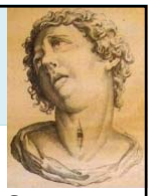
Faut-il intuber lors de la réanimation d'un arrêt cardiaque?

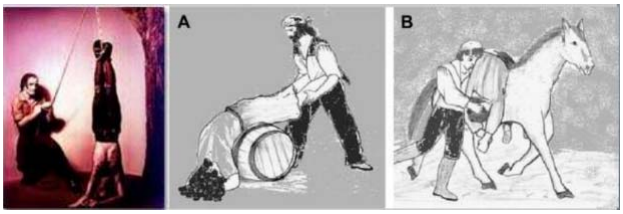
Frédéric Adnet
Urgences – Samu 93
Hôpital Avicenne, 93000 Bobigny
frederic.adnet@aphp.fr

Des l'origine…

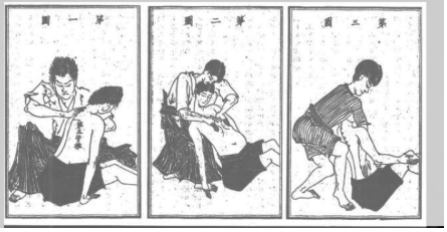


- 980-1037 Avicenne propose d'insérer une canule d'or dans la trachée
- 1871 Trendelenberg propose la trachéostomie
- 1889 Head introduit la sonde endotrachéale
- 1885 Kristen invente le laryngoscope

A l'origine : RCP = airway

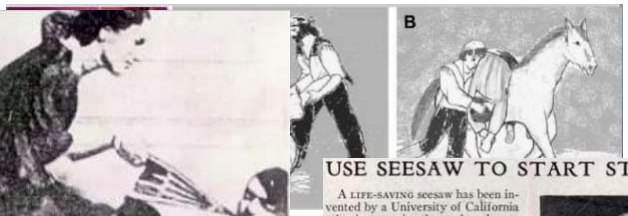


Jiu Jutsu Books 1600's: Kappo



Silvester Method 1861

A l'origine : RCP = airway

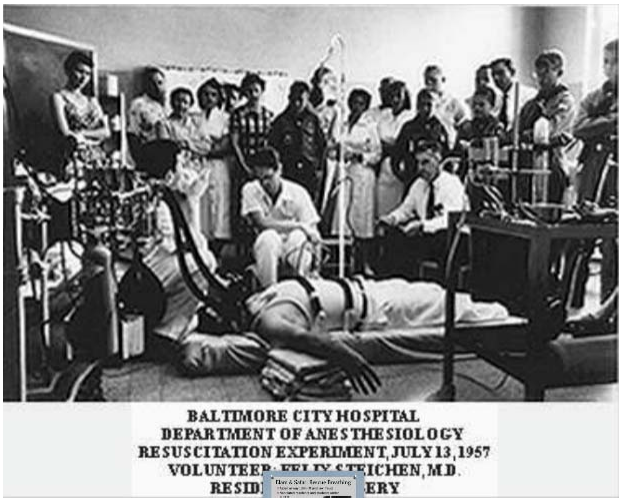


USE SEESAW TO START STOPPED HEART

A LIFE-SAVING seesaw has been invented by a University of California scientist to revive those whose hearts have stopped, as the result of certain kinds of accidents. While oxygen is forced into the lungs and heat is applied to the body, the patient will be rocked steadily up and down on the pivoted plank, to which he will be strapped lying on his back. The theory is that the steady change in position will cause gravity to send the blood coursing through the veins and will start the heart beating. The apparatus, the inventor points out, is for use only in certain cases where the patient has met with an unusual accident.

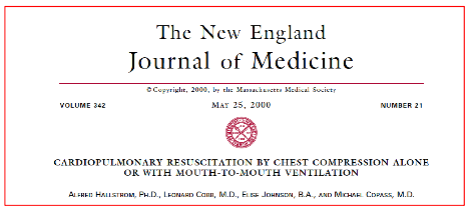
The patient is rocked while oxygen is administered

Approche scientifique d'un dogme…



Le bouche à bouche…

- Proposé en 1740 par l'académie des Sciences de Paris
- Enterré en 2000 par une étude NEJM



The New England
Journal of Medicine

VOLUME 342 MAY 25, 2000 NUMBER 21

CARDIOPULMONARY RESUSCITATION BY CHEST COMPRESSION ALONE OR WITH MOUTH-TO-MOUTH VENTILATION

ALFRED HALLSTROM, PH.D., LEONARD COBB, M.D., FESS JOHNSON, B.A., AND MICHAEL COMPASS, M.D.

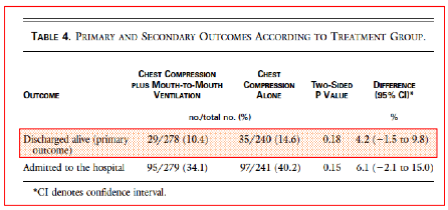


TABLE 4. PRIMARY AND SECONDARY OUTCOMES ACCORDING TO TREATMENT GROUP.

OUTCOME	CHEST COMPRESSION PLUS MOUTH-TO-MOUTH VENTILATION	CHEST COMPRESSION ALONE	TWO-SIDED P VALUE	DIFFERENCE (95% CI)*
	no./total no. (%)			%
Discharged alive (primary outcome)	29/278 (10.4)	35/240 (14.6)	0.18	4.2 (−1.5 to 9.8)
Admitted to the hospital	95/279 (34.1)	97/241 (40.2)	0.15	6.1 (−2.1 to 15.0)

*CI denotes confidence interval.

Historique de la ventilation pendant la RCP

- « Airway Breathing and ..peut être…C » (Safar,1950)
- Puis le « C » vient challenger le A,B:
  - 1/5 compressions (1992)
  - 2/15 (1995)
    - 2/30 (2005)
  - C…A..B.. (2010)
- MCE seul est autorisé (2015)

2015	Layperson—Compression-Only CPR Versus Conventional CPR	Compression-only CPR is a reasonable alternative to conventional CPR in the adult cardiac arrest patient (Class IIa, LOE C-LD).	updated for 2015

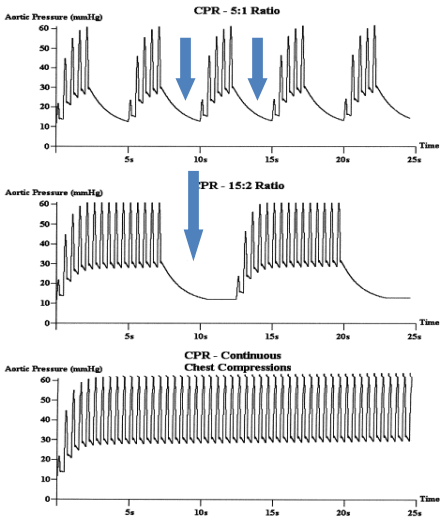
Historique de la ventilation pendant la RCP

- « Airway Breathing and
- 1/5 compressions
- 2/15 (19
-
-

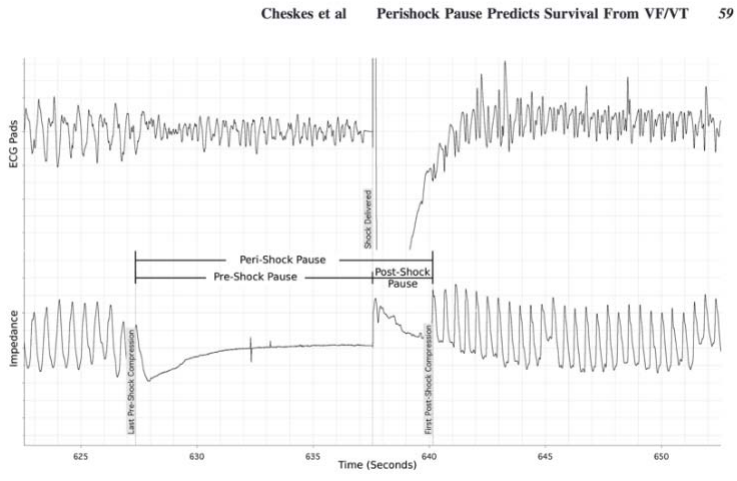
breaths (B). Physiologically, in cases of sudden cardiac arrest, the need for assisted ventilation is a lower priority because of the availability of adequate arterial oxygen content at the time of a sudden cardiac arrest. The presence of this oxygen and its renewal through gasping and chest compressions (provided there is a patent airway) also supported the use of compression-only CPR and the use of passive oxygen delivery.

2015	La… Onl… Conv…	…is a reasonable alternative to conventional CPR in the adult cardiac arrest …IIa, LOE C-LD).	updated for 2015

La ventilation gêne l'hémodynamique



Définition des pauses



Cheskes S et al. Circulation 2011;124:58-66

Association survie et interruption MCE

Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart Association.

Association Between Chest Compression Interruptions and Clinical Outcomes of Ventricular Fibrillation Out-of-Hospital Cardiac Arrest

Tom F. Brouwer, Robert G. Walker, Fred W. Chapman and Rudolph W. Koster

Table 2. Survival to hospital discharge as a function of the duration of the longest pause#.

	Pause duration			P value*
	<10 sec	10-19 sec	≥20 sec	
Longest pre-shock pause (n=294)	43%	37%	24%	<0.01
Longest post-shock pause (n=311)	37%	36%	35%	0.69

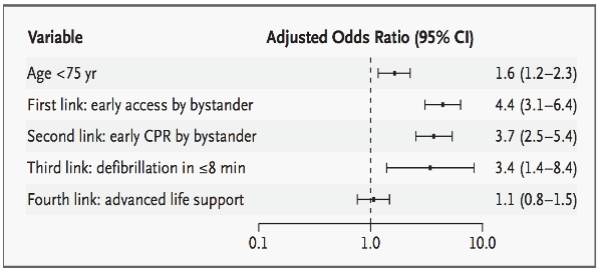
Analyse multivariée: augmentation de la mortalité de 17% pour chaque Augmentation de 5 secondes d'interruption du MCE.

Brouwer TF et al. Circulation. August 2015

Advanced Cardiac Life Support in Out-of-Hospital Cardiac Arrest

Ian G. Stiell, M.D., George A. Wells, Ph.D., Brian Field, A.C.P., M.B.A., Daniel W. Spaite, M.D., Lisa P. Nesbitt, M.H.A., Valerie J. De Maio, M.D., Graham Nichol, M.D., M.P.H., Donna Cousineau, B.Sc.N., Josée Blackburn, B.Sc., Doug Munkley, M.D., Lorraine Luinstra-Toohey, B.Sc.N., M.H.A., Tony Campeau, M.Ed., Eugene Dagnone, M.D., and Marion Lyver, M.D., for the Ontario Prehospital Advanced Life Support Study Group

N ENGL J MED 351;7 WWW.NEJM.ORG AUGUST 12, 2004



CONCLUSIONS

The addition of advanced-life-support interventions did not improve the rate of survival after out-of-hospital cardiac arrest in a previously optimized emergency-medical-services system of rapid defibrillation. In order to save lives, health care planners should make cardiopulmonary resuscitation by citizens and rapid-defibrillation responses a priority for the resources of emergency-medical-services systems.

Contents lists available at ScienceDirect

Resuscitation

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

Resuscitation, 2011.

Mini-review

Advanced life support versus basic life support in the pre-hospital setting: A meta-analysis☆

G. Bakalos*, M. Mamali, C. Komninos, E. Koukou, A. Tsantilas, S. Tzima, T. Rosenberg

University of Athens School of Medicine, Post Graduate Program on International Medicine, Health Crisis Management, Athens, Greece

conclude that ALS does not provide additional benefits over BLS-defibrillation care and more research was needed in this area.[7]

Furthermore, the results of our review differ from the outcome of the two biggest trials in this therapeutic field.[10,15] In

Our analysis presented that ALS care in non trauma cardiac arrest patients increases the probability of survival at hospital discharge almost by 47% than BLS care (OR 1.468, 95% CI, 1.257–1.715). It was noticed that in cases where ALS care is provided by physi-

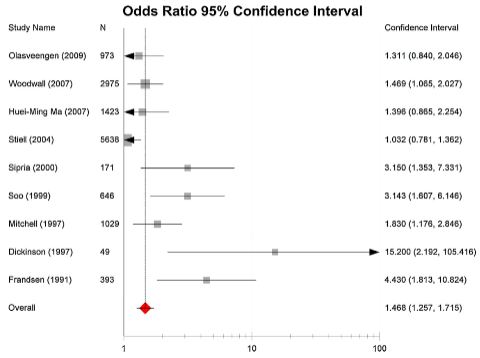


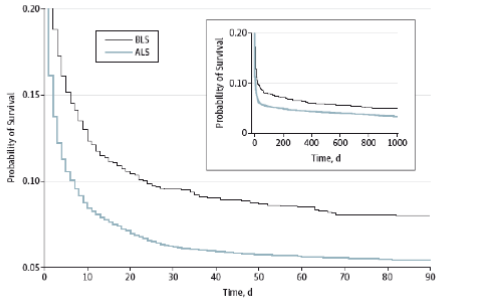
Fig. 4. Forrest plot of comparison of ALS versus BLS in patients with non traumatic cardiac arrest.

Outcomes After Out-of-Hospital Cardiac Arrest Treated by Basic vs Advanced Life Support

Prachi Sanghavi, BS; Anupam B. Jena, MD, PhD; Joseph P. Newhouse, PhD; Alan M. Zaslavsky, PhD

- Comparaison entre patients en ACR pris en charge ALS vs. BLS
- 31.292 ACR (ALS) vs. 1642 ACR (BLS)
- ALS =intubation; BLS = masque

Figure 2. Kaplan-Meier Analysis of Survival After Cardiac Arrest by Ambulance Service Level



CONCLUSIONS AND RELEVANCE Patients with out-of-hospital cardiac arrest who received BLS had higher survival at hospital discharge and at 90 days compared with those who received ALS and were less likely to experience poor neurological functioning.

JAMA Internal Medicine Published online November 24, 2014

Field intubation of cardiac arrest patients: a dying art?

Richard M Lyon,[1] John D Ferris,[2] Danielle M Young,[1] Dermot W McKeown,[3] Angela J Oglesby,[1] Colin Robertson[1]

- Cause: morbidité liée à l'intubation
  - 790 intubations lors d'ACR
  - 628 intubations tentées (79%)
  - Succès 573 (91%)
  - Complications 9%
- 17% survie (intubation) vs. 33% (pas d'intubation); p<0,001

Emerg Med J 2010;**27**:321–323

Advanced Airway Management Does Not Improve Outcome of Out-of-hospital Cardiac Arrest

M. Arslan Hanif, MD, Amy H. Kaji, MD, PhD, and James T. Niemann, MD

- Etude descriptive
- 131 ventilations au masque vs. 1.027 intubations
- Survie (sortie vivant hôpital):
  - Intubation 4%
  - Masque 11%

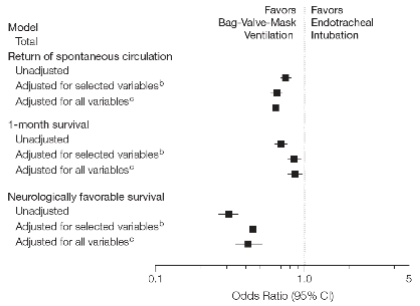
ACADEMIC EMERGENCY MEDICINE 2010; 17:926–931

Association of Prehospital Advanced Airway Management With Neurologic Outcome and Survival in Patients With Out-of-Hospital Cardiac Arrest

Kohei Hasegawa, MD, MPH

Importance It is unclear whether advanced airway management such as endotra-

- Appariement par score de propension
- 649.359 patients
  - 367.837 masque
  - 41.972 intubation
  - 239.550 matériel supra-glottique

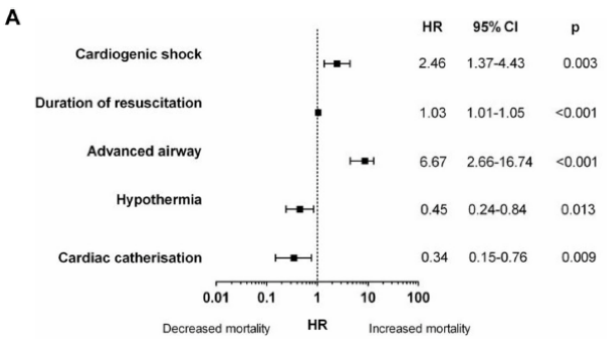


JAMA, January 16, 2013—Vol 309, No. 3

Predictors of Survival and Favorable Functional Outcomes After an Out-of-Hospital Cardiac Arrest in Patients Systematically Brought to a Dedicated Heart Attack Center (from the Harefield Cardiac Arrest Study)

M. Bilal Iqbal, MD[a,*], Abtehale Al-Hussaini, MD[a], Gareth Rosser, MD[a], Saleem Salehi, MD[a],

ACR extrahospitaliers récupérés et hospitalisés, analyse de la survie

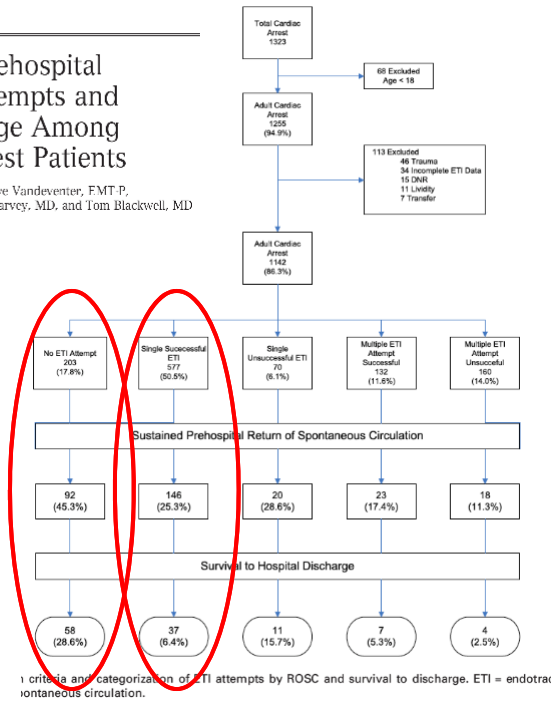


Am J Cardiol 2015;115:730e737

CLINICAL PRACTICE

The Association Between Prehospital Endotracheal Intubation Attempts and Survival to Hospital Discharge Among Out-of-hospital Cardiac Arrest Patients

Jonathan R. Studnek, PhD, NREMT-P, Lars Thestrup, MD, Steve Vandeventer, EMT-P, Steven R. Ward, NREMT-P, Kevin Staley, MPA, EMT-P, Lee Garvey, MD, and Tom Blackwell, MD

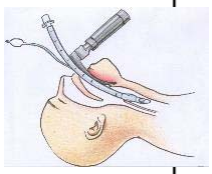


ontaneous circulation.

Acad Emerg Med, 2010

Interruptions in Cardiopulmonary Resuscitation From Paramedic Endotracheal Intubation

Wang HE. Ann Emerg Med. 2009



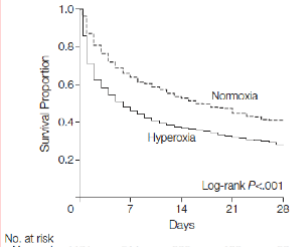
Hyperoxie délétère!

Association Between Arterial Hyperoxia Following Resuscitation From Cardiac Arrest and In-Hospital Mortality

J. Hope Kilgannon, MD

Context Laboratory investigations suggest that exposure to hyperoxia after resuscita-

Figure. In-Hospital Death Between Hyperoxia and Normoxia



No. at risk

Normoxia	1171	514	236	129	83
Hyperoxia	1156	406	211	115	70

JAMA. 2010;303(21):2165-2171

Contents lists available at ScienceDirect

Resuscitation

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

ELSEVIER

EUROPEAN RESUSCITATION COUNCIL

Review article

Endotracheal intubation versus supraglottic airway placement in out-of-hospital cardiac arrest: A meta-analysis

Justin L. Benoit*, Ryan B. Gerecht, Michael T. Steuerwald, Jason T. McMullan

University of Cincinnati, College of Medicine Department of Emergency Medicine, 231 Albert Sabin Way, PO Box 670769, Cincinnati, OH, 45267-0769, USA

Study	N (ETI)	N (SGA)	OR (95% CI)
FULL MODEL:			
Kajino 2011	1679	3698	0.71 (0.39-1.30)
McMullan 2014	5591	3110	1.66 (1.15-2.41)
Noda 2007	4	24	5.22 (0.09-299.04)
Tanabe 2013	12992	29640	1.30 (1.06-1.59)
Wang 2012	8487	1968	1.40 (1.04-1.89)
Yanagawa 2010	158	478	1.01 (0.20-5.05)
TOTAL	28911	38918	1.33 (1.09-1.61)
SENSITIVITY ANALYSIS MODEL:			
Kajino 2011	1679	3698	0.71 (0.39-1.30)
McMullan 2014	5591	3110	1.66 (1.15-2.41)
Tanabe 2013	12992	29640	1.30 (1.06-1.59)
Wang 2012	8487	1968	1.40 (1.04-1.89)
TOTAL	28749	38416	1.33 (1.04-1.69)

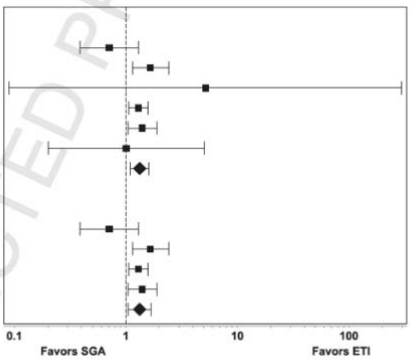


Fig. 5. Forest plot for neurologically intact survival to hospital discharge. ETI = Endotracheal intubation; SGA = Supraglottic airway; OR = Odds ratio; CI = Confidence interval; Full Model = Random effects model with all studies included; Sensitivity Analysis Model = Random effects model excluding studies of "very low" quality.

Resuscitation, 2015

Guidelines 2010

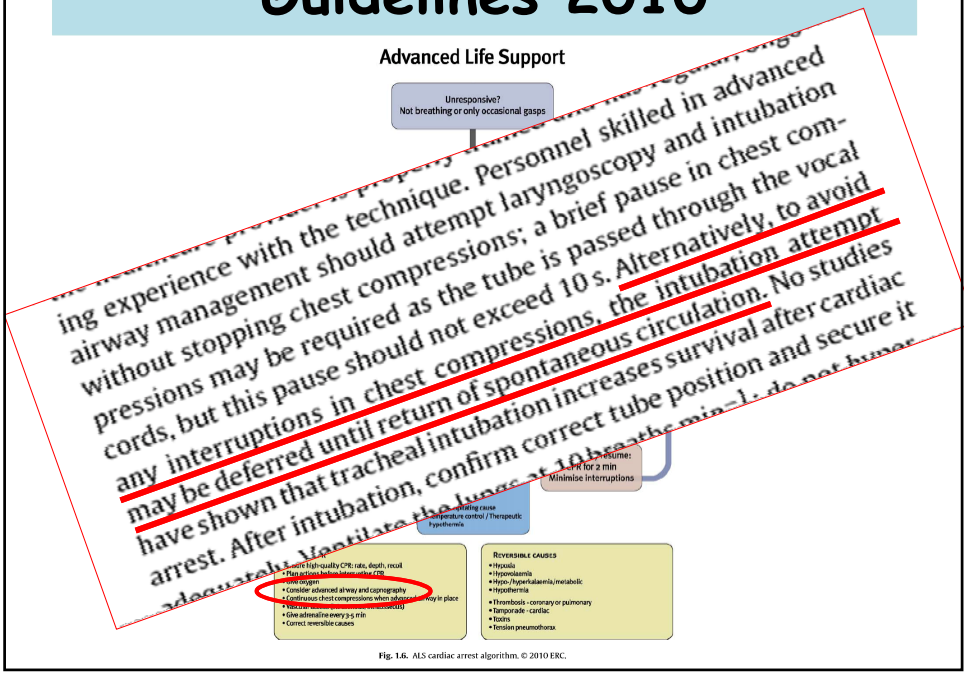


Fig. 1.6. ALS cardiac arrest algorithm. © 2010 ERC.

2015: Equipoise

Contents lists available at ScienceDirect

Resuscitation

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

European Resuscitation Council Guidelines for Resuscitation 2015
Section 3. Adult advanced life support

Jasmeet Soar[a,*], Jerry P. Nolan[b,c], Bernd W. Böttiger[d], Gavin D. Perkins[e,f], Carsten Lott[g], Pierre Carli[h], Tommaso Pellis[i], Claudio Sandroni[j], Markus B. Skrifvars[k], Gary B. Smith[l], Kjetil Sunde[m,n], Charles D. Deakin[o], on behalf of the Adult advanced life support section Collaborators[1]

Summary of airway management for cardiac arrest

The ILCOR ALS Task Force has suggested using either an advanced airway (tracheal intubation or SGA) or a bag-mask for airway management during CPR.[4] This very broad recommendation is made because of the total absence of high quality data to indicate which airway strategy is best.

Limites des études observationnelles comparatives

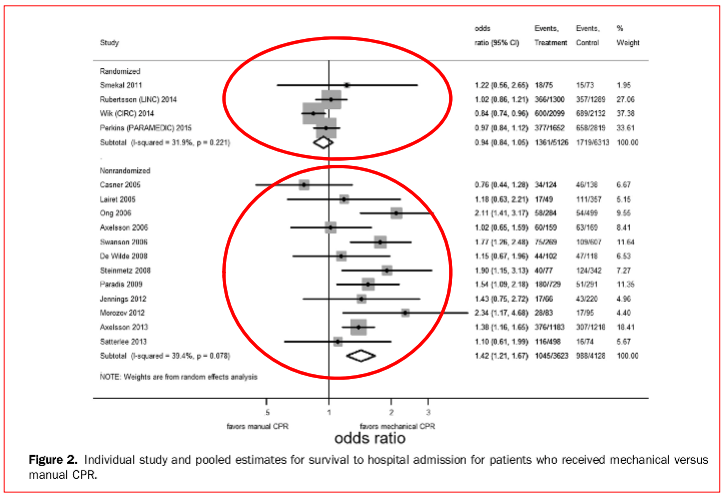


Figure 2. Individual study and pooled estimates for survival to hospital admission for patients who received mechanical versus manual CPR.

Bonnes JL. Ann Emerg Med 2015; Nov.

INITIAL AIRWAY MANAGEMENT IN PATIENTS WITH OUT-OF-HOSPITAL CARDIAC ARREST: TRACHEAL INTUBATION VS. BAG-MASK VENTILATION.

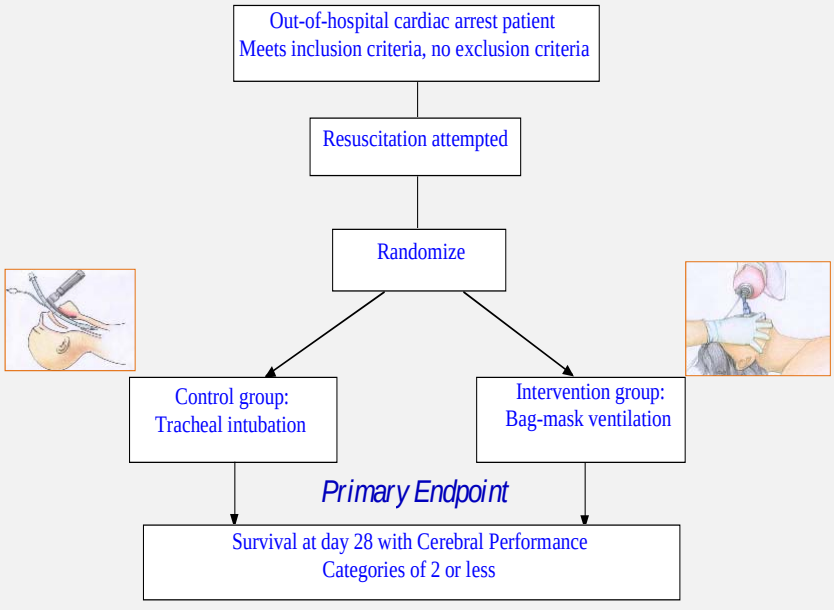
A European, multicenter, randomized controlled trial

CAAM TIAL

Frédéric Adnet
Samu 93 – Urgences – Inserm U942
Avicenne Universitary Hospital
93000 Bobigny, France

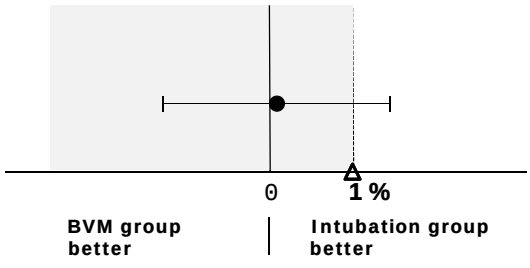
Trial funded by French Ministry of Health (PHRC 2013)

CAAM trial: 20 pre-hospital emergency medical services centers (SAMU): 15 in France and 5 in Belgium



Primary outcome (ITT analysis)

Primary outcome	BMV (N=1018)	TI (N=1022)	Difference	[95% CI]
Survival with good neurological status at day 28	N= 42 (4.2%)	N= 43 (4.3%)	0.11	[-1.64; 1.87]



Outcomes (ITT analysis)

Outcomes	BMV group (N=1018)	TI group (N=1022)	P value
Return of spontaneous circulation – no. (%)	348 (34.2)	397 (38.9)	0.03
Survival at hospital admission– no. (%)	294 (28.9)	333 (32.6)	0.07
Survival at day 28 – no. (%)	55 (5.4)	54 (5.3)	0.90

Safety analysis

Item	BVM group	ETI group	p
BVM or ETI failure – no. (%)	64 (6.3)	26 (2.5)	<0.0001
BMV or ETI difficulty – no. (%)	186 (18.1)	134 (13.4)	0.004
Regurgitation of gastric content	152 (14.9)	79 (7.7)	<0.0001

Conclusion de CAAM

- **Non infériorité non démontrée pour un problème de puissance**
- **On ne retrouve pas la supériorité de la ventilation au masque**
- **La ventilation au masque est responsable de complications plus importante.**

En conclusion…

- Intubation toujours d'actualité… mais pas déterminante
- Priorité à l'hémodynamique
- Attention à l'hyperoxie