Prognostication in Cardiac Arrest
Are we getting it right?

Prof Gavin Perkins
Co-Chair ILCOR
ERC, RC(UK)
When to start

- Early recognition and call for help
  - to prevent cardiac arrest
- Early CPR
  - to buy time
- Early Defibrillation
  - to restart the heart
- Post resuscitation care
  - to restore quality of life

When to stop
Prognostication

‘Giving up really is your best option’. 
Ethics

Science

Law
Ethics

- Autonomy
- Beneficence
- Justice
- Non-maleficence
Quantitative futility : 1%

The medical community, or society at large, may prefer longer (or shorter) odds, but in the end we all will have to accept some empirical notion of medical futility or else throw all commonsense to the wind.

99 Patients subjected to burdensome, painful treatment
1 possible rare success.

This violates medicine’s duty to avoid unnecessary harm and the ethical duty of proportionality.

Schneiderman 2011
• “For those whose lives are always in a state of inner sickness Asclepius [who was a legendary, indeed divine, physician] did not attempt to prescribe a regime to make their life a prolonged misery … A life with preoccupation with illness and neglect of work is not worth living”

(Plato 1981)
Science

- When to start CPR
- When to stop CPR
- How long to continue treatment
When to start?

I admire your persistence doctor, but face it, you’ve lost this one
Recognition of Life Extinct by Ambulance Clinicians

In patients with cardiopulmonary arrest, vigorous resuscitation attempts must be undertaken whenever there is a chance of survival, however remote.

- **Unless**
  - Unequivocal signs of Death
  - Unsafe

**CONDITIONS UNEQUIVOCALLY ASSOCIATED WITH DEATH WHERE RESUSCITATION SHOULD NOT BE ATTEMPTED**

All the conditions, listed below, are unequivocally associated with death in **ALL** age groups (see below for further details):

1. massive cranial and cerebral destruction
2. hemicorporectomy
3. massive truncal injury incompatible with life, including decapitation
4. decomposition/putrefaction
5. incineration
6. hypostasis
7. rigor mortis

In the newborn, fetal maceration is a contraindication to attempted resuscitation.
Recognition of Life Extinct by Ambulance Clinicians

**Early termination**

- DNACPR / living will
- Terminal illness
- All of the following present
  - > 30min since collapse
  - no bystander CPR
  - absence of any of the exclusion factors
  - asystole for >30 s
When to stop

YOU'RE NOT DOING MUCH FOR MY CONFIDENCE YOU KNOW!
Key concepts for prognostication

• Cardiac arrest
• Apply rule
• Transport
• Outcome
Key concepts for prognostication

- Cardiac arrest
- Apply rule
- Transport
- Outcome

- Terminate
- All die
Key concepts for prognostication

• Test to predict poor outcome:
  – Positive test = bad outcome
  – **False positive rate** = proportion of patients showing positive test but having a good outcome (must include 95% CI)
  – Low false positive rate = **high specificity**
  – **Sensitivity** - ability of the test to pick up all those that will have a bad outcome
Derivation of a Termination-of-resuscitation Guideline for Emergency Medical Technicians Using Automated External Defibrillators

P. Richard Verbeek, MD, Marian J. Vermeulen, BScN, MHSc, Fahim H. Ali, BSc, David W. Messenger, BSc, Jim Summers, Paramedic, Laurie J. Morrison, MD, MSc

769 arrests

69 non-cardiac

36 ROSC

11 survive

626 No ROSC

2 survive

Bystander CPR

Bystander witnessed

EMS witnessed

Shock given

Any ROSC prior to transport

Acad Em Med 2002
Validation of a Rule for Termination of Resuscitation in Out-of-Hospital Cardiac Arrest

Laurie J. Morrison, M.D., Laura M. Visentin, B.Sc., Alex Kiss, Ph.D., Rob Theriault, Don Eby, M.D., Marian Vermeulen, B.Sc.N., M.H.Sc., Jonathan Sherbino, M.D., and P. Richard Verbeek, M.D., for the TOR Investigators*  

1240 OHCA
1172 No ROSC
41 Survivors

- No ROSC
- No Shock
- Not witnessed by EMS
**Table 4. Test Characteristics of the Clinical Prediction Rule for the Termination of Resuscitation (TOR) in 1240 Reported Cardiac Arrests.**

<table>
<thead>
<tr>
<th>Action According to Prediction Rule</th>
<th>Death</th>
<th>Survival</th>
<th>Total No. of Cardiac Arrests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminate basic life support (test positive)</td>
<td>772</td>
<td>4</td>
<td>776</td>
</tr>
<tr>
<td>Transportation to emergency department (test negative)</td>
<td>427</td>
<td>37</td>
<td>464</td>
</tr>
<tr>
<td>Total</td>
<td>1199</td>
<td>41</td>
<td>1240</td>
</tr>
</tbody>
</table>

- Survival rate when termination recommended by TOR — % (95% CI) 0.5 (0.1–0.9)
- Sensitivity — % (95% CI) 64.4 (61.6–67.0)
- Specificity — % (95% CI) 90.2 (88.4–91.8)
- Positive predictive value — % (95% CI) 99.5 (98.9–99.8)
- Negative predictive value — % (95% CI) 8.0 (6.6–9.7)
Derivation and evaluation of a termination of resuscitation clinical prediction rule for advanced life support providers

Laurie J. Morrison\textsuperscript{a,b,d,*}, P. Richard Verbeek\textsuperscript{b,c}, Marian J. Vermeulen\textsuperscript{d,e}, Alex Kiss\textsuperscript{e}, Katherine S. Allan\textsuperscript{a}, Lisa Nesbitt\textsuperscript{f}, Ian Stiell\textsuperscript{f,g}

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bystander witnessed</td>
<td>2.0 (1.3, 3.2)</td>
</tr>
<tr>
<td>EMS witnessed</td>
<td>12.3 (7.1, 21.3)</td>
</tr>
<tr>
<td>CPR started by bystander</td>
<td>2.8 (1.9, 4.1)</td>
</tr>
<tr>
<td>Shocked (by PAD or provider)</td>
<td>6.4 (4.1, 10.1)</td>
</tr>
<tr>
<td>Any return of spontaneous circulation</td>
<td>260.9 (96.3, 706.8)</td>
</tr>
</tbody>
</table>

OR: odds ratio; EMS: emergency medical services; CPR: cardiopulmonary resuscitation; PAD: Public Access Defibrillation.
Survival rates in out-of-hospital cardiac arrest patients transported without prehospital return of spontaneous circulation: An observational cohort study

Ian R. Drennan\textsuperscript{a,b,c,*}, Steve Lin\textsuperscript{a,d}, Daniel E. Sidalak\textsuperscript{a}, Laurie J. Morrison\textsuperscript{a,b,d}
Validation of a universal prehospital termination of resuscitation clinical prediction rule for advanced and basic life support providers

Laurie J. Morrison\textsuperscript{a,b,d,*}, P. Richard Verbeek\textsuperscript{b,c}, Cathy Zhan\textsuperscript{a}, Alex Kiss\textsuperscript{e}, Katherine S. Allan\textsuperscript{a,f}

<table>
<thead>
<tr>
<th></th>
<th>ALS</th>
<th>BLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rule terminate but survive</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sensitivity (95% CI)</td>
<td>32.8 (30.8–34.7)</td>
<td>57.5 (55.4–59.4)</td>
</tr>
<tr>
<td>Specificity (95% CI)</td>
<td>100 (99.8–100)</td>
<td>100 (99.8–100)</td>
</tr>
<tr>
<td>Positive predictive value (95% CI)</td>
<td>100 (99.8–100)</td>
<td>100 (99.8–100)</td>
</tr>
<tr>
<td>Negative predictive value (95% CI)</td>
<td>7.9 (6.8–9.0)</td>
<td>11.9 (10.6–13.3)</td>
</tr>
<tr>
<td>Transport rate (%)</td>
<td>69.0</td>
<td>45.6</td>
</tr>
</tbody>
</table>

Resuscitation 2009
Predicting survival with good neurological recovery at hospital admission after successful resuscitation of out-of-hospital cardiac arrest: the OHCA score

Table 3  Equation for the OHCA cardiac arrest score

-13 if the initial recorded rhythm is VF or ventricular tachycardia  
+6 × ln (no-flow interval)$^a$  
+9 × ln (low-flow interval)$^b$  
−1434/(serum creatinine)$^c$  
+10 × ln (arterial lactate)$^d$

N = 201  
Good outcome = 53  
Poor outcome = 157  

Cut 32: 10-20% FPR

Adrie C. Eur Heart J 2006;27:2840-2845
Pre-emptive treatment decisions

Futility, Balance of benefits and burdens, Patient request
In-hospital

UK National Cardiac Arrest Audit

- % cardiac arrests attended by the team
- Number of days from admission to 2222 call
- Your hospital vs. NCAA
Prediction of Survival to Discharge Following Cardiopulmonary Resuscitation Using Classification and Regression Trees*

Mark H. Ebell, MD, MS; Anna M. Afonso, BS, MPH; Romergryko G. Geocadin, MD; for the American Heart Association's Get With the Guidelines-Resuscitation (formerly National Registry of Cardiopulmonary Resuscitation) Investigators

AUROC 0.7
Development and Validation of the Good Outcome Following Attempted Resuscitation (GO-FAR) Score to Predict Neurologically Intact Survival After In-Hospital Cardiopulmonary Resuscitation

Mark H. Ebell, MD, MS; Woncheol Jang, PhD; Ye Shen, PhD; Romergryko G. Geocadin, MD; for the Get With the Guidelines–Resuscitation Investigators

- 51,240 IHCAs
  - Neurologically intact (-15)
  - Major trauma (10)
  - Acute stroke (8)
  - Malignancy (7)
  - Sepsis (7)
  - Age (>70 +2...>85 11)

<table>
<thead>
<tr>
<th>GO-FAR score</th>
<th>% Survivors CPC 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;24</td>
<td>0.8%</td>
</tr>
<tr>
<td>14-23</td>
<td>2%</td>
</tr>
<tr>
<td>-5 - 13</td>
<td>9.2%</td>
</tr>
<tr>
<td>-15 to -6</td>
<td>27.8%</td>
</tr>
</tbody>
</table>

JAMA Intern Med 2013;173:1872-8
Duration of resuscitation efforts and survival after in-hospital cardiac arrest: an observational study

Zachary D Goldberger, Paul S Chan, Robert A Berg, Steven I Kronick, Colin R Cooke, Mingrui Lu, Mousumi Banerjee, Rodney A Hayward, Harlan M Krumholz, Brahmajeet K Nallamothu, for the American Heart Association Get With The Guidelines—Resuscitation (formerly the National Registry of Cardiopulmonary Resuscitation) Investigators*

64 339 patients
435 hospitals

<table>
<thead>
<tr>
<th>Quartile</th>
<th>Adjusted risk ratio (95% CI)</th>
<th>Adjusted rate</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.00</td>
<td>14.5%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1.05 (0.96–1.14)</td>
<td>15.2%</td>
<td>0.304</td>
</tr>
<tr>
<td>3</td>
<td>1.05 (0.96–1.14)</td>
<td>15.2%</td>
<td>0.280</td>
</tr>
<tr>
<td>4</td>
<td>1.12 (1.02–1.23)</td>
<td>16.2%</td>
<td>0.021</td>
</tr>
</tbody>
</table>

Lancet 2012
A Validated Prediction Tool for Initial Survivors of In-Hospital Cardiac Arrest

Paul S. Chan, MD, MSc; John A. Spertus, MD, MPH; Harlan M. Krumholz, MD, SM; Robert A. Berg, MD; Yan Li, PhD; Comilla Sasson, MD, MPH; Brahmajee K. Nallamothu, MD, MPH; for the Get With the Guidelines–Resuscitation Registry Investigators

- Age
- Initial rhythm
- Admission CPC
- Location
- Duration of arrest
- Ventilation
- Organ failures

Arch Intern Med 2012
<table>
<thead>
<tr>
<th>Predictor</th>
<th>Points</th>
<th>Predictor</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Age Group, yrs</td>
<td></td>
<td>4) Hospital Location</td>
<td></td>
</tr>
<tr>
<td>&lt; 50</td>
<td>0</td>
<td>Telemetry unit</td>
<td>0</td>
</tr>
<tr>
<td>50 to 59</td>
<td>0</td>
<td>Intensive Care unit</td>
<td>1</td>
</tr>
<tr>
<td>60 to 69</td>
<td>1</td>
<td>Non-monitored unit</td>
<td>3</td>
</tr>
<tr>
<td>70 to 79</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 80</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Initial Arrest Rhythm</td>
<td></td>
<td>5) Duration of Resuscitation, min</td>
<td></td>
</tr>
<tr>
<td>VF / VT, Time to Defibrillation</td>
<td></td>
<td>&lt; 2</td>
<td>0</td>
</tr>
<tr>
<td>≤ 2 minutes</td>
<td>0</td>
<td>2 to 4</td>
<td>0</td>
</tr>
<tr>
<td>3 minutes</td>
<td>0</td>
<td>5 to 9</td>
<td>3</td>
</tr>
<tr>
<td>4 - 5 minutes</td>
<td>2</td>
<td>10 to 14</td>
<td>5</td>
</tr>
<tr>
<td>&gt; 5 minutes</td>
<td>3</td>
<td>15 to 19</td>
<td>6</td>
</tr>
<tr>
<td>Pulseless Electrical Activity</td>
<td>6</td>
<td>20 to 24</td>
<td>6</td>
</tr>
<tr>
<td>Asystole</td>
<td>7</td>
<td>25 to 29</td>
<td>6</td>
</tr>
<tr>
<td>≥ 30</td>
<td>8</td>
<td>Factors Present Prior to Arrest (items 6-11)</td>
<td></td>
</tr>
<tr>
<td>3) Pre-Arrest CPC Score</td>
<td></td>
<td>6) Mechanical Ventilation</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>7) Renal Insufficiency</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>8) Hepatic Insufficiency</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>9</td>
<td>9) Sepsis</td>
<td>3</td>
</tr>
<tr>
<td>≥ 4</td>
<td>9</td>
<td>10) Malignancy</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11) Hypotension</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Points</th>
<th>Cardiac Arrest Survival Score</th>
<th>No. Alive Total N</th>
<th>Mean Survival (95% CI)</th>
<th>Proportion of Observations in Cohort</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Cardiac Arrest Survival Score</td>
<td>No. Alive Total N</td>
<td>Mean Survival (95% CI)</td>
<td>Proportion of Observations in Cohort</td>
</tr>
<tr>
<td>2)</td>
<td>0 to 4</td>
<td>303/367</td>
<td>82.6% (78.7% - 86.5%)</td>
<td>2.6%</td>
</tr>
<tr>
<td>3)</td>
<td>5 to 9</td>
<td>707/1061</td>
<td>66.6% (63.8% - 69.5%)</td>
<td>7.4%</td>
</tr>
<tr>
<td>4)</td>
<td>10 to 14</td>
<td>1023/2434</td>
<td>42.0% (40.1% - 44.0%)</td>
<td>17.0%</td>
</tr>
<tr>
<td>5)</td>
<td>15 to 19</td>
<td>946/4092</td>
<td>23.1% (21.8% - 24.4%)</td>
<td>28.6%</td>
</tr>
<tr>
<td>6)</td>
<td>20 to 24</td>
<td>403/3291</td>
<td>12.3% (11.1% - 13.4%)</td>
<td>23.0%</td>
</tr>
<tr>
<td>7)</td>
<td>25 to 29</td>
<td>112/2158</td>
<td>5.2% (4.3% - 6.1%)</td>
<td>15.1%</td>
</tr>
<tr>
<td>8)</td>
<td>30 to 34</td>
<td>16/751</td>
<td>2.1% (1.1% - 3.2%)</td>
<td>5.2%</td>
</tr>
<tr>
<td>9)</td>
<td>35 to 40</td>
<td>0/158</td>
<td>0.0%</td>
<td>1.1%</td>
</tr>
<tr>
<td>10)</td>
<td>Cardiac Arrest Survival Score</td>
<td>No. Alive Total N</td>
<td>Mean Survival (95% CI)</td>
<td>Proportion of Observations in Cohort</td>
</tr>
<tr>
<td>11)</td>
<td>≥ 40</td>
<td>0/16</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

**Cardiac Arrest Survival Score =**

![Graph showing Favorable Neurological Survival](image-url)
Causes of death: TTM trial

n=939, Overall mortality 49%
Intensive care unit mortality after cardiac arrest: the relative contribution of shock and brain injury in a large cohort

2000-2009 OHCA, n= 760
Overall mortality 66%
Active treatment withdrawn

Percentage of admissions to critical care following cardiac arrest, with active treatment withdrawn

Year

Percentage of cardiac arrest admissions

ICNARC 2013
I want a second opinion
Mother comes back from dead after family is told to give up hope

Simon de Bruxelles

Carol Brothers is living proof that doctors do not always get it right. Three days after medical support was withdrawn and she was left to die “in peace”, she opened her eyes and told her family: “I’m coming home.”

Mrs Brothers, a 63-year-old grandmother of eight, from Easterton, Wiltshire, was expected to die after a cardiac arrest stopped her heart beating for 45 minutes. She was rushed to hospital in an air ambulance, but family members gathered at her bedside in intensive care were told there was no chance of a recovery. Sadly they agreed that medical support could be withdrawn.

Her daughter, Maxine Dickinson, said: “We were told she had minimal brain activity and the kindest thing to do would be to withdraw medication and let her slip away. Everyone was beside themselves; we were distraught. The doctors told us it could be 12 hours or 24 hours but she would die in peace.”

Mrs Dickinson’s husband, Chris, went to pay his respects. “I had been so busy looking after her affairs I hadn’t had a chance to get to the hospital so I went to say goodbye,” he said. “When I got there she was sitting up in bed. I cried then.”

There were also tears of relief that Mrs Brothers’s organs had not been harvested for transplants. Mr Dickinson said: “Her husband Dave was adamant that her organs could not be donated until she was clinically dead: that was something he was very clear on.”

She had just got home after shopping with her husband and her daughter, when she collapsed. Mrs Dickinson began to administer CPR as neighbours rushed to help. A community first responder arrived shortly afterwards and continued with CPR before using a defibrillator. Paramedics, two air ambulances and a specialist critical care doctor also attended and tried for 45 minutes before they could restart her heart and Mrs Brothers was taken by air ambulance to the Royal United Hospital in Bath.

Mrs Dickinson said: “She was having fits and massive seizures. The problem was the amount of brain damage. They did a scan and it was worse and worse.”

The family were advised that the kindest thing to do would be to withdraw all medical support and allow her to die in peace. Mrs Brothers’s body, which had been chilled during treatment, was brought back to normal temperature and sedation was stopped.

Mrs Dickinson said: “We all said goodbye to her and just sat by the phone waiting for the call to say she had gone, but we waited three days and it never came, so I went to visit her.

“When I got there a doctor said ‘I don’t know how to tell you this but your mum is not going to die. We have to reverse the decision’.

“Apparently a nurse had been washing her face and doing her daily checks when mum just opened her eyes and began tracking her around the room. I went to see mum and she whispered, ‘I’m coming home.’ I couldn’t believe it. It was absolutely fantastic news.”

Mrs Brothers now suffers from epilepsy and has difficulty talking because of trauma from the breathing tube, but she is making a good recovery. Only 8 per cent of patients who suffer cardiac arrest outside a hospital survive. Dr Jerry Nolan, who was responsible for Mrs Brothers’s treatment in the critical care unit, said the swift treat-
Prognostication in comatose survivors of cardiac arrest: An advisory statement from the European Resuscitation Council and the European Society of Intensive Care Medicine

Claudio Sandroni, Alain Cariou, Fabio Cavallaro, Tobias Cronberg, Hans Friberg, Cornelia Hoedemaekers, Janneke Horn, Jerry P. Nolan, Andrea O. Rossetti, Jasmeet Soar

Resuscitation 2014;85:1779-89
At ≥24h after ROSC in patients not treated with targeted temperature, poor outcome is very likely (FPR <5%, narrow 95%CIs)

Two or more of the following:
- Status myoclonus ≤48h after ROSC
- High NSE levels
- Unreactive burst-suppression or status epilepticus on EEG
- Diffuse anoxic injury on brain CT/MRI

One or both of the following:
- No pupillary and corneal reflexes
- Bilaterally absent N20 SSEP wave

Indeterminate outcome
Observe and re-evaluate

Use multimodal prognostication whenever possible

Sandroni C et al
## Clinical examination

<table>
<thead>
<tr>
<th>Test Description</th>
<th>Sensitivity</th>
<th>False positive rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor response to pain</td>
<td>74%</td>
<td>27% (12-48%)</td>
</tr>
<tr>
<td>Bilateral absence of pupillary reflex at 24 hours</td>
<td>24%</td>
<td>0% (0-2%)</td>
</tr>
<tr>
<td>Bilateral absence pupillary reflex at 72 hours (TH)</td>
<td>18%</td>
<td>0% (0-8%)</td>
</tr>
<tr>
<td>Bilateral absence pupillary reflex at 72 hours (NTH)</td>
<td>18%</td>
<td>0% (0-8%)</td>
</tr>
<tr>
<td>Bilateral absence corneal reflexes (NTH)</td>
<td>29%</td>
<td>4% (1-7%)</td>
</tr>
</tbody>
</table>
Brain imaging

- Reduced GM/WM ratio
- Sulcal effacement on brain CT within 24 h
- Sens 81%
- FPR 8% (0-38%)
Impaired ADC (apparent diffusion coefficient) predicts poor outcome

n=51

Widjman Ann Neurol 2009

ERC / ESICM: Using brain CT and MRI for prognosticating poor outcome after cardiac arrest only in combination with other predictors.
Neurophysiology: EEG

- Variability in interpretation
- EEG (>72h) combination of
  - Absence of reactivity
  - Status epilepticus
  - Burst-suppression#
- Use in combination with other markers

# Not during TH

Sensitivity 40-60%
FP 0-6%
Neurophysiology: EEG

• Bilateral absence of SSEP at > 72 h
  – Sensitivity 45%,
  – FPR 0(0-2%)
Neurologic Outcomes and Postresuscitation Care of Patients With Myoclonus Following Cardiac Arrest

Prognostic factors

- Younger age (53.7 vs 62.7 yr)
- Shockable (81% vs 46%)
- Shorter ischemic time (18.9 vs 26.4 min)
- Witnessed (91% vs 77%)
- Fewer “do-not-resuscitate” orders (7% vs 78%)
At ≥24h after ROSC in patients not treated with targeted temperature

See text for details.

Poor outcome very likely (FPR <5%, narrow 95% CIs)

Two or more of the following:
- Status myoclonus ≤48h after ROSC
- High NSE levels
- Unreactive burst-suppression or status epilepticus on EEG
- Diffuse anoxic injury on brain CT/MRI

One or both of the following:
- No pupillary and corneal reflexes
- Bilaterally absent N20 SSEP wave

Exclude confounders, particularly residual sedation

Unconscious patient, M=1-2 at ≥72h after ROSC

Yes

No

Wait at least 24h

Two or more of the following:
- Status myoclonus ≤48h after ROSC
- High NSE levels
- Unreactive burst-suppression or status epilepticus on EEG
- Diffuse anoxic injury on brain CT/MRI

Yes

No

Indeterminate outcome
Observe and re-evaluate

Use multimodal prognostication whenever possible

(1) At ≥24h after ROSC in patients not treated with targeted temperature
(2) See text for details.
Prognostication

- When to start and when to stop
- Ethics, Science, Art
- Termination of Resuscitation Rules
- Patient centered approach
RESUSCITATION 2015
THE GUIDELINES CONGRESS

29-30-31 OCTOBER - PRAGUE - CZECH REPUBLIC