

# THE COPENHAGEN EMS MODEL FOR EMERGENCY PATIENT CARE





## Freddy Lippert

CEO, Ass. Prof. MD. FERC  
Emergency Medical Services, Copenhagen  
University of Copenhagen, Denmark

E-mail: Lippert @ regionh.dk



@FreddyLippert



Freddy-K-Lippert



## Disclosure and acknowledgment

Projects and research supported (unrestricted grants) by The Danish Foundation “TrygFonden”

**TrygFonden**

Unrestricted research grants from the Laerdal Foundation



Laerdal Foundation  
helping save lives



## This presentation

- Danish?
- We share the same challenges in Emergency Medical Services
- We reorganising emergency patient care in Copenhagen to an integrated and cohesive solution for emergency patient care
- Some of our results so far
- Short presentation of The Global Resuscitation Alliance (GRA)





# DANISH?

Danish pastry





# DANISH?

## Fairytales of Hans Christian Andersen





# DANISH?

Carolina Wozniacki





**DANISH?**

Victor Axelsen





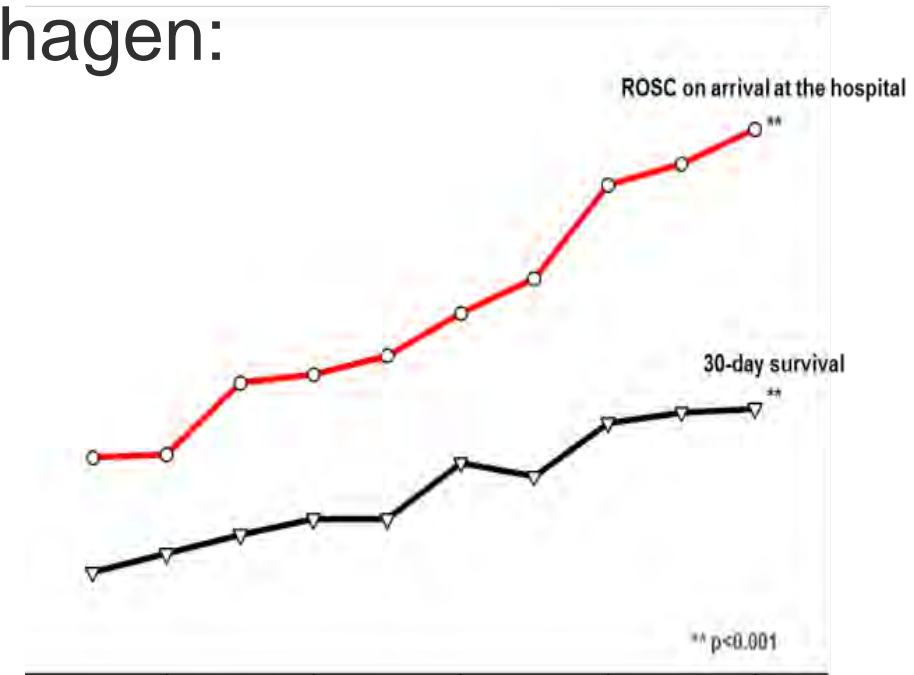


## DANISH?

”The Danish Case”: Tripling survival

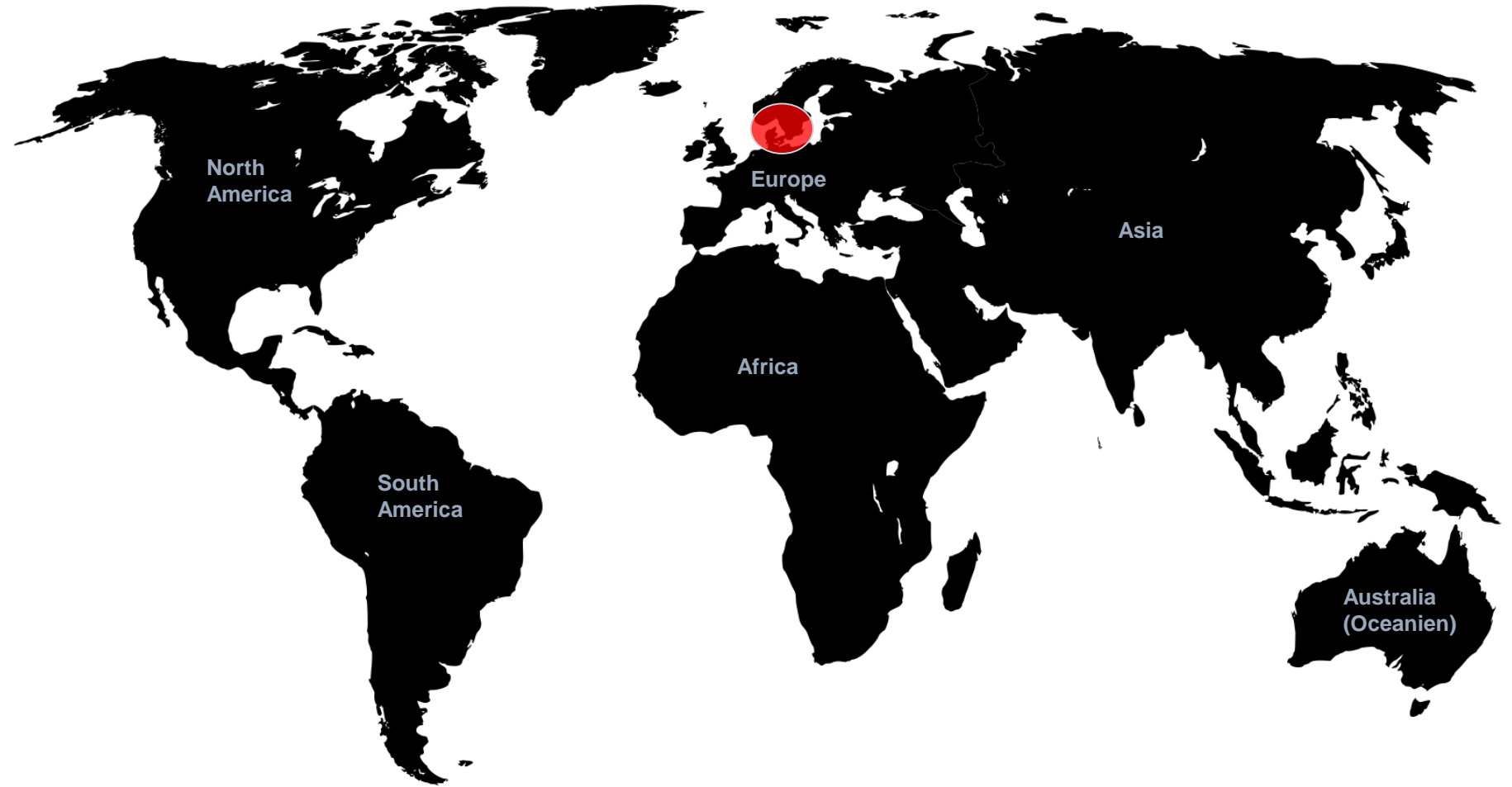
The European EMS Congress in Copenhagen:  
EMS2016, EMS2017 and EMS2018

Our fully integrated EMS solution





# Denmark



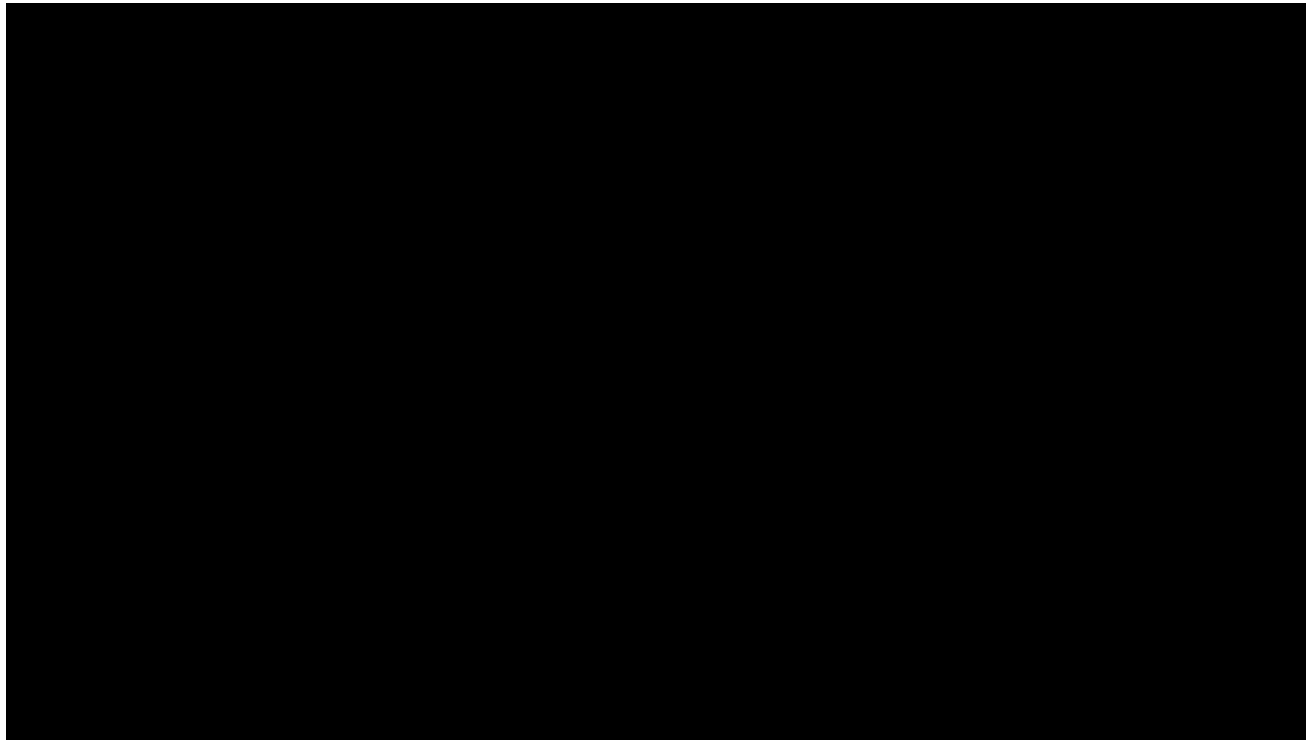


# Wonderful Copenhagen





# Copenhagen and Denmark from our view







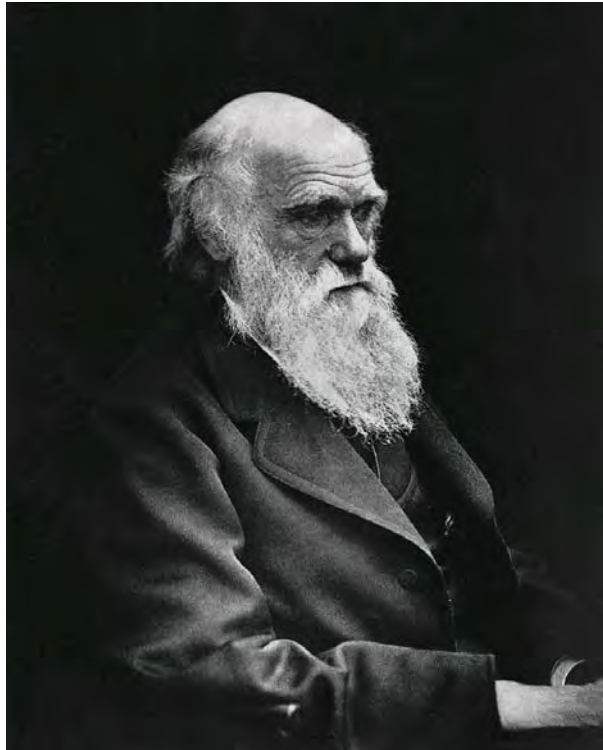
# Emergency Medical Services Copenhagen





## The changing community and population

- Growing population
- More elderly patients
- Patients with more co-morbidity
- Higher expectations for emergency care 24/7
- More advanced diagnostic tools and treatment available
- Demand for patient empowerment
- New opportunities that requires new solutions



It is not the strongest of the species that survives, nor the most intelligent that survives.

It is the one that is most adaptable to change.

Charles Darwin



# EMERGENCY HEALTH CARE IN COPENHAGEN

## FROM SILOS TO INTEGRATED AND PATIENT CENTRED CARE





# Change in emergency health care in Copenhagen

Before 2008:

- Emergency care free of charge
- Emergency (112) call taking and triage by police
- Four separate ambulance services and two separate dispatch centres
- Different Standard Operation Procedures and medical supervision
- Out-of-Hours services a separate entity
- Stand-alone emergency departments and walk-in patients
- 3 different hospitals trusts and 12 independent hospitals



## Health care in Copenhagen now

- 1 hospital trust - 5 university hospitals in 9 locations and 1 EMS
- Health Care related Emergency Calls (112) part of EMS - triage using health care personnel for medical dispatch
- All ambulance service part of EMS – same SOP and medical supervision 24/7
- Out-of-Hours services part of EMS
- Referral of patients to emergency departments triaged by the EMS Dispatch Center through a separate telephone number
- Still free of charge



## Our journey: from.... to.....

- From paper documentation to full electronic documentation in dispatch center and electronic patient charge fra call taking to hospital care
- From limited data and limited quality control to all the data we need
- From limited research to leading in research
- From no innovation to numerous ongoing projects



## Main tasks for EMS Copenhagen (1.8 mio)

- One Emergency Medical Command and Control Centre
- Health related emergency calls (1-1-2) (130.000 / year)
- Medical help-line 1813 for health care advice and admission to ED (1 mio/year)
- Dispatch Centre for all prehospital resources
  - Ambulances
  - Emergency physician critical care units
  - HEMS
  - Specialised Neonatal Transport
  - Special respons car for chief emergency physician to major incidents
  - Major incident mobile control centre
  - Mobile Psychiatric Care Unit
  - “Social-ambulance”





## Activity

- 130.000 Emergency medical calls (1-1-2)
- 950.000 Medical Helpline 1813
- 120.000 Emergency ambulance missions
  - 17.000 Mobile Critical Care Unit (Physician-staffed) missions
  - 10.000 Interhospital transfers (3000 Physician-escorts)
  - 30.000 Scheduled ambulance tasks
  - 60.000 Patient transfers – non-emergency
    - 1.000 Mobile prehospital psychiatric care unit tasks
    - 1.000 Helicopter Emergency Medical Services missions

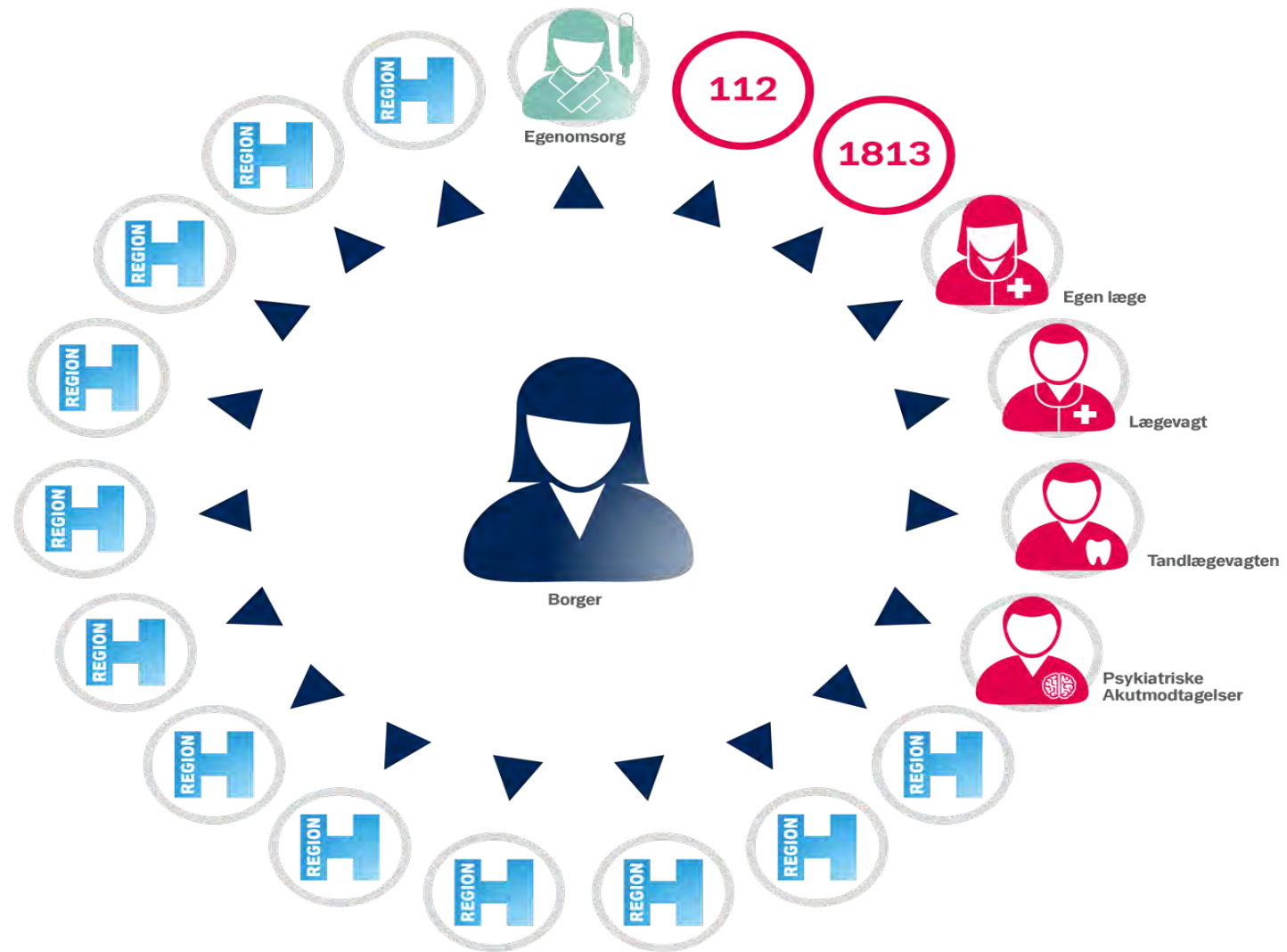


*Approximately 700 missions per day*

*60 % of all ambulance tasks are emergency*

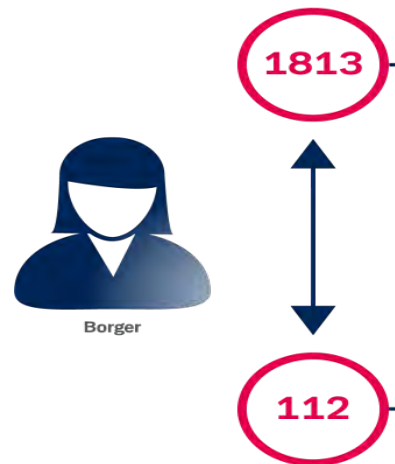


# Emergency care Before 2014



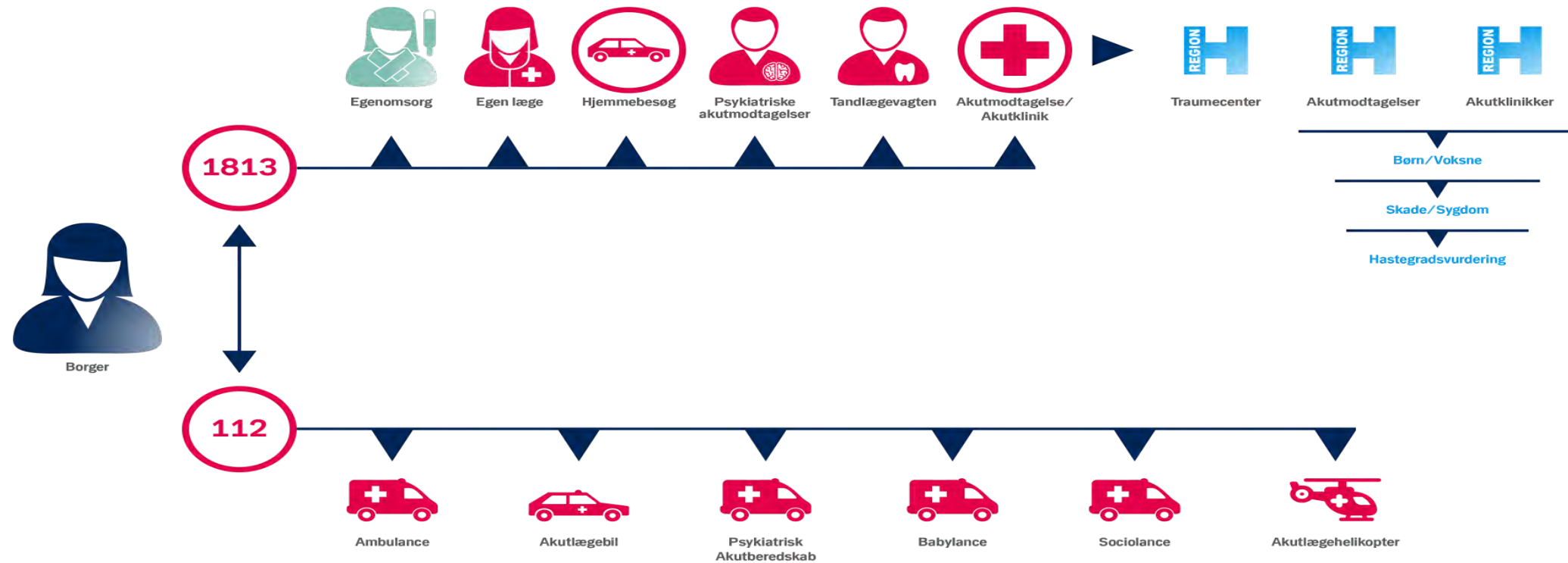


# Today: Emergency Care 24/7 in Copenhagen





# Today: Emergency Care 24/7 in Copenhagen





# Emergency Medical Dispatch Center in Copenhagen

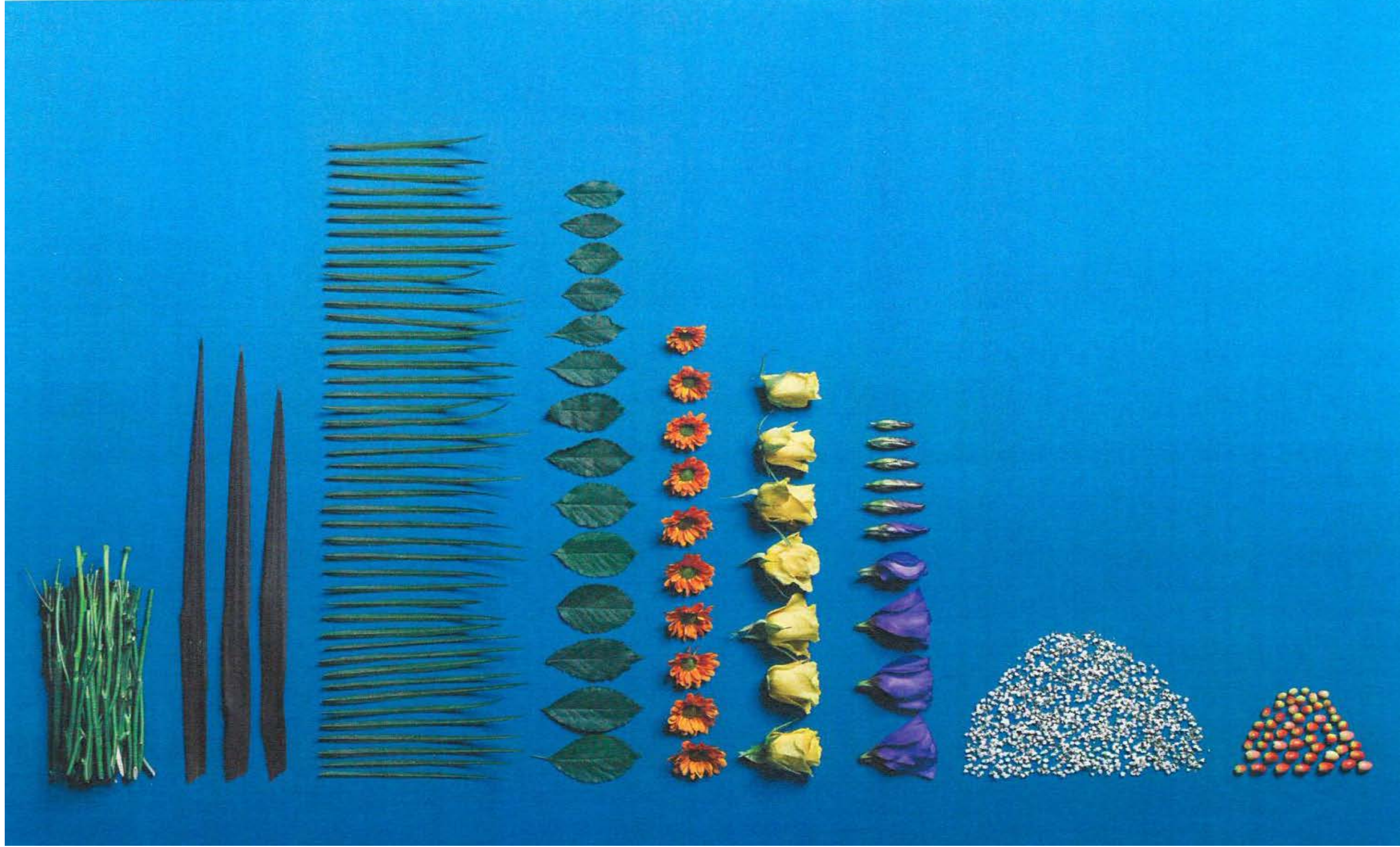






## Data summery

- 945.000 calls per year for population of 1.8 mil
- Time to call answered: 5 seconds for the emergency number and 3 minutes (median) other calls
- Shortest waiting time in emergency departments ever
- Emergency departments visits reduced with 10%
- Fewer home visits by physicians
- Hospitalization rates slightly decreased
- Increase in ambulance mission (less than expected)
- Patient satisfaction high
- Few complaints (15-20 per months for 80.000 calls)
- Few patient safety issues
- Total lower costs in the system









## Summary

- We managed to establish an integrated EMS system
- For the first time ONE easy access for citizens 24/7 (besides 112)
- For the first time: ED fulfilling goals
- Reductions in ED visits by 10 %
- For the first time: Available data
- It took three years, but it can be done!



# CARDIAC ARREST

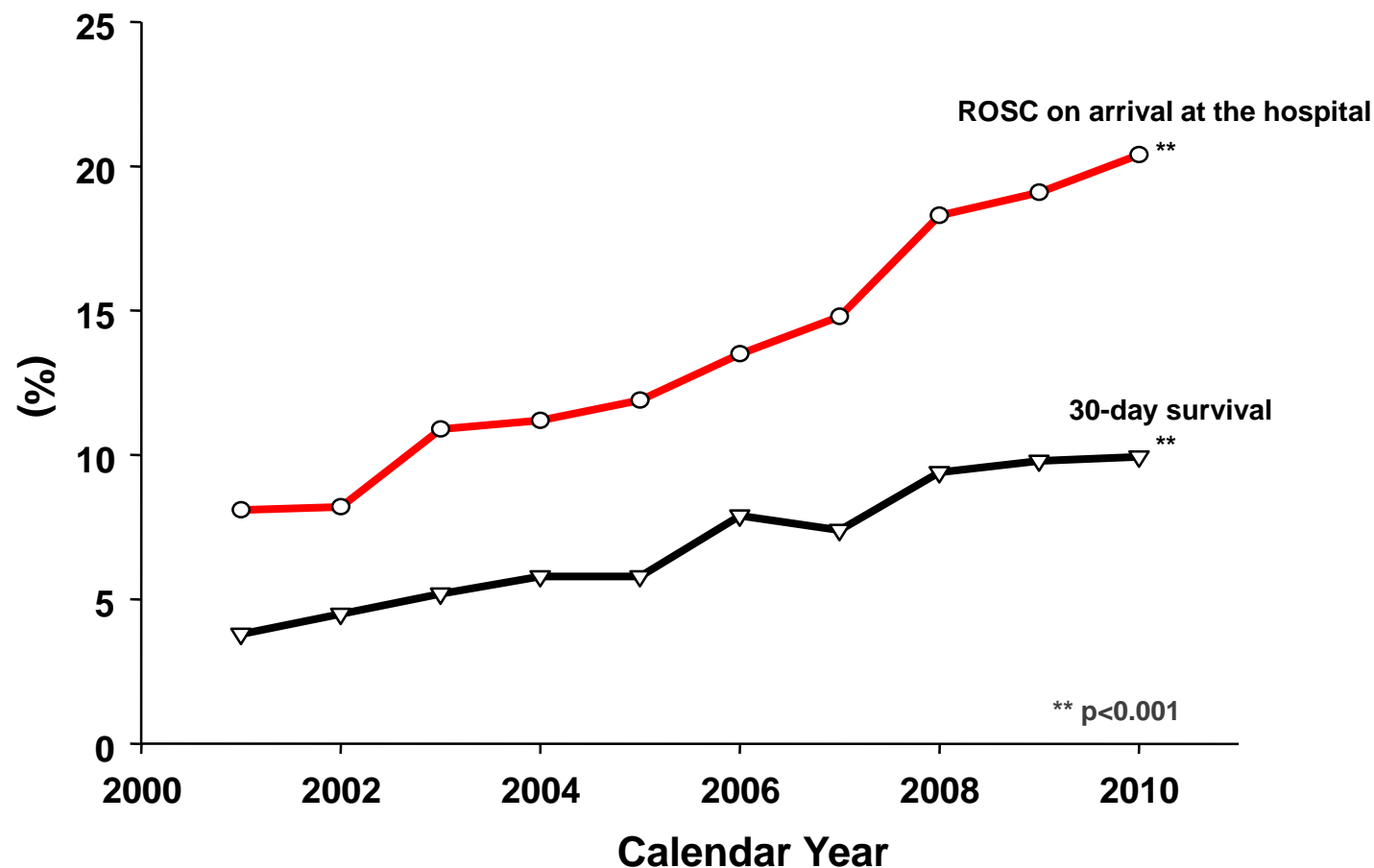
## IS A KEY PERFORMANCE INDICATOR

### FOR EMERGENCY MEDICAL SERVICES



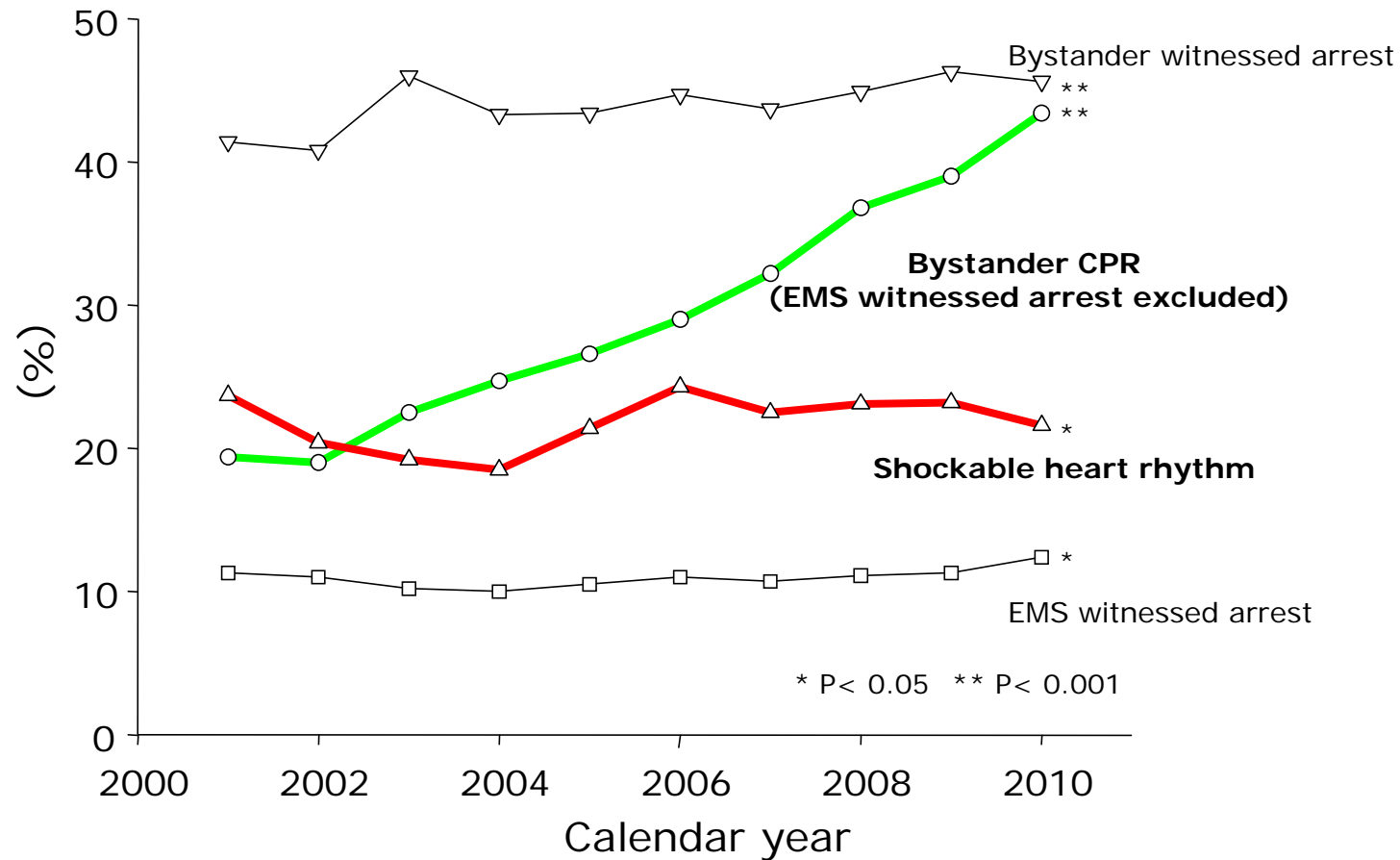


# Temporal trends in ROSC on arrival at the hospital and 30-day survival





# Temporal trends in Bystander CPR, Witnessed status and Shockable heart rhythm





**JAMA** The Journal of the  
American Medical Association

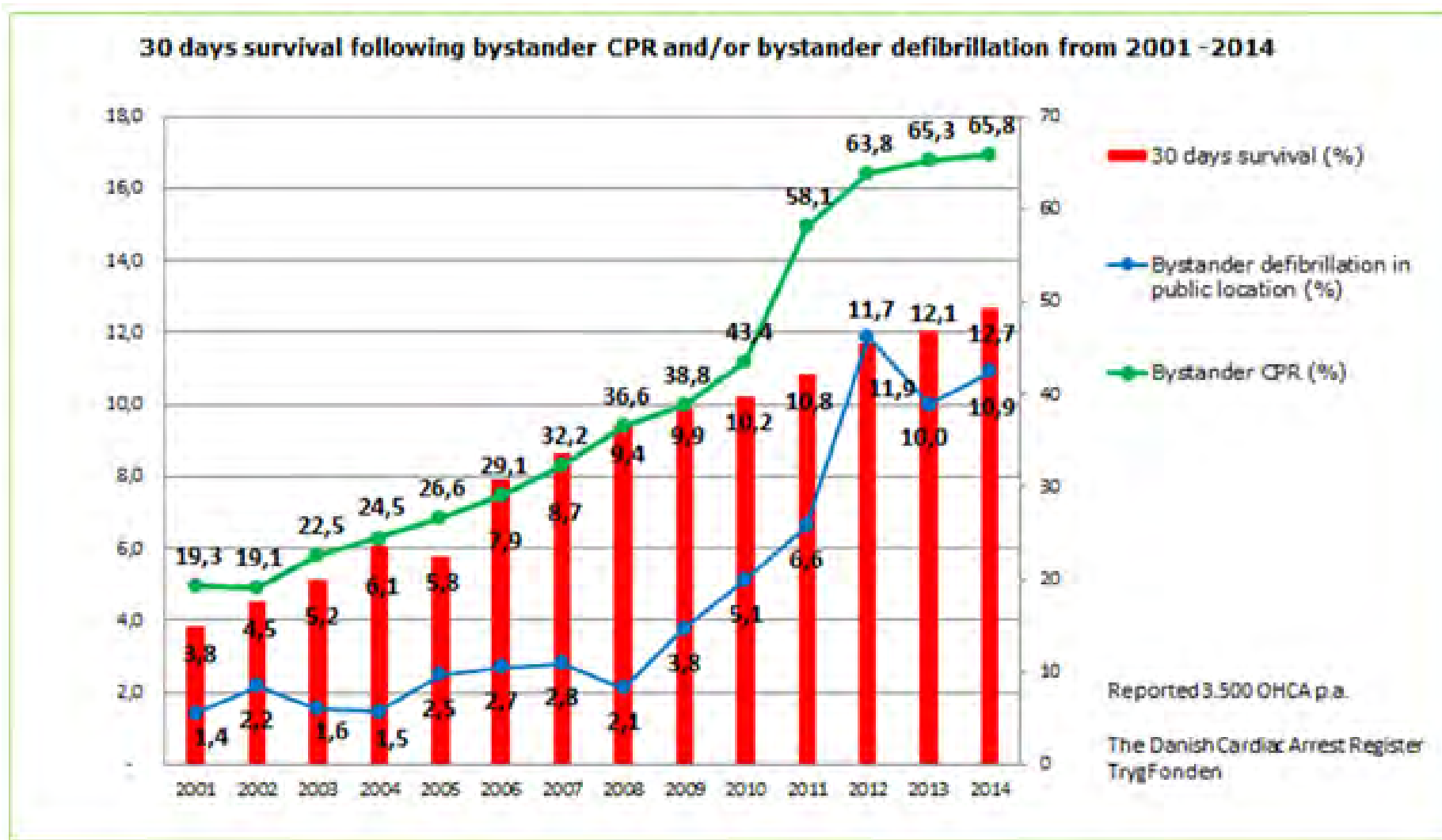
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## October 2013

Association of National Initiatives to Improve Cardiac Arrest Management With Rates of Bystander Intervention and Patient Survival After Out-of-Hospital Cardiac Arrest  
Wissenberg et al

JAMA. 2013;310(13):1377-1384. doi:10.1001/jama.2013.278483





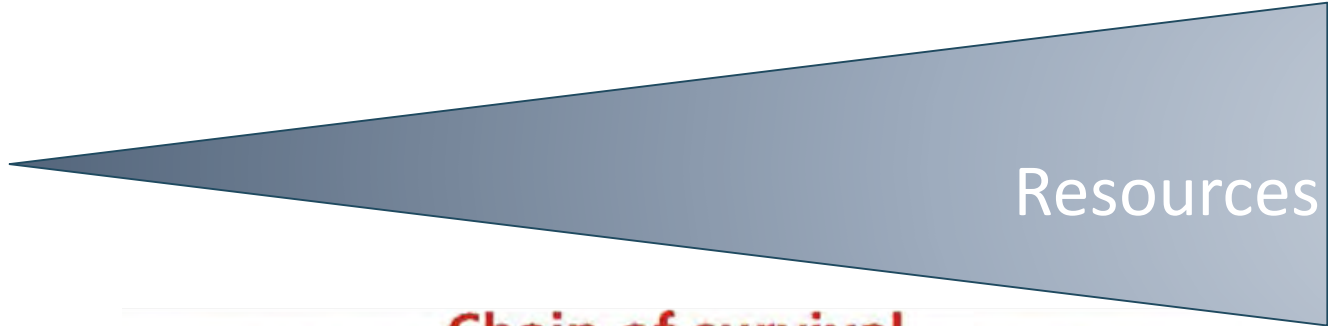






# The important role of medical dispatch and the first resuscitation team







# Follow-up study: Do Cardiac arrest survivors return to work? Circulation 2015

## Resuscitation Science

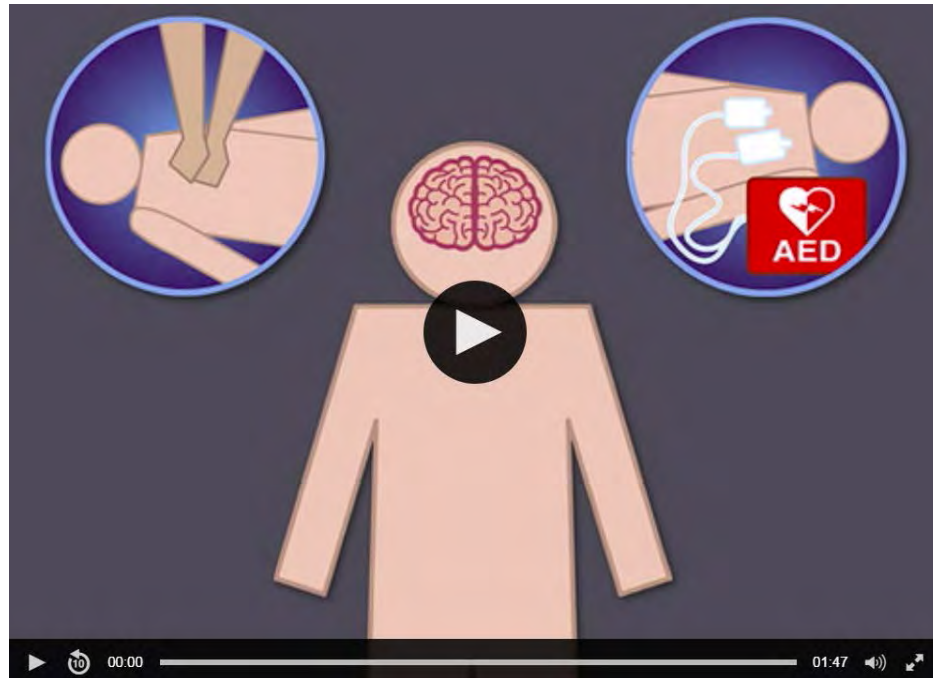
### Return to Work in Out-of-Hospital Cardiac Arrest Survivors A Nationwide Register-Based Follow-Up Study

Kristian Kragholm, MD; Mads Wissenberg, MD; Rikke Normark Mortensen, MSc;  
Kirsten Fonager, MD, PhD; Svend Eggert Jensen, MD, PhD; Shahzleen Rajan, MD;  
Freddy Knudsen Lippert, MD; Erika Frischknecht Christensen, MD; Poul Anders Hansen, MD;  
Torsten Lang-Jensen, MD; Ole Mazur Hendriksen, MD; Lars Kober, MD, DSc;  
Gunnar Gislason, MD, PhD; Christian Torp-Pedersen, MD, DSc; Bodil Steen Rasmussen, MD, PhD



## Link to NEJM 2017 Kragholm et al

<http://www.nejm.org/doi/full/10.1056/NEJMoa1601891>





## NEJM 2017 Results

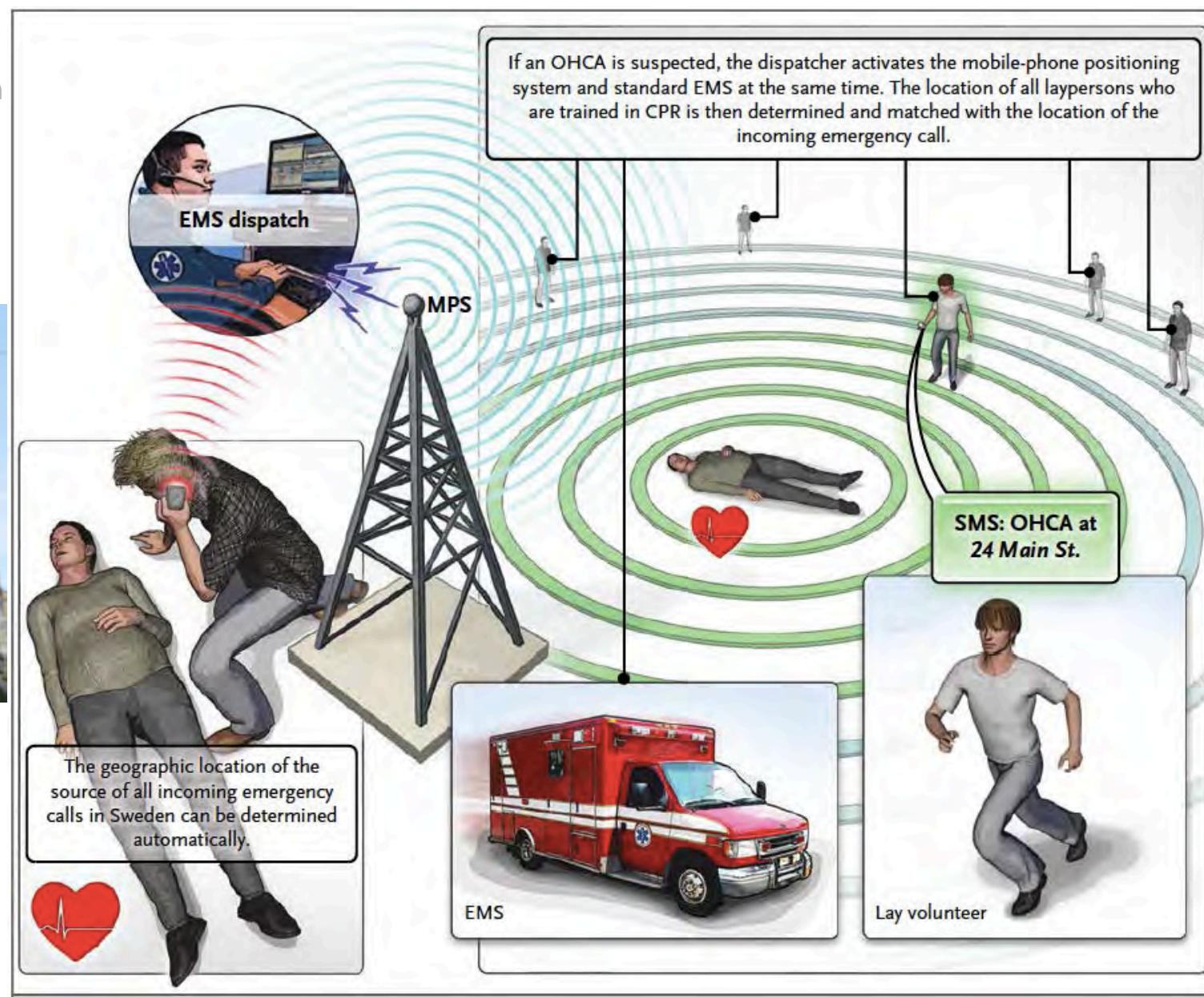
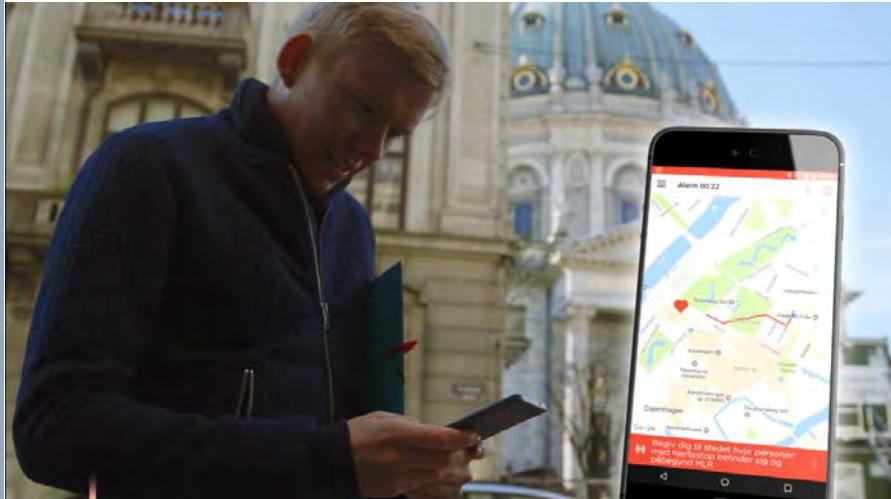
- Rate of bystander CPR increased from 66.7% to 80.6%
- Rate of bystander defibrillation increased from 2.1% to 16.8%
- Rate of brain damage or nursing home admission decreased from 10.0% to 7.6%



# Innovation in EMS

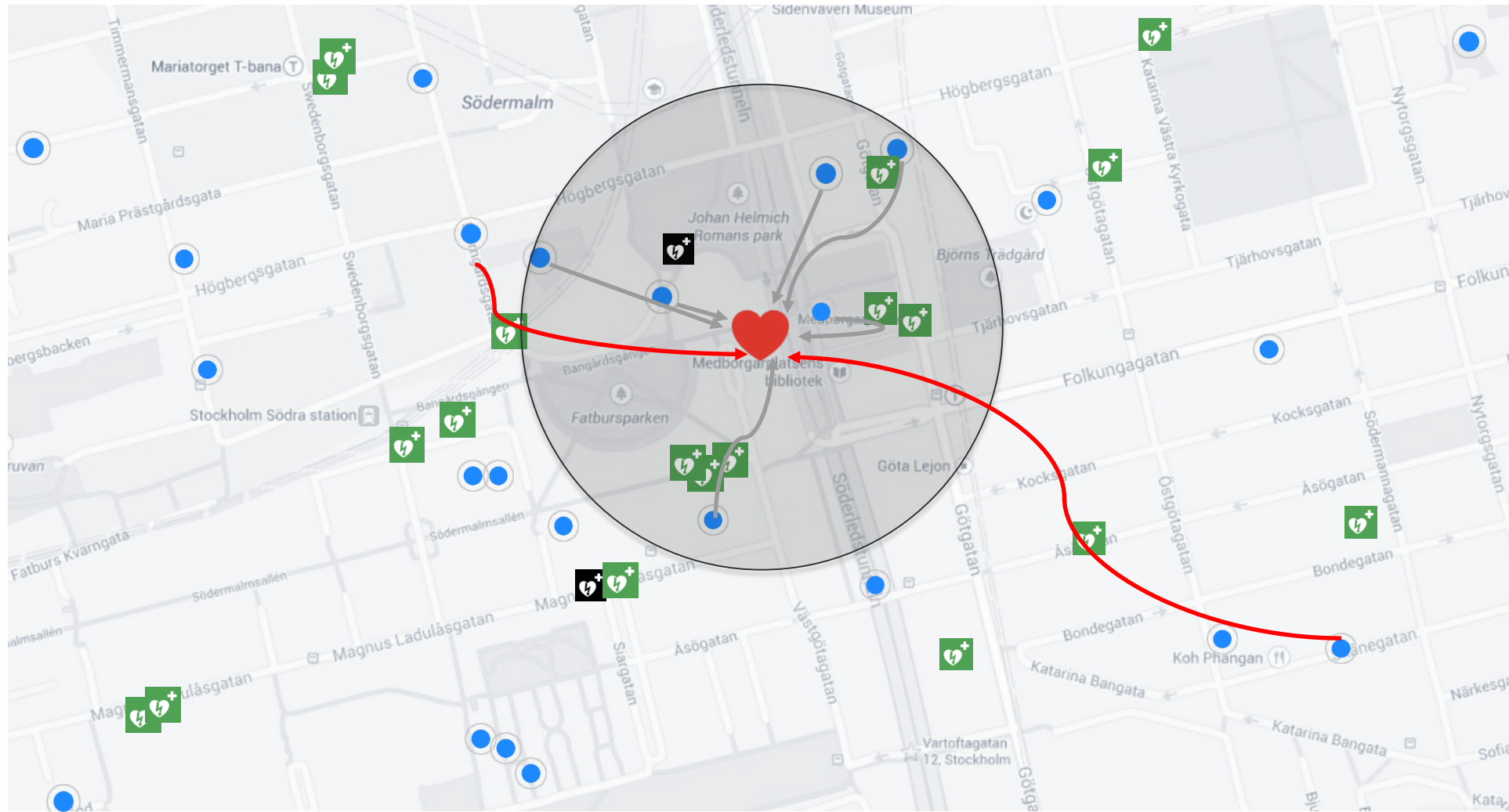


# The Capital Region of Denmark Emergency Medical Services Copenhagen





# The Capital Region of Denmark Emergency Medical Services Copenhagen



REGION

- Connected SMSlifesaver
- OHCA

- Running pace: 8 km/h
- Mobile SMSlifesaver, pace: 30 km/h

- "Open" AED
- "Closed" AED

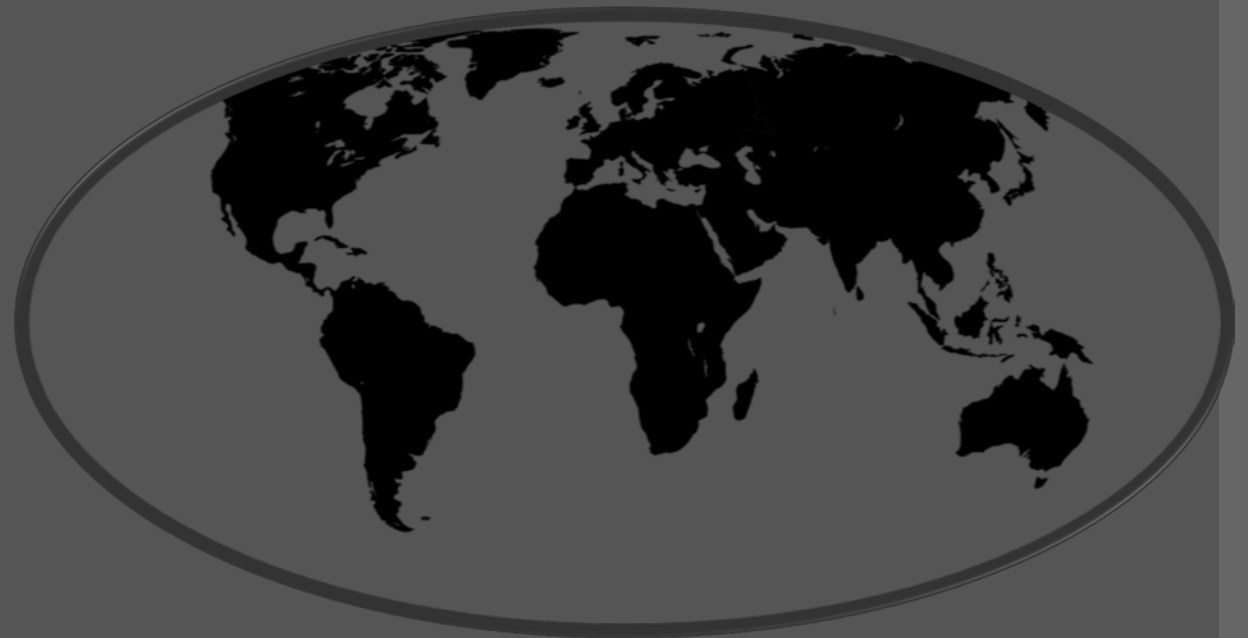
# CARTOON ABOUT THE CASE DENMARK

EVERYONE CAN SAVE A LIFE

LINK: [www.youtube.com/watch?v=EDp4krk2--M](https://www.youtube.com/watch?v=EDp4krk2--M)



# INTERNATIONAL COOPERATION



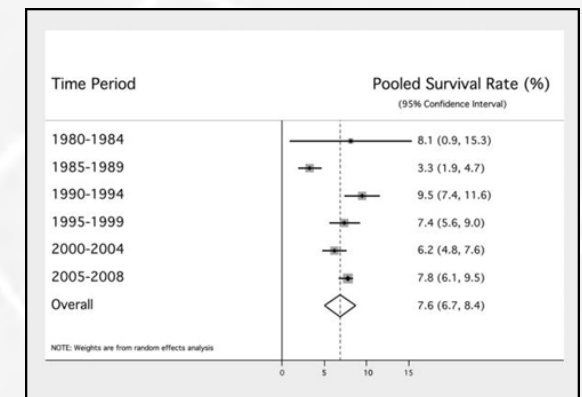
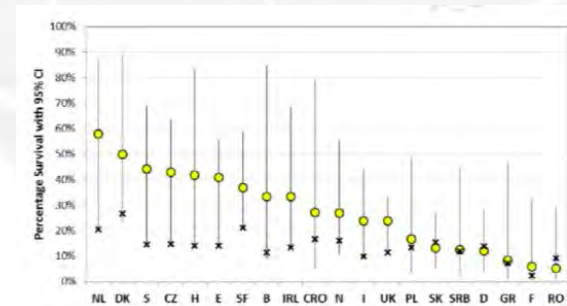
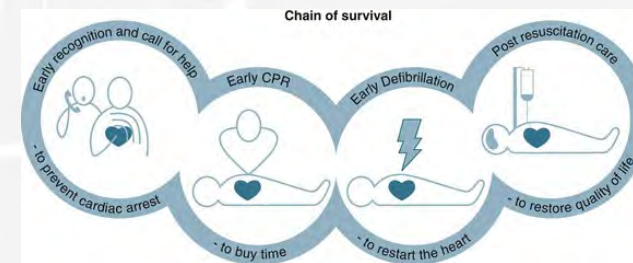
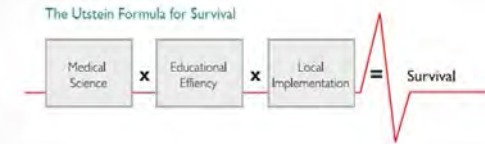




Global  
Resuscitation  
Alliance

## Background

- We have science and consensus
- We have the chain of survival
- We have education
- We have seen very little progress in survival
- We have huge disparity in outcome





Global  
Resuscitation  
Alliance

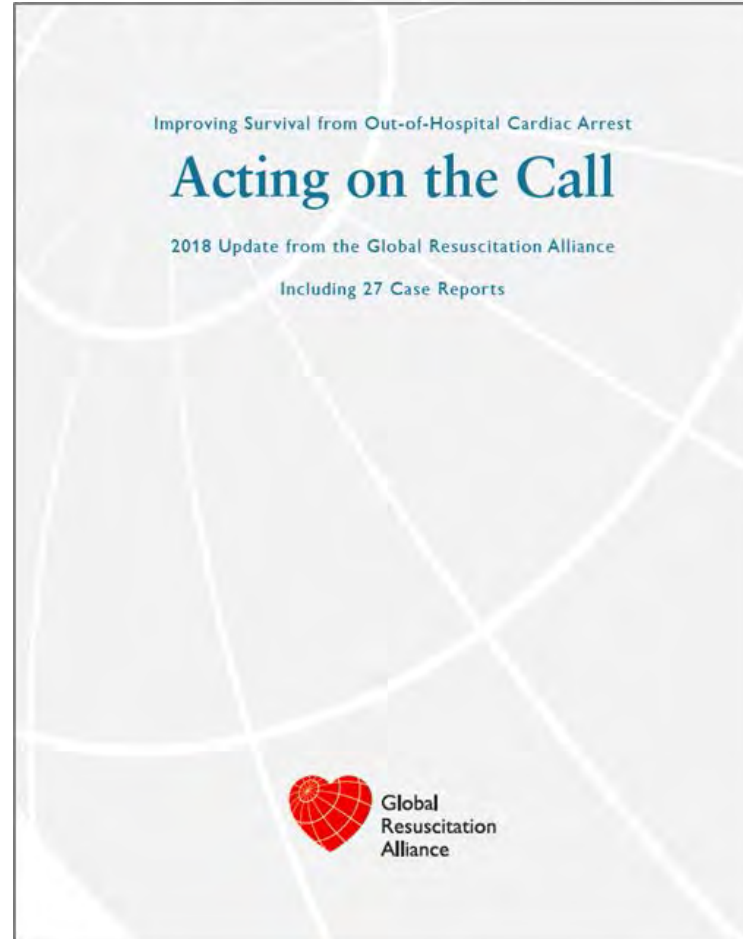
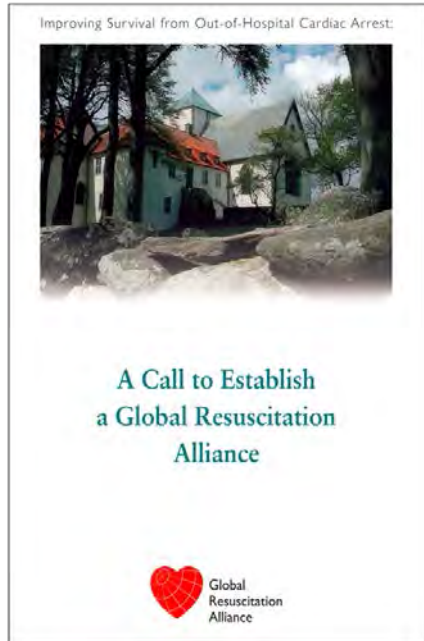
## **Global Resuscitation Alliance**

- All about implementation of evidence best practices and best practices in Emergency medical Services Systems
- To increase survival by 50 % locally



Global  
Resuscitation  
Alliance

# Global Resuscitation Alliance Update paper in 2018





## Programs

- Cardiac arrest registry
- Telephone CPR
- High performance CPR
- Rapid dispatch
- Measurement of professional resuscitation
- AED program for first responders
- Smart technologies for CPR and AED
- Mandatory training for CPR and AED
- Accountability
- Culture of excellence

Improved  
Survival

## Actions

- Form a team
- Select programs
- Plan implementation strategy
- Set specific goals
- Achieve buy-in
- Establish standards
- Pilot the program
- Consult experts
- Communicate progress
- Support, advocate, celebrate



Global  
Resuscitation  
Alliance

# Development EMS systems: Where does the world live?

More than half of the people on earth live  
within this circle

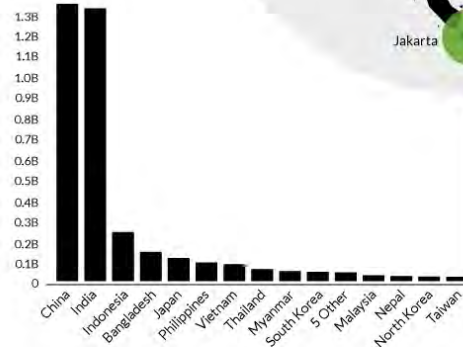
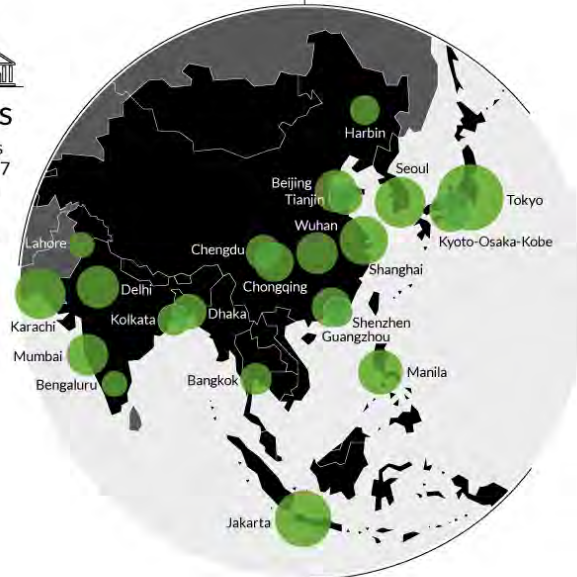
## SPHERE OF INFLUENCE

More than half of the people on Earth live within this circle



### Megacities

This circle contains 22 of the world's 37 megacities, which each hold at least 10 million people.



These 19 countries represent more than half of the world's population.

= 3,777,580,230







Global  
Resuscitation  
Alliance

## GRA Conclusions

- We have a common challenge to improve survival
- The Global Resuscitation Alliance facilitates and supports local implementation of best practices in EMS systems globally
- Aim: improving survival by 50 % locally
- Tool: Resuscitation Academics 10 programs to improve survival
- Think Global, Act Local



## Summary

- We share the same challenges in Emergency Medical Services
- We reorganising emergency patient care in Copenhagen to an integrated and cohesive solution and model for emergency patient care
- We tripled survival from cardiac arrest, we reduced emergency department visits and
- Join the the Global Resuscitation Alliance (GRA) in Asia through Asian Association of EMS (AAEMS)



## For more information



**EMS Copenhagen**

[www.regionh.dk/akutberedskabet](http://www.regionh.dk/akutberedskabet)



**EMS congress**

[www.emseurope.org](http://www.emseurope.org)



**European EMS Leadership Network**

[www.emsleadershipnetwork.org](http://www.emsleadershipnetwork.org)



**Global Resuscitation Alliance**

[www.globalresuscitationalliance.org](http://www.globalresuscitationalliance.org)



**Resuscitation Academy**

[www.resuscitationacademy.org](http://www.resuscitationacademy.org)

