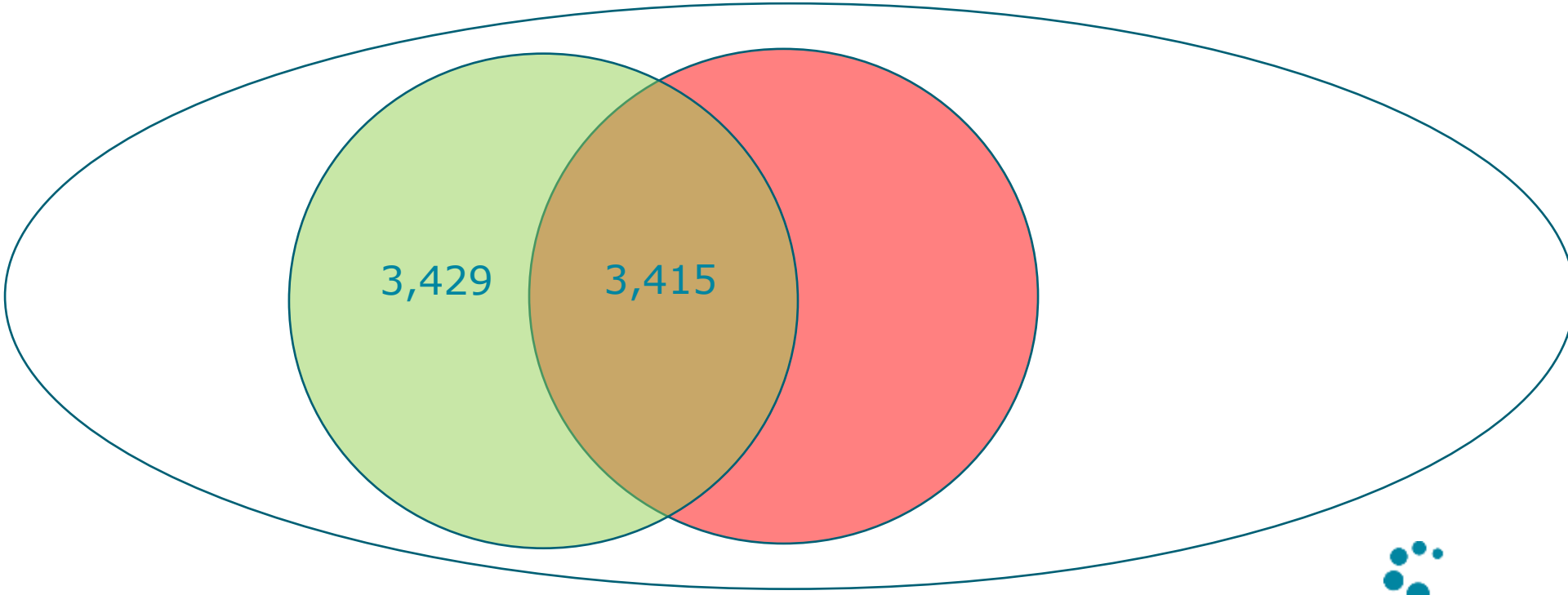
Ambulance dispatched for suspected stroke, n=18,289



True Strokes

Stroke chain of survival

Ambulance dispatched for suspected stroke, n=18,289

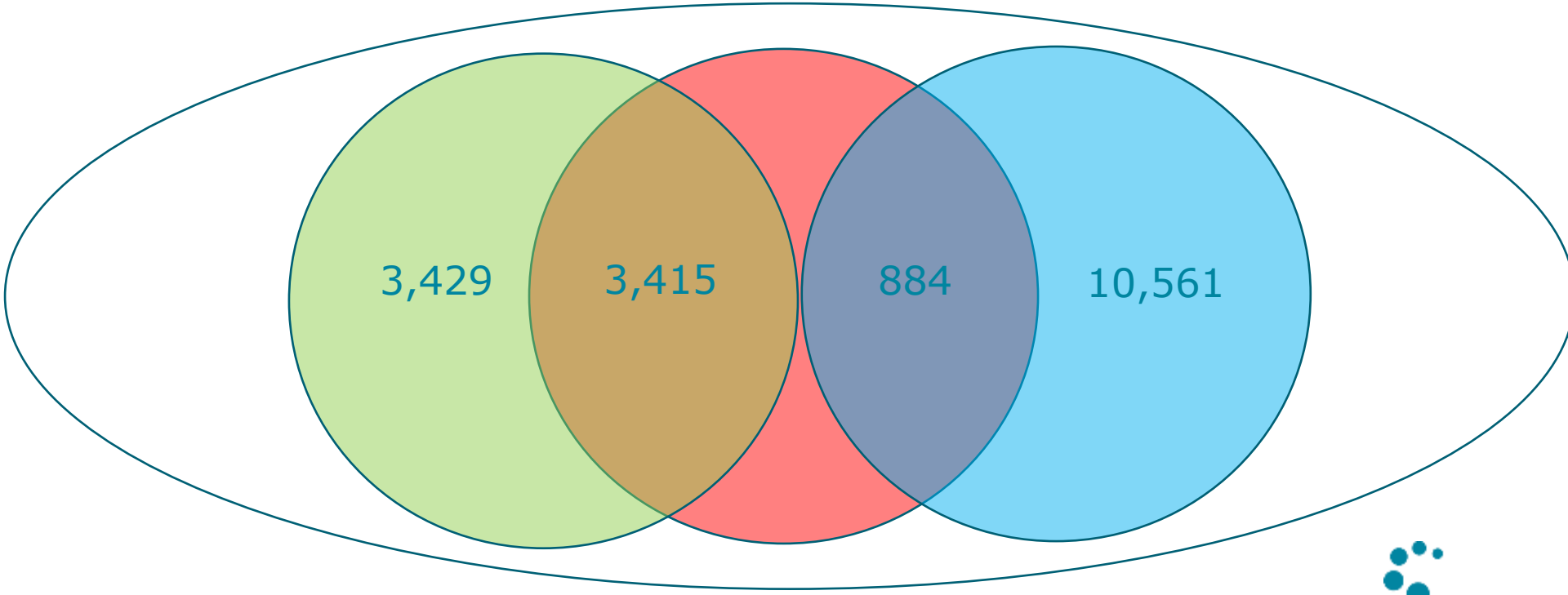


Transported to stroke center

True Strokes

Stroke chain of survival

Ambulance dispatched for suspected stroke, n=18,289

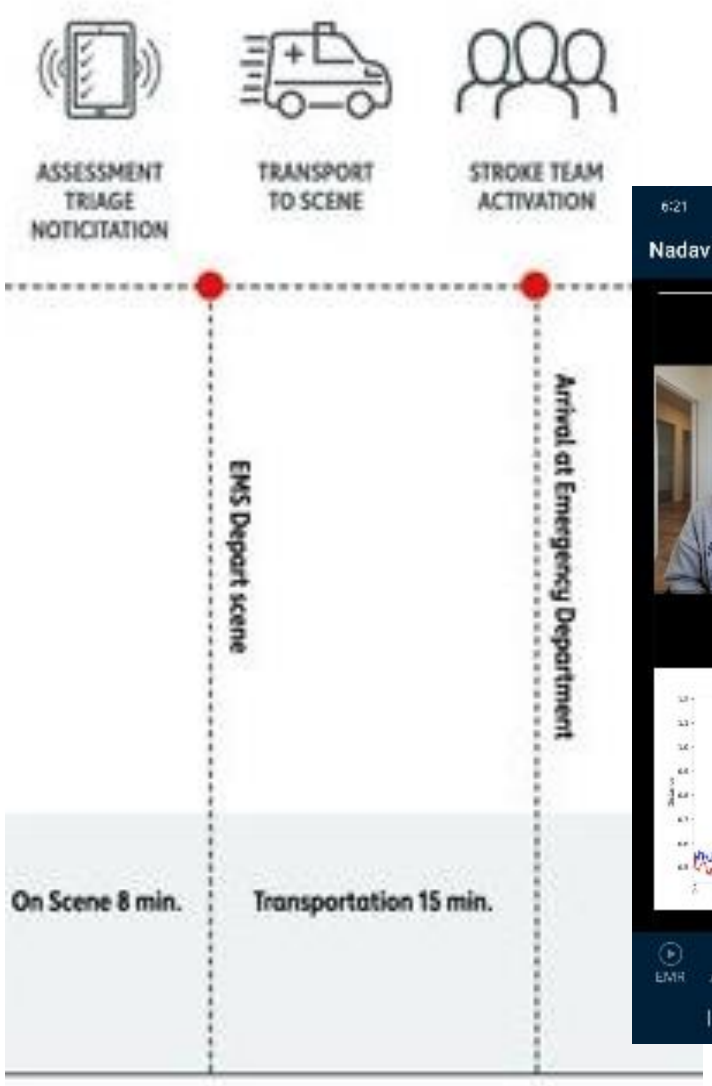


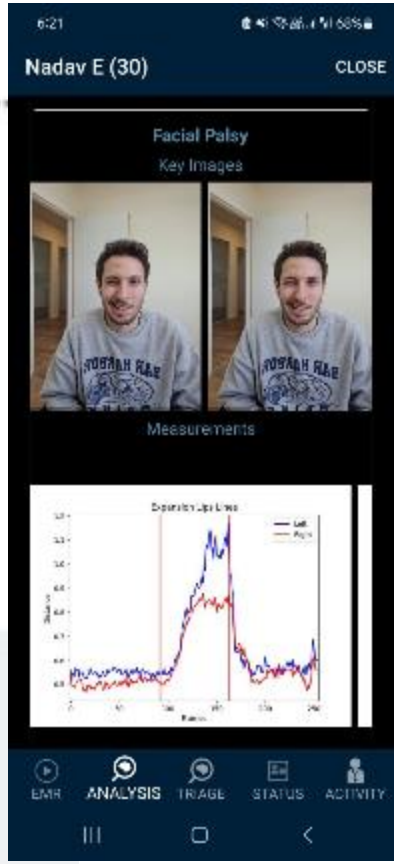
Transported to stroke center

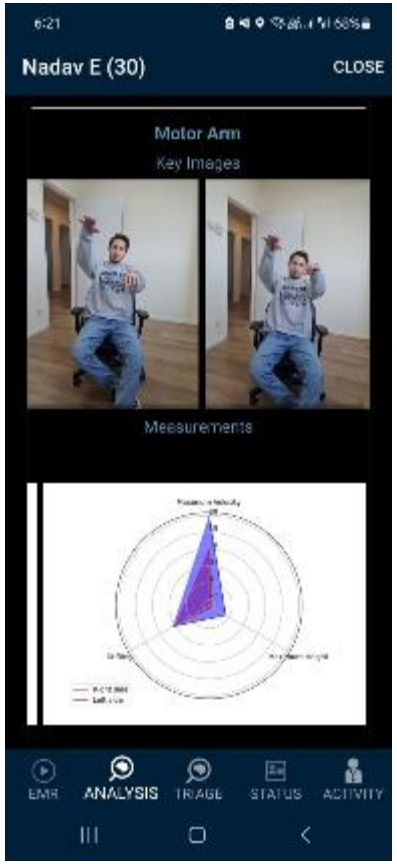
True Strokes

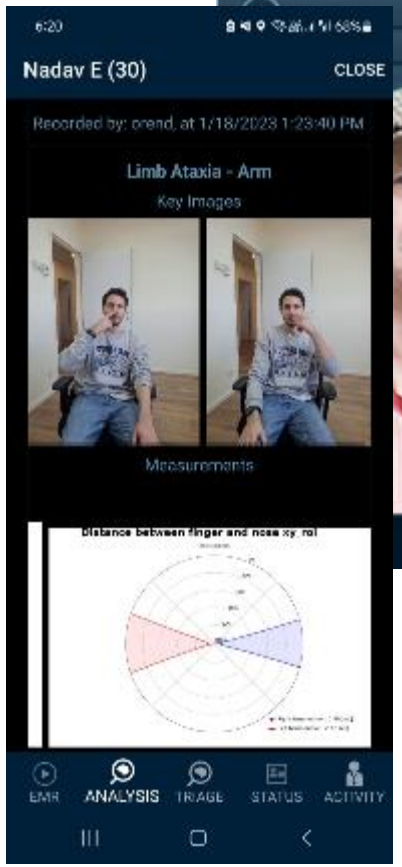
Transported to low-level hospital

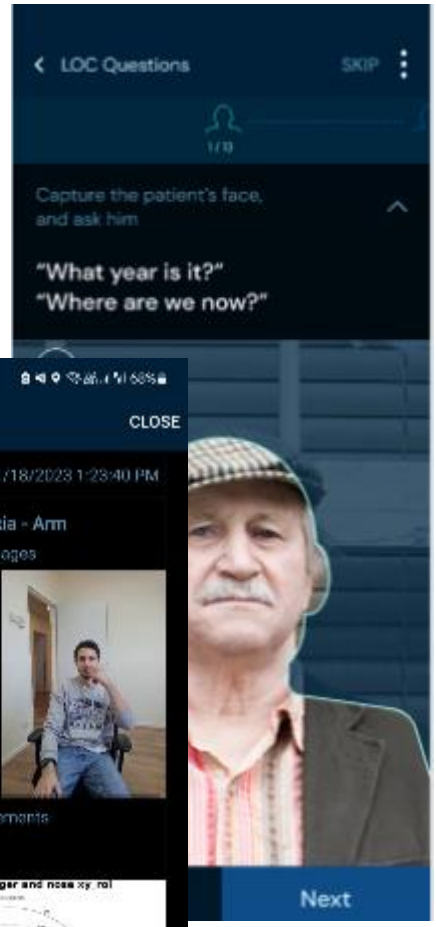
App to improve diagnose

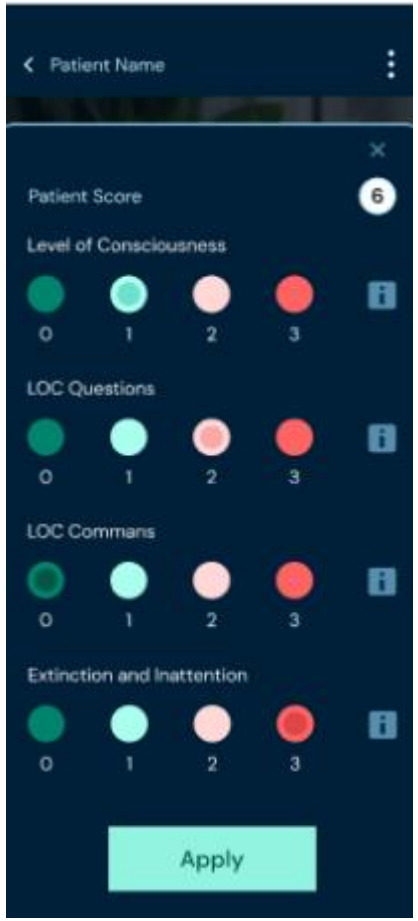




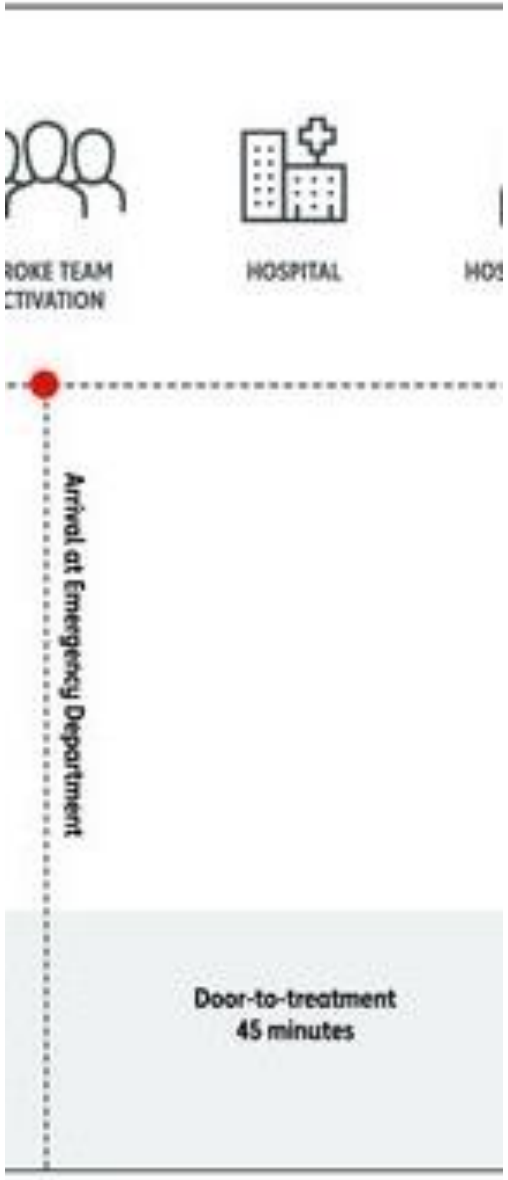




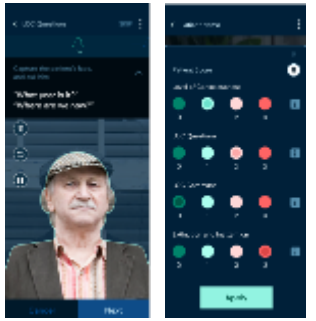


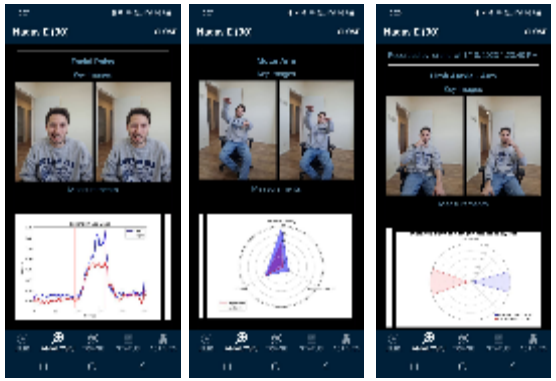


App to improve diagnose



- Increased precision
- Reduce number of false positives
- Reduce hospital door-to-treatment time






Who wants change?


Who wants *to* change?

Thank you

Questions?

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KONCERN DIGITALISERING
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