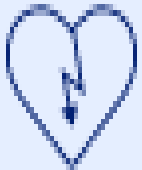


Recommandations Resucor



**ORIENTATION DES ARRETS CARDIAQUES RECUPERES
INDICATION DE CORONAROGRAPHIE**

9 juin 2021

IMMEDIATE CORONARY ANGIOGRAPHY IN SURVIVORS OF OUT-OF-HOSPITAL CARDIAC ARREST

CHRISTIAN M. SPAULDING, M.D., LUC-MARIE JOLY, M.D., ALAIN ROSENBERG, M.D., MEHRAN MONCHI, M.D.,
SIMON N. WEBER, M.D., JEAN-FRANÇOIS A. DHAINAUT, M.D., PH.D., AND PIERRE CARLI, M.D.

N Engl J Med 1997;336:1629-33

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84 patients

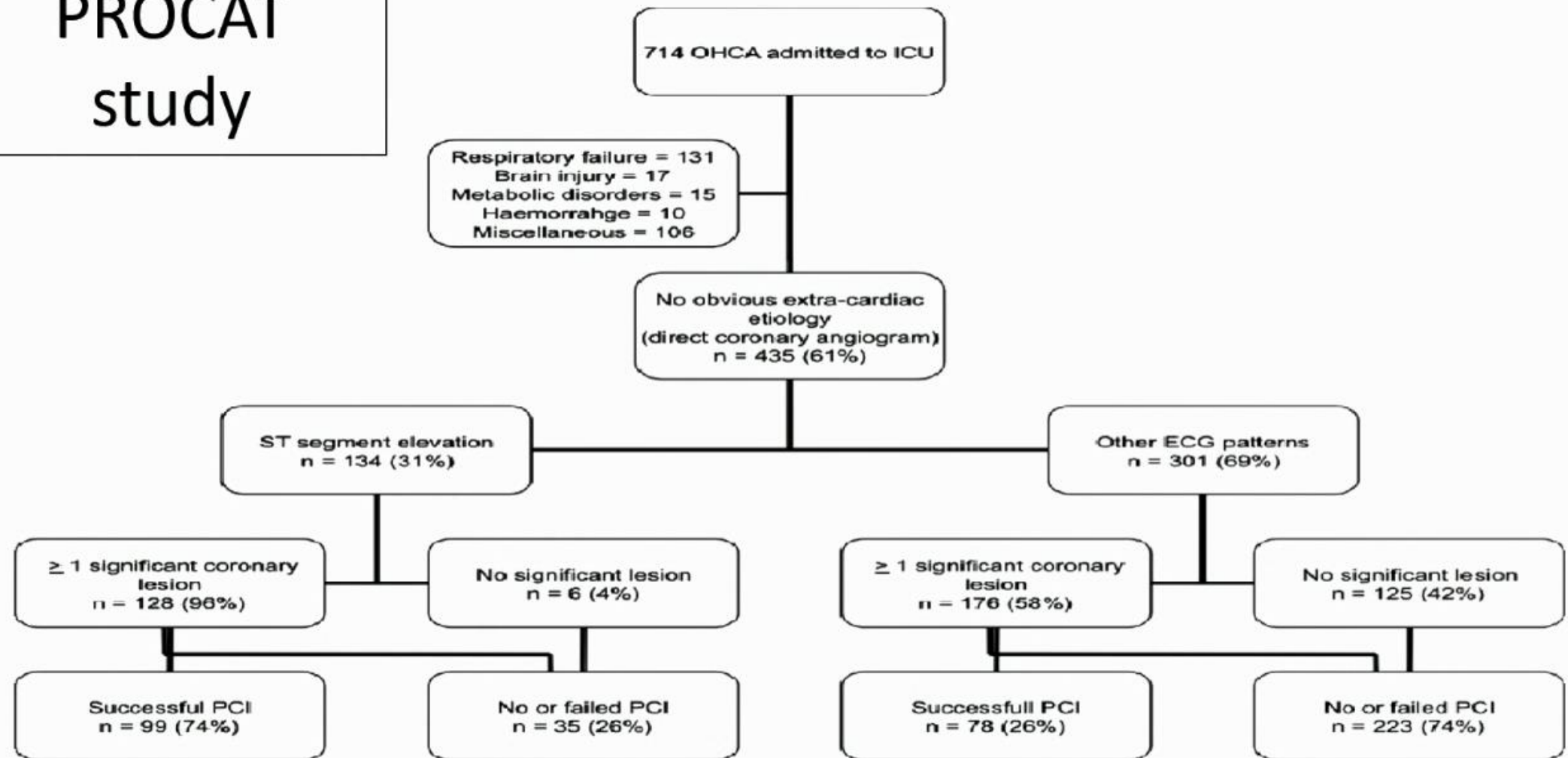
ACEH sans cause extra-cardiaque évidente

Coronarographie immédiate quelque soit ECG

Artère occluse ou lésion instable: 70%

ATL réussie améliore le pronostic par étude multivariée

PROCAT study



In-hospital survival rates

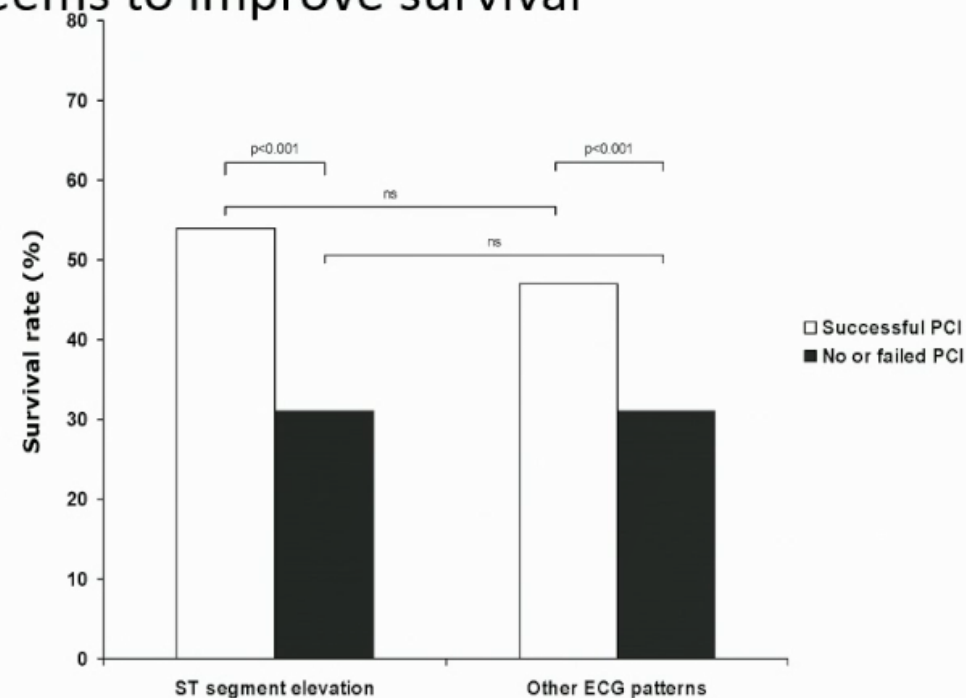
OHCA and ST segment elevation

High rate of acute coronary occlusion or « unstable lesion »

Successful PCI seems to improve survival

Survivors: 174/435 (39%)

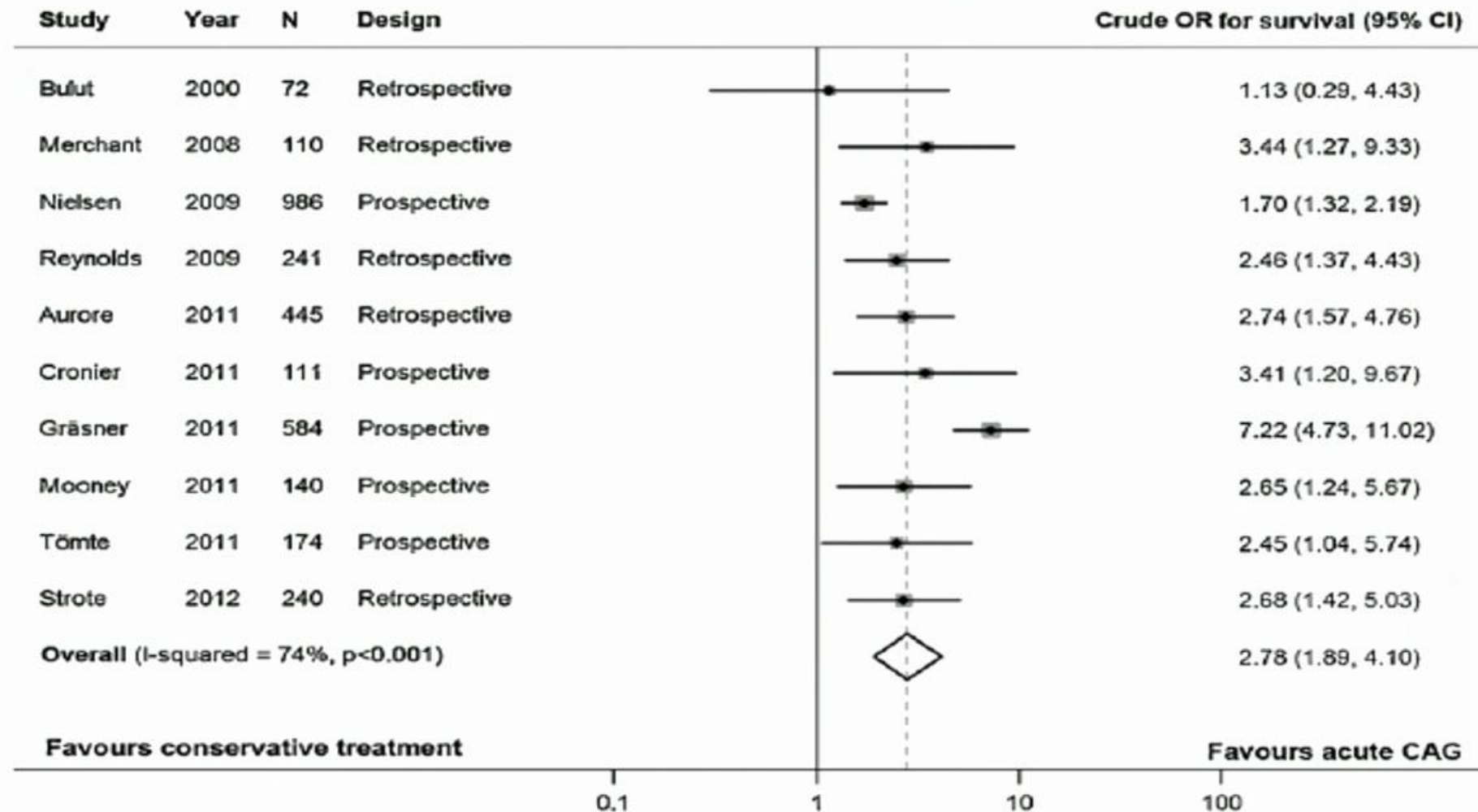
CPC levels 1/2: 160/174: 92%



Dumas F et al. Circ Cardiovasc Interv 2010;3:200-207

Registres comparant la coro immediate ou non dans l'AC

J.M. Larsen, J. Ravkilde / Resuscitation 83 (2012) 1427–1433



...Etudes randomisées...

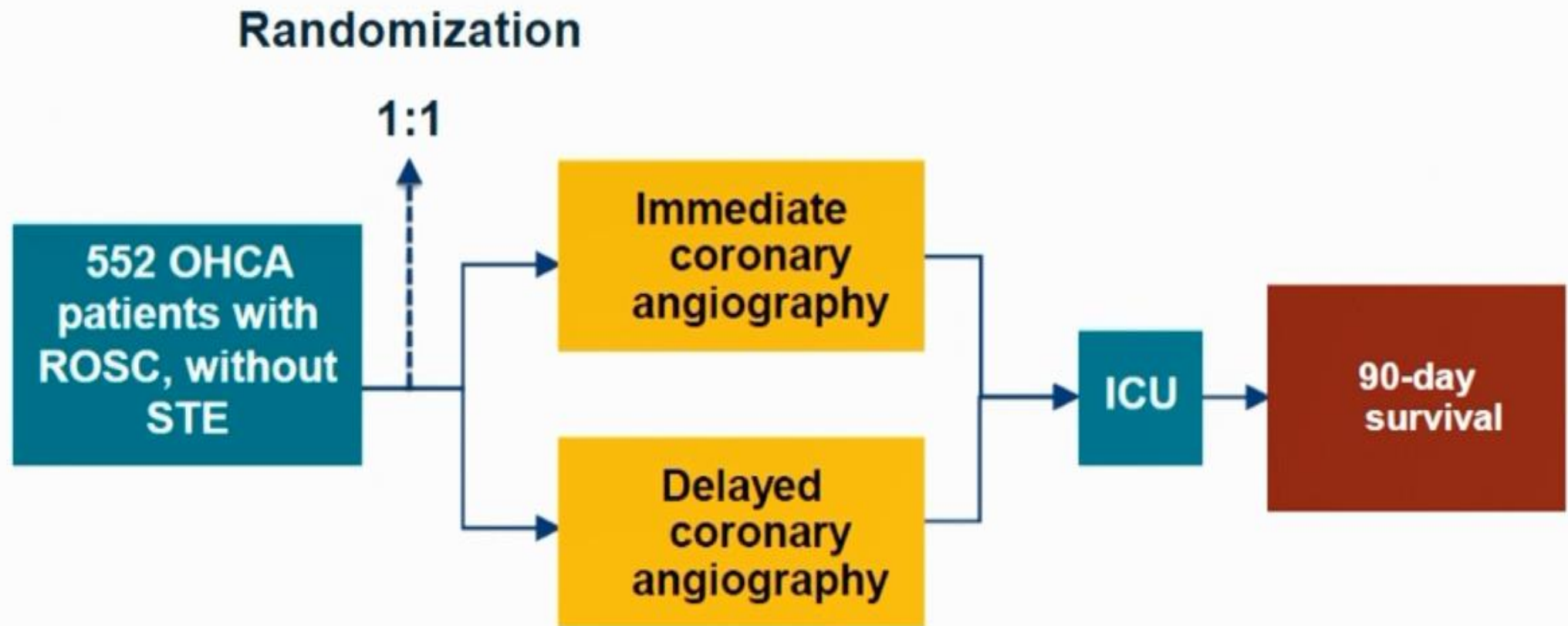
Coronary Angiography after Cardiac Arrest without ST-Segment Elevation: the COACT trial

On behalf of the **COACT** investigators

Jorrit Lemkes, MD, Interventional cardiologist

Amsterdam UMC, Vrije Universiteit Amsterdam, the Netherlands

Trial design





Procedures, treatments and characteristics of coronary artery disease

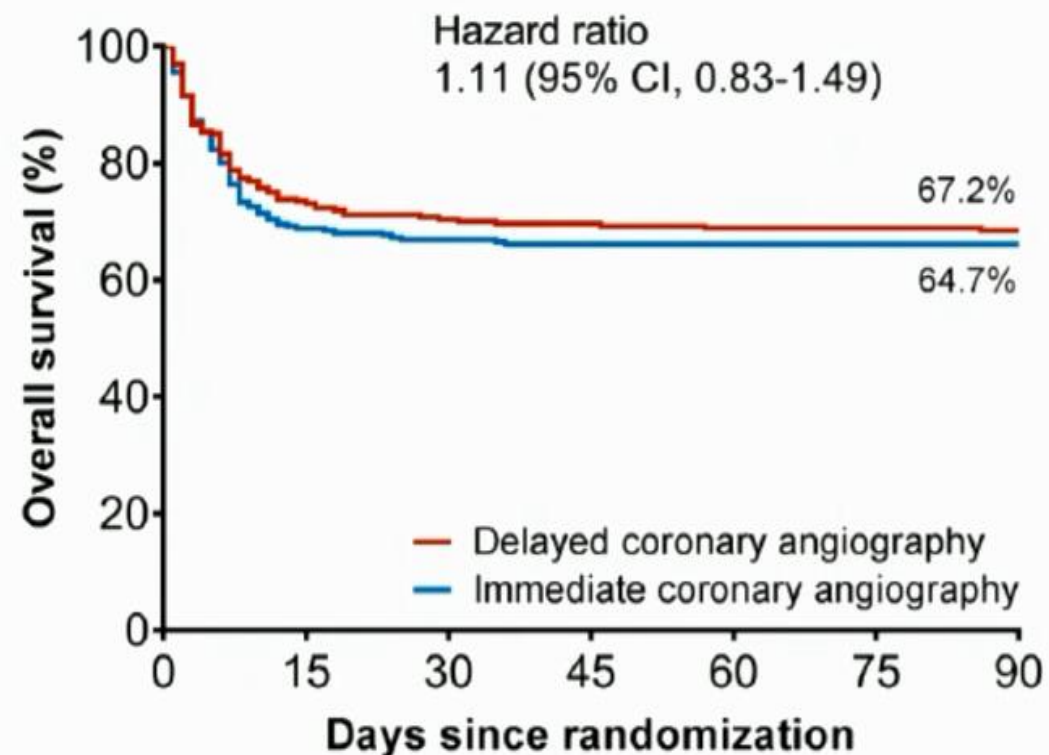
	Immediate Angiography Group (N=273)	Delayed Angiography Group (N=265)
CAG performed – no. (%)	265 (97.1%)	172*† (64.9%)
Median time from arrest to CAG (IQR) – hr	2.3 (1.8-3.0)	121.9 (52.0-197.3)
Median time randomization to CAG (IQR) – hr	0.8 (0.5-1.2)	119.9 (47.2-203.7)
Arteries with stenosis – no./total no. (%)		
0	94/265 (35.5%)	59/172 (34.3%)
1	72/265 (27.2%)	49/172 (28.5%)
2	54/265 (20.4%)	35/172 (20.3%)
3	45/265 (17.0%)	29/172 (16.9%)
Acute unstable lesion – no./total no. (%)	36/265 (13.6%)	29/172 (16.9%)
Acute thrombotic occlusion – no./total no. (%)	9/265 (3.4%)	13/172 (7.6%)‡
Chronic total occlusion – no./total no. (%)	100/265 (37.7%)	58/172 (33.7%)
Revascularization treatment – no. (%)		
PCI	90 (33.0%)	64 (24.2%)
CABG	17 (6.2%)	23 (8.7%)
Medical or conservative treatment	168 (61.5%)	179 (67.5%)

† 38 of these patients received urgent intervention because of cardiac deterioration, * 95% of patients who survived until hospital discharge.

‡ Six of these patients received urgent intervention because of cardiac deterioration.



Overall survival



No. at risk							
Immediate	273	183	178	176	176	176	176
Delayed	265	191	183	181	179	179	178



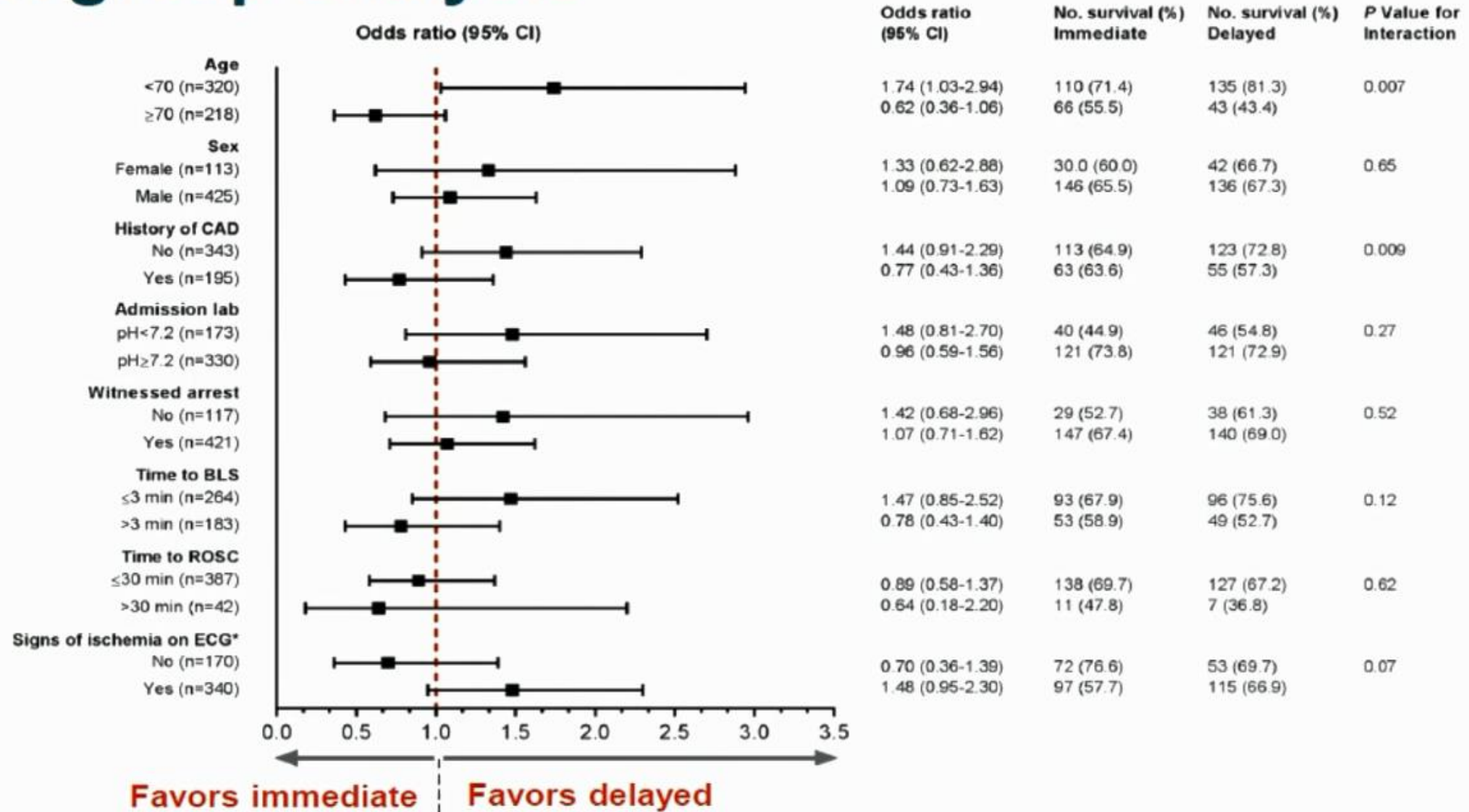
Secondary end points

	Immediate Angiography Group (N=273)	Delayed Angiography Group (N=265)	Effect Size (95% CI)*
Survival with good cerebral performance or moderate disability – no./total no. (%)	171/272 (62.9%)	170/264 (64.4%)	OR, 0.94 (0.66-1.31)
TIMI-major bleeding – no. (%)	7 (2.6%)	13 (4.9%)	OR, 0.51 (0.20-1.30)
Recurrence of VT resulting in defibrillation or electrical cardioversion – no. (%)	21 (7.7%)	16 (6.0%)	OR, 1.30 (0.66-2.54)
Need for renal replacement therapy – no. (%)	8 (2.9%)	11 (4.2%)	OR, 0.70 (0.28-1.76)
Time to target temperature – hr			
Median (IQR)	5.4 (2.9-8.6)	4.7 (2.6-7.5)	1.19 (1.04-1.36)
Geometric mean (95% CI)	6.5 (5.9-7.1)	5.5 (5.0-6.0)	
Duration of inotropic/catecholamine support – days			
Median (IQR)	1.7 (1.1-2.7)	1.9 (1.2-2.7)	0.94 (0.79-1.12)
Geometric mean (95% CI)	1.6 (1.4-1.8)	1.7 (1.5-1.9)	
Duration of mechanical ventilation – days			
Median (IQR)	2.3 (1.4-4.1)	2.2 (1.5-4.1)	0.96 (0.80-1.14)
Geometric mean (95% CI)	2.3 (2.0-2.6)	2.4 (2.1-2.7)	

* The delayed angiography group is used as the reference group for odds ratios and mean differences.



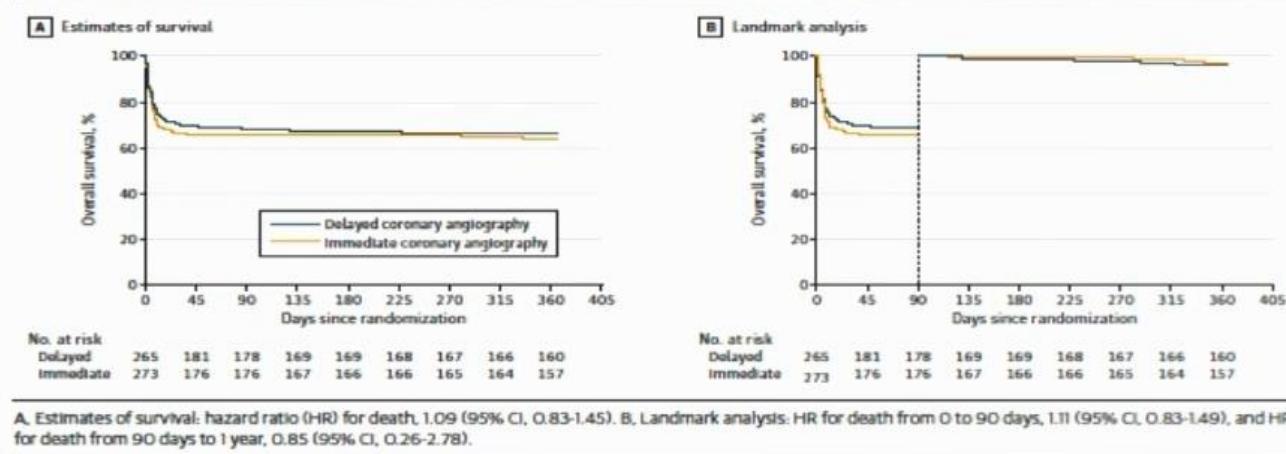
Subgroup analysis



Coronary Angiography After Cardiac Arrest Without ST Segment Elevation One-Year Outcomes of the COACT Randomized Clinical Trial

Jorrit S. Lemkes, MD; Gladys N. Janssens, MD; Nina W. van der Hoeven, MD; Lucia S. D. Jewbali, MD; Eric A. Dubois, MD, PhD; Martijn M. Meuwissen, MD, PhD; Topm A. Rijpstra, MD, PhD; Hans A. Bosker, MD, PhD; Michiel J. Blans, MD; Gabe B. Bleeker, MD, PhD; Remon R. Baak, MD; George J. Vlachojannis, MD, PhD; Bob J. W. Elkemans, MD; Pim van der Harst, MD, PhD; Iwan C. C. van der Horst, MD, PhD; Michiel Voskuil, MD, PhD; Joris J. van der Heijden, MD; Albertus Beishuizen, MD, PhD; Martin Stoel, MD, PhD; Cyril Camaro, MD, PhD; Hans van der Hoeven, MD, PhD; Jose P. Henriques, MD, PhD; Alexander P. J. Vlaar, MD, PhD; Maarten A. Vink, MD, PhD; Bas van den Bogaard, MD, PhD; Ton A. C. M. Heestermaars, MD, PhD; Wouter de Ruijter, MD, PhD; Thijs S. R. Delnoij, MD, PhD; Harry J. G. M. Crijns, MD, PhD; Gillian A. J. Jessurun, MD, PhD; Pranobe V. Oemrawsingh, MD, PhD; Marcel T. M. Gosselink, MD, PhD; Kees Plomp, MD; Michael Magro, MD, PhD; Paul W. G. Elbers, MD, PhD; Eva M. Spoormans, MD; Peter M. van de Ven, PhD; Heleen M. Oudemans-van Straaten, MD, PhD; Niels van Royen, MD, PhD

Figure 2. Estimates of Survival Among Patients Who Underwent Immediate or Delayed Coronary Angiography After Cardiac Arrest

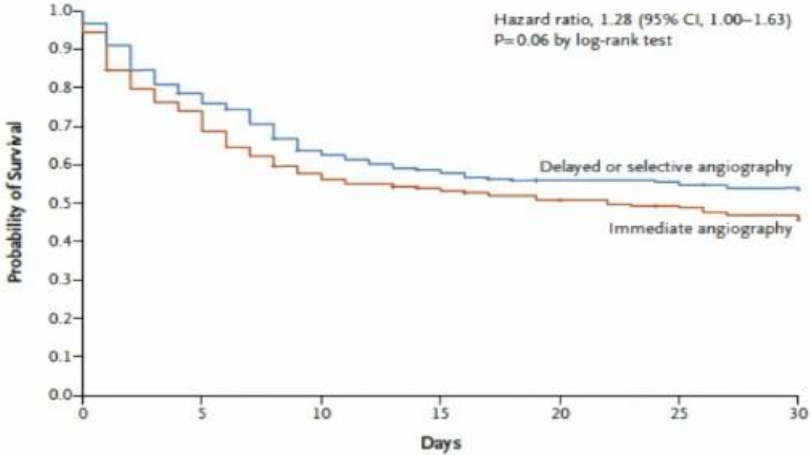


ORIGINAL ARTICLE

Angiography after Out-of-Hospital Cardiac Arrest without ST-Segment Elevation

S. Desch, A. Freund, I. Akin, M. Behnes, M.R. Preusch, T.A. Zelniker, C. Skurk, U. Landmesser, T. Graf, I. Eitel, G. Fuernau, H. Haake, P. Nordbeck, F. Hammer, S.B. Felix, C. Hassager, T. Engström, S. Fichtlscherer, J. Ledwoch, K. Lenk, M. Joner, S. Steiner, C. Liebetrau, I. Voigt, U. Zeymer, M. Brand, R. Schmitz, J. Horstkotte, C. Jacobshagen, J. Pöss, M. Abdel-Wahab, P. Lurz, A. Jobs, S. de Waha-Thiele, D. Olbrich, F. Sandig, I.R. König, S. Brett, M. Vens, K. Klinge, and H. Thiele, for the TOMAHAWK Investigators*

Rythme choquable et non choquable

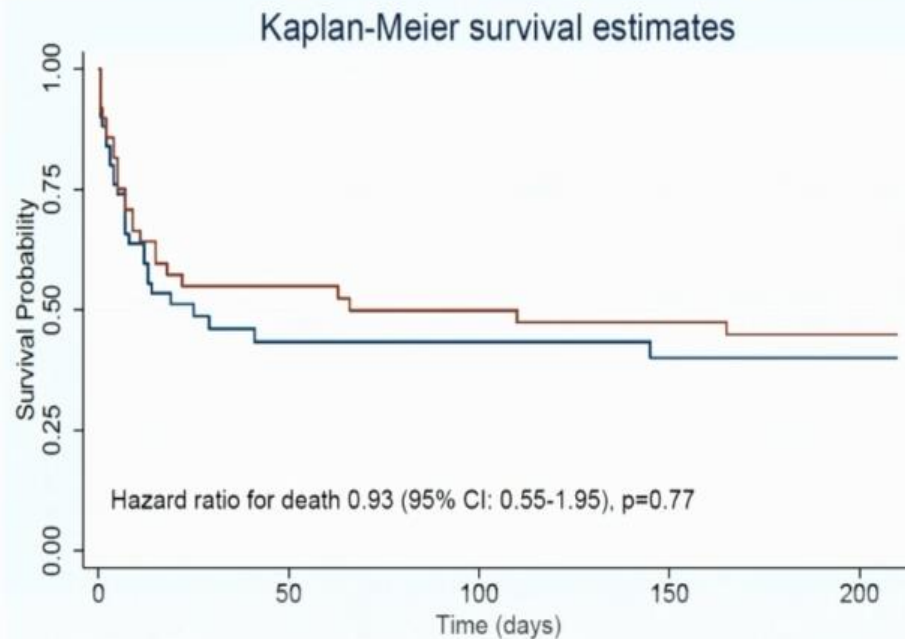


No. at Risk							
Delayed or selective angiography	265	207	163	149	139	138	133
Immediate angiography	265	195	151	138	129	123	117

Figure 1. Kaplan–Meier Estimates of Death from Any Cause at 30 Days. Shown is the risk of death at 30 days (the primary end point) among patients who underwent either immediate angiography or delayed or selective angiography after out-of-hospital cardiac arrest without ST-segment elevation.

A Randomized Pilot Clinical Trial of Early Coronary Angiography Versus No Early Coronary Angiography for Post-Cardiac Arrest Patients Without ST-Segment Elevation: The PEARL Study

Running Title: *Kern et al.; Angiography in Resuscitated Patients Without ST Elevation*



Disco Trial.

- Etude suedoise en cours...
- « Design » identique.
- Plus de 1000 patients à inclure

JACC: CARDIOVASCULAR INTERVENTIONS

VOL. 13, NO. 19, 2020

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CORONARY

Coronary Angiography in Patients With Out-of-Hospital Cardiac Arrest Without ST-Segment Elevation

A Systematic Review and Meta-Analysis

Beni R. Verma, MD,^a Vikram Sharma, MD,^a Shashank Shekhar, MD,^a Manpreet Kaur, MD,^a Shameer Khubber, MD,^a Agam Bansal, MD,^a Jarmanjeet Singh, MD,^a Keerat Rai Ahuja, MD,^a Salik Nazir, MD,^b Michael Chetrit, MD,^a Venu Menon, MD,^a Grant Reed, MD,^a Samir Kapadia, MD^a





Consider realistic outcomes
of treatment

Therapeutic hypothermia

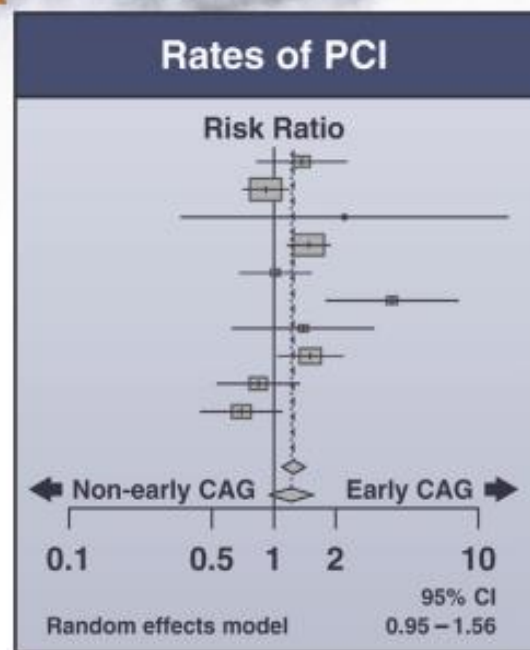
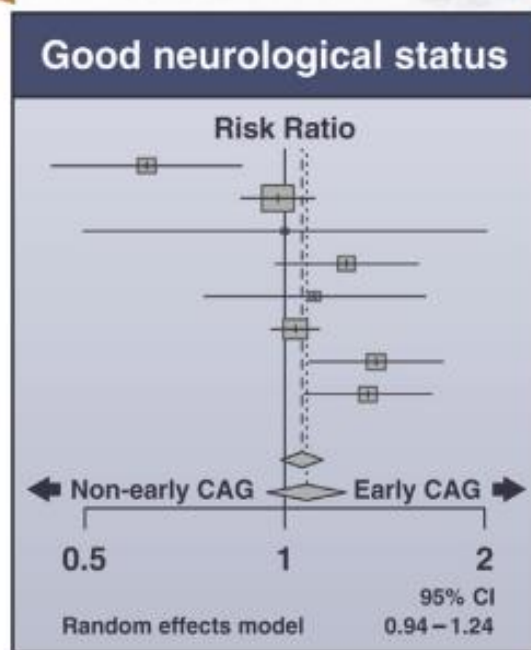
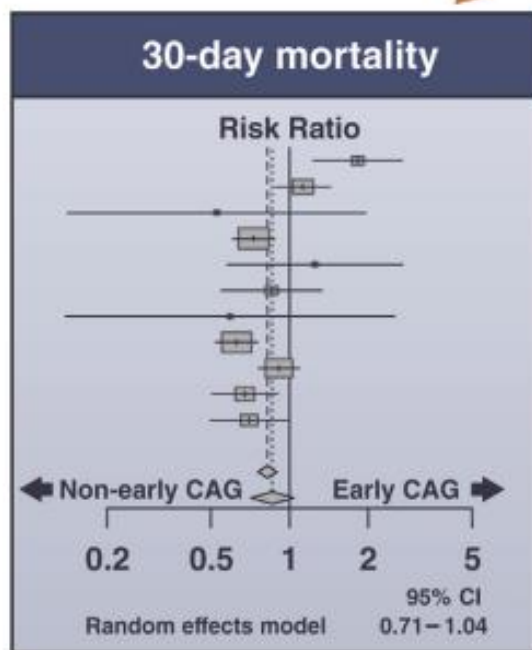
+

Mechanical Support

IABP, Impella, ECMO

+

Early vs Non-early CAG





Emergency *Versus* Delayed Coronary Angiogram In Survivors Of Out-Of-Hospital Cardiac Arrest Without ST Segment Elevation: Results Of The EMERGE Trial

Christian Spaulding on behalf of the EMERGE investigators

AHA Late Breaking Trials November 14, 2021

EMERGE Randomized Trial

- **Hypothesis:** Performing an immediate CAG after an OHCA without ST segment elevation on the post-resuscitation ECG and no obvious non-cardiac cause of arrest leads to a better outcome *versus* performing a delayed CAG
- **Primary end-point:** 180-day survival with no or minimal neurological sequel (Cerebral Performance Category (CPC) 1 or 2)

Trial Network and Organization

Principal investigator
Christian Spaulding

Sterring Committee
Alain Cariou, Pierre Carli, Gilles Chatellier, Caroline Hauw-Berlemont, Lionel Lamhaut, Christian Spaulding

Funding
French Ministry of Health

Project Manager—, Abel Grine, Sophie Glippa, Juliette Djadi-Prat, Mandy Nizard, Ophélie Rogier

Clinical Research Associate - Khaled Alsaleh, Sabrina Boudhif, Djennat Bousry, Myriam Calvet, Fatima Djelouat, Muriel Gernet, Youcef Sekour, Estelle Souedi

Methodologist - Gilles Chatellier

Statistician - Aurélie Vilfaillot

Data manager—Axel Bouffier, Hajar Chouiki

Centers: 24



Greater Paris Area

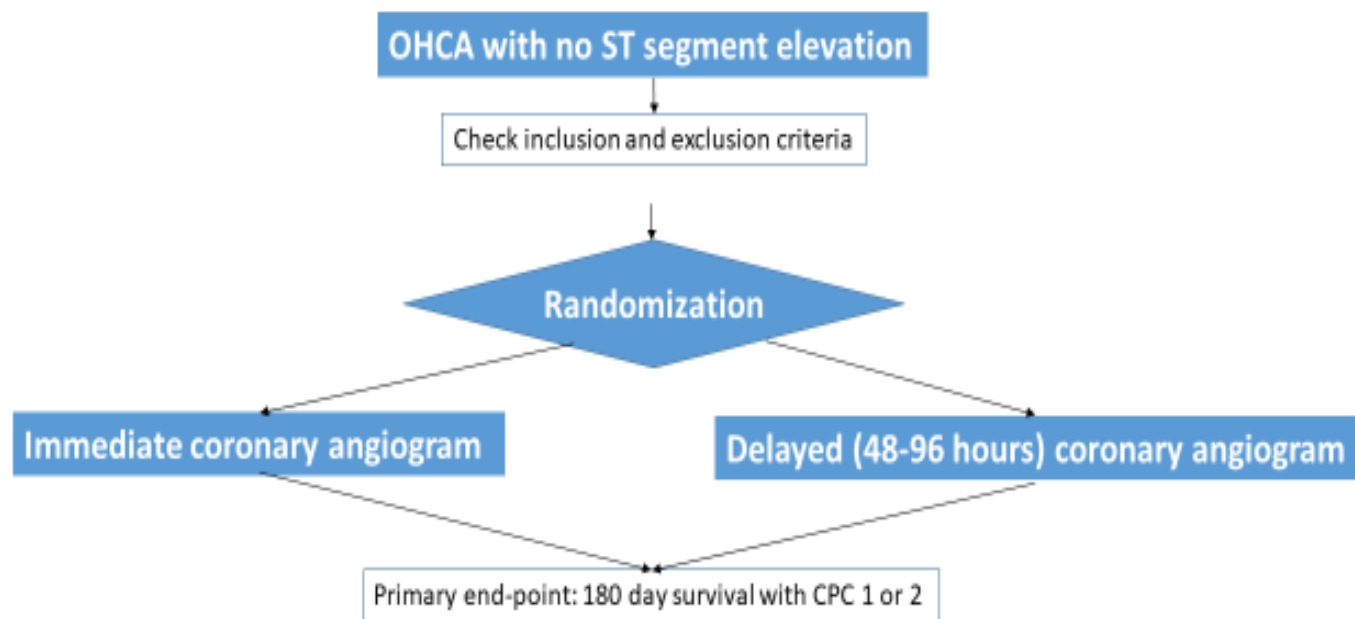
Key Inclusion and Exclusion Criteria and Trial Design

Inclusion criteria

- Adult patients > 18 years of age
- OHCA with return of spontaneous circulation (ROSC), without obvious non-cardiac cause of arrest
- Admitted to a center with an intensive care unit and a 24/7 interventional cardiology department

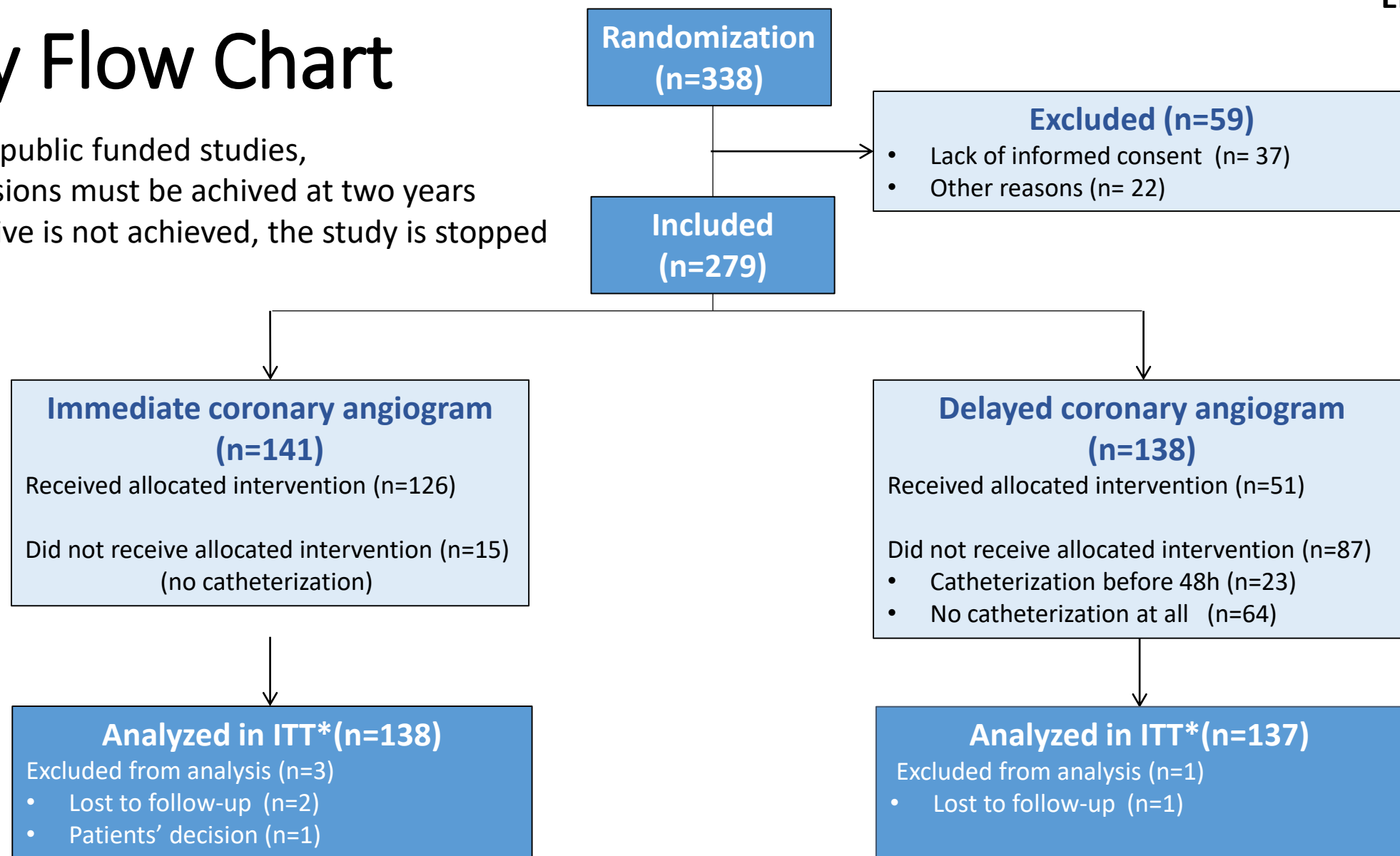
Exclusion criteria

- No ROSC
- ST segment elevation
- In-hospital cardiac arrest
- Participation in another intervention study
- Absence of informed consent



Study Flow Chart

In France, in public funded studies,
50% of inclusions must be achieved at two years
If this objective is not achieved, the study is stopped



*ITT : Intention To Treat

	Immediate Coronary Angiogram N=141	Delayed Coronary Angiogram N=138
Age (years) Median (IQR)	67 (55-76)	66.5 (55-75.8)
Male sex-n/total (%)	103/141 (73.1)	92/138 (66.7)
Witnessed OHCA- %	88.7	92.7
Bystander CPR-%	75	79.7
Time from OHCA to BLS (min); median (IQR)	3 (1-6)	2 (1-5)
Time from OHCA to ROSC (min); median (IQR)	27 (16.5-36.5)	25 (18-35.3)
Place of cardiac arrest-% Public area Home Other	41.1 51.8 7.1	42 53.6 4.4
Initial rythm-% Non-shockable Shockable	65.2 34.8	69.9 30.1
GCS after ROSC; median (IQR)	3(3-3)	3(3-3)
Signs of ischemia on ECG-%	49.6	48.1
LVEF at inclusion-%; median (IQR)	45 (30-55)	50 (30-60)

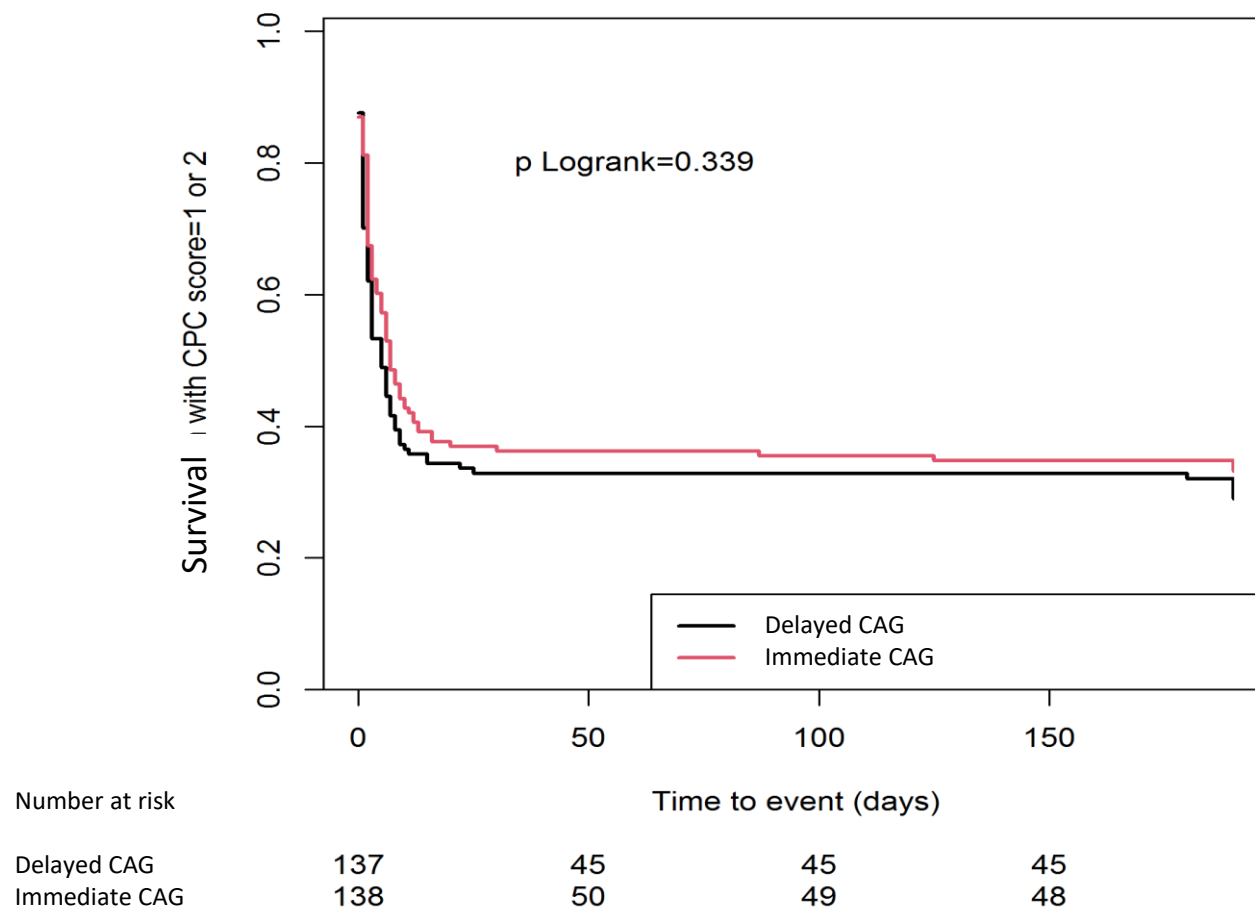
OHCA: out of hospital cardiac arrest, CPR: cardiopulmonary resuscitation, BLS: basic life support, GCS: Glasgow coma score, LVEF: left ventricular ejection fraction, ECG: electrocardiogram, IQR: interquartile range

Procedural data

	Immediate Coronary Angiogram N=141	Delayed Coronary Angiogram N=138	p
CAG performed-n/total (%)	126/141 (89.4)	74/138(53.6)	<0.001
Time from arrest to CAG-(hours);median (IQR)	2(2-3)	65.5 (40.8-74.8)	<0.001
Urgent CAG before planned procedure-n/total (%)	NA	23/74 (31.1)	
Radial approach-%	50.4	76.7	<0.001
Severity of coronary artery disease-n/total (%) No significant disease One-vessel disease Two-vessel disease Three-vessel disease	 57/126 (45.2) 22/126 (17.5) 26/126 (20.6) 21/126 (16.7)	 41/74 (55.4) 11/74 (14.9) 10/74 (13.5) 12/74 (16.2)	0.484
PCI-n/total (%) Yes No	 38/126 (30.2) 88/126 (69.8)	 17/74 (23) 57/74 (77)	0.002
Reasons for not performing PCI-n/total (%) No significant lesion No clear culprit lesion Clear culprit lesion not treated Other reason	 35/88 (39.8) 37/88(42.1) 1/88 (1.1) 15/88 (17.1)	 20/57 (35.1) 24/57 (42.1) 1/57 (1.8) 12/57 (21.1)	0.9
Stent implanted-n/total(%)	35/38 (92.1)	14/17 (82.4)	0.359

CAG: coronary angiogram, IQR: interquartile range, PCI: percutaneous coronary intervention

Primary end-point: Survival at 180 days with CPC 1 or 2



Secondary end-points

EMERGE Trial

	Immediate Coronary Angiogram N=141	Delayed Coronary Angiogram N=138	p
Overall survival rate-n/total(%)	51/141 (36.2)	46/138 (33.3)	0.308
CPC 1 or 2 at ICU discharge-n/total (%)	43/141 (30.5)	40/138 (29.0)	0.254
CPC 1 or 2 at 90 days	40/141 (28.4)	34/138 (24.6)	0.293
Shock during first 48 hours-n/total (%)	50/129 (38.8)	53/133 (39.8)	0.857
Occurrence of VT/VF during the first 48 hours-n/total (%)	10/141 (7.1)	5/138 (3.6)	0.207
LVEF at 180 days-% (median, IQR)	60 (50-63)	57.5 (51-60)	0.259
Length of hospital stay-days (mean, IQR)	7(2-13)	5 (1-11)	0.749
Withdrawal of care-n/total (%)	56/141 (39.7)	65/138 (47.1)	0.214

ICU: intensive care unit, CPC: cerebral performance category, VT: ventricular tachycardia, VF: ventricular fibrillation, LVEF: left ventricular ejection fraction

Discussion

- The inclusions were stopped before the planned number of patients were included
- The results from EMERGE confirm previously published randomized studies
- EMERGE inclusion criteria were broad, with a high rate of non-shockable patients
- Results from randomized controlled trials are in contrast with data from registries in survivors of OHCA
- There is a need to perform a large meta-analysis to determine if there is a subgroup of patients which benefits from an early invasive strategy

Lemkes JS et al, N Engl J Med 2019; 380:1397-1407

Kern KB et al, Circulation 2020; 142:2002-12

Desh S et al, N Engl J Med 2021; Aug 29 epub

Dumas F et al JACC Cardiovas Interv 2016; 23:1011-8

Conclusions

- In survivors of an out-of-hospital cardiac arrest with no obvious non cardiac cause of arrest and no ST segment elevation on the post-resuscitation ECG, there was no difference on survival at 180 days with CPC 1 or 2 between a strategy of immediate and delayed (48-92 hours) coronary angiogram
- The current data supports direct admission of these patients to ICU and performing a deferred coronary angiogram



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RESUSCITATION
COUNCIL**ILCOR Summary Statement****2021 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations ★,★★,☆☆***Treatment Recommendations*

When CAG is considered for comatose postarrest patients without ST-segment elevation, we suggest that either an early or a delayed approach for CAG is reasonable (weak recommendation, low-certainty evidence).

We suggest early CAG in comatose post-cardiac arrest patients with ST-segment elevation (good practice statement).

Découvrez les procédures Cardiologie RESURCOR mises à disposition



Recommandations régionales pour la prise en charge des SCA ST+ < 12 h

7 mai 2021

📄 Ouvrir



Arrêts cardiaques réfractaires - indications d'ECMO et DDAC

1 janvier 2021

📄 Ouvrir



Prise en charge des patients porteurs d'un défibrillateur implantable : chocs sur DAI

1 janvier 2021

📄 Ouvrir



Orientation des arrêts cardiaques récupérés : indication de coronarographie

1 janvier 2021

📄 Ouvrir



Prise en charge d'une fibrillation atriale / flutter de l'adulte

1 janvier 2021

📄 Ouvrir



Embolie pulmonaire : diagnostic et traitement

1 janvier 2021

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Prise en charge d'une syncope de l'adulte

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Prise en charge de l'OAP en urgence

1 janvier 2021

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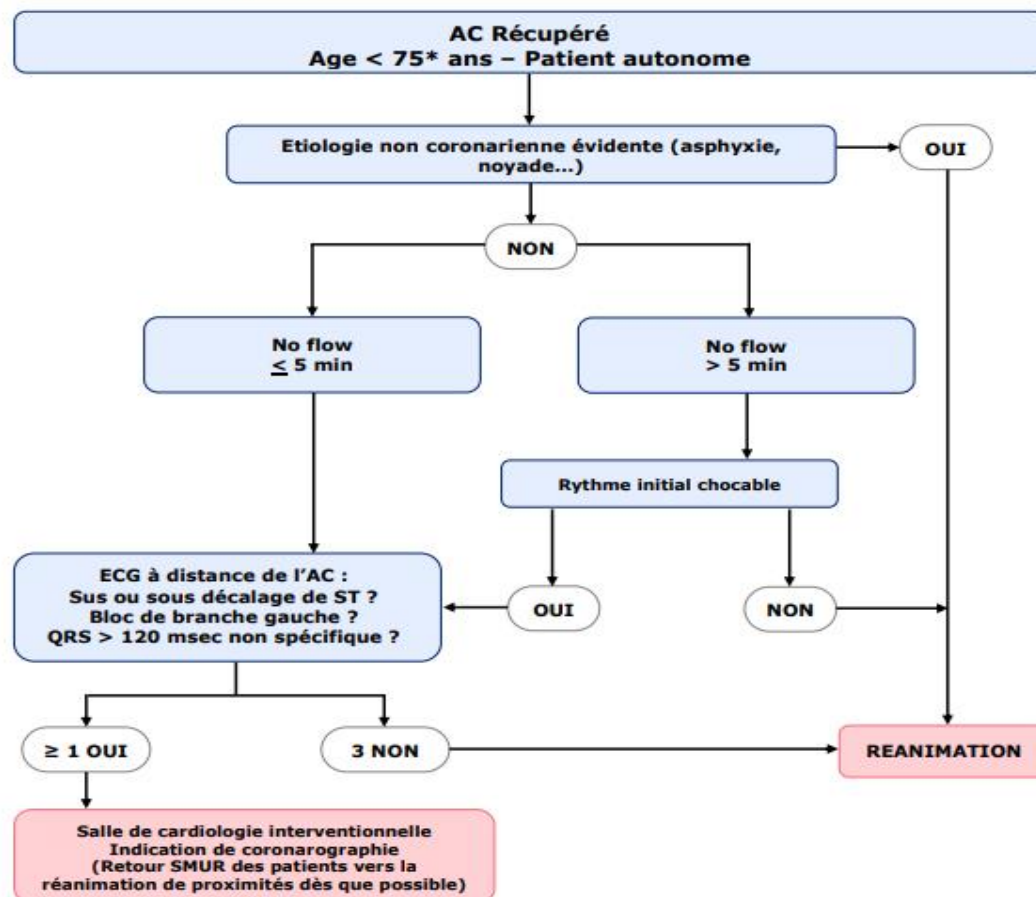
ARRETS CARDIAQUES



ORIENTATION DES ARRETS CARDIAQUES RECUPERES INDICATION DE CORONAROGRAPHIE

REDACTION : Bureau RESURCOR
 VALIDATION : Commission scientifique

MAJ du 01/01/2021



* Pour les patients âgés de + de 75 ans, les décisions de coronarographies se feront au cas par cas (contact téléphonique avec le cardiologue de garde).

ARRETS CARDIAQUES



ORIENTATION DES ARRETS CARDIAQUES RECUPERES INDICATION DE CORONAROGRAPHIE

REDACTION : Bureau RESURCOR
VALIDATION : Commission scientifique

MAJ du 01/01/2022

