



Krajská nemocnice Liberec, a.s.
nemocnice Liberec nemocnice Turnov

STUDIE HYPERION

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ORIGINAL ARTICLE

Targeted Temperature Management for Cardiac Arrest with Nonshockable Rhythm

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HYPERION

- Multicentrická randomizovaná pragmatická studie
- 25 ICUs ve Francii
- Porovnání mírné terapeutické hypetermie (33 st.) vs. normotermie (37 st.)
- U komatózní pacientů po KPR s nedefibrilovatelným rytmem
- Primární outcome je 90-denní dobrý neurologický outcome (CPC 1,2)
- Sekundární outcomes: 90 denní mortalita, UPV, ICU stay, infekce a hematol. komplikace



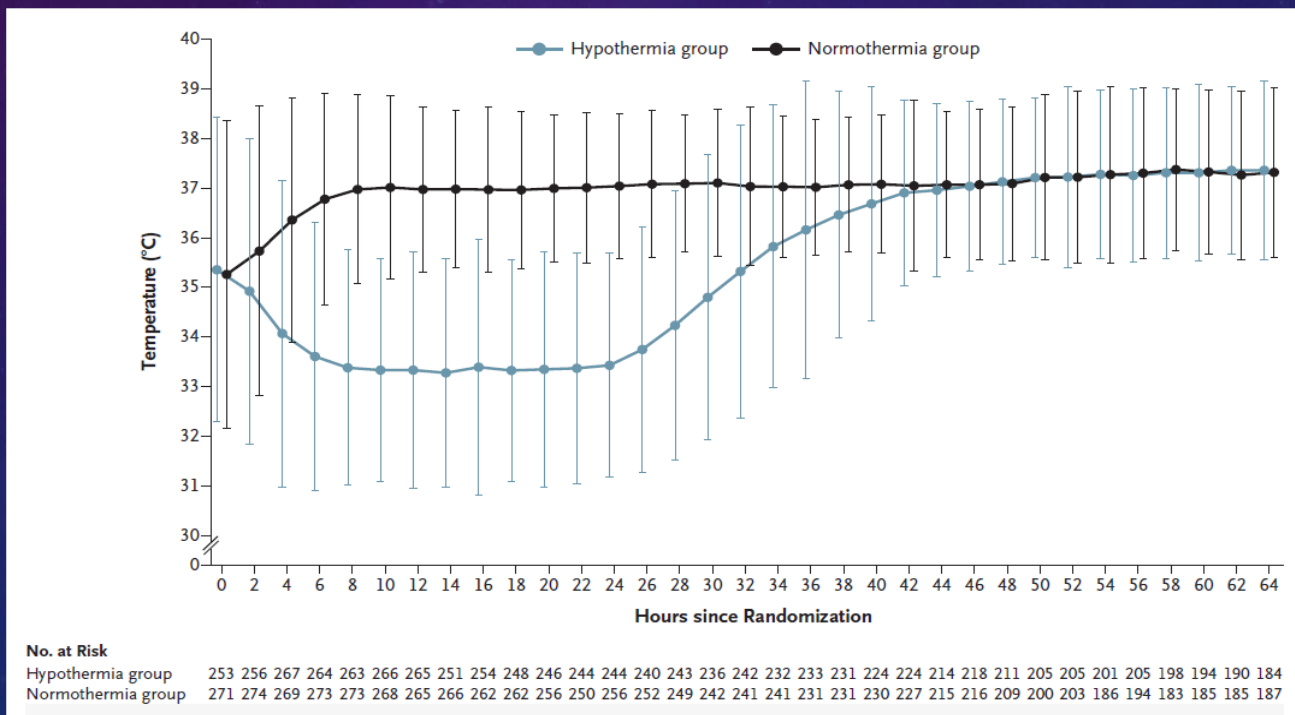
VSTUPNÍ KRITÉRIA

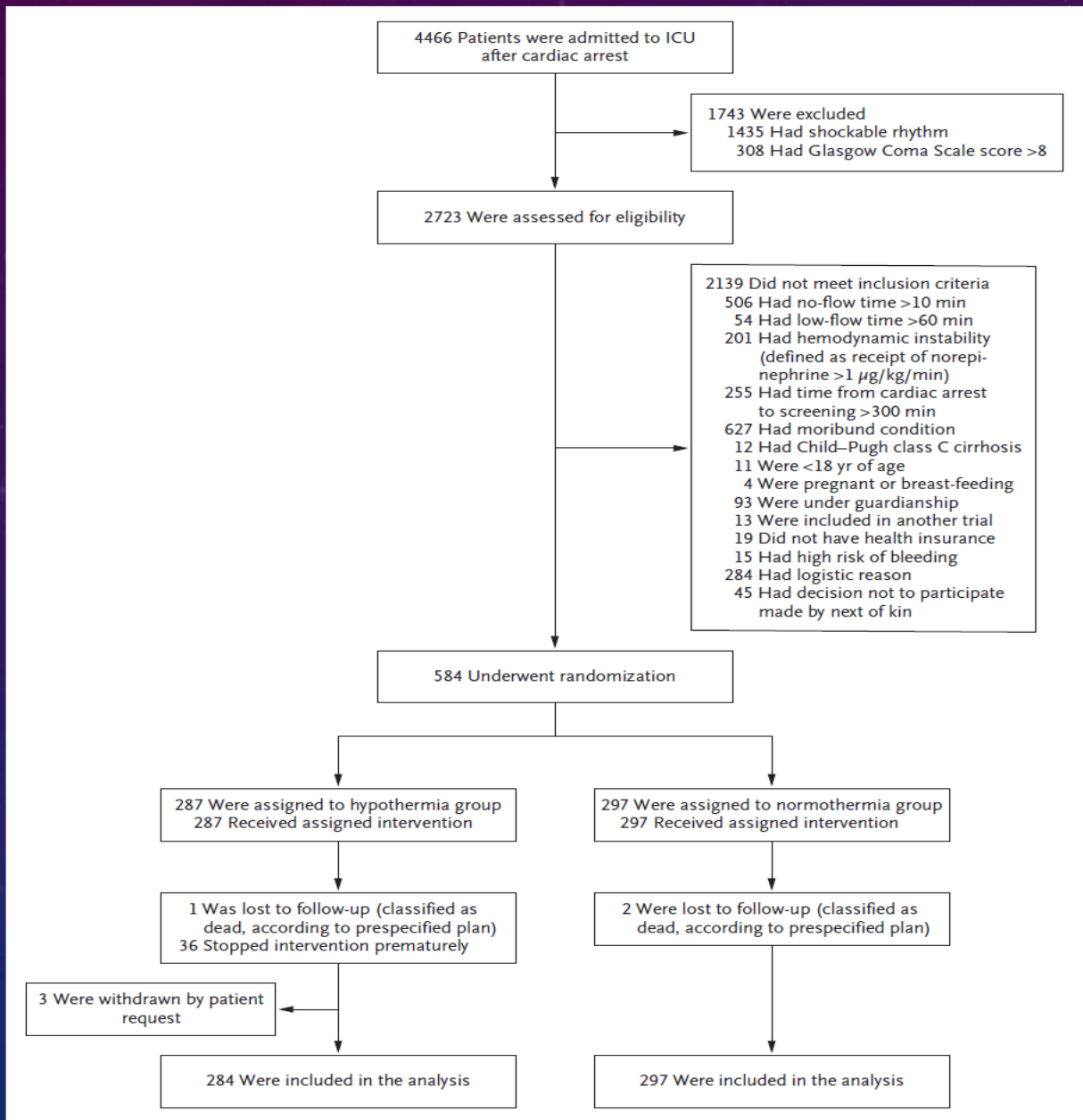
- Zástava oběhu s nedefibrovatelným rytmem
- Coma GCS 8 a méně
- Věk nad 18 let
- No-flow nad 10 min
- Low-flow nad 60 min
- Hemodyn. nestabilita (NA nad 1)
- polymorbidita



TTM MANAGEMENT

- Randomizace 1:1
- 33 st. na 24 hod., ohřívání 1/4-1/2 st. /hod, poté 24 hodin 36,5-37,5 st.
- normotermie 36,5-37,5 st na 48 hod.
- všechny typy cooling devices, sedace a relaxace dle protokolu



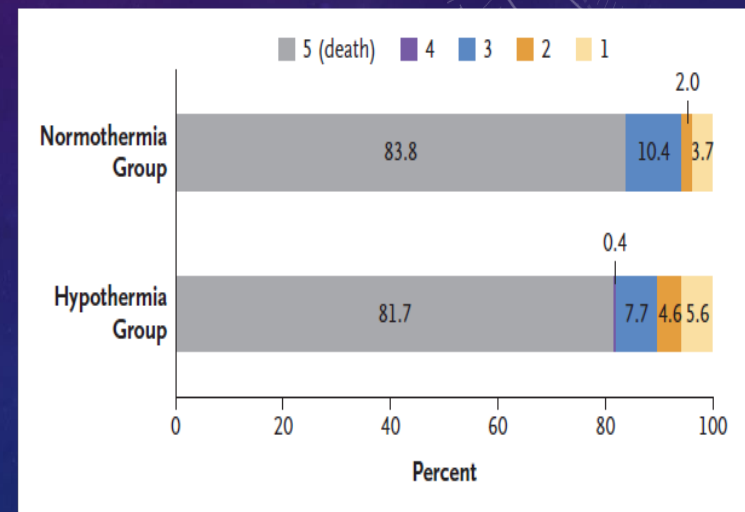




Characteristic	Hypothermia (N = 284)	Normothermia (N = 297)
Age — yr		
Median	67.1	67.2
Interquartile range	56.9–76.3	57.8–76.1
Male sex — no. (%)	185 (65.1)	188 (63.3)
Charlson comorbidity index†		
Median	4.0	4.0
Interquartile range	2.0–6.0	2.0–6.0
Chronic heart disease — no. (%)	162 (57.0)	180 (60.6)
Chronic pulmonary disease — no. (%)	97 (34.2)	107 (36.0)
Location at cardiac arrest — no. (%)		
Place of residence	138 (48.6)	157 (52.9)
Public place	73 (25.7)	54 (18.2)
Hospital	73 (25.7)	86 (29.0)
Bystander-witnessed cardiac arrest — no. (%)	274 (96.5)	273 (91.9)
Bystander-performed CPR — no. (%)	200 (70.4)	207 (69.7)
First monitored rhythm — no. (%)		
Asystole	221 (77.8)	241 (81.1)
Pulseless electrical activity	33 (11.6)	36 (12.1)
Unknown, not shocked	30 (10.6)	20 (6.7)
Cause of cardiac arrest — no. (%)		
Asphyxia	158 (55.6)	162 (54.5)
Cardiac cause	79 (27.8)	79 (26.6)
Anaphylaxis	4 (1.4)	5 (1.7)
Neurologic cause	7 (2.5)	6 (2.0)
Pulmonary embolism	10 (3.5)	12 (4.0)
Other medical cause	20 (7.0)	22 (7.4)
Trauma	1 (0.4)	2 (0.7)
Drug poisoning	1 (0.4)	7 (2.4)
Drowning	4 (1.4)	2 (0.7)
Glasgow Coma Scale score at enrollment‡		
Median	3.0	3.0
Interquartile range	3.0–3.0	3.0–3.0
Circulatory shock — no. (%)§	159 (56.0)	180 (60.6)
Duration from cardiac arrest to randomization — min		
Median	232.5	219.0
Interquartile range	178.0–276.5	170.0–266.0
Body temperature at inclusion — °C		
Median	35.5	35.4
Interquartile range	34.6–36.4	34.4–36.5



Outcome	Hypothermia (N=284)	Normothermia (N=297)	Difference or Hazard Ratio (95% CI)
CPC score of 1 or 2 on day 90 — no. (%)	29 (10.2)	17 (5.7)	4.5 (0.1 to 8.9)†
CPC score distribution on day 90 — no. (%)			
CPC score of 1	16 (5.6)	11 (3.7)	
CPC score of 2	13 (4.6)	6 (2.0)	
CPC score of 3	22 (7.7)	31 (10.4)	
CPC score of 4	1 (0.4)	0	
CPC score of 5	231 (81.3)	247 (83.2)	
Loss to follow-up	1 (0.4)	2 (0.7)	
Death by day 90 — no. (%)	231 (81.3)	247 (83.2)	-1.9 (-8.0 to 4.4)†
Death in the ICU — no. (%)	222 (78.2)	236 (79.5)	0.93 (0.78 to 1.10)‡
Duration of mechanical ventilation — days			
Median	4.5	4.0	
Interquartile range	2.0 to 7.0	2.0 to 7.0	
Length of stay in ICU — days			
Median	4.0	4.0	
Interquartile range	2.0 to 7.0	2.0 to 6.0	
Survival to ICU discharge — no. (%)	62 (21.8)	61 (20.5)	1.07 (0.75 to 1.52)‡
Duration of mechanical ventilation — days			
Median	11.0	10.0	
Interquartile range	6.0 to 24.0	4.0 to 27.0	
Length of stay in ICU — days			
Median	6.0	6.0	
Interquartile range	4.0 to 18.0	2.0 to 21.0	
Survival to hospital discharge — no. (%)	56 (19.7)	50 (16.8)	1.19 (0.81 to 1.74)‡





ZÁVĚR

- Komatózní pacienti po zástavě oběhu s primárně nedefibrilovatelným rytmem mají signifikantně lepší 90 denní dobrý neurologický outcome (CPC 1,2) pokud jsou léčeni terapeutickou hypotermií 33 st. proti normotermii 37 st.
- Sekundární outcomy se u obou skupin nelyší