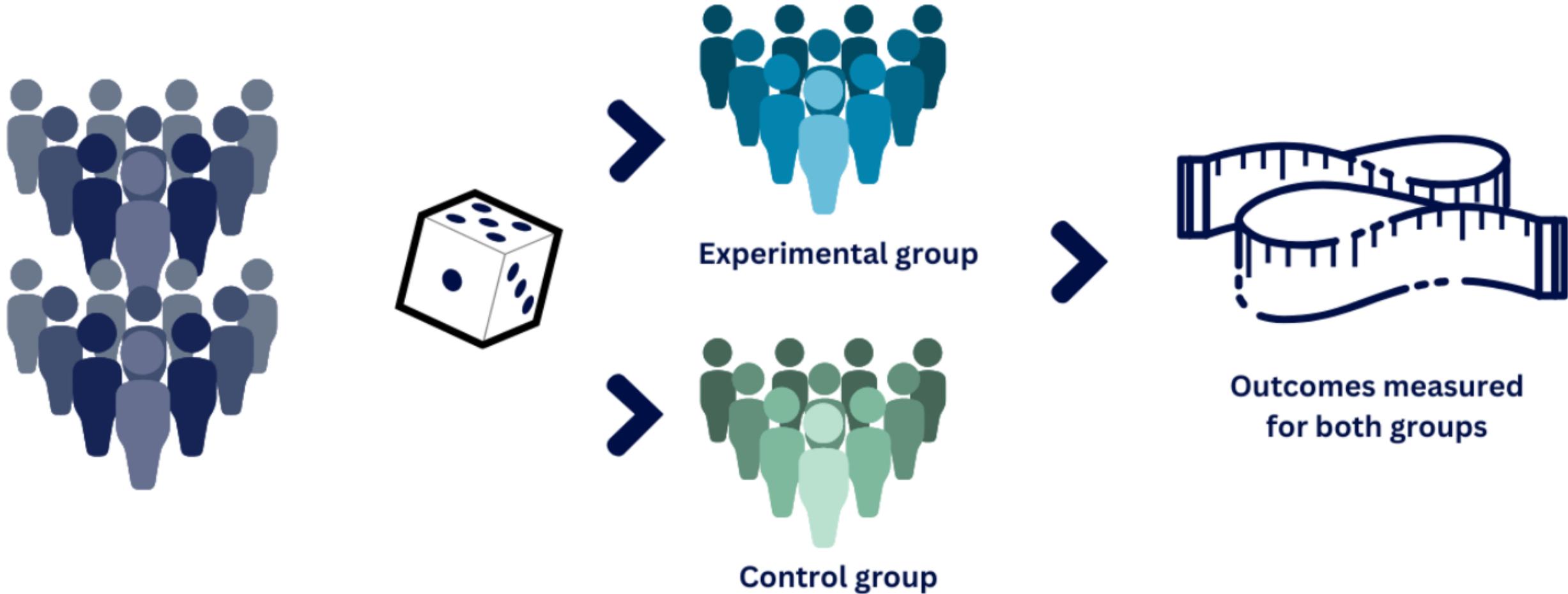




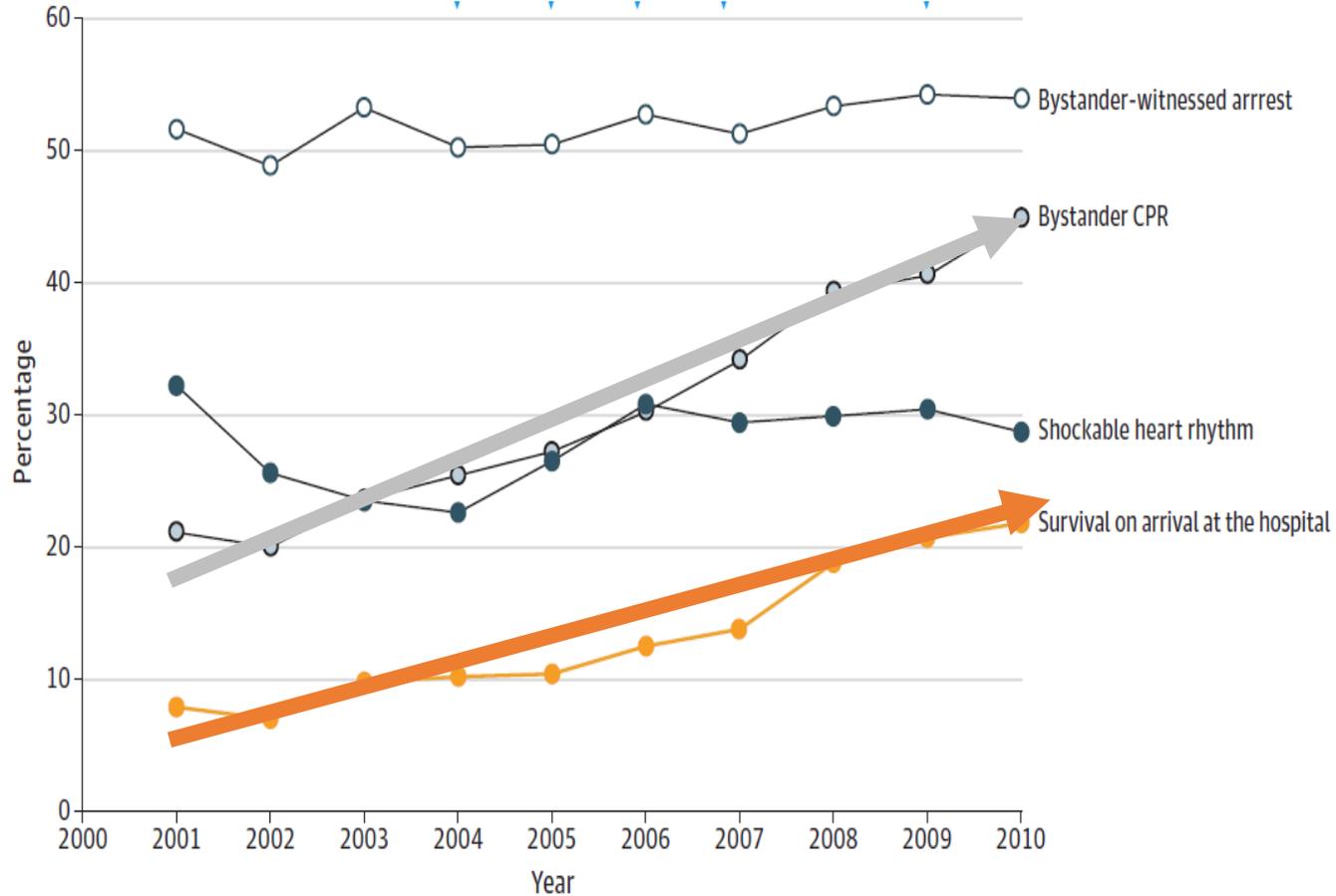
Skal hjertestoppatienter nedkøles?

Christian Hassager

Det randomiserede forsøg

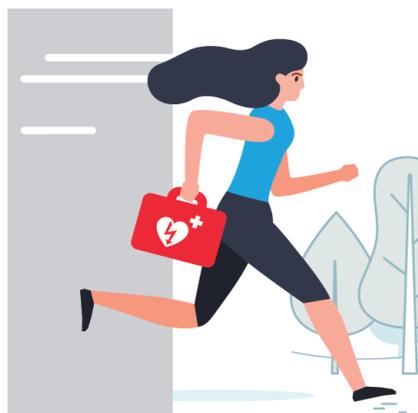
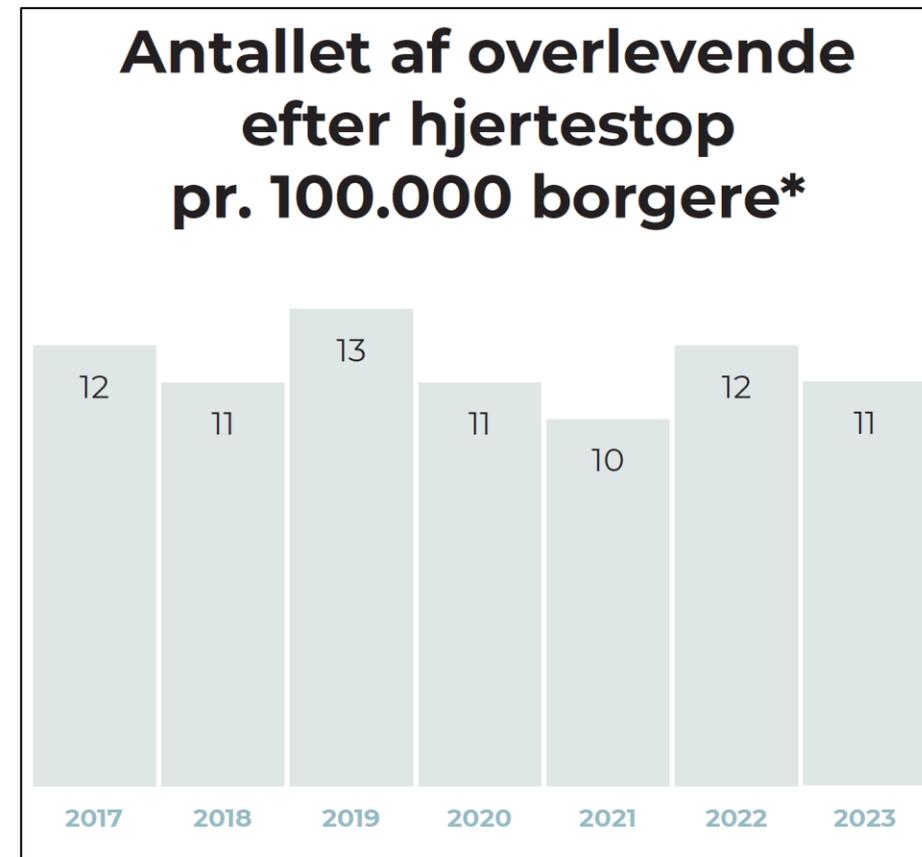
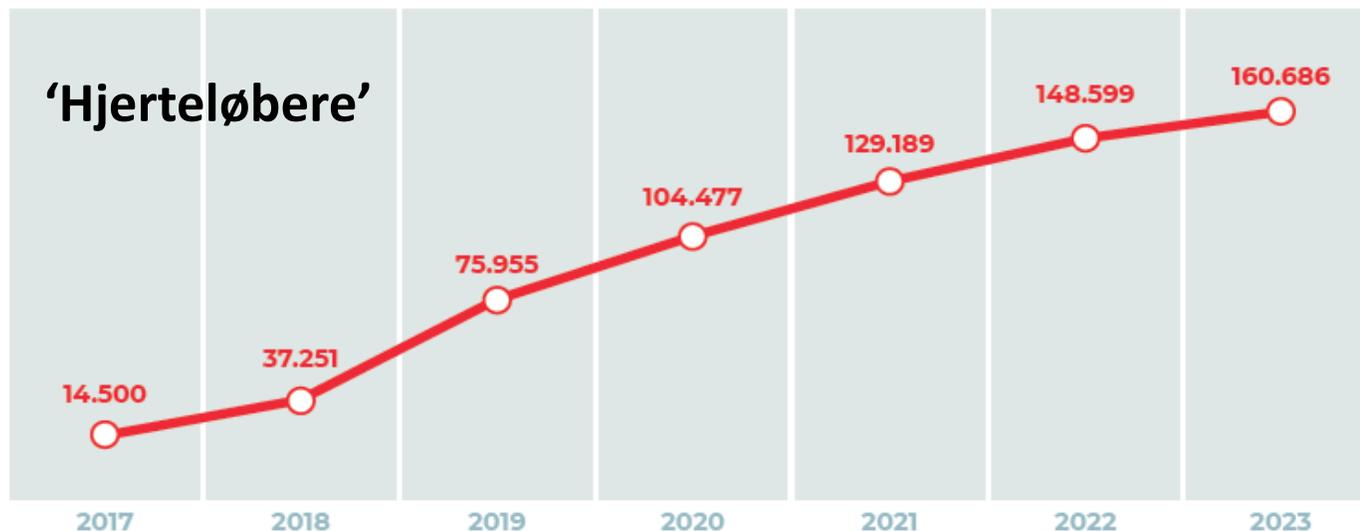


Observationelle data

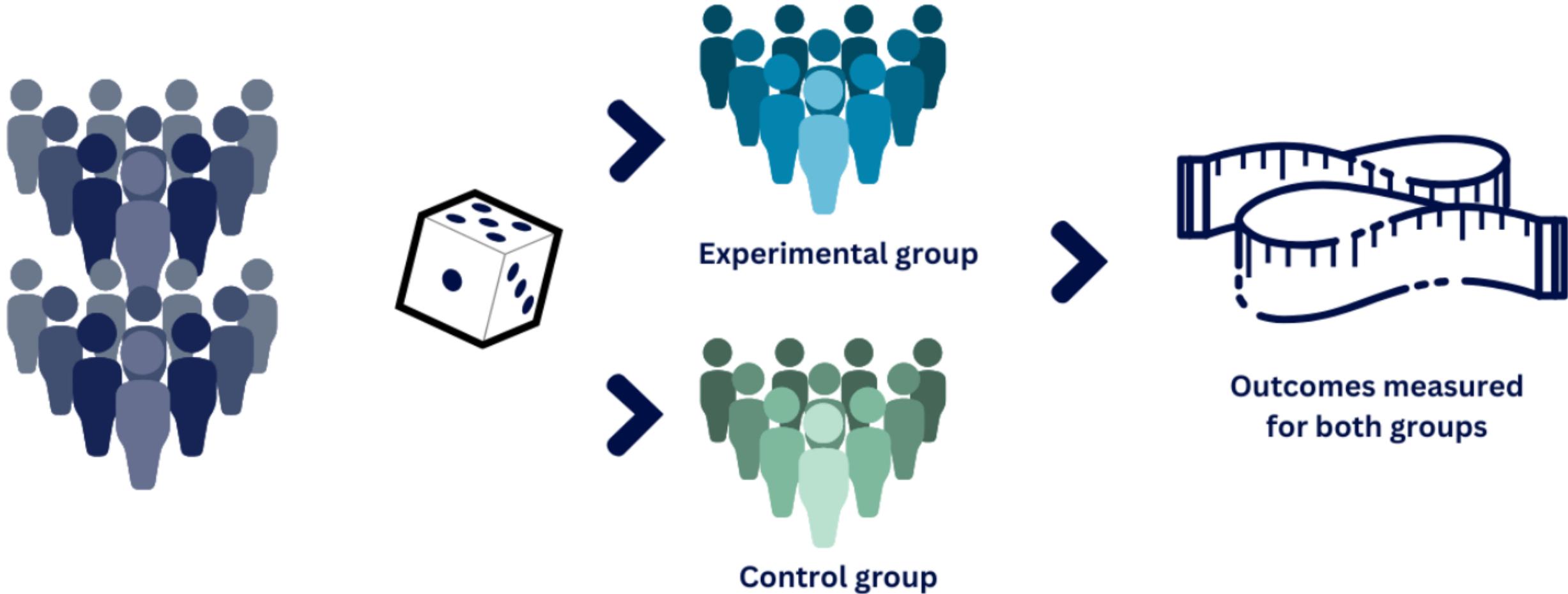


Wissenberg M et al. JAMA. 2013;310(13):1377-1384

Observationelle data



Det randomiserede forsøg



Peter Safar
1924-2003

HEART - LUNG RESUSCITATION

I FIRST AID: OXYGENATE THE BRAIN IMMEDIATELY

IF UNCONSCIOUS

Airway - TILT HEAD BACK

IF NOT BREATHING

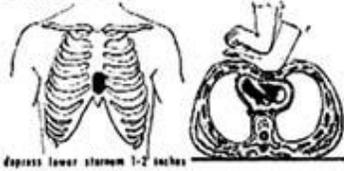
Breathe - INFLATE LUNGS 3-5 TIMES, MAINTAIN HEAD TILT
MOUTH-TO-MOUTH, MOUTH-TO-NOSE, mouth-to-adjunct, bag-mask

PEEL PULSE
IF PRESENT - CONTINUE LUNG INFLATIONS
IF ABSENT -

Circulate - COMPRESS HEART ONCE A SECOND. ALTERNATE 2-3 LUNG INFLATIONS WITH 15 STERNAL COMPRESSIONS UNTIL SPONTANEOUS PULSE RETURNS.

Depress lower sternum 1-2 inches

1 or 2 operators



II START SPONTANEOUS CIRCULATION

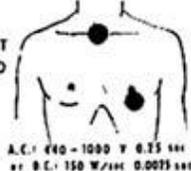
for physicians only

Drugs - EPINEPHRINE: 1.0 mg (1.0 CC OF 1:1000) I.V. OR 0.5 mg INTRACARDIAC. REPEAT LARGER DOSE IF NECESSARY

SODIUM BICARBONATE: APPROXIMATELY 3.75 G/50 CC (1/2 DOSE IN CHILDREN) I.V. REPEAT EVERY 5 MINUTES IF NECESSARY

E. K. G. -

- **FIBRILLATION:** EXTERNAL ELECTRIC DEFIBRILLATION. REPEAT SHOCK EVERY 1-3 MINUTES UNTIL FIBRILLATION REVERSED
- **IF ASYSTOLE OR WEAK BEATS:** EPINEPHRINE OR CALCIUM I.V.



Fluids - I.V. PLASMA, DEXTRAN, SALINE
Do not interrupt cardiac compressions and ventilation.
Tracheal intubation only when necessary.
AFTER RETURN OF SPONTANEOUS CIRCULATION USE VASOPRESSORS AS NEEDED.
e.g. NOREPINEPHRINE (Levophed) I.V. DRIP

III SUPPORT RECOVERY (physician-specialist)

Gauge EVALUATE AND TREAT CAUSE OF ARREST

Hypothermia START WITHIN 30 MINUTES IF NO SIGN OF CNS RECOVERY

Intensive Care

- SUPPORT VENTILATION:** TRACHEOTOMY, PROLONGED CONTROLLED VENTILATION, GASTRIC TUBE AS NECESSARY
- SUPPORT CIRCULATION**
- CONTROL CONVULSIONS**
- MONITOR**



Figure 1. The A, B, C of emergency resuscitation. These instructions have been arranged for the front and back of a billfold ready to use in a center which may be obtained from the Pennsylvania Heart Association or the Pennsylvania Department of

Køling virker

- 1 Under større hjerte-kar kirurgi
- 2 Organ transport ifm transplantation
- 3 Ulykker med underafkøling



Køling virker



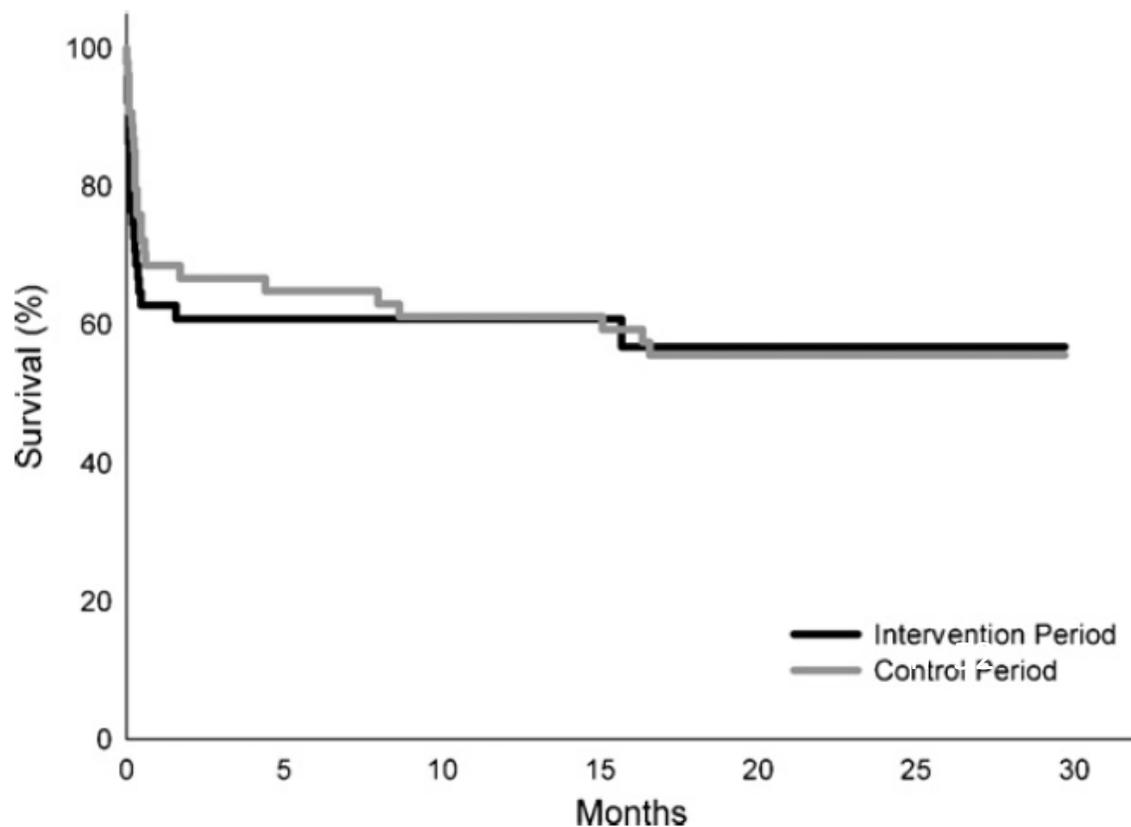
7 unge fundet med hjertestop i 2⁰ C vand

- Kærne temperatur: 16-20⁰ C
- Tid til hjælp: 108 – 168 min
- Varighed af hjertemassage: 56 – 125 min
- Tid til ECMO: 178 – 233 min

...og alle overlevede

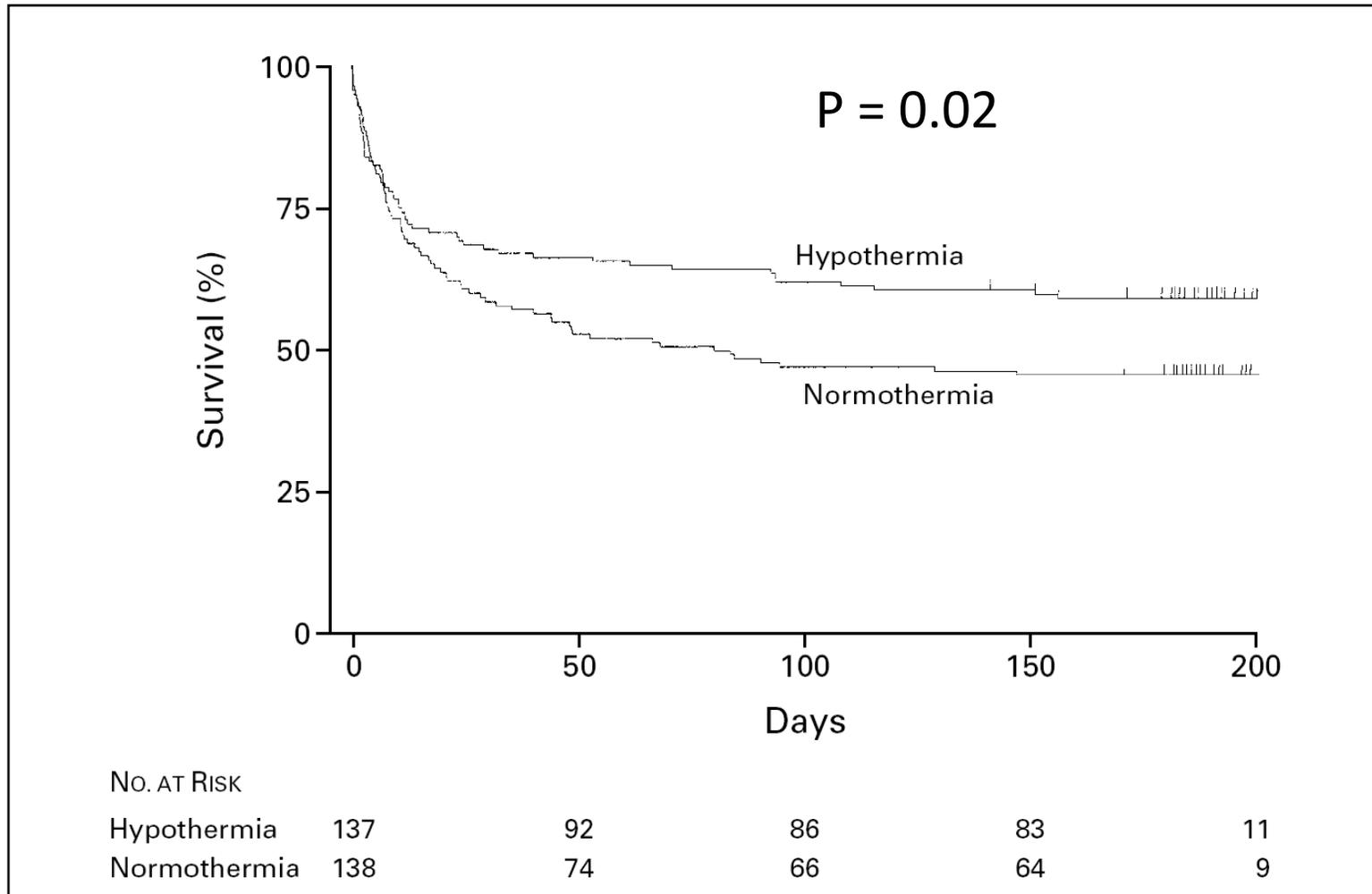


Køling virker ?



Hypotermi (33C) efter OHCA på RH
(2 år før vs 2 år efter implementering)

Targeted Temperature Management 2002



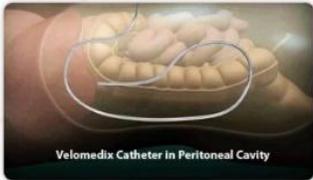
Det startede et nyt industri eventyr



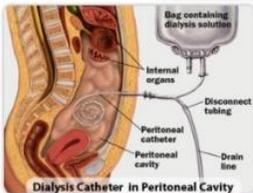
Selv et nyt
tidsskrift...



Unparalleled Thermodynamics for Achieving Therapeutic Hypothermia

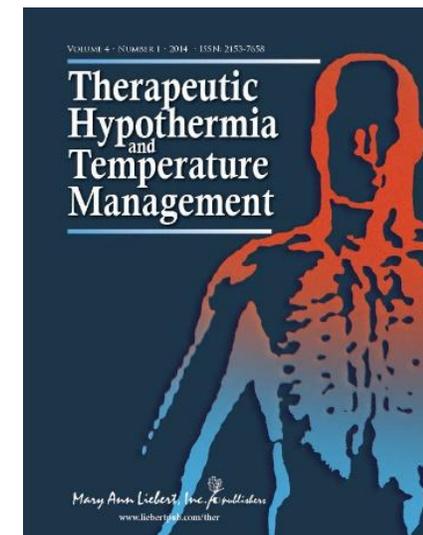


Velomedix Catheter in Peritoneal Cavity

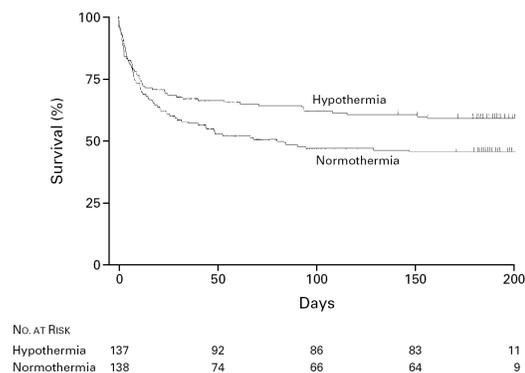


Dialysis Catheter in Peritoneal Cavity

- ⇒ Large surface area
- ⇒ Access to core organs
- ⇒ Access to ~50% of blood flow



Er det nok med et lille studie?



- Ikke blindet studie
- Stoppet før tid



VS





Nye ting får mere focus....

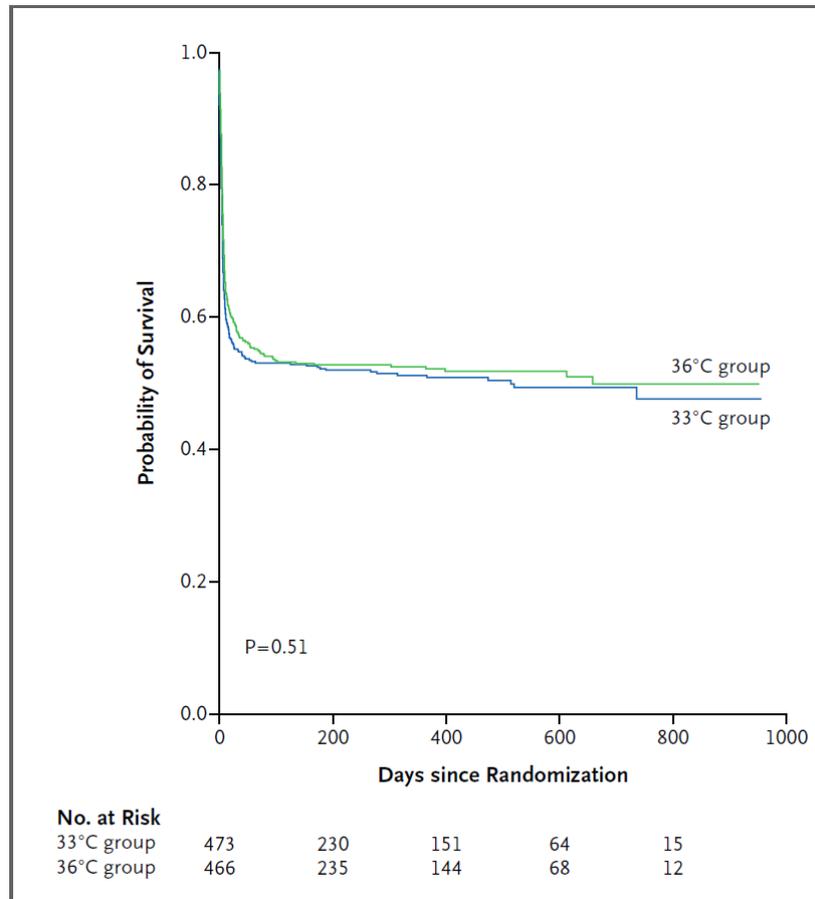
Nyt studie 33C vs 36C



VS

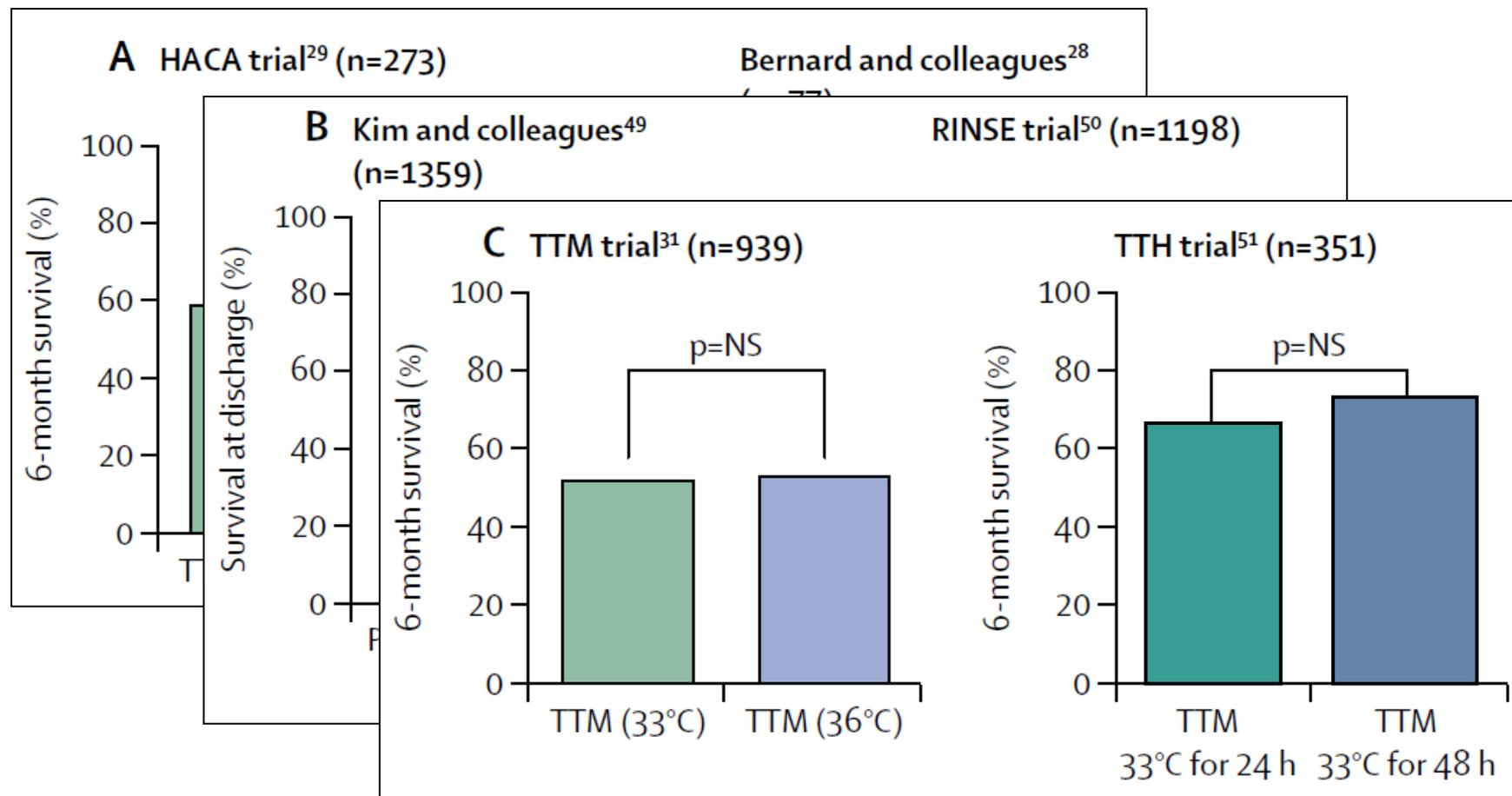


TTM



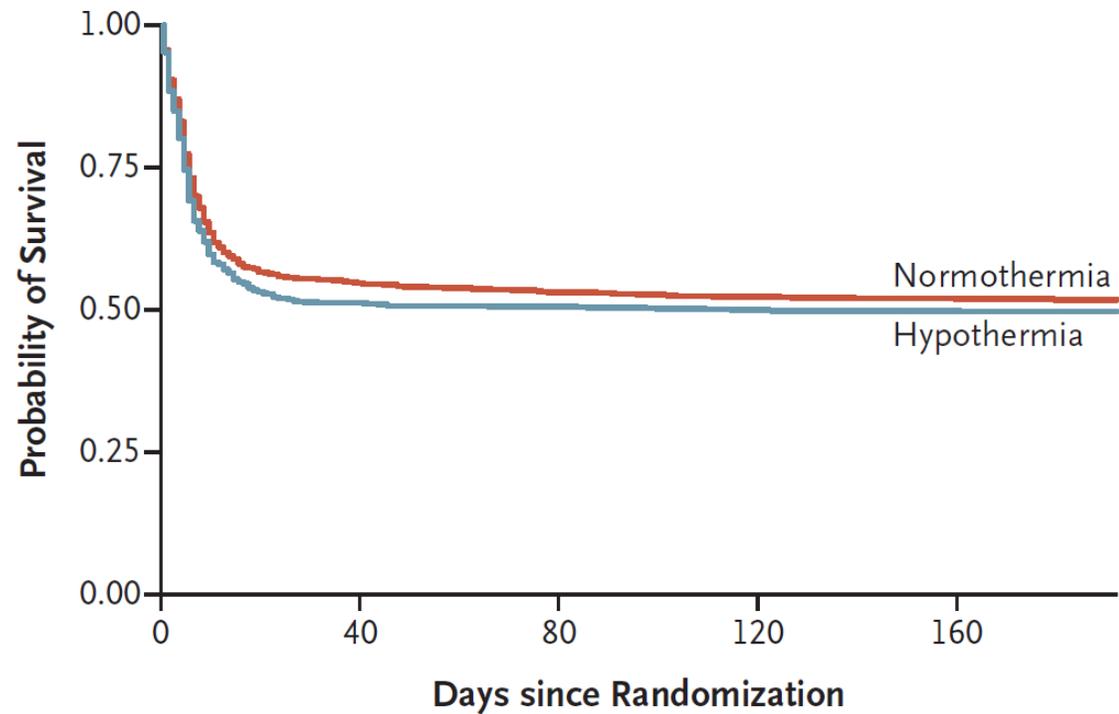
- **CPC 3-5**
54% vs 52% RR=1.02 (0.88-1.16)
- **mRS 4-6**
52% vs 52% RR=1.01 (0.89-1.14)

Køling af OHCA i 2017



TTM2

1850 OHCA
33C vs 37.5C

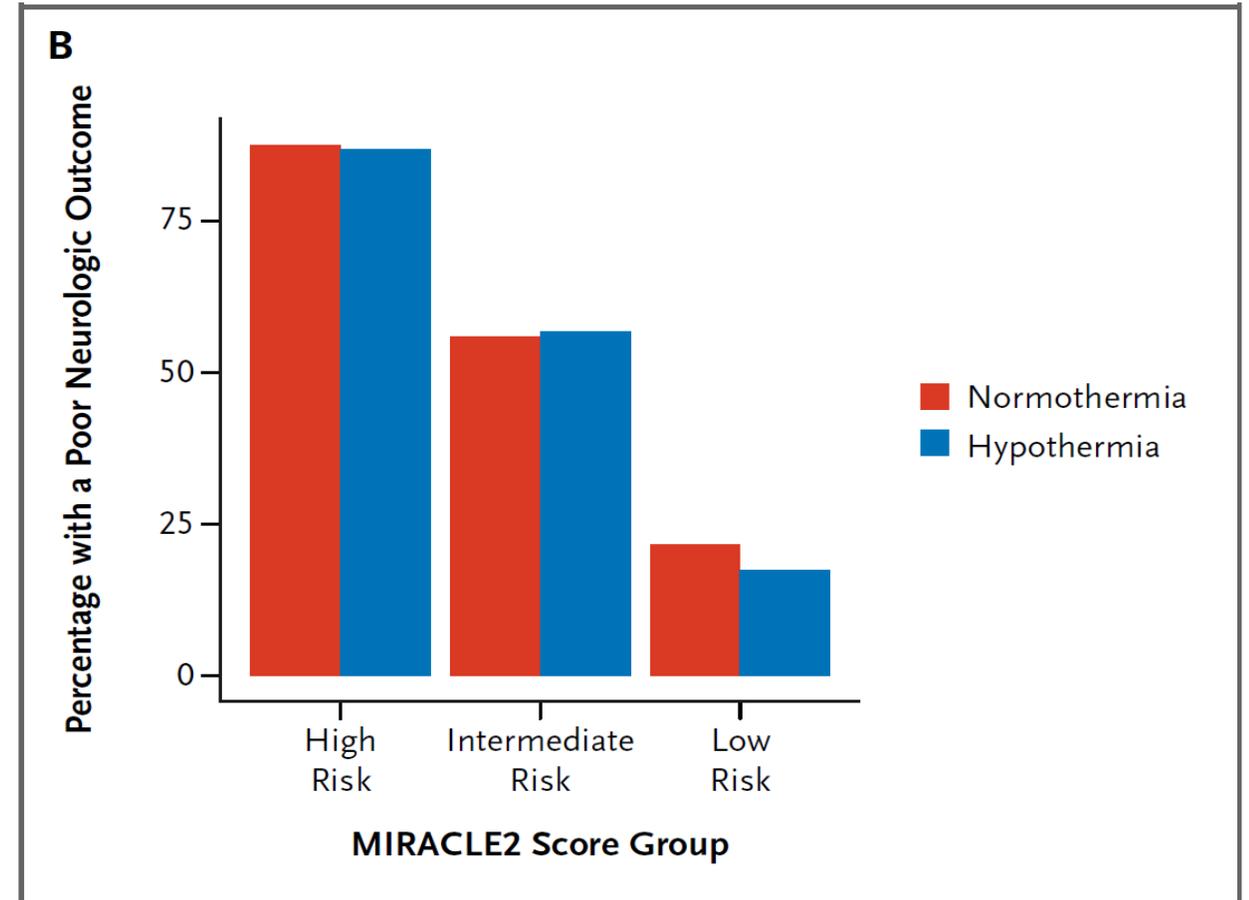
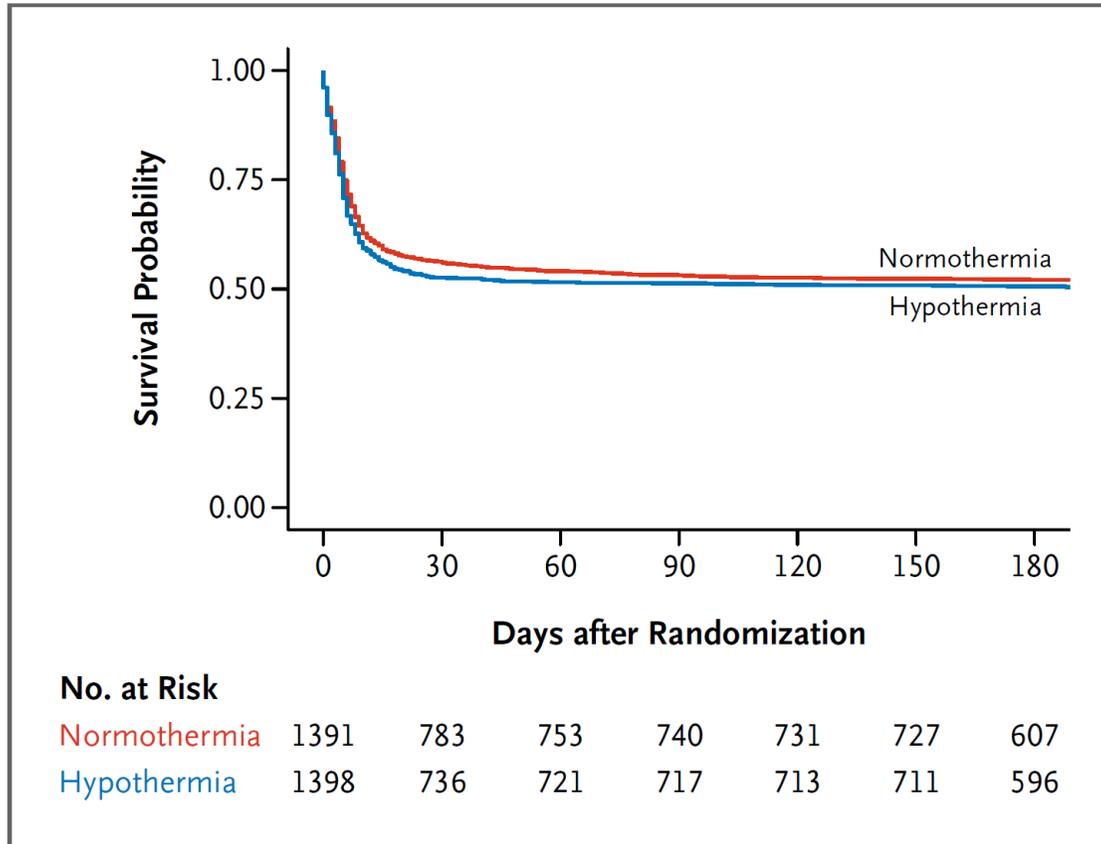


No. at Risk

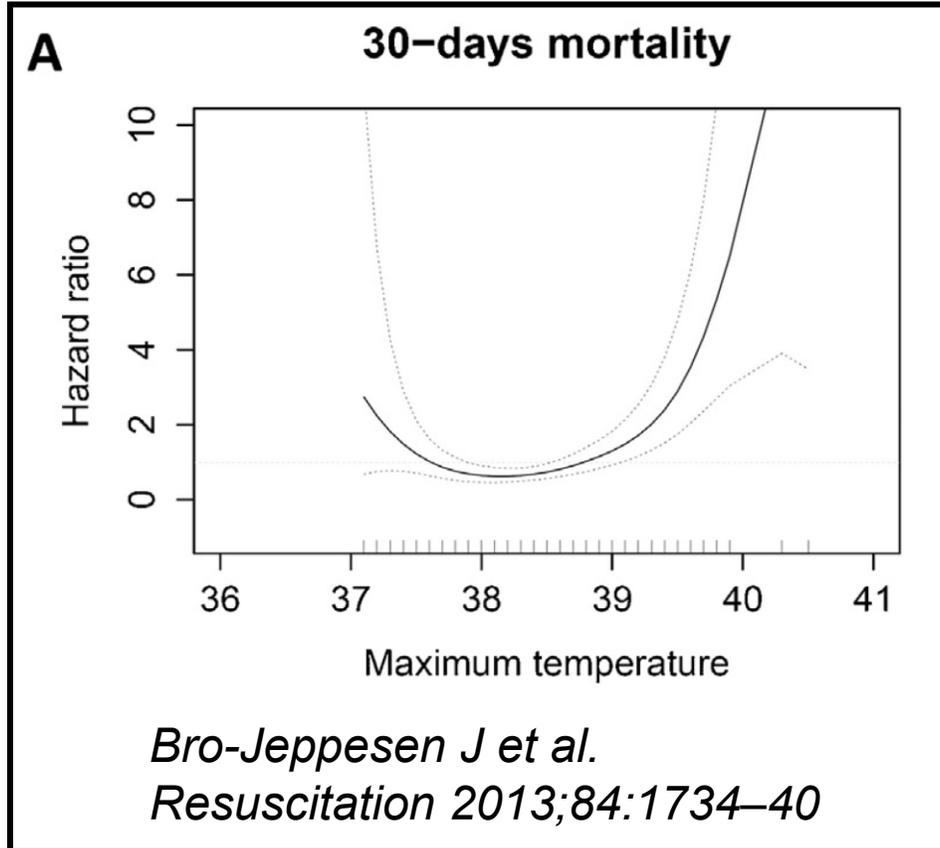
Normothermia	925	506	491	484	480
Hypothermia	925	474	468	462	461

Dankiewicz J et al. N Engl J Med 2021;384:2283-94.

TTM og TTM2 – er det nu nok?

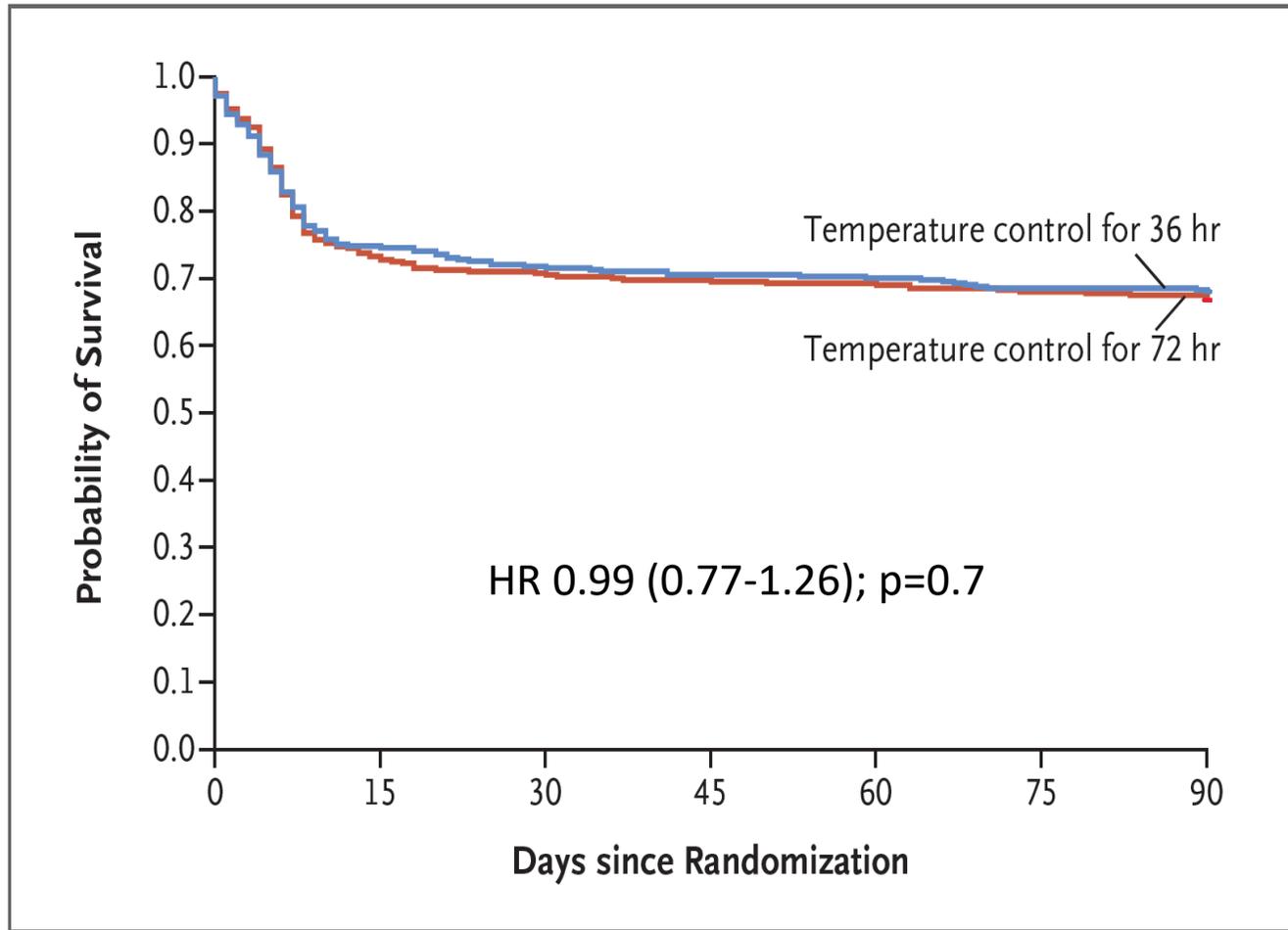


Feber efter TTM



‘We suggest active prevention of fever for at least 72 hours in post-cardiac arrest patients who remain comatose (good practice statement)’

BOX



Hassager C et al. *N Engl J Med* 2023;388:888-97

Mange venter stadig på

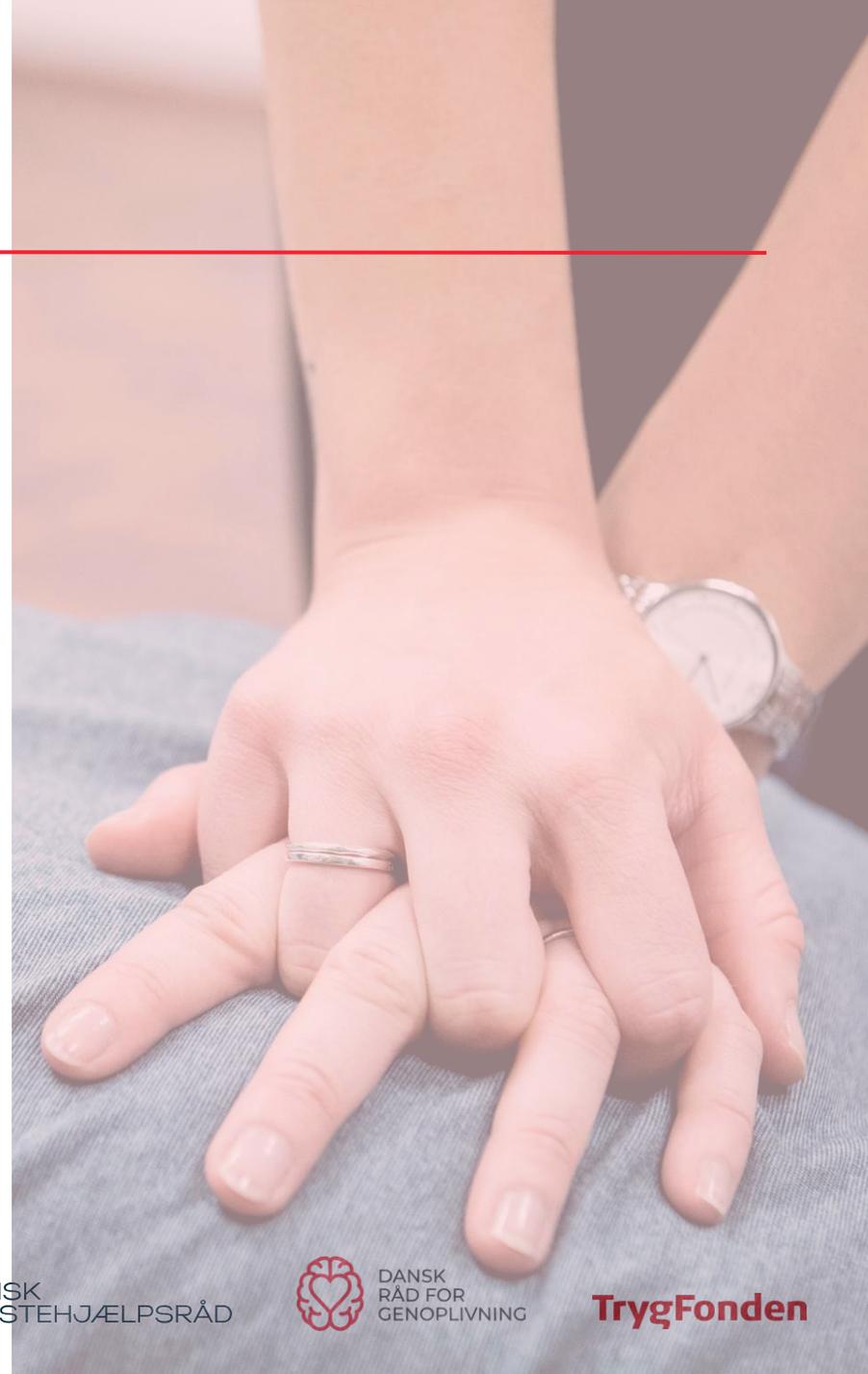
- * STEP-CARE
- * 3000 OHCA patienter
- * 33C eller ingen kontrol

Køling før ROSC?



PRINCESS²

ULTRAFAST HYPOTHERMIA IN CARDIAC ARREST



Indtil videre

- * Køling efter ankomst på hospital ser ikke ud til at virke
- * Præhospital køling med kolde væsker etc virker ikke
- * God dokumentation før officiel anbefaling er ekstremt vigtig