



Les Jeudis de l'Urgence Bataillon des Marins-Pompiers de Marseille

Marseille - 6 février 2014

Recommandations / RCP perspectives pour 2015?

Pr P-Y. Gueugniaud

SAMU de Lyon

Pôle « Urgences – Réanimation Médicale – Anesthésie-Réanimation - SAMU - »

GH Edouard Herriot

RCP en 2014

- Alerte
- RCP de base
- Défibrillation
- RCP spécialisée (et monitorage)
- Suites de la RCP

RCP en 2014

- Alerte
- RCP de base
- Défibrillation
- RCP spécialisée (et monitorage)
- Suites de la RCP

RCP en 2015 ?

- Alerte
- RCP de base:
MCE vs MCE + B^aB ?
- Défibrillation
- RCP spécialisée:
adrénaline / monitorage ?
- Suites de la RCP:
hypothermie post-RACS ?

RCP en 2014

- Alerte
- RCP de base
- Défibrillation
- RCP spécialisée (et monitorage)
- Suites de la RCP

RCP en 2014

- Reconnaissance / Diagnostic de l' AC:
= absence de « signes de vie »
 - Conscience - Réactivité = 0
 - Respiration absente ou anormale: « gasps » +++
 - [+/- pouls = 0]
- Conseil téléphonique = MCE seul
- Alerte PRIORITAIRE (15 - 112) / début RCP
... sauf enfants

RCP en 2014

- Alerte
- RCP de base
- Défibrillation
- RCP spécialisée (et monitorage)
- Suites de la RCP

RCP en 2010

RCP Mécanique = Ventilation + MCE

Principe fondamental Reco.
2005/2010
=

Prépondérance MCE

→ Continuité du MCE: ↗ interruptions

- ↳ Réduction de la ventilation
- ↳ Prise de pouls différée

RCP en 2014

RCP de base
MCE seul ou MCE + B&B ?

RCP de base en 2007 ? = MCE seul

Articles

Cardiopulmonary resuscitation by bystanders with chest compression only (SOS-KANTO): an observational study

SOS-KANTO study group

Summary

Lancet 2007; 369: 920-26

See Comment page 882

*Members listed at end of paper

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Background Mouth-to-mouth ventilation is a barrier to bystanders doing cardiopulmonary resuscitation (CPR), but few clinical studies have investigated the efficacy of bystander resuscitation by chest compressions without mouth-to-mouth ventilation (cardiac-only resuscitation).

Methods We did a prospective, multicentre, observational study of patients who had out-of-hospital cardiac arrest. On arrival at the scene, paramedics assessed the technique of bystander resuscitation. The primary endpoint was favourable neurological outcome 30 days after cardiac arrest.

Findings 4068 adult patients who had out-of-hospital cardiac arrest witnessed by bystanders were included; 439 (11%) received cardiac-only resuscitation from bystanders, 712 (18%) conventional CPR, and 2917 (72%) received no bystander CPR. Any resuscitation attempt was associated with a higher proportion having favourable neurological outcomes than no resuscitation (5·0% vs 2·2%, $p<0\cdot0001$). Cardiac-only resuscitation resulted in a higher proportion of patients with favourable neurological outcomes than conventional CPR in patients with apnoea (6·2% vs 3·1%; $p=0\cdot0195$), with shockable rhythm (19·4% vs 11·2%, $p=0\cdot041$), and with resuscitation that started within 4 min of arrest (10·1% vs 5·1%, $p=0\cdot0221$). However, there was no evidence for any benefit from the addition of mouth-to-mouth ventilation in any subgroup. The adjusted odds ratio for a favourable neurological outcome after cardiac-only resuscitation was 2·2 (95% CI 1·2–4·2) in patients who received any resuscitation from bystanders.

Interpretation Cardiac-only resuscitation by bystanders is the preferable approach to resuscitation for adult patients with witnessed out-of-hospital cardiac arrest, especially those with apnoea, shockable rhythm, or short periods of untreated arrest.

SOS Kanto

4 068 AC / 16 mois - 58 EMS

RCP / Témoins = 29 %

RCP + = 5,0% vs RCP - = 2,2% ($p < 0,001$)

| | MCE seul (11% AC) | MCE + B&B (18% AC) | p |
|-------------|----------------------|-----------------------|-------|
| Tous AC | 6,1% | 4,2% | 0,14 |
| FV | 19,4% | 11,2% | 0,041 |
| RCP < 4 min | 10,1% | 5,1% | 0,022 |



RCP de base en 2010 = MCE seul

Chest Compression–Only CPR by Lay Rescuers and Survival From Out-of-Hospital Cardiac Arrest

Brentley J. Roberson, MD

Thomas W. Squitier, M.D.

Robert A. Hertz, M.D.

Uwe Sölk, PhD, MPH

Arthur B. Sanders, MD

Karl R. Kern, MD

Tatjana Vodoborova, MSc

Lund 436

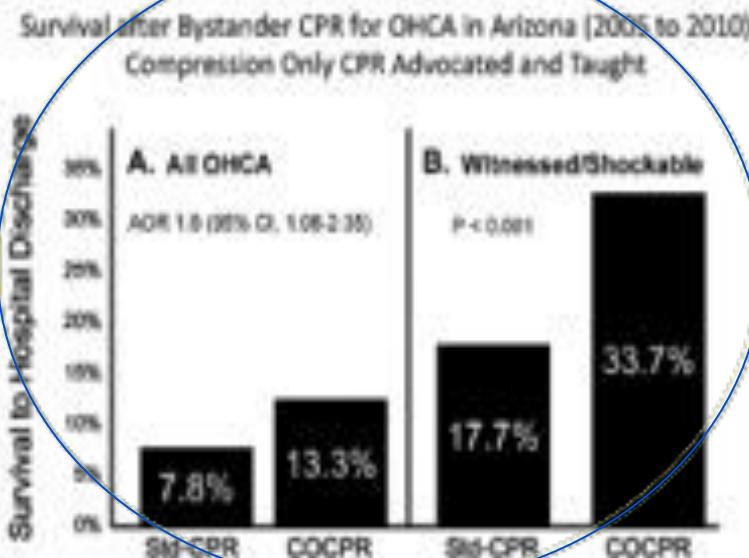
Table V

Context: Chest compression-only bystander cardiopulmonary resuscitation (CPR) may be as effective as conventional CPR with rescue breathing for out-of-hospital cardiac arrest.

Objective To investigate the survival of patients with out-of-hospital cardiac arrest using compression-only CPR (COCPR) compared with conventional CPR.

Design, Setting, and Patients A 5-year prospective observational cohort study of survival in patients at least 18 years old with out-of-hospital cardiac arrest between January 1, 2005, and December 31, 2009, in Arizona. The relationship between layperson bystander CPR and survival to hospital discharge was evaluated using multivariable logistic regression.

Main Outcome Measure: Survival to hospital discharge

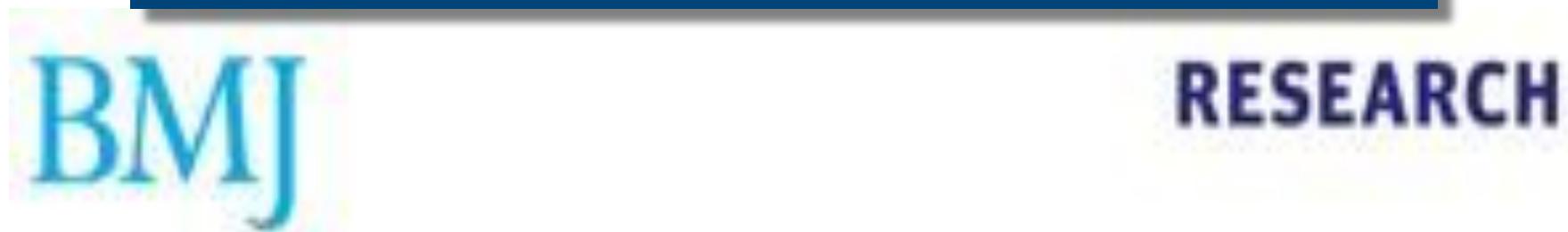


MCE seul/2005 = 19,6% vs /2009 = 75,9%
Survie = 3,7 % (2005) \Rightarrow 9,8 % (2009)(p<0,001)

Conclusion Among patients with out-of-hospital cardiac arrest, layperson compression-only CPR was associated with increased survival compared with conventional CPR and no bystander CPR in this setting with public endorsement of chest compression-only CPR.

JAMA 2010;304(13):1447-1454

RCP de base en 2011 = MCE seul ou RCP conventionnelle ?



Outcomes of chest compression only CPR versus conventional CPR conducted by lay people in patients with out of hospital cardiopulmonary arrest witnessed by bystanders; nationwide population based observational study

Toshiro Ogawa, assistant professor;¹ Manabu Aizuhane, lecturer;¹ Soichiro Kikuchi, associate professor;¹ Seisan Tanabe, professor;¹ Tatsuhiko Mizoguchi, specialist for ambulance service;¹ Tomoaki Iimura, professor¹

T Ogawa et al. BMJ 2011; 342: c7106

RCP de base en 2011

= RCP conventionnelle > MCE seul

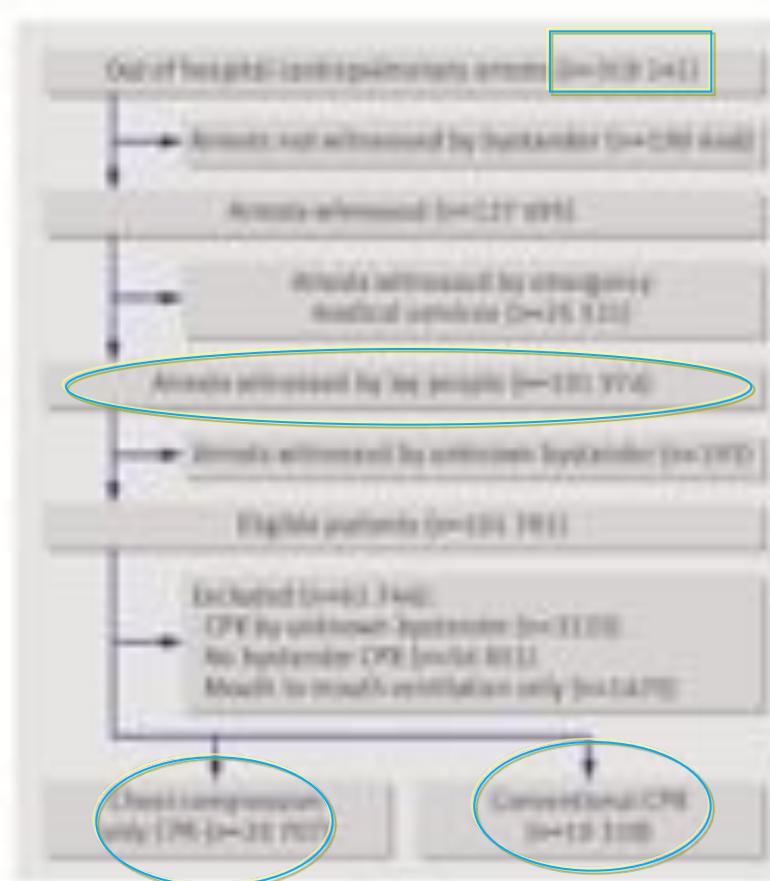


Fig 1: Study profile with selection of participants

BMJ 2011; 342: c7106

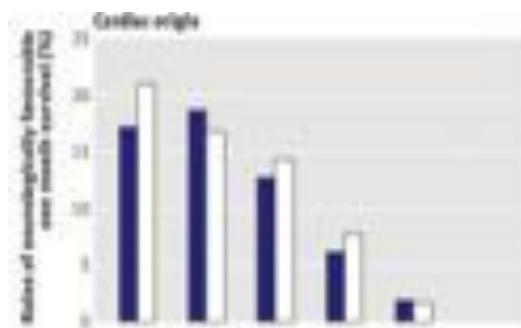
RCP de base en 2011

= RCP conventionnelle > MCE seul

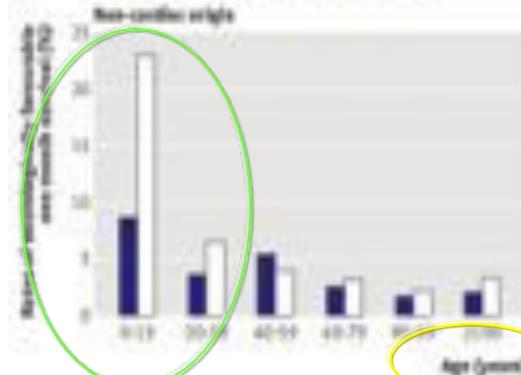
Table 2 | One month survival and neurologically favourable one month survival in cases of out of hospital cardiopulmonary arrest witnessed by bystander with chest compression only CPR and conventional CPR. Figures are percentages (numbers of participants)

| | Chest compression only CPR | Conventional CPR | Unadjusted | Adjusted* |
|--|----------------------------|--------------------|-----------------------------|----------------------------|
| One month survival | 8.7 (1799/20 707) | 10.3 (1997/19 327) | 1.21 (1.13 to 1.29), <0.001 | 1.17 (1.06 to 1.29), 0.002 |
| Neurologically favourable one month survival | 4.6 (943/20 662) | 5.6 (1070/19 247) | 1.23 (1.12 to 1.35), <0.001 | 1.17 (1.01 to 1.35), 0.037 |

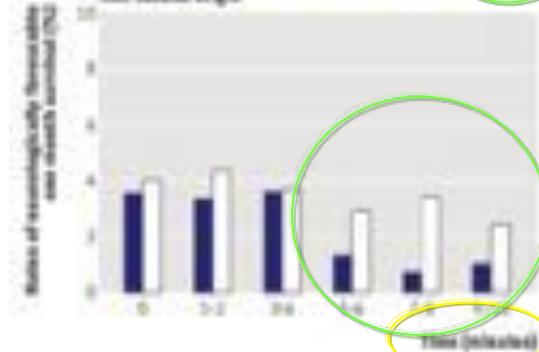
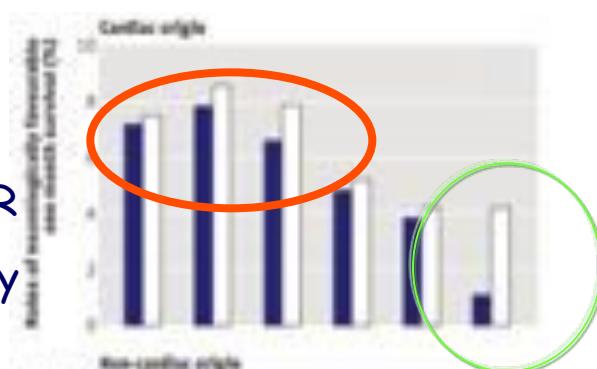
*Adjusted for age, sex, assistance from dispatcher, initial identified cardiac rhythm, cause of cardiac arrest, relation of bystander to patient, use of public access automated external defibrillator, first shock from emergency medical staff, use of drug during CPR, and duration between bystander witnessing event to bystander starting CPR, to CPR by emergency medical staff, and to patient's arrival at hospital.



- Conventionnal CPR
- Compressions only



BMJ 2011; 342: c7106



RCP de base en 2012 = MCE seul > RCP conventionnelle

Chest Compression-Only Cardiopulmonary Resuscitation for Out-of-Hospital Cardiac Arrest With Public-Access Defibrillation A Nationwide Cohort Study

Taka Imano, MD, MPH, PhD; Takanori Kikuchi, MD, PhD; Takashi Kawamura, MD, PhD;
Hideo Minoura, MD, PhD; Ken Nagai, MD, PhD; Masahiro Tsuchihashi, MD, PhD;
Yoshitaka Saito, MD, PhD; Ryukken Tanaka, MD, PhD; Hiroshi Aonogi, MD, PhD;
Makoto Tomizawa, DPhil; Tatsuo Kurosu, MD, PhD; for the Japanese Circulation Society
Resuscitation Science Study (JCS-Ress) Group

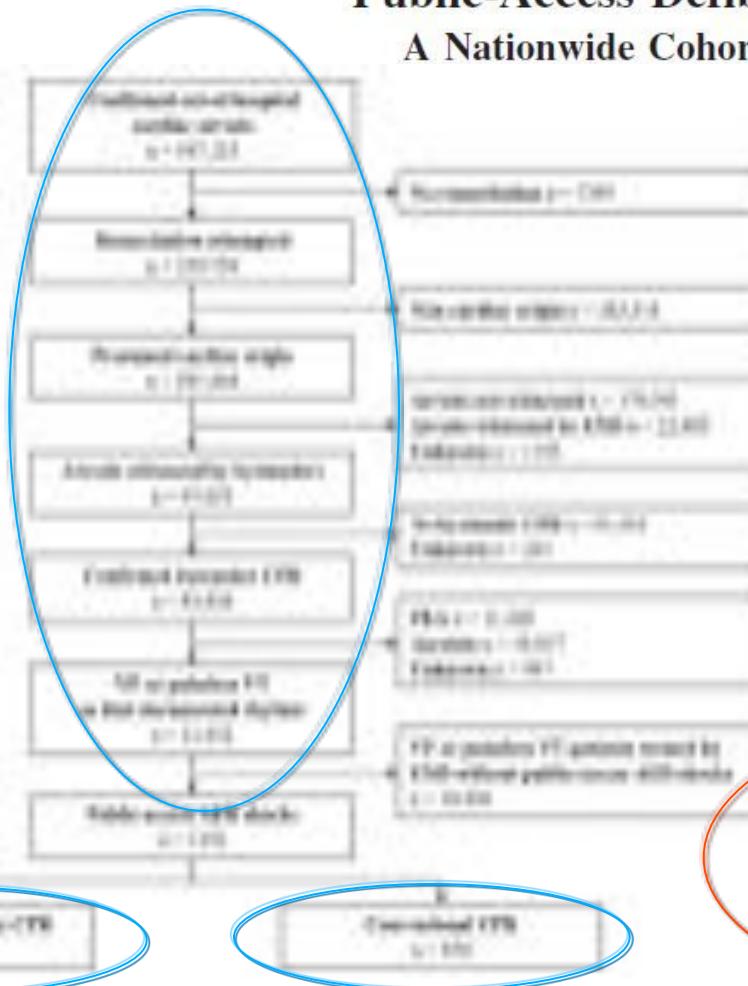
Background. It remains unclear which is more effective to resuscitate survival after out-of-hospital cardiac arrest in those with public-access defibrillation: chest-compression-only cardiopulmonary resuscitation (CPR) or conventional CPR with rescue breathing.

Methods and Results. A nationwide, prospective, registration-based, three-period study covering the elderly population of Japan and involving consecutively out-of-hospital cardiac arrest patients with resuscitation attempts has been conducted since 2005. We enrolled all out-of-hospital cardiac arrests of presumed cardiac origin that were witnessed and received shocks with public-access automated external defibrillators (AEDs) by bystanders from February 1, 2005, to December 31, 2009. The main outcome measure was neurologically favorable 1-month survival. We compared consecutively the rates of neuroresuscitated CPR (chest compression-only CPR and conventional CPR with compressions and rescue breathing). Multivariable logistic regression was used to assess the relationship between the type of CPR and a better neurological outcome. Among the 7,500 cases, CPR techniques adopted out-of-hospital cardiac arrests of cardiac origin by individuals who received CPR and shocks with public access (40%) by bystanders were registered. Among them, 580 (16.2%) received chest compression-only CPR and 379 (63.7%) received conventional CPR. The chest compression-only CPR group (46.7%, 366 of 796) had a significantly higher rate of 1-month survival with favorable neurological outcome than the conventional CPR group (32.8%, 246 of 737), adjusted odds ratio, 1.58; 95% confidence interval, 1.03–2.13.

Conclusion. Chest compression-only CPR is more effective than conventional CPR for patients in whom out-of-hospital cardiac arrest is witnessed and treated with public-access defibrillation. Compression-only CPR is the best likely outcome in which lay rescuers can witness a sudden collapse and use public-access AEDs. (Resuscitation 2013; 84:2944–2951.)

RCP de base en 2012

Chest Compression-Only Cardiopulmonary Resuscitation for Out-of-Hospital Cardiac Arrest With Public-Access Defibrillation A Nationwide Cohort Study



| | Compression-Only CPR (n=506) | Conventional CPR (n=870) | P |
|---|------------------------------|--------------------------|--------|
| Prehospital ROSC, n (%) | 254 (50.2) | 352 (40.5) | <0.001 |
| 1-mo survival, n (%) | 235 (46.4) | 347 (39.9) | 0.018 |
| Neurologically favorable 1-mo survival, n (%) | 206 (40.7) | 286 (32.9) | 0.003 |

CPR indicates cardiopulmonary resuscitation; ROSC, return of spontaneous circulation.

RCP de base en 2013 MCE seul ...

Chest Compression Alone Cardiopulmonary Resuscitation Is Associated With Better Long-Term Survival Compared with Standard Cardiopulmonary Resuscitation

Florian Deneux, PhD; Thomas D. Rea, MD, MPH; Carol Tokarschuk, MD, PhD;
Matsen Rosenberg, MD, PhD; Jason Pepe, MD; Leif Sverke, MD, PhD;
Malay K. Bisarya, MD, PhD; Katharina Holm, RN, PhD

Background: Little is known about the long-term survival effects of dispatcher cardiopulmonary resuscitation (CPR) in the community. We hypothesized that dispatcher intervention consisting of chest compression alone would be associated with better overall long-term prognosis in comparison with chest compression plus rescue breathing.

Methods and Results: This investigation was a retrospective cohort study that combined 2 randomized trials comparing the short-term survival effects of dispatcher CPR interventions involving either chest compression alone or chest compression plus rescue breathing. Long-term vital status was assessed by using the prospective National and State Death Registry through July 1, 2011. We performed Kaplan-Meier survival analysis in conjunction with Cox regression to evaluate survival according to the type of CPR intervention. Of the 2496 subjects included in the current investigation, 1343 (54%) were randomly assigned to chest compression alone and 1153 (46%) were randomly assigned to chest compression plus rescue breathing. Survival characteristics were similar between the 2 CPR groups. During the 10.5±7 years mean of follow-up, there were 2262 deaths and 236 long-term survivors. Hazard ratios related to chest compression alone vs compression with chest compression plus rescue breathing that remained with a lower risk of death after adjustment for potential confounders indicated hazard ratio, 0.81; 95% confidence interval, 0.63 to 0.99 ($P=0.03$).

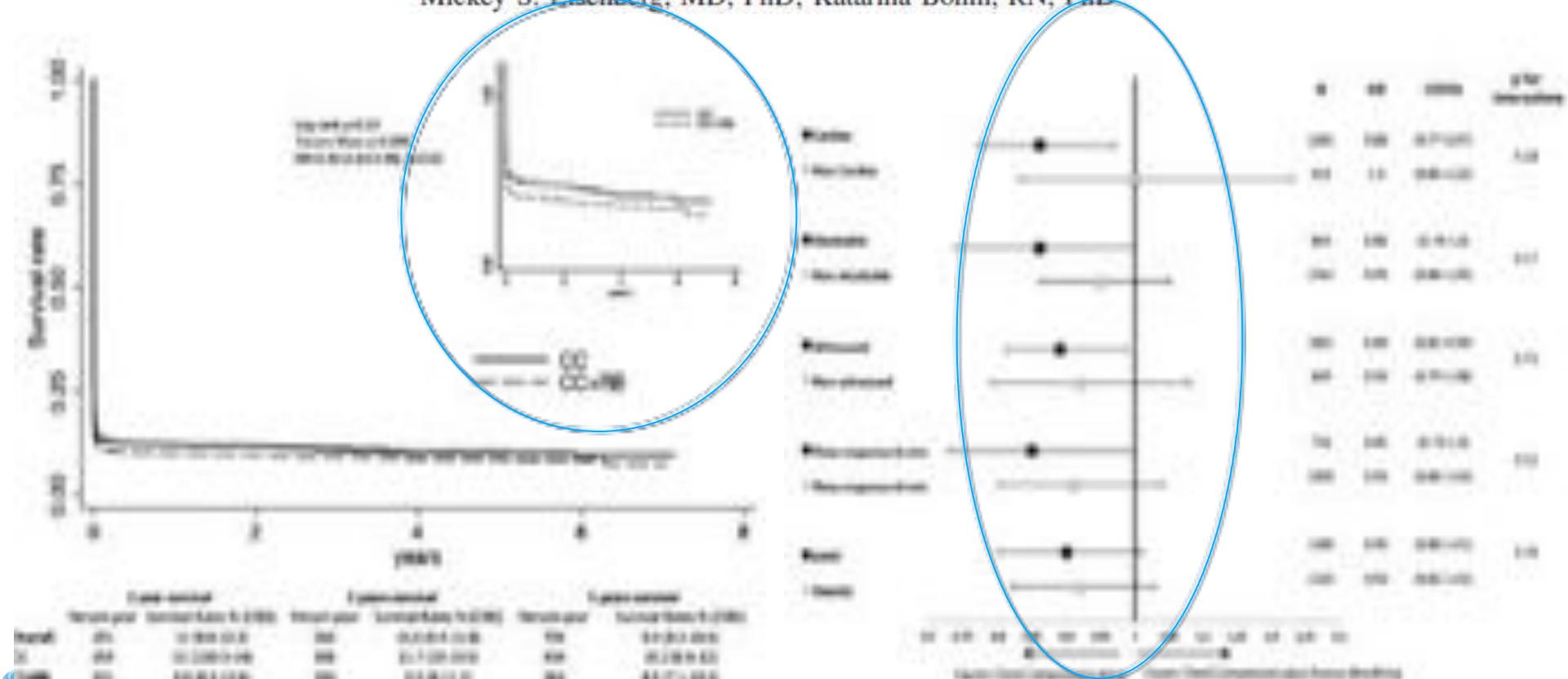
Conclusions: The findings provide strong support for long-term mortality benefit of dispatcher CPR intervention strategy consisting of chest compression alone rather than chest compression plus rescue breathing among adult patients with cardiac arrest requiring dispatcher guidance. (Resuscitation 2013;137:405-409.)

RCP de base en 2013

MCE seul ...

Chest Compression Alone Cardiopulmonary Resuscitation Is Associated With Better Long-Term Survival Compared with Standard Cardiopulmonary Resuscitation

Florence Dumas, MD, PhD; Thomas D. Rea, MD, MPH; Carol Fahrenbruch MSPH;
Marten Rosenqvist, MD, PhD; Jonas Faxén, MD; Leif Svensson, MD, PhD;
Mickey S. Eisenberg, MD, PhD; Katarina Bohm, RN, PhD





French Registry data = 5 665 CA

« Conventional vs CC only CPR »

= 40,4 vs 59,6 %

ROSC / Admission / Discharge =

23,6 / 20,1 / 6,6 % if Chest Compressions alone

Vs 30,2* / 25,9* / 8,6 % if Rescue Breathing

* $p < 0,01$

RCP en 2014

- Alerte
- RCP de base
- Défibrillation
- RCP spécialisée (et monitorage)
- Suites de la RCP



ORIGINAL ARTICLE

Nationwide Public-Access Defibrillation in Japan

Tetsuhisa Kitamura, M.D., Taku Iwami, M.D., Takashi Kawamura, M.D.,

- Etude prospective observationnelle / 3 ans
 - = analyse de l' impact de la diffusion des DAE
 - 9 906 DAE en 2005 vs 88 265 DAE en 2007
 - 312 319 AC \Rightarrow 12 631 FV \Rightarrow 462 DAE / témoins (3,7 %)
 - Fréquence du choc = 1,2 % en 2005 vs 6,2 % en 2007
 - Délai / choc = 3,7 min vs 2,2 min entre 2005 et 2007
 - Survie FV (CPC 1 ou 2) = 14,4 % vs 31,6 % si choc / témoin
 - 2,4 \Rightarrow 8,9 survivants/10 M habitants entre 2005 et 2007
 - 1 \Rightarrow 4 DAE / Km² urbain



French Registry data = 5 665 CA
« First data on AED in France »

AED in OOHCA = 4,5 %

ROSC / Admission / Discharge =

30,1 / 28 / 12,4 % if AED (n=256)

Vs 17,4 / 14,3 / 3,7 % if no AED (n=5409)

p < 0,001

RCP en 2014

- Alerte
- RCP de base
- Défibrillation
- RCP spécialisée (et monitorage)
- Suites de la RCP

Nouvelles techniques/MCE



« Lucas »

⇒ MCE prolongés: prélèvements « à cœur arrêté » ... PYG-2014



« Autopulse »

Monitorage RCP en 2014

$\text{EtCO}_2 \Rightarrow \text{rSO}_2 / \text{Spectrométrie infrarouge (NIRS)}$



INVOS™ 5100 C / COVIDIEN

Monitorage RCP en 2014

Resuscitation 2014; 75(3):373-376.



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Contents lists available at ScienceDirect

Resuscitation

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



Clinical paper

A pilot study examining the role of regional cerebral oxygen saturation monitoring as a marker of return of spontaneous circulation in shockable (VF/VT) and non-shockable (PEA/Asystole) causes of cardiac arrest^{*}



Anna Ahn, Asad Nasir, Hanan Malik, Francis D'Orazi, Sam Parnia*

Background: Non-invasive monitoring of cerebral perfusion and oxygen delivery during cardiac arrest is not routinely utilized during cardiac arrest resuscitation. The objective of this study was to investigate the feasibility of using cerebral oximetry during cardiac arrest and to determine the relationship between regional cerebral oxygen saturation (rSO_2) with return of spontaneous circulation (ROSC) in shockable

Monitorage RCP en 2014

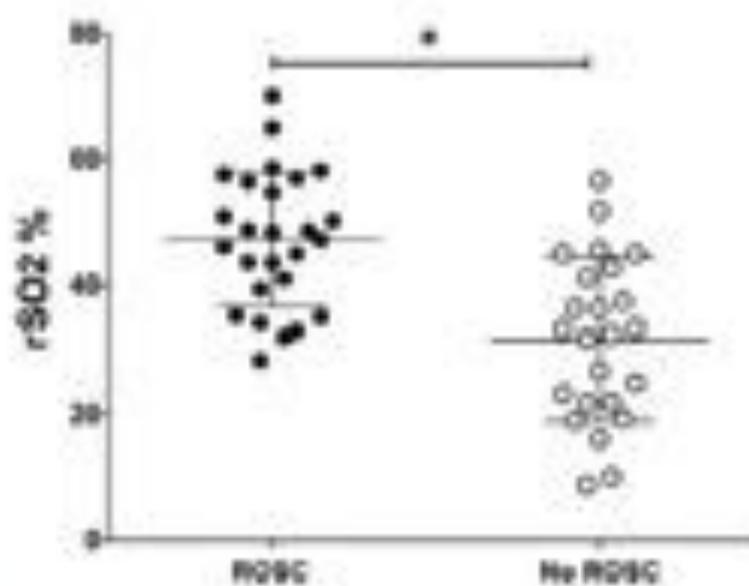


Fig 1. The relationship between means of spontaneous circulation (ROSC) and mean regional cerebral saturation (rSO2) expressed as mean \pm standard deviation (SD) during resuscitation in patients with ROSC ($n=26$) vs. no ROSC ($n=24$). * $p<0.0001$ using the Student's t test.

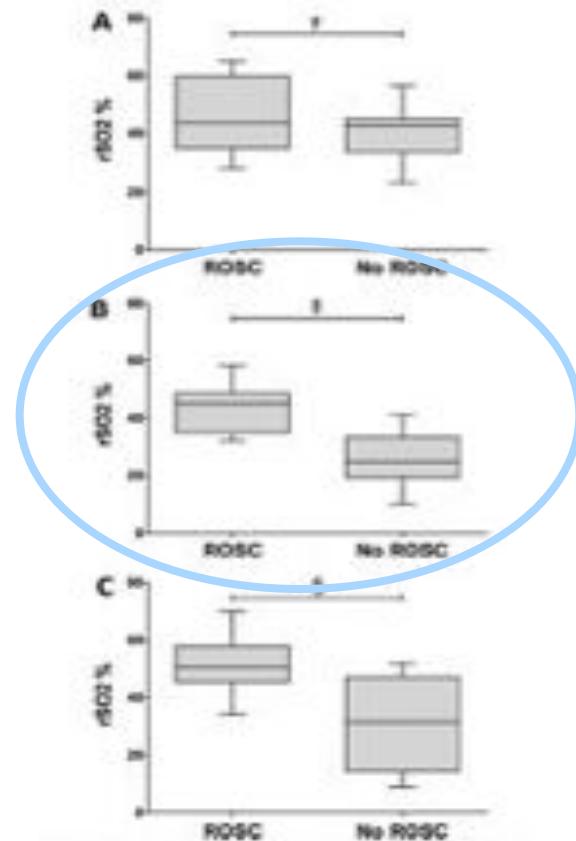


Fig 2. The relationship between means of spontaneous circulation (ROSC) and mean regional cerebral saturation (rSO2) during resuscitation. (A) Overall, (B) VRVT ROSC, (n=21), no ROSC, (n=21), (C) PEA (n=10) ROSC, (n=10), no ROSC, (n=10) using the Mann-Whitney U test.

Methods: Cerebral oximetry was applied to 50 in-hospital and out-of-hospital cardiac arrest patients.
Results: Overall, 52% ($n=26$) achieved ROSC and 48% ($n=24$) did not achieve ROSC. There was a significant difference in mean \pm SD rSO2% in patients who achieved ROSC compared to those who did not ($47.2 \pm 10.7\%$ vs. $31.7 \pm 12.8\%$, $p<0.0001$). This difference was observed during asystole (median rSO2 (IQR) ROSC versus no ROSC: 45.0% (35.1–48.8) vs. 24.9% (20.5–32.9), $p<0.002$) and PEA (50.6% (46.7–57.5) vs. 31.6% (18.8–43.3), $p=0.02$), but not in the VRVT subgroup (43.7% (41.1–54.7) vs. 42.8% (34.9–45.0), $p=0.63$). Furthermore, it was noted that no subjects with a mean rSO2 < 30% achieved ROSC.

Médicaments de l' AC

Drugs
or
Not drugs
in 2015 CPR ?

TM Olasveengen et al: Intravenous drug administration during out-of-hospital CA. JAMA 2009; 302: 2222-9

Intravenous Drug Administration During Out-of-Hospital Cardiac Arrest A Randomized Trial

Theena M. Olasveengen, MD

Context: Intravenous access and drug administration are included in advanced cardiac life support (ACLS) guidelines despite a lack of evidence for improved outcome.

Kjell Sundt, MD, PhD

Sophie Grimaud, MD

Catherine Frangenberg, MSc

Jean Thivierge, MD

Peter A. Rosen, MD, PhD

Lars Wik, MD, PhD

Objectives: To determine whether removing intravenous drug administration from an ACLS protocol would improve survival to hospital discharge after out-of-hospital cardiac arrest.

Etude prospective, monocentrique / 5 ans = 851 ACEH

ACLS + médicaments IV vs ACLS sans Médicaments IV

- ✓ Survie / sortie = 10.5 vs 9.2 % (p=0.61)
- ✓ Survie admission = 32 vs 21 % (p<0.001)
- ✓ Survie à 1 an = 10 vs 8 % (p=0.53)
- ✓ Survie CPC 1 = 9.8 vs 8.1 % (p=0.45)

⇒ Pas d'amines ni anti-arythmiques ??



Prehospital Epinephrine Use and Survival Among Patients With Out-of-Hospital Cardiac Arrest

Akihito Hagihara, DMSc, MPH

Manabu Hasegawa, MD

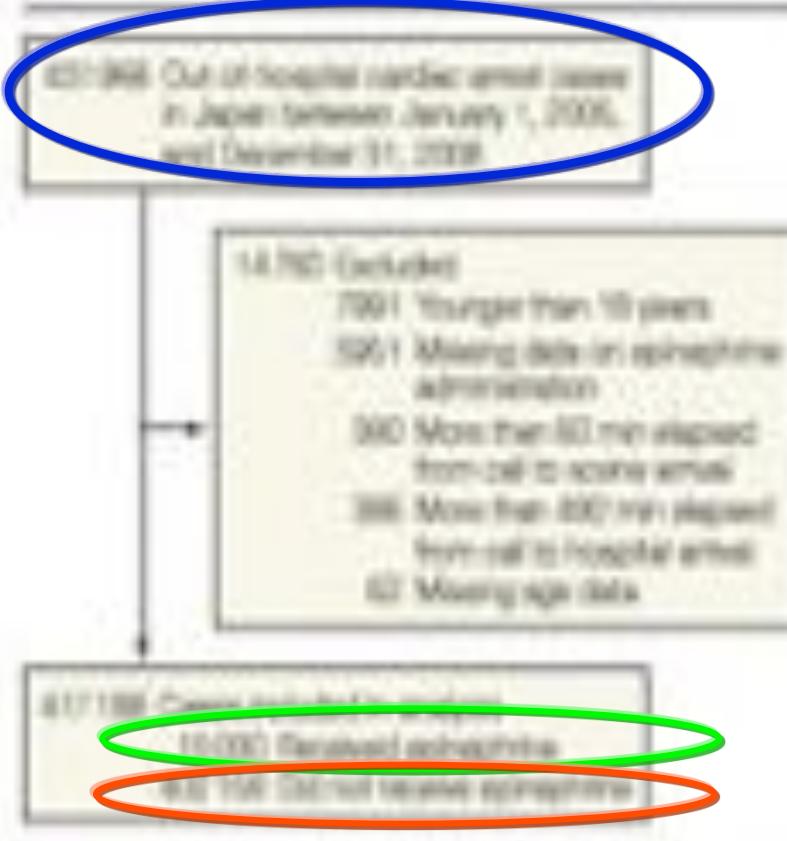
Takeru Abe, MA

Takashi Nagata, MD

Context Epinephrine is widely used in cardiopulmonary resuscitation for out-of-hospital cardiac arrest (OHCA). However, the effectiveness of epinephrine use before hospital arrival has not been established.

Objective To evaluate the association between epinephrine use before hospital arrival and short- and long-term mortality in patients with cardiac arrest.

Figure 1. Study Participant Selection





Prehospital Epinephrine Use and Survival Among Patients With Out-of-Hospital Cardiac Arrest

Akihito Hagihara, DMSc, MPH

Manabu Hasegawa, MD

Takemi Abe MA

Takashi Nagata, MD

Context Epinephrine is widely used in cardiopulmonary resuscitation for out-of-hospital cardiac arrest (OHCA). However, the effectiveness of epinephrine use before hospital arrival has not been established.

Objective To evaluate the association between epinephrine use before hospital arrival and short- and long-term mortality in patients with cardiac arrest.

JAMA. 2012;307(11):1161-1168

Prehospital Epinephrine Use and Survival Among Patients With Out-of-Hospital Cardiac Arrest

Akihito Hagihara, DMSc, MPH

Manabu Hasegawa, MD

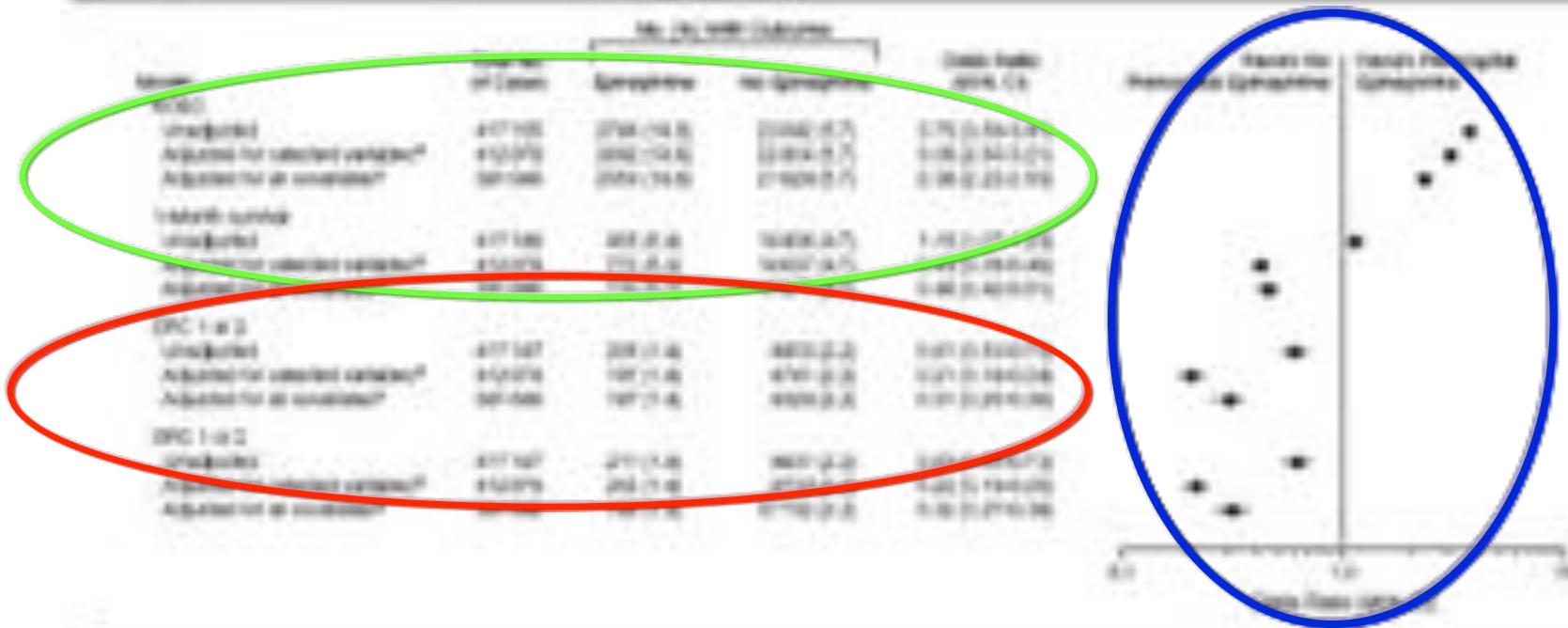
Takeru Abe, MA

Takashi Nagata, MD

Context Epinephrine is widely used in cardiopulmonary resuscitation for out-of-hospital cardiac arrest (OHCA). However, the effectiveness of epinephrine use before hospital arrival has not been established.

Objective To evaluate the association between epinephrine use before hospital arrival and short- and long-term mortality in patients with cardiac arrest.

Figure 2. Results of Unconditional Logistic Regression Analyses Comparing Prehospital Epinephrine Use vs No Prehospital Epinephrine Use in Patients With Out-of-Hospital Cardiac Arrest



Conclusion Among patients with OHCA in Japan, use of prehospital epinephrine was significantly associated with increased chance of return of spontaneous circulation before hospital arrival but decreased chance of survival and good functional outcomes 1 month after the event.

JAMA. 2012;307(11):1161-1168



Médicaments de l' AC

Vasopressin, Steroids, and Epinephrine and Neurologically Favorable Survival After In-Hospital Cardiac Arrest A Randomized Clinical Trial

Spyros D. Mentzakopoulos, MD, PhD; Sotirios Malachias, MD; Christos Chamos, MD; Demetrios Kourastanopoulos, MD; Theodora Ntaidou, MD; Androula Papageorgiou, MD, PhD; Koullaia Kollantzi, MD; Maria Theodoridi, MD; Helen Iouchali, MD, PhD; Demosthenes Makris, MD, PhD; Epaminondes Zakynthinos, MD, PhD; Elias Zintzaras, MD, PhD; Sotirios Sourtis, MD; Stavros Alouattis, MD; Spyros G. Zakynthinos, MD, PhD

IMPORTANCE: Among patients with cardiac arrest, preliminary data have shown improved return of spontaneous circulation and survival to hospital discharge with the vasopressin-steroids-epinephrine (VSE) combination.

Supplemental content at
jama.com

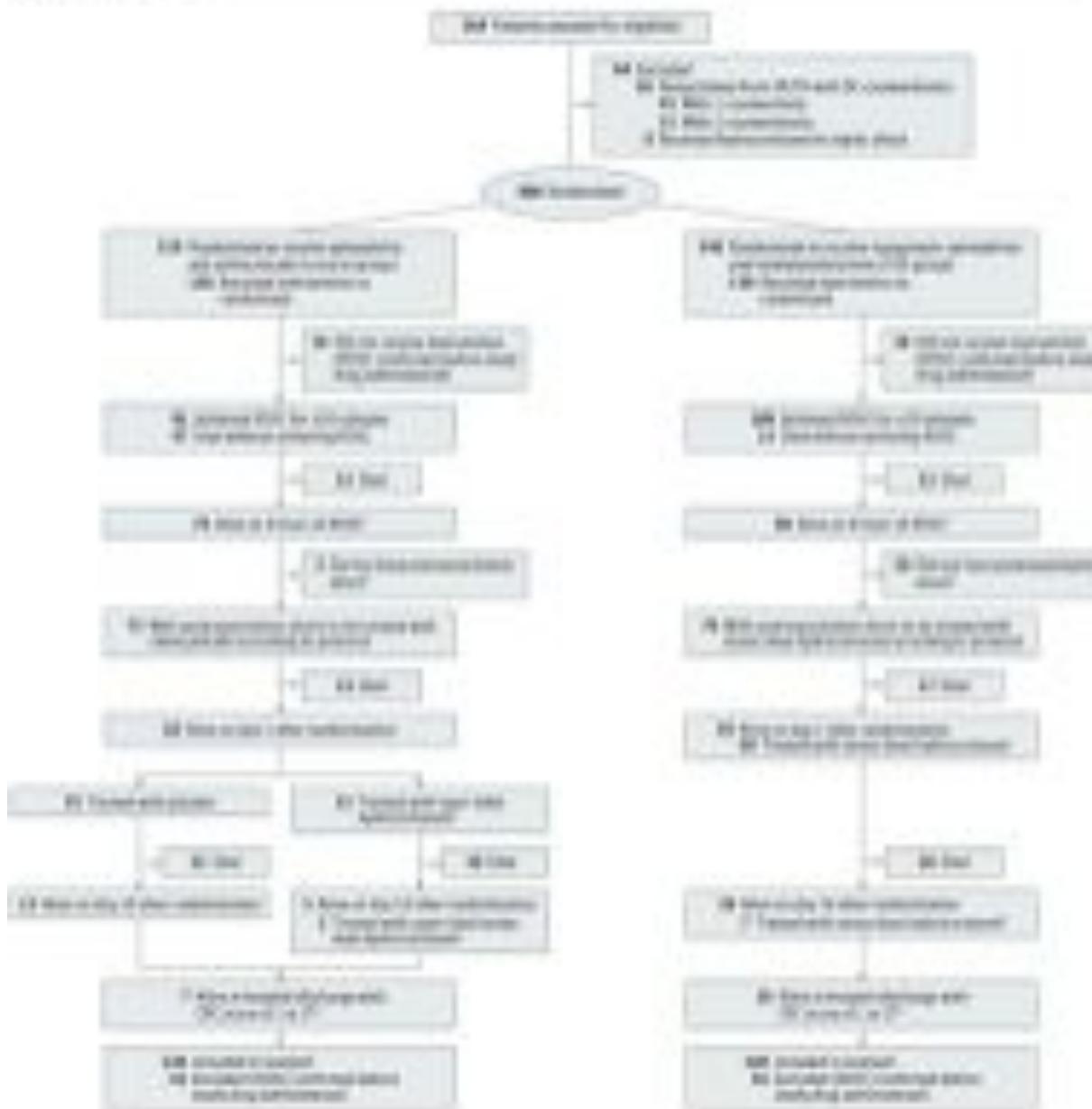
JAMA. 2013;310(3):270-279. doi:10.1001/jama.2013.7832



Vasopressin, Steroids, and Epinephrine and Neurologically Favorable Survival After In-Hospital Cardiac Arrest

Piguet Study Protocol

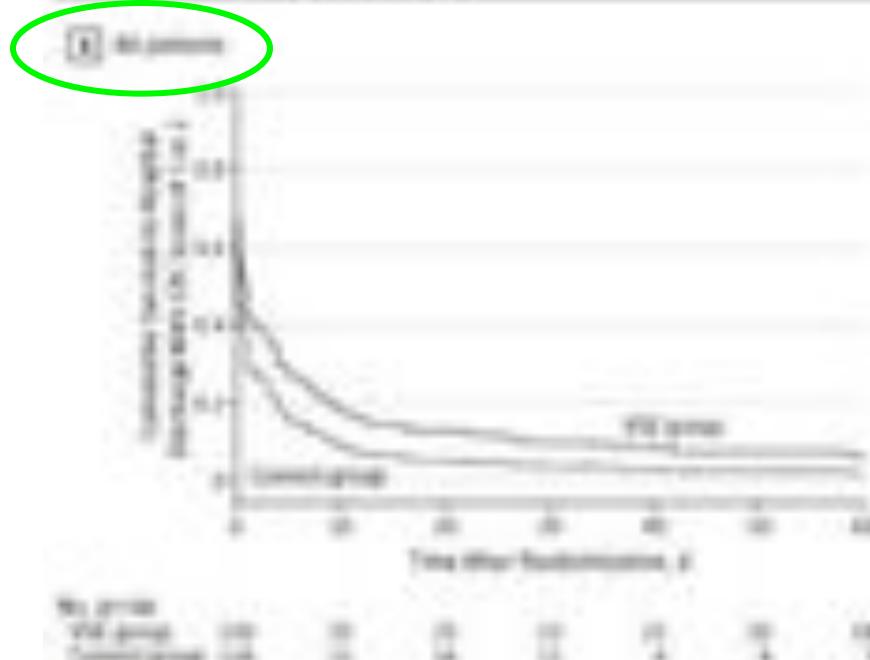
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Vasopressin, Steroids, and Epinephrine and Neurologically Favorable Survival After In-Hospital Cardiac Arrest

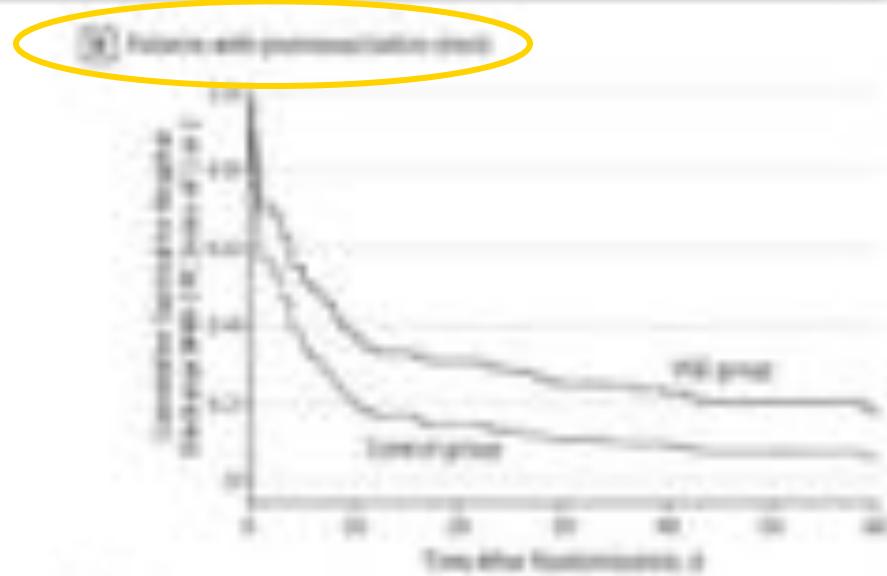
JAMA. 2013;310(3):270-279. doi:10.1001/jama.2013.7832

Figure 2. Results of Survival Analysis



No. events
Vasopressin
Unadjusted
Control group

Probability of survival with a favorable functional outcome (CPC score of 1 to 3) after resuscitation, which was identified to result in hospital discharge with a CPC score of 1 or 2, in all 2000 patients (A) and in the 169 patients with postresuscitation stroke (B). The numbers of events at risk were reduced according to the time points of occurrence of patients death or the



No. events
Vasopressin
Unadjusted

survivors follow-up neurological evaluation that was consistent with a subsequent good neurological outcome (ie, CPC score of < 3) that was ultimately confirmed at the final neurological evaluation at hospital discharge. CPC indicates cerebral performance category.

Vasopressin, Steroids, and Epinephrine and Neurologically Favorable Survival After In-Hospital Cardiac Arrest

JAMA. 2013;310(3):270-279. doi:10.1001/jama.2013.7832

RESULTS. Follow-up was completed in all resuscitated patients. Patients in the VSE group vs patients in the control group had higher probability for ROSC of 20 minutes or longer (109/130 [83.9%] vs 91/138 [65.9%]; odds ratio [OR], 2.98; 95% CI, 1.39-6.40; $P = .005$) and survival to hospital discharge with CPC score of 1 or 2 (18/130 [13.9%] vs 7/138 [5.1%]; OR, 3.28; 95% CI, 1.17-9.20; $P = .02$). Patients in the VSE group with postresuscitation shock vs corresponding patients in the control group had higher probability for survival to hospital discharge with CPC scores of 1 or 2 (16/76 [21.1%] vs 6/73 [8.2%]; OR, 3.74; 95% CI, 1.20-11.62; $P = .02$), improved hemodynamics and central venous oxygen saturation, and less organ dysfunction. Adverse event rates were similar in the 2 groups.

CONCLUSION AND RELEVANCE. Among patients with cardiac arrest requiring vasopressors, combined vasopressin-epinephrine and methylprednisolone during CPR and stress-dose hydrocortisone in postresuscitation shock, compared with epinephrine/saline placebo, resulted in improved survival to hospital discharge with favorable neurological status.

RCP en 2014

- Alerte
- RCP de base
- Défibrillation
- RCP spécialisée (et monitorage)
- Suites de la RCP

... dès la RACS ...

Suites de la RCP

= Syndrome post-AC = « maladie AC »

- ↳ Maintien homéostasie
- ↳ VA \Rightarrow $SpO_2 > 92\%$ ($< 98\%$: lutte contre hyperoxémie)
- ↳ PA « optimale » / patient = stable
- ↳ Traiter les manifestations épileptiques: sédation ?
- ↳ Protéger coronaires et cerveau: pas de tt protecteur
- ↳ Traiter l'hyperthermie ... et induire une « hypothermie »
- ↳ Lutter contre hyperglycémie > 10 mmoles/L

Suites de la RCP

= Hypothermie induite précoce / coma post-RCP

- ➡ Précoce pendant 12 - 24 h
- ➡ Modérée (32 - 34 °C)

* S.A. Bernard et al. Treatment of comatose survivors of out-of-hospital cardiac arrest with induced hypothermia. N Engl J Med 2002 ; 346 : 557-63.

* M. Holzer et Hypothermia ACA Study Group : Mild therapeutic hypothermia to improve the neurologic outcome after cardiac arrest. N Engl J Med 2002 ; 346 : 549-56.

Quelque soit le type d' AC

The Relationship Between Time Interval from Collapse to Emergency Department Circulation and Prehospitally Shivering Survival after Cardiac Arrest with Hypothermia after Resuscitation: A French Prospective Observational Study

• Unconsciousness (shivering) strongly supports post-resuscitation hypothermia in older patients with pulseless electrical activity (PEA) or asystole (non-shivering), but there are no data to show that hypothermia has therapeutic benefit in those who had VF arrest.

• Purpose: To assess whether variation in frequency and timing of shivering after resuscitation is a measure of survival following cardiac arrest.

JH Walters, JP Nolan: Resuscitation 2011; 82: 508-16 - Review/77 studies

YM Kim, HW Yim, CW Callaway: Resuscitation 2011; august 9 - TH ↓ IH mortality

F Dumas, A Cariou: Circulation 2011; 123: 877-86 - TH # IH non VF mortality

JB Lundbyé, J Kluger: Resuscitation 2011; august 22 - TH ↑ IH outcome (29 vs 10 %)



E Lopez-de-Sa et al: Circulation 2012; 126:2826. Level H: $32^\circ > 34^\circ$ (61 vs 15 % CPC 1)



Is Hypothermia After Cardiac Arrest Effective in Both Shockable and Nonshockable Patients?

Université Claude Bernard Lyon 1

Insights From a Large Registry

Florence Dumas, MD; David Grimaldi, MD; Benjamin Zuber, MD; Jérôme Fichet, MD;
Julien Charpentier, MD; Frédéric Pène, MD, PhD; Benoît Vivien, MD, PhD; Olivier Varenne, MD;
Pierre Carli, MD, PhD; Xavier Jouven, MD, PhD; Jean-Philippe Empana, MD, PhD; Alain Cariou, MD, PhD

2000 – 2009

n = 1 145 AC

= VF

= RNC

En pratique

- **Monitorage continu de la T°**
- **NaCl 4°C (30 ml/kg max 2l) IV rapide sur VVP dédiée**
- **Plaque d' hydrogel congelé** sur le tronc et les gros axes vasculaires
(champ en interface pour éviter les gelures)
- **Sédation + Curarisation (Cistracrium)**

Contre-indications :

- **Arrêt cardiaque traumatique ou hémorragique (hémorragies digestives...)**
- **Patients dont la température initiale est inférieure à 34°C**

Hypothermie : pré hospitalier ?

Et dans la vraie vie en SMUR ?

« Survey of pre-hospital hypothermia use in France »

- ❖ Enquête téléphonique sur 105 SAMU / Mars 2010: 100 % de réponses
- ❖ 30 % = Hypothermie dont ½ sur protocole écrit
- ❖ 84 % pour tout RC
- ❖ 54 % / SS 0,9% à 4° (30 mL/ Kg en 30 min)
- ❖ 20 % sans surveillance de température

Suites de la RCP

Intensive care and resuscitation of the patient

ORIGINAL ARTICLE

Targeted Temperature Management at 33°C versus 36°C after Cardiac Arrest

Holger Ankele, M.D., Ph.D., Jan Wenzelius, M.D., Ph.D., Tobias Christberg, M.D., Ph.D., David Ellings, M.D., Ph.D., Niels Gørtz, M.D., Christian Hammel, M.D., D.M.Sc., Janneke Henn, M.D., Ph.D., Jan Hildebrandt, M.D., Ph.D., Inge Kærgaard, M.D., D.M.Sc., Michael Kjaer, M.D., Ph.D., Tarmann Rehm, M.D., Perild Hammer, M.D., Michael Brænstrup, M.D., Ph.D., Matt P. Wien, M.D., D.Phil., Anders Rybnik, M.D., Ph.D., Niyazid R. Salim, M.D., Svenn Bünge, M.D., D.M.Sc., John Brønjeppesen, M.D., Jørgen Boumed, M.D., Jan Frederik Røpke, M.D., Ph.D., Christopher D. Ferguson, M.D., Nicolas P. Jaffray, M.D., Ph.D., Morten Korsgaard, K.H., M.Sc., Lars Kühne, M.D., D.M.Sc., Henrik Langberg, M.D., Gunilla Lila, D.T., Jacob Eike Møller, M.D., D.M.Sc., Alain Rungger, M.D., Ph.D., Christian Rylander, M.D., Ph.D., Ovej Syrdal, M.D., Christophe Wien, M.D., Per Wiklund, M.D., D.M.Sc., and Hans Friberg, M.D., Ph.D.,
for the ITM Trial Investigators

N Engl J Med 2013;369:2197-206.
DOI: 10.1056/NEJMoa1310519

Hypothermie post-RACS

Targeted Temperature Management at 33°C versus 36°C after Cardiac Arrest

Background

In an international trial, we randomly assigned 1998 unconscious adults after out-of-hospital cardiac arrest of presumed cardiac cause to targeted temperature management at either 33°C or 36°C. The primary outcome was all-cause mortality through the end of the trial. Secondary outcomes included a composite of poor neurologic function or death at 180 days, as evaluated with the Coma-Confusion-Vermischte Category (CCPC) scale and the modified Rankin scale.

Methods

In total, 999 patients were included in the primary analysis. At the end of the trial, 50% of the patients in the 33°C group (295 of 475 patients) had died, as compared with 40% of the patients in the 36°C group (225 of 466 patients) (hazard ratio with a temperature of 33°C, 1.08; 95% confidence interval [CI], 0.87 to 1.29; $P=0.10$). At the 180-day follow-up, 54% of the patients in the 33°C group had died or had poor neurologic function according to the CCPC, as compared with 52% of patients in the 36°C group (risk ratio, 1.02; 99% CI, 0.88 to 1.16; $P=0.78$). In the analysis using the modified Rankin scale, the comparable risk was 52% in both groups (risk ratio, 1.06; 99% CI, 0.87 to 1.24; $P=0.87$). The results of analyses adjusted for known prognostic factors were similar.

Conclusion

In unconscious survivors of out-of-hospital cardiac arrest of presumed cardiac cause, hypothermia at a targeted temperature of 33°C did not confer a benefit as compared with a targeted temperature of 36°C. (Funded by the Swedish Heart-Lung

Hypothermie post-RACS

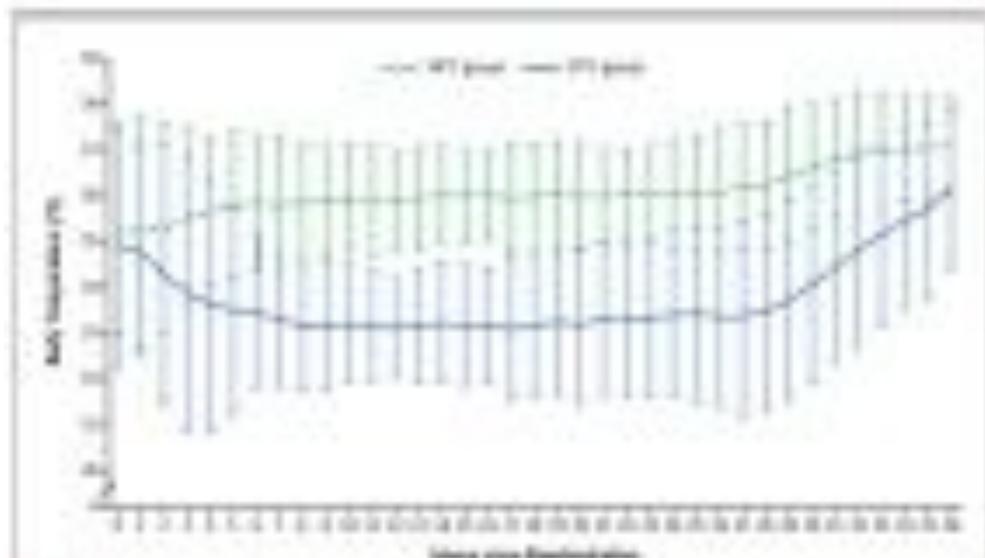


Figure 1. Study temperatures during the revascularization period.

Women randomly received either hypothermia (RPT group) or the SPT (control) to reduce a double exposure risk for patients in the setting of RADS. The minimum was recorded with an immersion of abdominal cavity with a water temperature of 10°C (phase I). Recovery was measured at 18 hours after revascularization. The temperatures were significantly lower than control (< 0.001) at the measurements done after the procedure.

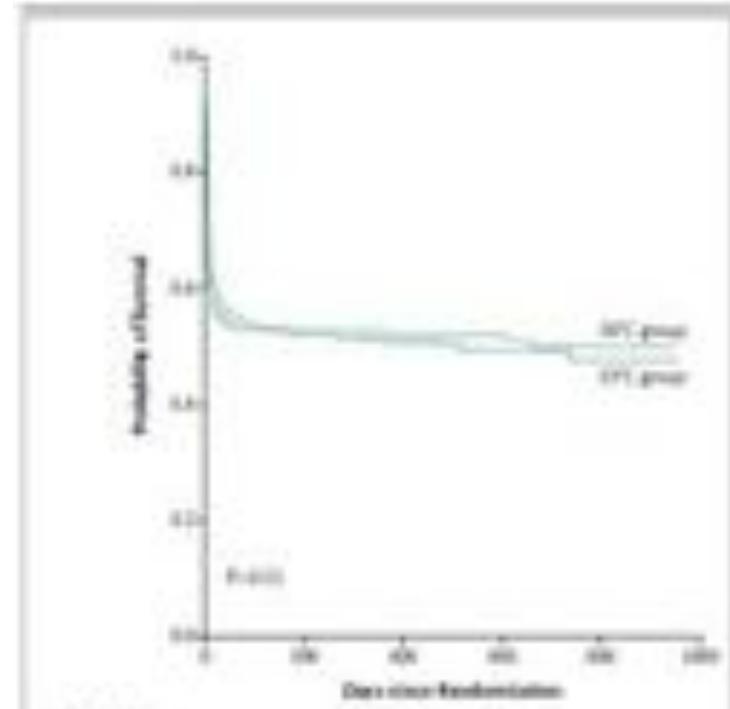


Figure 2. Probability of survival through the last of the trial.

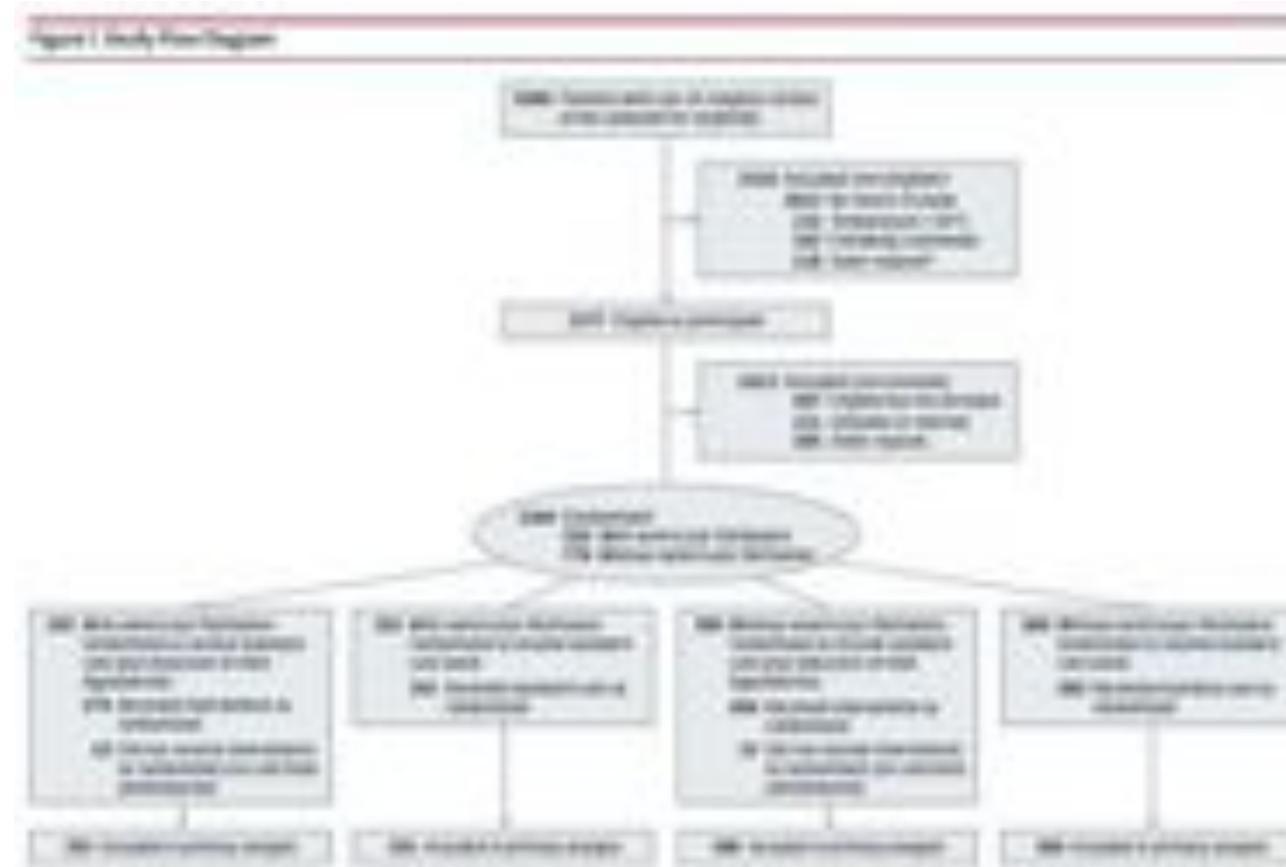
Women are Kaplan-Meier estimates of the probability of survival for patients exposed to a legal temperature of either 10°C or 30°C and the number of patients at risk at each time point. The P value was calculated by means of Cox regression with the effect of the intervention adjusted for the stratification variable of study site.



Hypothermie : pré hospitalier ?

Effect of Prehospital Induction of Mild Hypothermia on Survival and Neurological Status Among Adults With Cardiac Arrest
A Randomized Clinical Trial

Francis Kim, MD; Graham Nichol, MD, MPH; Charles Maynard, PhD; Al Hallstrom, PhD; Peter J. Kudenchuk, MD;
Thomas Rea, MD, MPH; Michael K. Copass, MD; David Carlbom, MD; Steven Deem, MD; W. T. Longstreth Jr, MD;
Michele Olsufka, RN; Leonard A. Cobb, MD



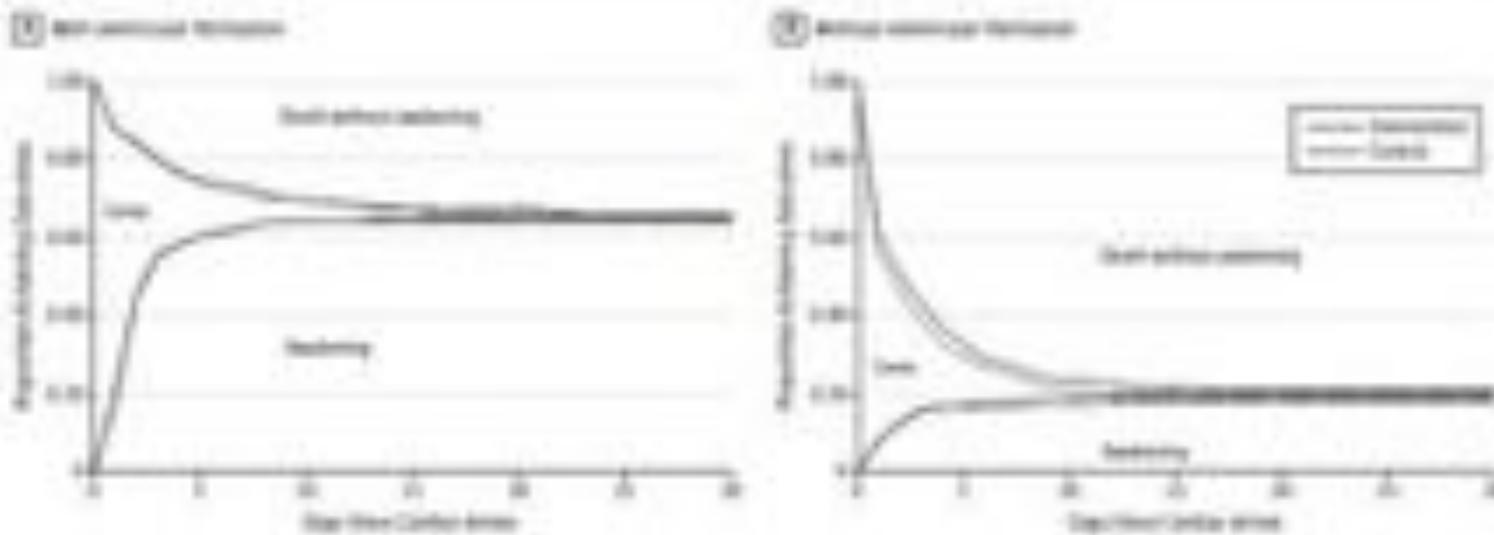


Hypothermie : pré hospitalier ?

Effect of Prehospital Induction of Mild Hypothermia on Survival and Neurological Status Among Adults With Cardiac Arrest A Randomized Clinical Trial

Francis Kim, MD; Graham Nichol, MD, MPH; Charles Maynard, PhD; Al Hallstrom, PhD; Peter J. Kudenchuk, MD; Thomas Rea, MD, MPH; Michael K. Copass, MD; David Carlbom, MD; Steven Deem, MD; W. T. Longstreth Jr, MD; Michele Olsufka, RN; Leonard A. Cobb, MD

Figure 1. The Proportion of Unconscious Patients Achieving Either Good or Excellent Neurologic Recovery in Comparison of Deep Hypothermia Versus No Thawed Patients.



The area beneath the 2 curves represents the proportion of patients who remain unconscious 48 hours after resuscitation and from this value subtracts the return to full neurological function. There were 300 patients with comorbidity (15% each) and those without comorbidity (15% each) in both groups (n=600 total). The patients with comorbidity had an 11% better survival than without comorbidity. The patients without comorbidity had an 11% better survival than without comorbidity (24%, 30% had excellent 62%), and 65% were still unconscious (11%, 10% 11%). All unconscious died without awakening. In contrast, 40% of the patients died without awakening, 10% recovered consciousness, and 50% remained unconscious.

Upon assessment, 100 patients recovered consciousness. 81% (n=77) patients without comorbidity had full neurological function (20% in the control group and 12% in the treated group). At 48 hrs, 150 patients did not have consciousness (21%), 100 had awakening (17%), and 67 were still unconscious (11%). In 11 other 60 unconscious patients died without awakening. 10 recovered consciousness, and 50 remained unconscious.

Hypothermie post-RACS



| | Sous-groupe | Nombre | Nombre (%) |
|--------------------|-------------|--------|------------|
| Hypothermia 0-10°C | Basal | 360 | 19,3% |
| Hyperthermia | Basal | 177 | 10,1% |

p = 0.24

| | Sous-groupe | Nombre | Nombre (%) |
|--------------------|-------------|--------|------------|
| Hypothermia 0-10°C | Basal | 360 | 19,3% |
| Hyperthermia | Basal | 177 | 10,1% |

p = 0.031

| | Sous-groupe | Nombre | Nombre (%) |
|--|-------------|--------|------------|
| Hypothermia dans les 24 premières heures | Basal | 360 | 19,3% |
| Hyperthermia | Basal | 177 | 10,1% |

p = 0.79

| | Sous-groupe | Nombre | Nombre (%) |
|--|-------------|--------|------------|
| Hypothermia dans les 24 premières heures | Basal | 360 | 19,3% |
| Hyperthermia | Basal | 177 | 10,1% |

p < 0.0001

En pratique, dès le SMUR

1- Oxygénation – Ventilation

VA – FiO₂ → SpO₂ 94-98 %

FR = 10 – VC = 6-8 ml/kg → Normocapnie

2- Optimisation de l' hémodynamique selon étiologie

PAM entre 65 et 90 mmHg

3- Orientation du patient et traitement étiologique

4- Contrôle ciblé de la température si pas CI

Monitorage continu → 34-36°C

5- Contrôle glycémie ≤ 10 mmoles/l

