Printemps 2013 de la Médecine d'Urgence

# Arrêt cardiaque :
# *La coro pour qui, quand, comment ?*

G.Vanzetto
Cardiologie & Urgences Cardiologiques
Pôle CVT

# Etiologies des ACR non traumatiques

- Coronary Heart Disease
  - Acute Coronary Occlusion
  - Arrhythmia
  - Pump Dysfunction
  - Abnormal coronary connexion
- Structural Heart Disease
  - Valvular Disease
  - Dilated CMP
  - Hypertrophic CMP
- Primary Arrhythmias
  - ARVD
  - PCTV
  - Channelopathy (LQT, SQT, BS,…)
- Non-cardiac causes
  - Metabolic
  - Toxic
  - Neurological
  - Pulmonary embolism
  - …

*D'après Kirtane, Columbia University*

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# Contexte

- Une occlusion coronaire aigue est retrouvée dans 40% des ACR

# 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.

1762 ACR extra-H
- → 852 DCD

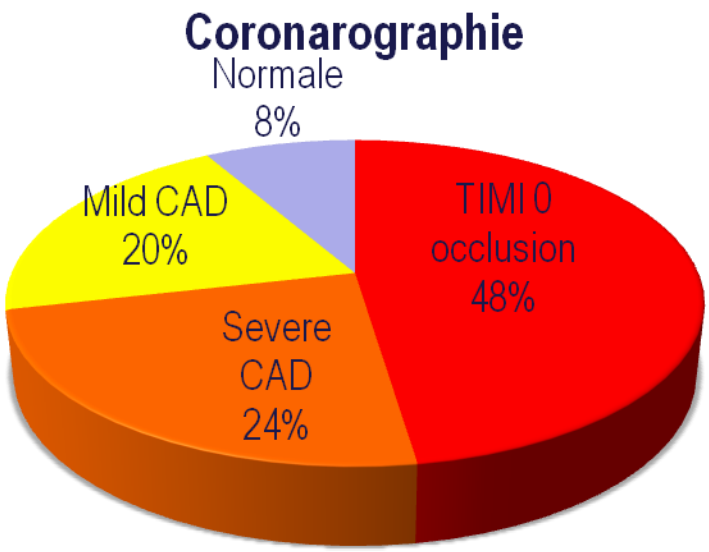
910 ACR réanimés
- → 598 échecs

312 ROSC
- → 126 re-ACR

186 survivants
- → 71 ACR expliqués
  30 exclus / âge

85 inclus (4.8%)
- → 1 échec (AOMI)

84 coronarographies

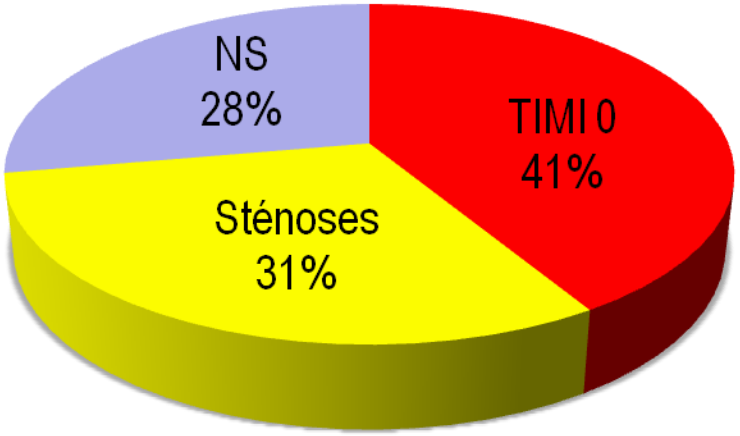


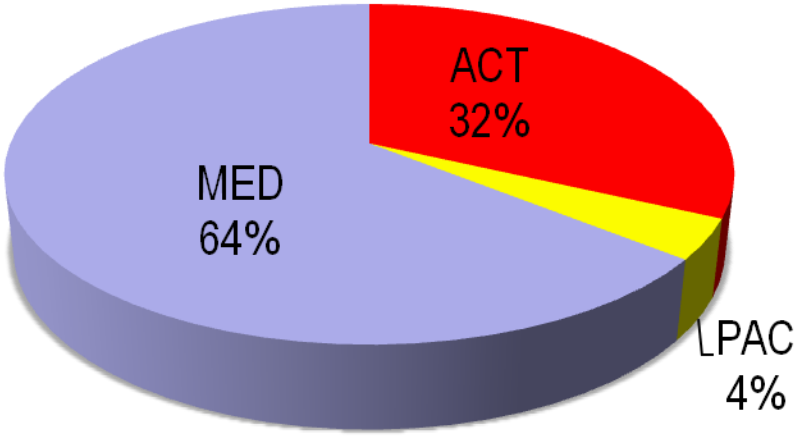

1. In this series of patients who had sustained cardiac arrest outside of the hospital, we found a high prevalence of acute coronary occlusions.

N Engl J Med 1997;336:1629-33

# Expérience CHU de Grenoble

- 2002-2009
- 288 ACR pris en salle de coronarographie
- 217 hommes / 71 femmes
- Age moyen 60 ± 15 ans (15-80)



# Contexte

- Une occlusion coronaire aigue est retrouvée dans 40% des ACR
- La valeur diagnostique de l'ECG post-ACR pour le diagnostic d'occlusion coronaire est sub-optimale

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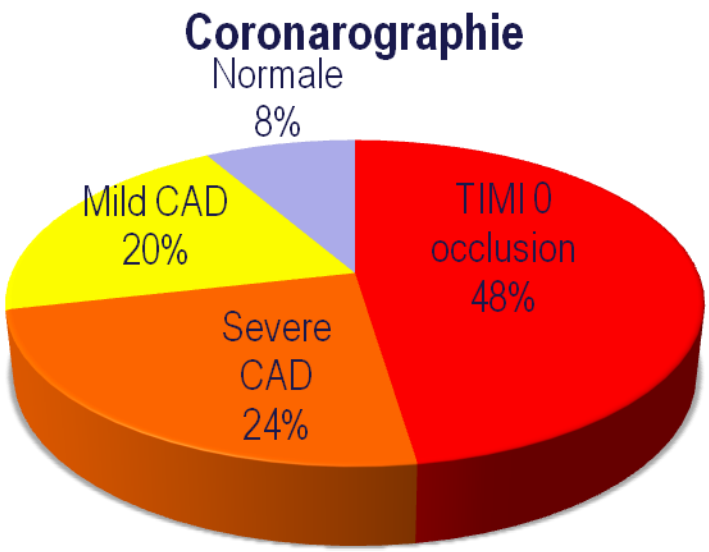
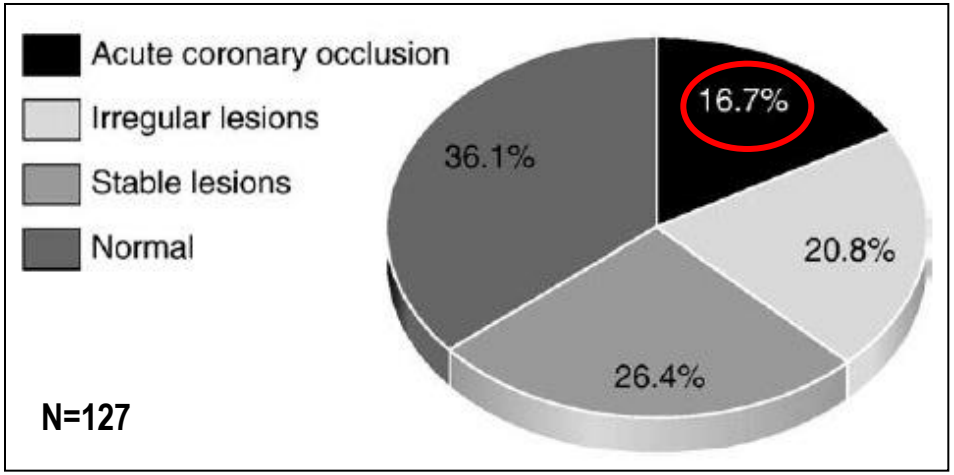



1. In this series of patients who had sustained cardiac arrest outside of the hospital, we found a high prevalence of acute coronary occlusions.
2. The second important finding is the poor predictive value of ECG data for coronary artery occlusion

N Engl J Med 1997;336:1629-33

# Acute coronary angiographic findings in survivors of out-of-hospital cardiac arrest

Zacharias Alexandros Anyfantakis, MD,[a,b] Gabriel Baron, MSc,[c] Pierre Aubry, MD,[a] Dominique Himbert, MD,[a] Laurent J. Feldman, MD, PhD,[a] Jean-Michel Juliard, MD,[a] Agnès Ricard-Hibon, MD,[d] Alexis Burnod, MD,[d] Dennis V. Cokkinos, MD,[b] and Philippe Gabriel Steg, MD[a] *Paris and Clichy, France; and Athens, Greece*




| Electrocardiographic patterns on admission | |
|---|---|
| ST-segment elevation | 23 (31.9) |
| ST-segment depression | 21 (21.9) |
| Left bundle branch block | 12 (16.7) |
| Right bundle branch block | 5 (16.9) |
| Unspecific ST or T patterns | 12 (16.7) |
| Normal | 11 (15.3) |

The presence of ST elevation on admission was a strong independent correlate of acute myocardial infarction and may be used to triage OHCA patients to emergency angiography with a view to PCI.

ST-segment elevation after ROSC was an independent correlate of the presence of CAD : OR 14.2 [2.85 - 70.8], P = .001) with a positive predictive values of 94.7% but a negative predictive value of 43.9%.

Am Heart J 2009;157:312-8

# Immediate Percutaneous Coronary Intervention Is Associated With Better Survival After Out-of-Hospital Cardiac Arrest

Florence Dumas, MD; Alain Cariou, MD; Stéphane Manzo-Silberman, MD; David Grimaldi, MD; Benoît Vivien, MD; Julien Rosencher, MD; Jean-Philippe Empana, MD; Pierre Carli, MD; Jean-Paul Mira, MD; Xavier Jouven, MD; Christian Spaulding, MD

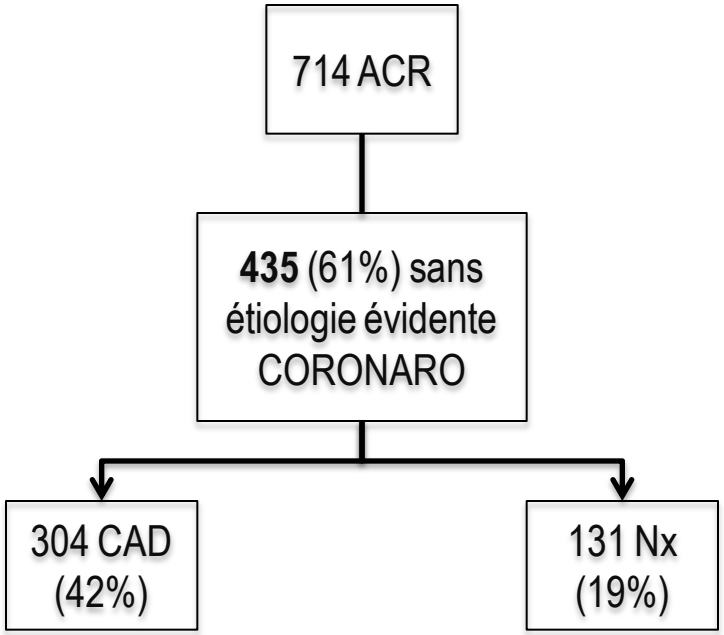



**Table 2. Predictive Values of ST-Segment Elevation for Significant Coronary Lesion and PCI**

| ST-Segment Elevation Predictive Values | Significant Coronary Lesion | Significant PCI |
|---|---|---|
| Positive predictive value | 0.96 | 0.74 |
| Negative predictive value | 0.42 | 0.74 |
| Sensitivity | 0.42 | 0.56 |
| Specificity | 0.95 | 0.83 |

Circ Cardiovasc Interv. 2010;3:200-207

# Contexte

- Une occlusion coronaire aigue est retrouvée dans 40% des ACR
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- La valeur diagnostique de l'ECG post-ACR pour le diagnostic d'occlusion coronaire est sub-optimale (VPN absence Pardee 50%)
- La coronarographie après ACR – associée à une réanimation spécialisée et une hypothermie – améliore le pronostic vital

J Intensive Care Med. 2009 May-Jun;24(3):179-86

## Coronary angiography predicts improved outcome following cardiac arrest: propensity-adjusted analysis.

Reynolds JC, Callaway CW, El Khoudary SR, Moore CG, Alvarez RJ, Rittenberger JC.

- Chart review of resuscitated cardiac arrest patients between 2005 and 2007
- The association between CATH and good outcome (discharge home or to acute rehabilitation facility) was determined using logistic regression adjusting for likelihood of receiving CATH via propensity score.
- Of the 241 patients, 96 (40%) received CATH. Significant disease was identified in 69% of patients including 57% of patients without acute ischemic ECG changes.
- Propensity adjusted logistic regression demonstrated an association between CATH and good outcome (OR 2.16; 95% CI 1.12, 4.19; P<0.02).
- **CONCLUSION:** Receiving CATH was independently associated with good outcome

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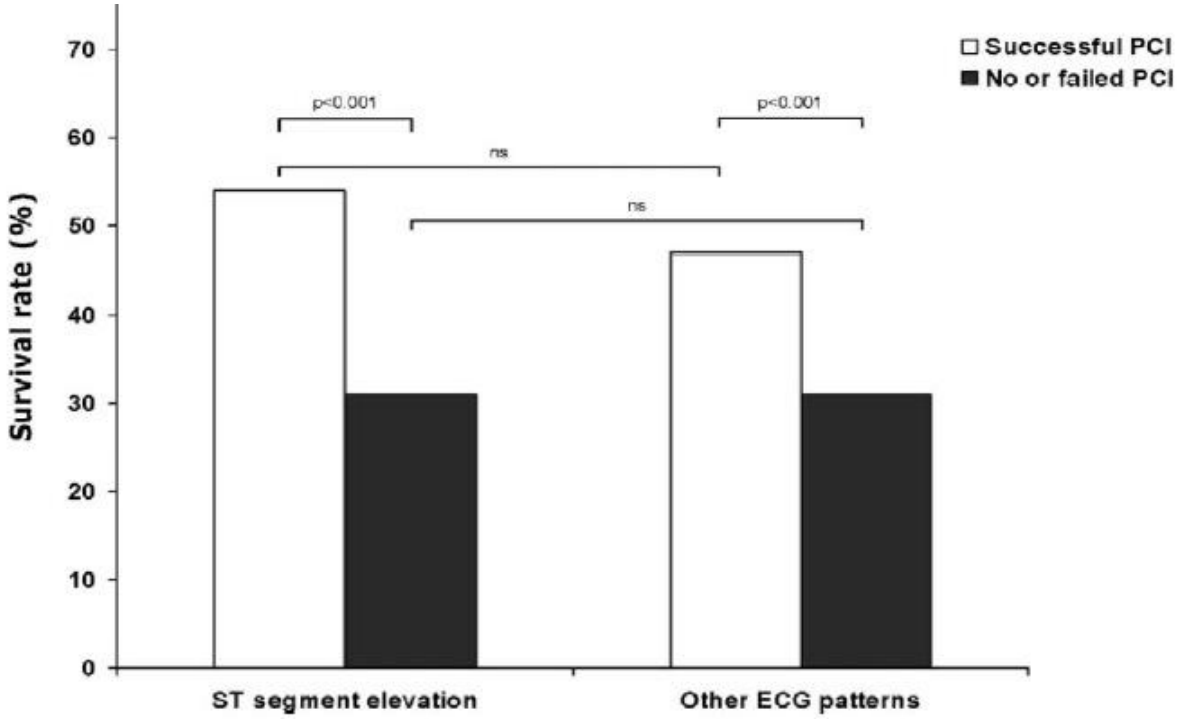
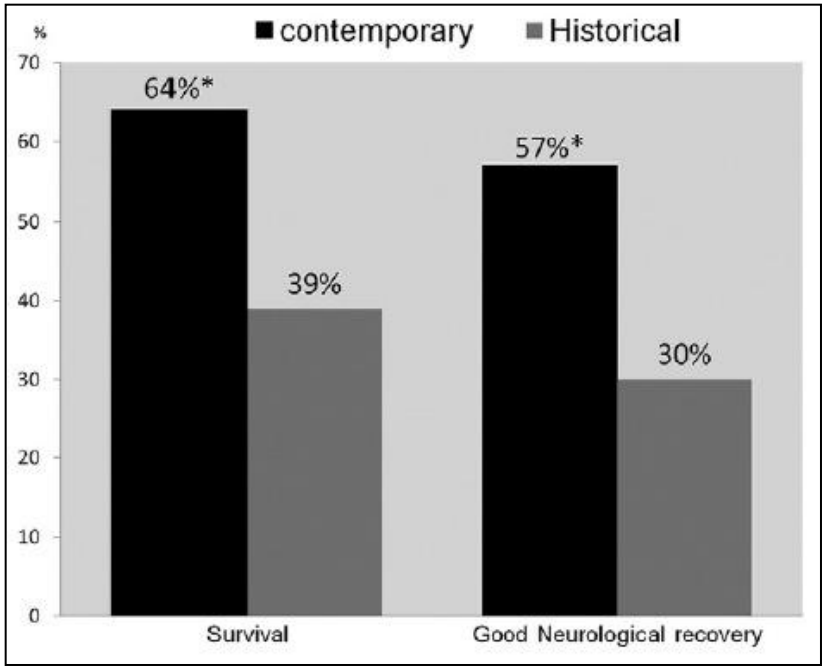


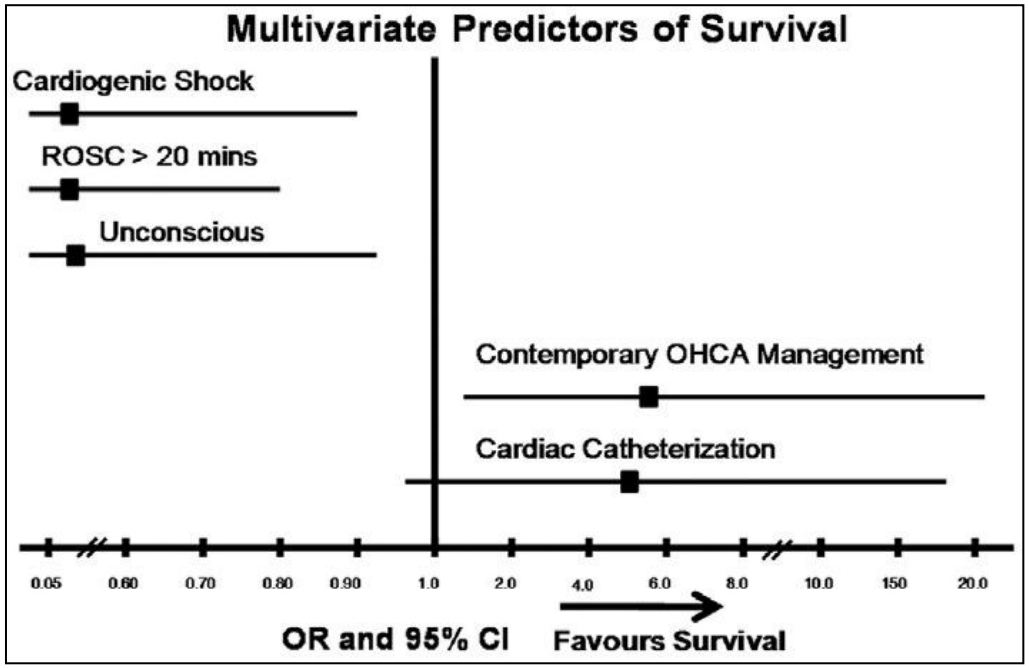

*Conclusions*—Successful immediate coronary angioplasty is associated with improved hospital survival in patients with or without ST-segment elevation. Therefore, our findings support the use of immediate coronary angiography in patients with out-of-hospital cardiac arrest with no obvious noncardiac cause of arrest regardless of the ECG pattern.

Circ Cardiovasc Interv. 2010;3:200-207

# Usefulness of Cooling and Coronary Catheterization to Improve Survival in Out-of-Hospital Cardiac Arrest

Dion Stub, MBBS[a,b,*], Christopher Hengel, MBBS[a], William Chan, MBBS[a,b], Damon Jackson, MBBS[a], Karen Sanders, RN, GradDipEd[a],



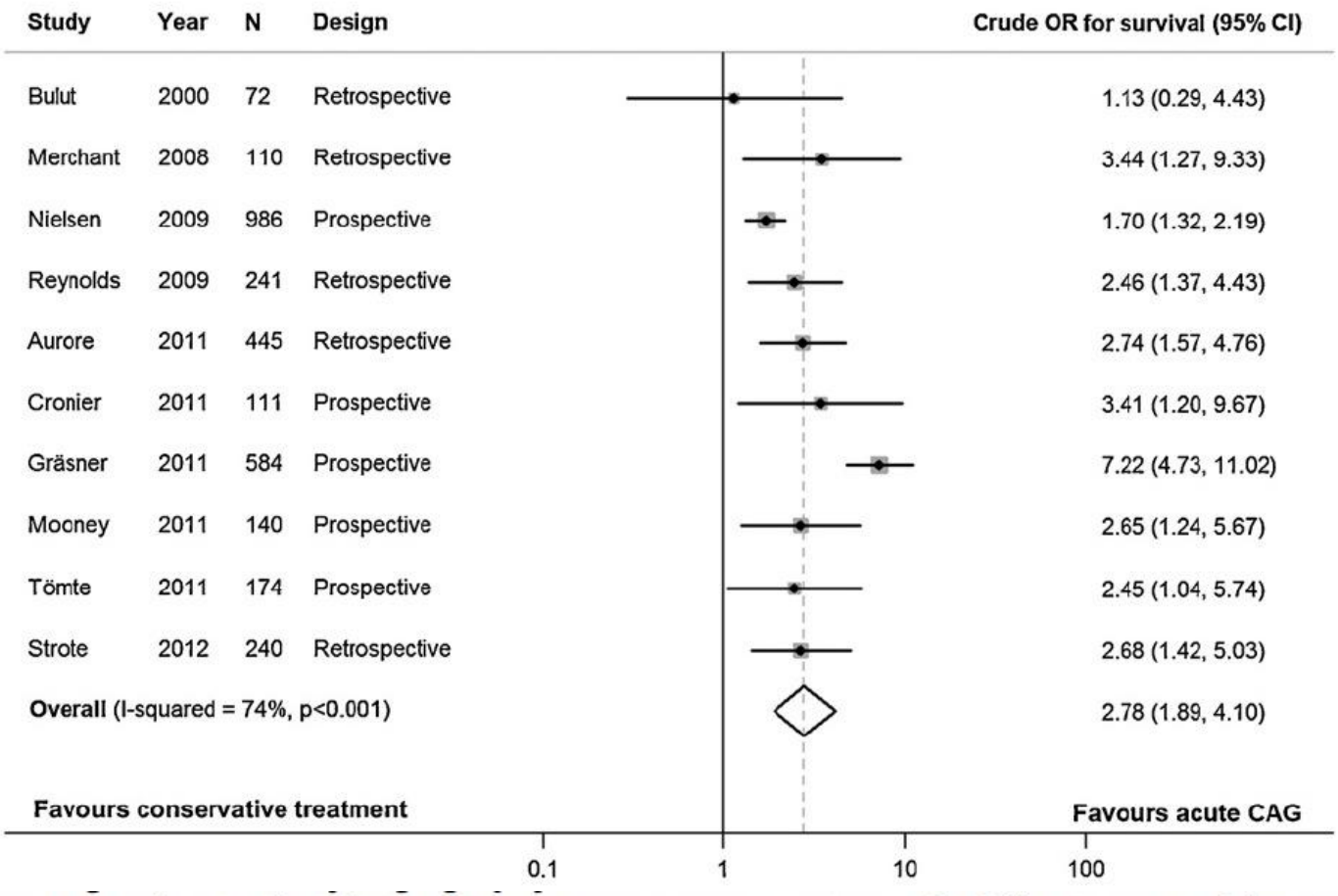

In conclusion, modern management of OHCA, including therapeutic hypothermia and early coronary angiography is associated with significant improvement in survival to hospital discharge and neurologic recovery.

Am J Cardiol. 2011;107:522-7

Clinical paper

Resuscitation 83 (2012) 1427–1433

# Acute coronary angiography in patients resuscitated from out-of-hospital cardiac arrest—A systematic review and meta-analysis☆




*Conclusion:* No randomised studies exist on acute coronary angiography following out-of-hospital cardiac arrest. An increasing number of observational studies support feasibility and a possible survival benefit of an early invasive approach. In patients without an obvious non-cardiac aetiology, acute coronary angiography should be strongly considered irrespective of electrocardiographic findings due to a high prevalence of coronary artery disease.

# Bénéfice de la stratégie interventionnelle post-ACR

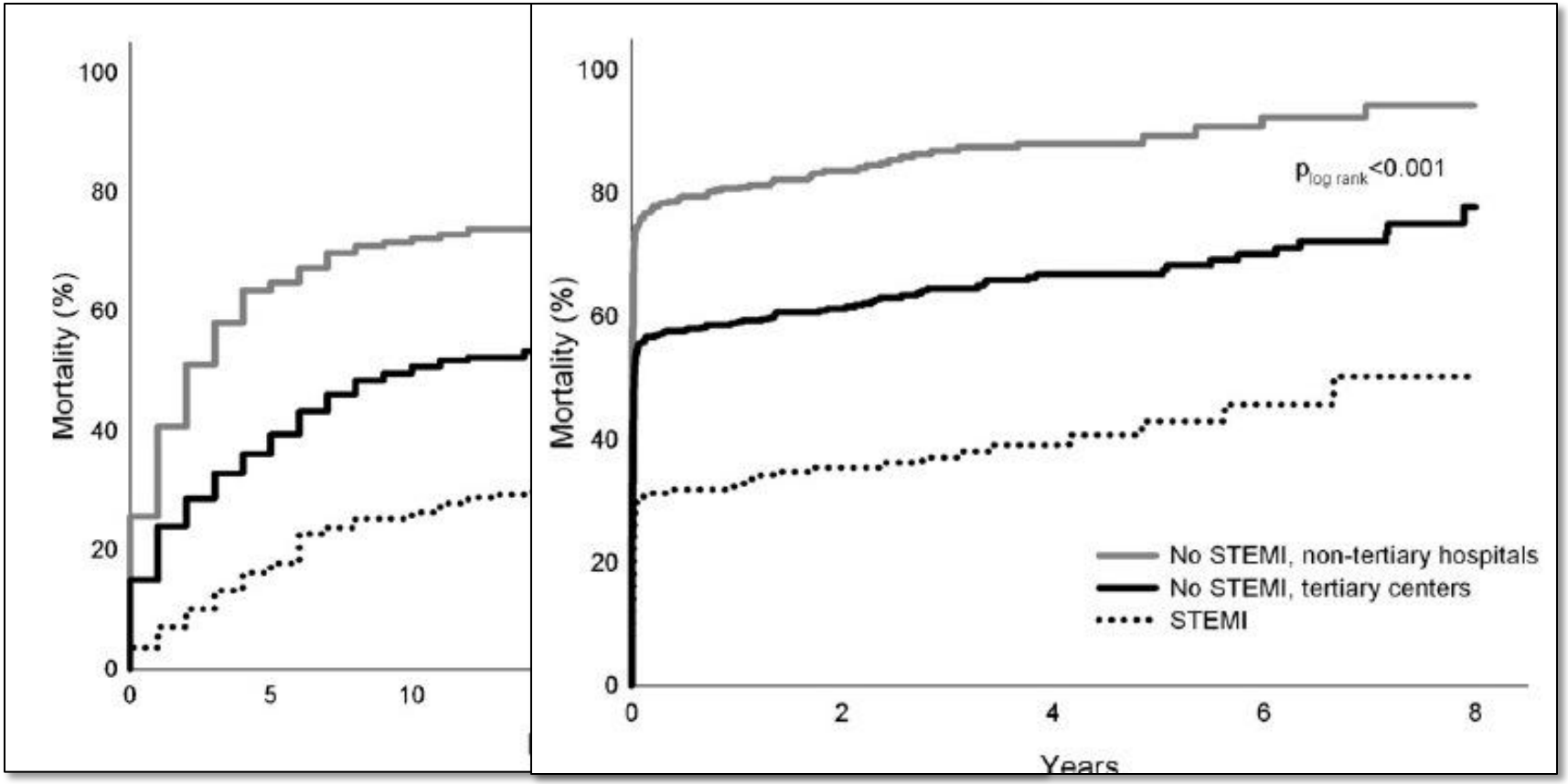
- Regroupement de compétences
  - Urgentiste + équipe SMUR
  - Réanimateur + équipe déchocage
  - Cardiologue de garde + échographie
  - Angioplasticien + IDE
  - Chirurgien cardiaque + pompiste + ECMO (si besoin)
- Proximité du plateau technique (imagerie)
- Accès à d'autres spécialités (« tertiary care center »)
- Evaluation pronostique et diagnostique +++

Resuscitation xxx (2012) xxx–xxx

Clinical paper

# Tertiary centres have improved survival compared to other hospitals in the Copenhagen area after out-of-hospital cardiac arrest☆

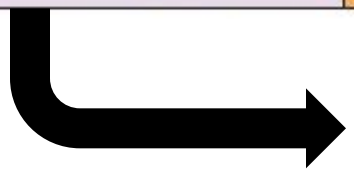
Helle Søholm[a,*], Kristian Wachtell[b], Søren Loumann Nielsen[c], John Bro-Jeppesen[a], Frants Pedersen[a] Michael Wanscher[d], Søren Boesgaard[a], Jacob Eifer Møller[a], Christian Hassager[a], Jesper Kjaergaard[a]



# Finallement, tous les ACR vont en SCI ?

# Recommandations ESC 2012

| | | |
|---|---|---|
| Therapeutic hypothermia is indicated early after resuscitation of cardiac arrest patients who are comatose or in deep sedation. | I | B |
| Immediate angiography with a view to primary PCI is recommended in patients with resuscitated cardiac arrest whose ECG shows STEMI. | I | B |
| Immediate angiography with a view to primary PCI should be considered in survivors of cardiac arrest without diagnostic ECG ST-segment elevation but with a high suspicion of ongoing infarction. | IIa | B |

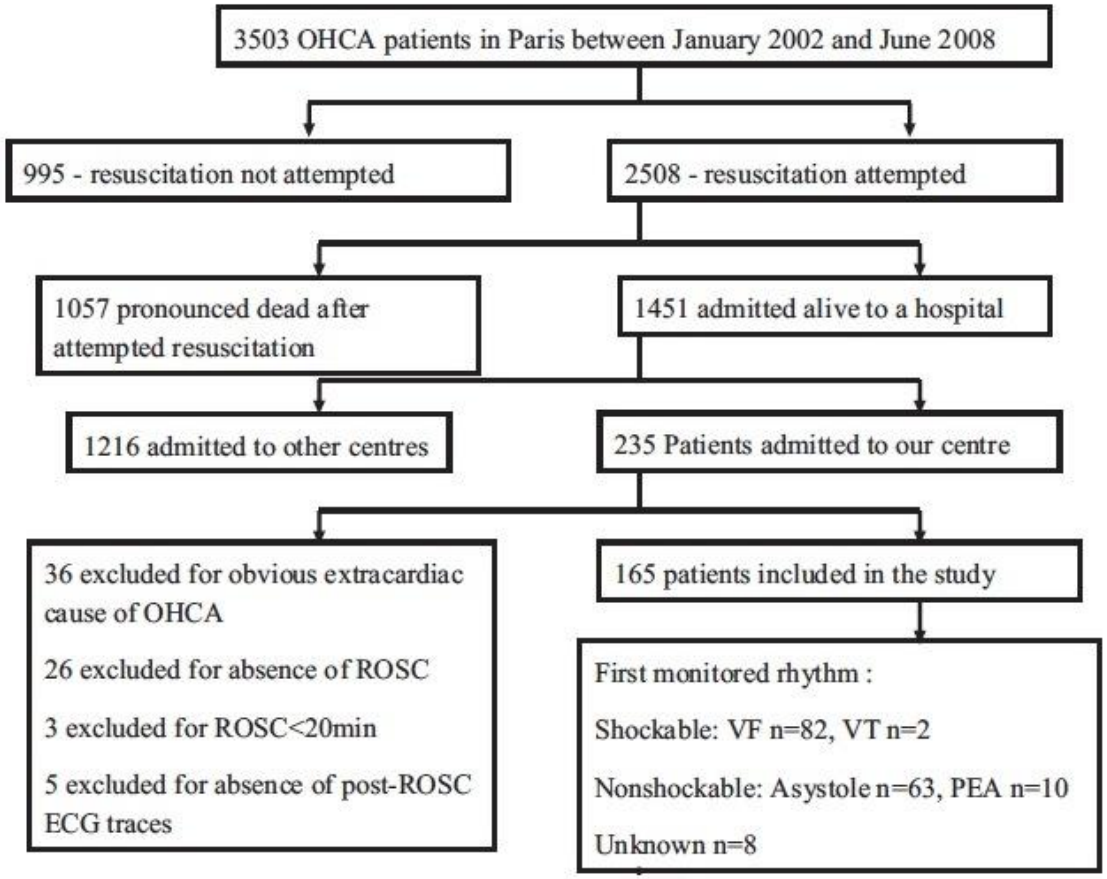


such as the presence of **chest pain** before arrest, history of **established CAD**, and **abnormal or uncertain ECG results**

Clinical paper

Resuscitation 82 (2011) 1148–1153

# Value of post-resuscitation electrocardiogram in the diagnosis of acute myocardial infarction in out-of-hospital cardiac arrest patients☆



Clinical paper

Resuscitation 82 (2011) 1148–1153

# Value of post-resuscitation electrocardiogram in the diagnosis of acute myocardial infarction in out-of-hospital cardiac arrest patients☆

| Variables | *N* (%) |
|---|---|
| Age (years), median (IQR), *n* = 165 | 56 (48–67) |
| Male sex | 131 (79) |
| Risk factors | |
| Hypertension | 53 (32) |
| Hypercholesterolemia | 34 (21) |
| Diabetes | 28 (17) |
| Active smoking | 66 (40) |
| Unknown | 11 (7) |
| History of coronary artery disease | 29 (18) |
| Unknown | 4 (2) |
| Place of cardiac arrest | |
| Public place | 99 (60) |
| Home | 56 (34) |
| Unknown | 10 (6) |
| Initial rhythm | |
| Ventricular fibrillation | 82 (50) |
| Ventricular tachycardia | 2 (1) |
| Asystole | 63 (38) |
| Pulseless electrical activity | 10 (6) |
| Unknown | 8 (5) |
| Duration of no flow, median (IQR), *n* = 127 | 3 (0–10) |
| Unknown | 38 (23) |
| Duration of low flow, median (IQR), *n* = 130 | 20 (10–30) |
| Unknown | 35 (21) |

Clinical paper

Resuscitation 82 (2011) 1148–1153

# Value of post-resuscitation electrocardiogram in the diagnosis of acute myocardial infarction in out-of-hospital cardiac arrest patients☆

The reference ECG used for analysis was the first interpretable 12-lead ECG obtained after sustained ROSC

ECG changes in patients with and without AMI.

| ECG changes | Patients with AMI $n$ (%)$n = 60$ | Patients without AMI $n$ (%)$n = 105$ |
|---|---|---|
| ST-segment elevation | 53 (88) | 17 (16) |
| ST-segment depression without ST-segment elevation | 4 (7) | 22 (21) |
| LBBB | 2 (3) | 10 (9) |
| Nonspecific wide QRS complex | 1 (2) | 7 (7) |
| RBBB without other significant changes | 0 (0) | 8 (8) |
| Patients without significant ECG changes | 0 (0) | 41 (39) |

Clinical paper

Resuscitation 82 (2011) 1148–1153

# Value of post-resuscitation electrocardiogram in the diagnosis of acute myocardial infarction in out-of-hospital cardiac arrest patients☆

| | PPV (%) (CI) | NPV (%) (CI) |
|---|---|---|
| ST-elevation ($n$ = 70) | 76 (64–85) | 92 (85–97) |
| ST-elevation and/or depression ($n$ = 96) | 59 (49–69) | 96 (87–99) |
| Combined criterion[a] ($n$ = 116) | 52 (42–61) | 100 (92–100) |
| Extended criterion[b] ($n$ = 124) | 48 (39–58) | 100 (91–100) |

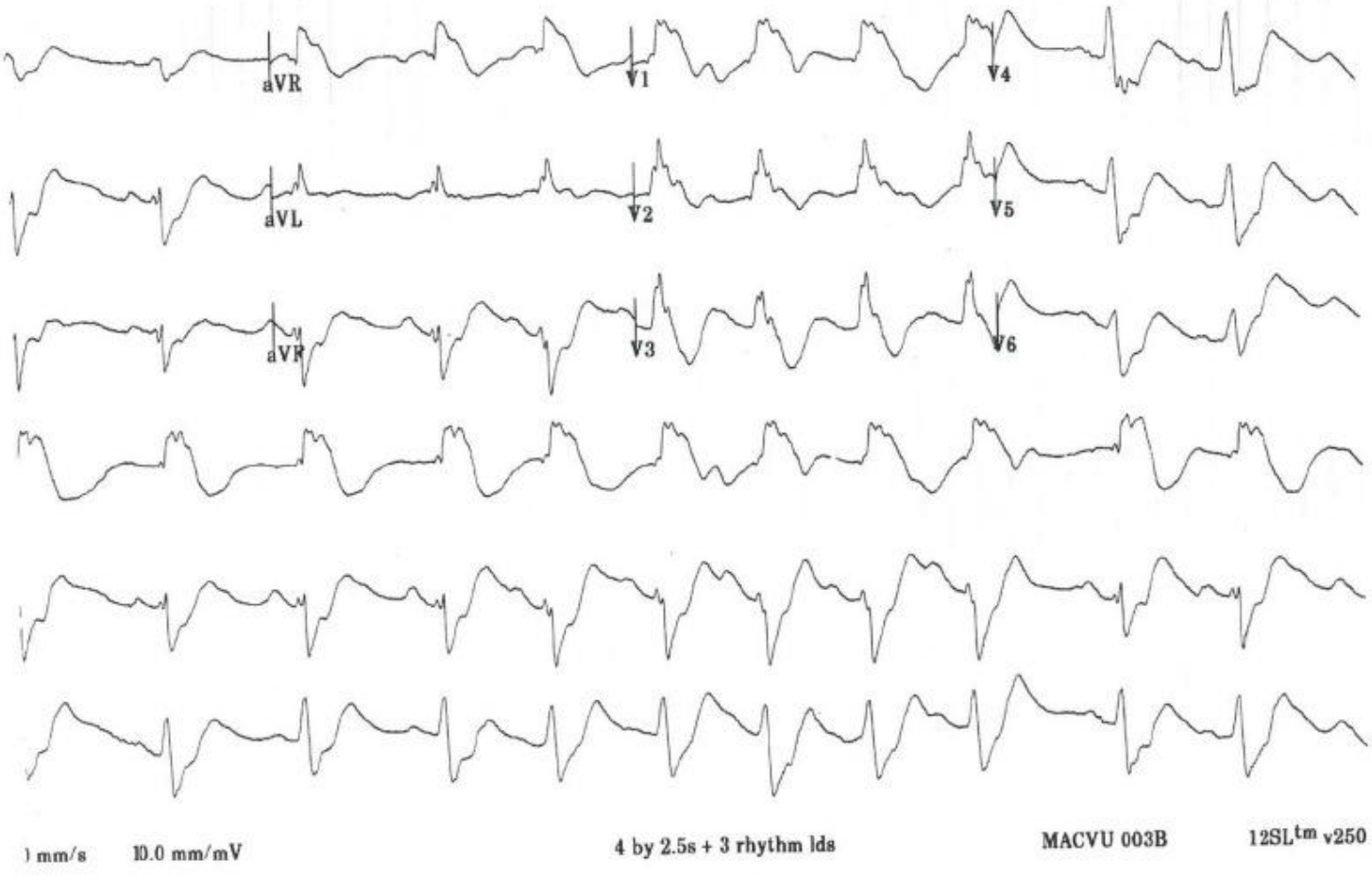
The combined criterion includes
- ST-elevation and/or depression,
- and/or left bundle branch block
- and/or non-specific wide QRS complex

*The extended criterion includes ST-elevation and/or depression, and/or left bundle branch block and/or non-specific wide QRS complex and/or right bundle branch block.*

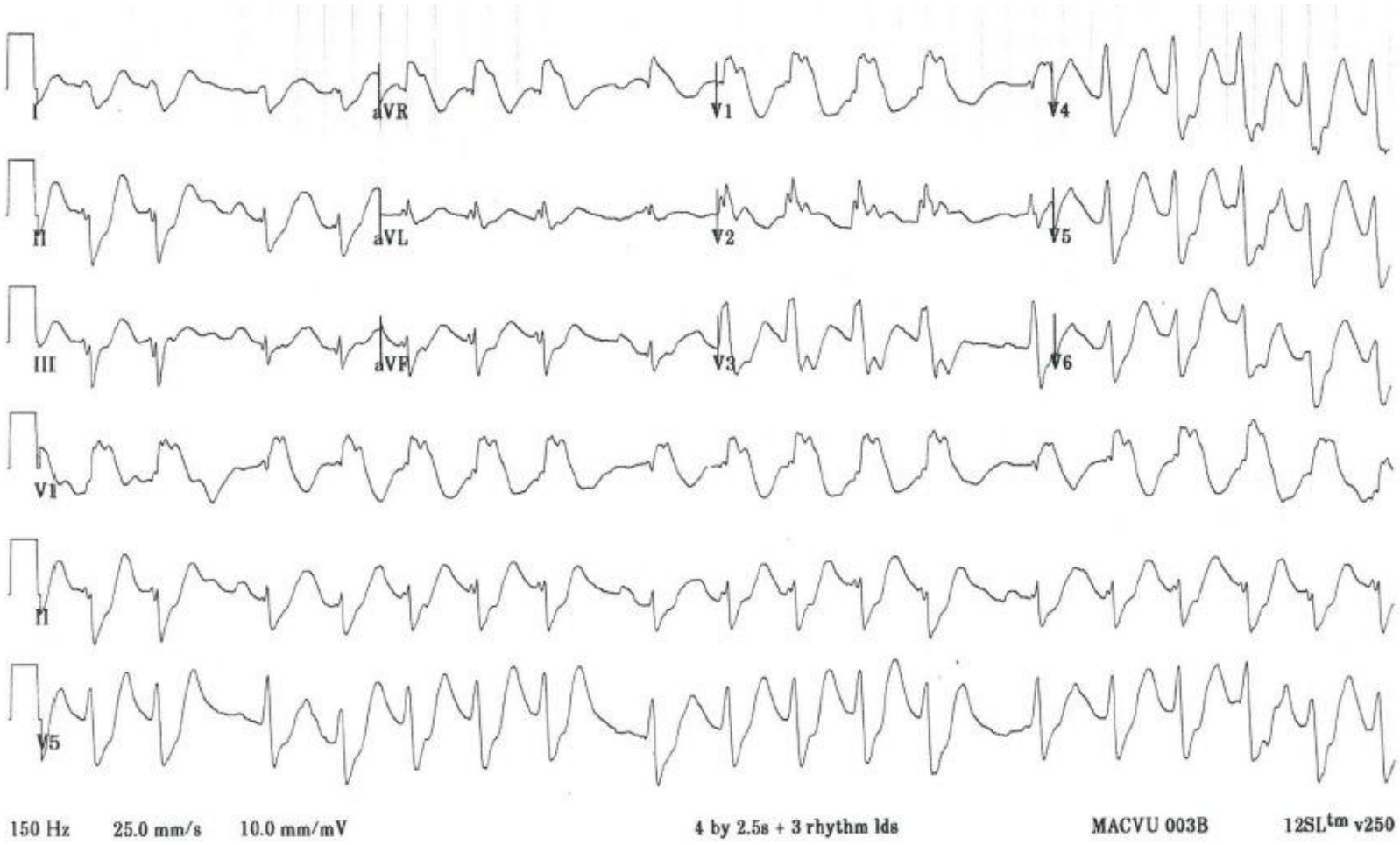
# Quel est l'ECG qualifiant ?

- Le plus tardif possible…

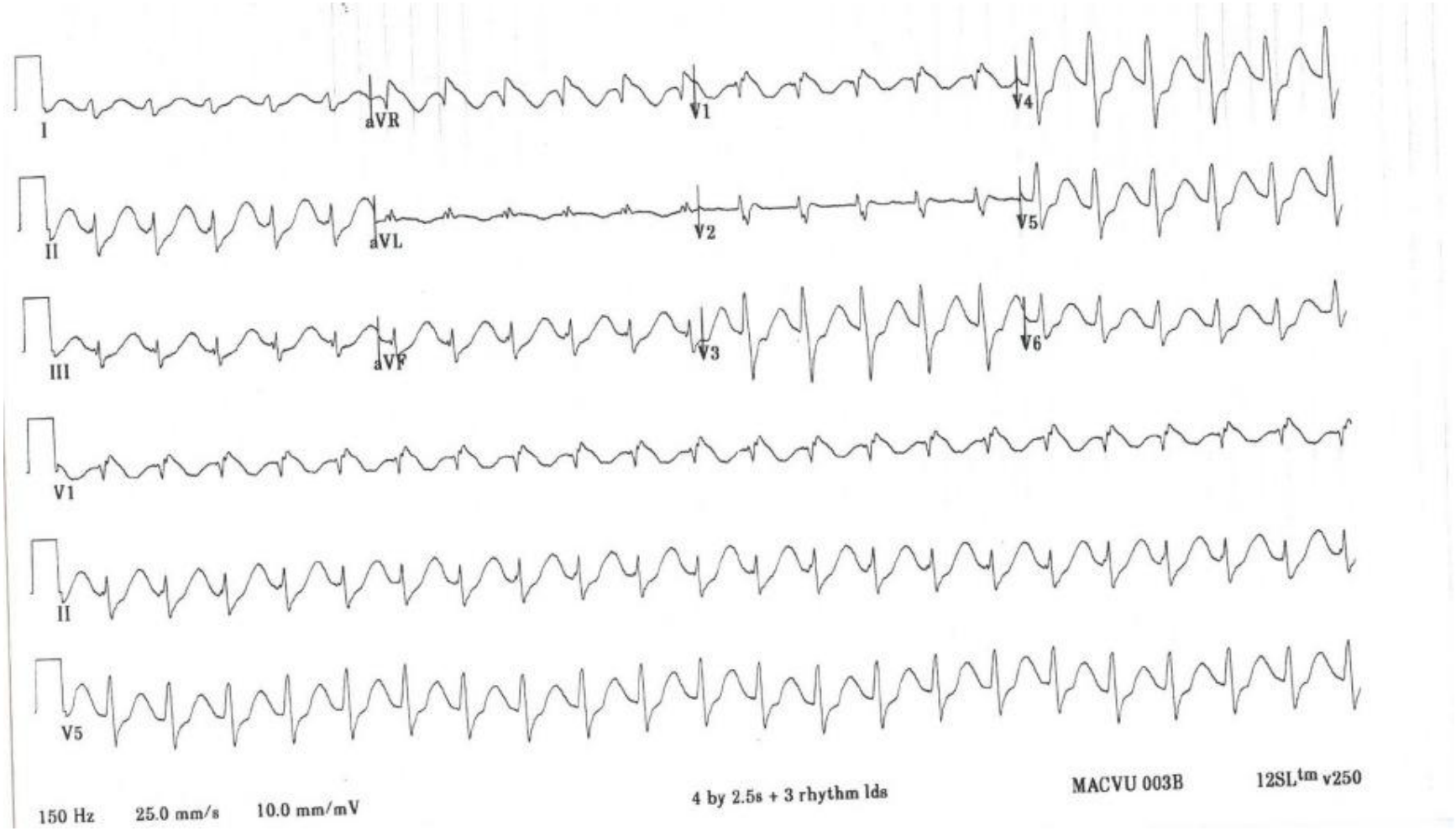
# ECG immédiat post-RACS



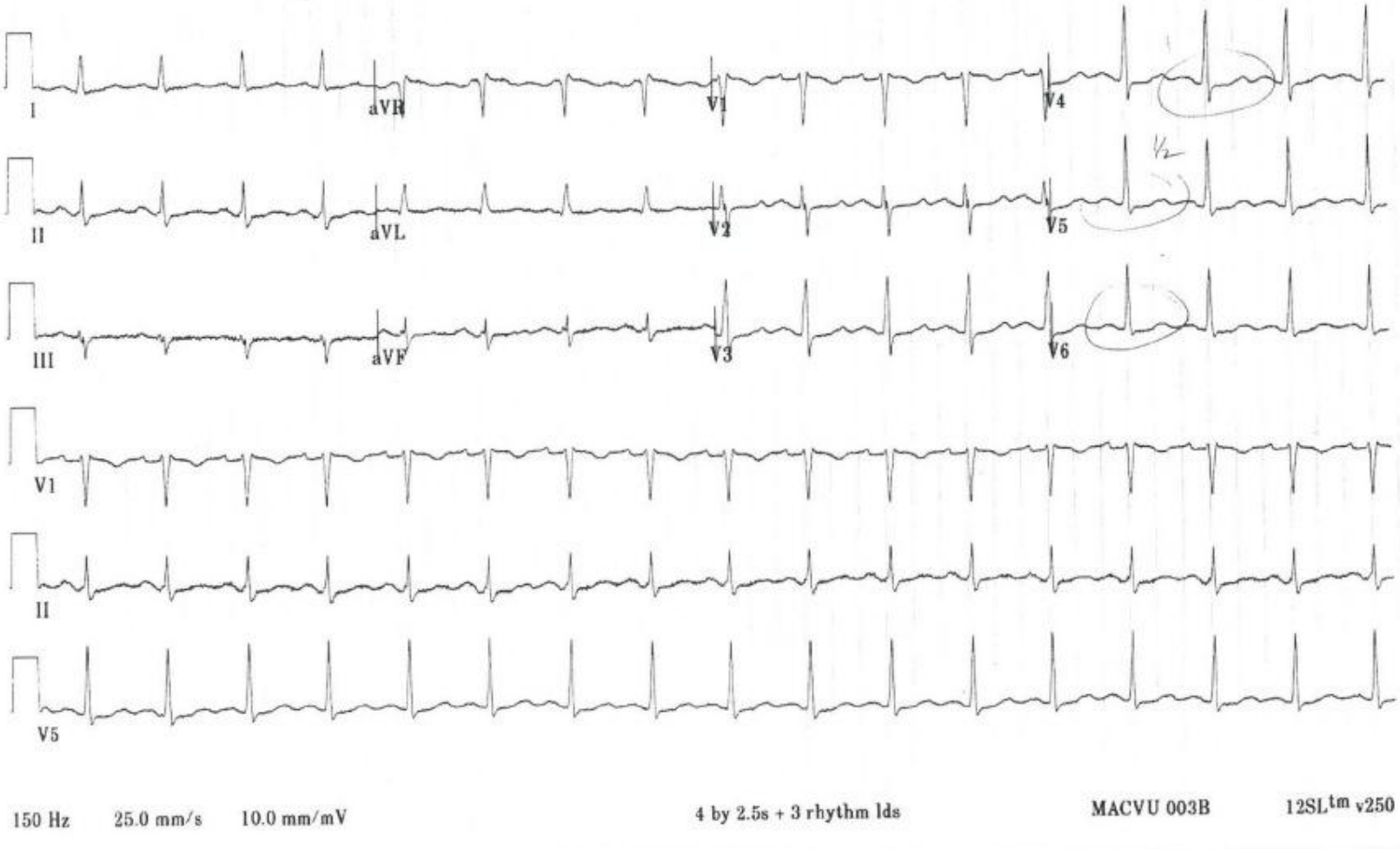
# ECG 5 min post-RACS



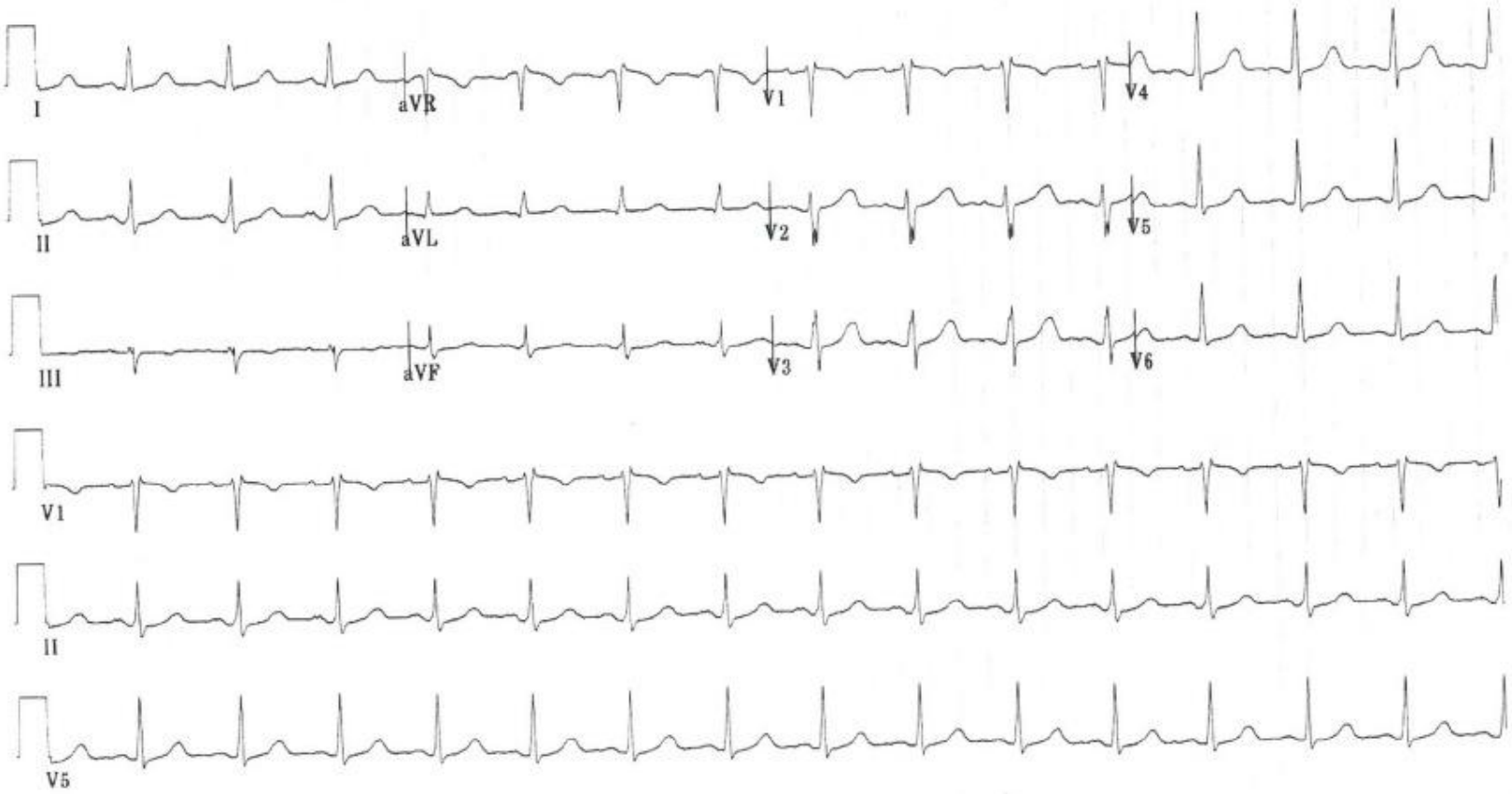
# ECG 30 min post-RACS



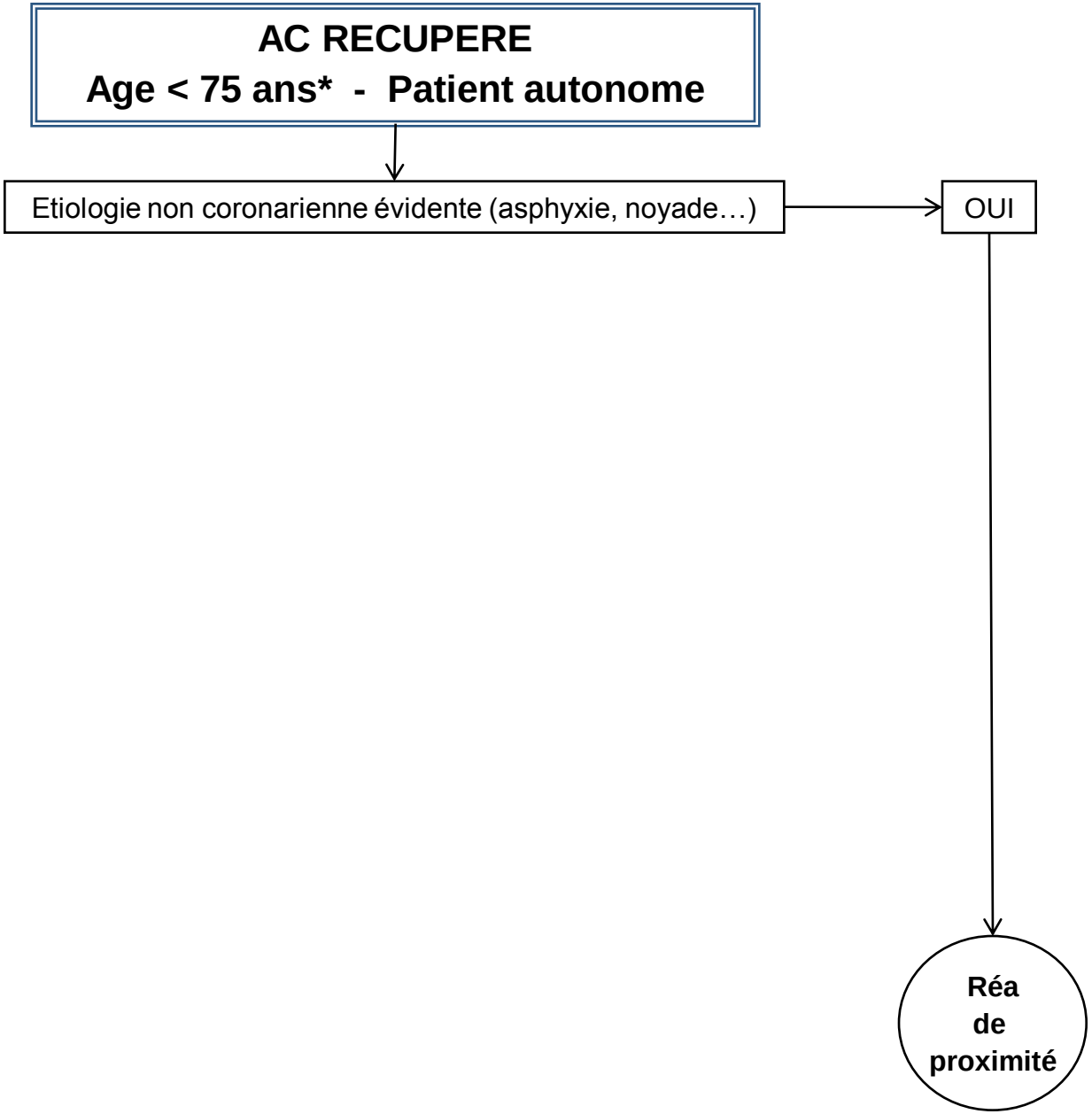
# ECG 4 heures post-RACS



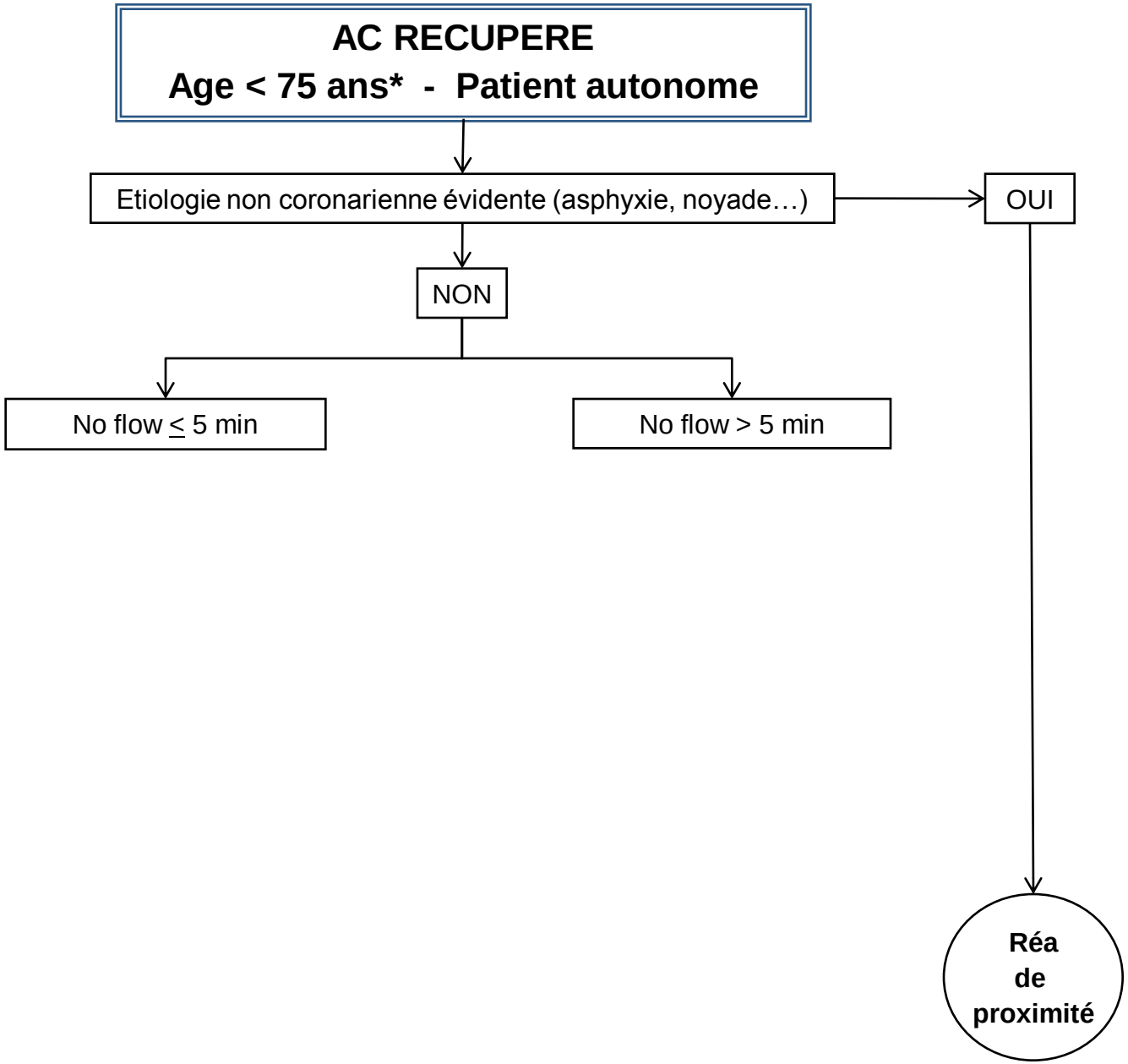
# ECG 12 heures post-RACS



# Stratégie Resurcor 2013




* 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).

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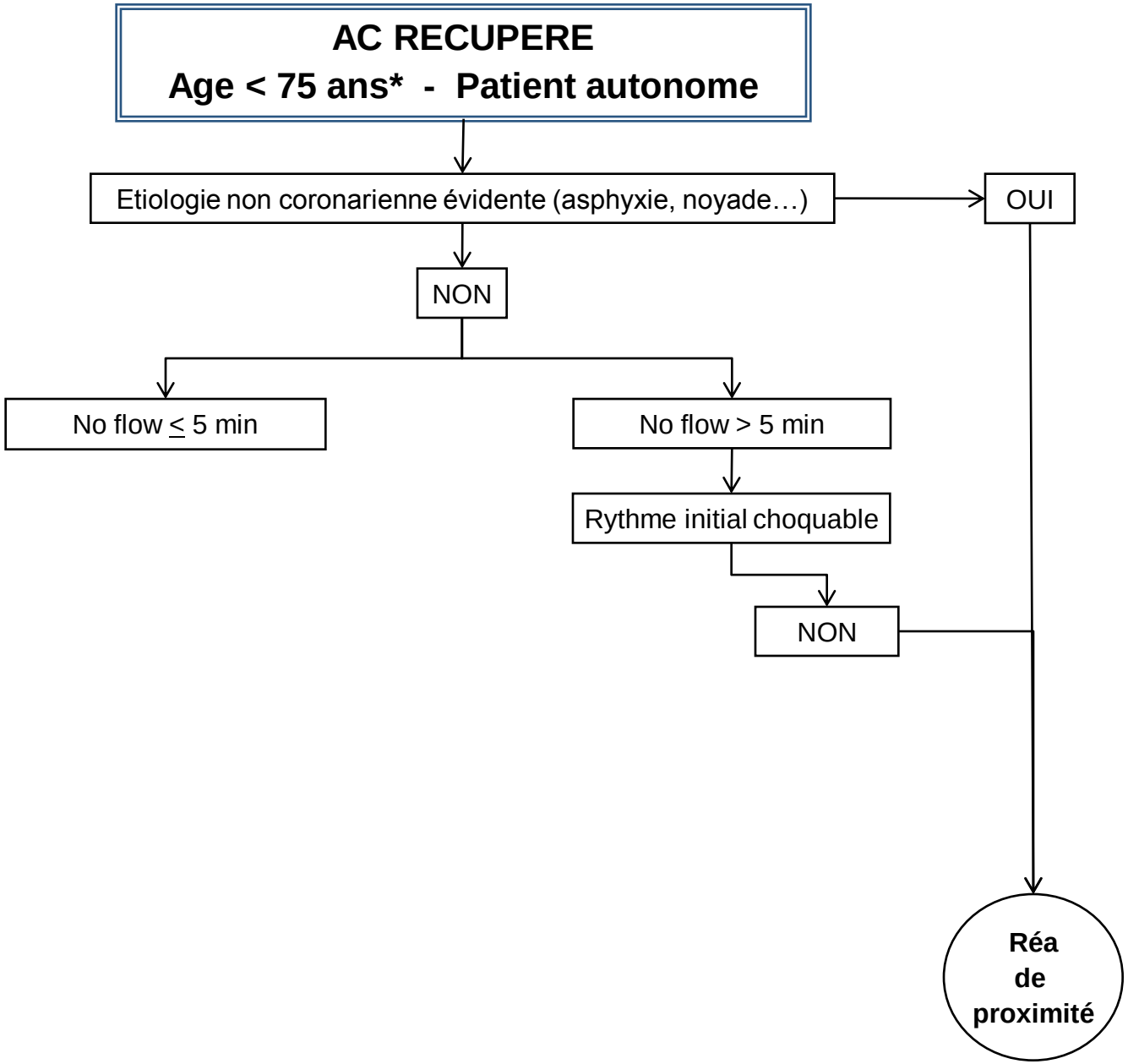


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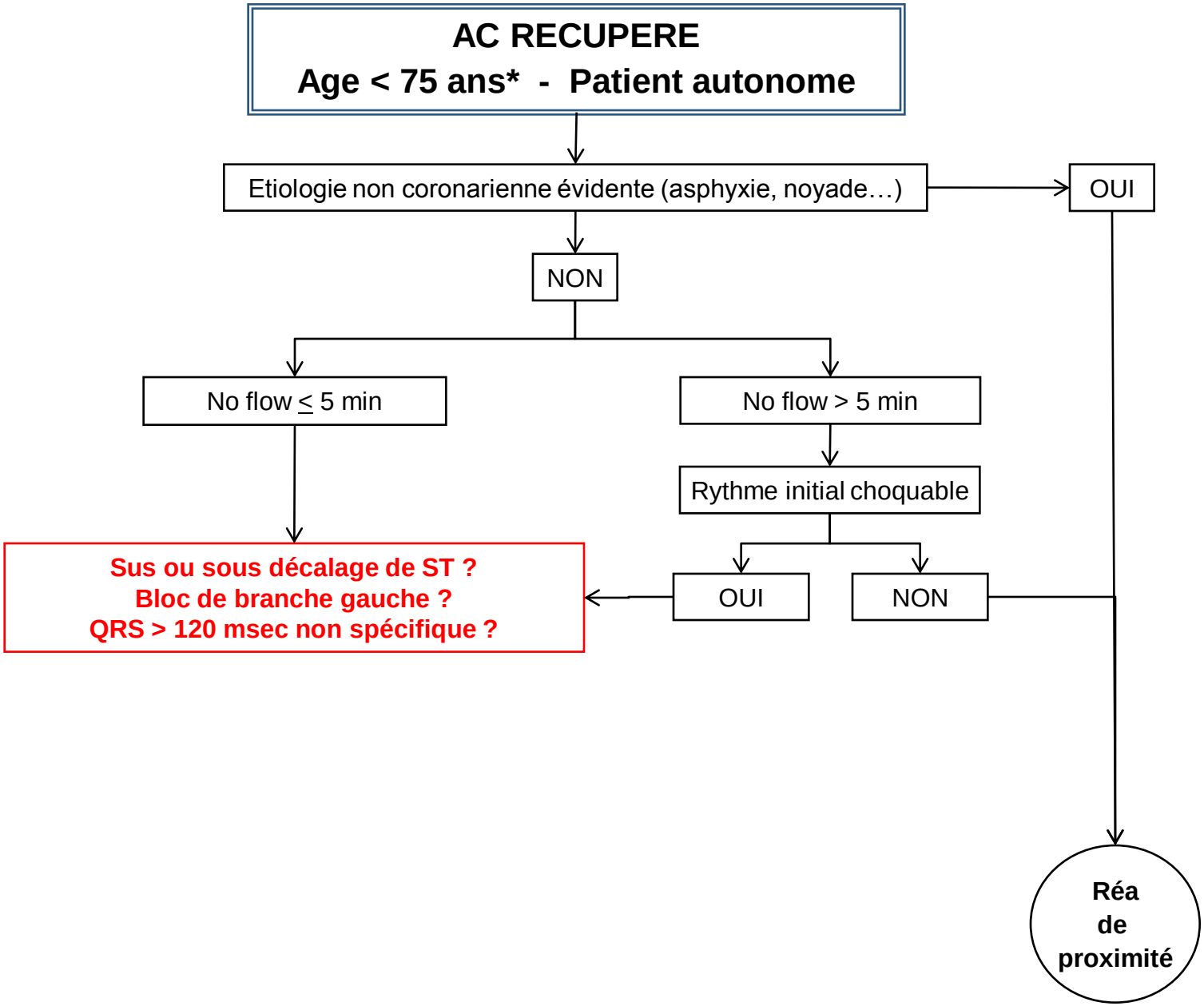


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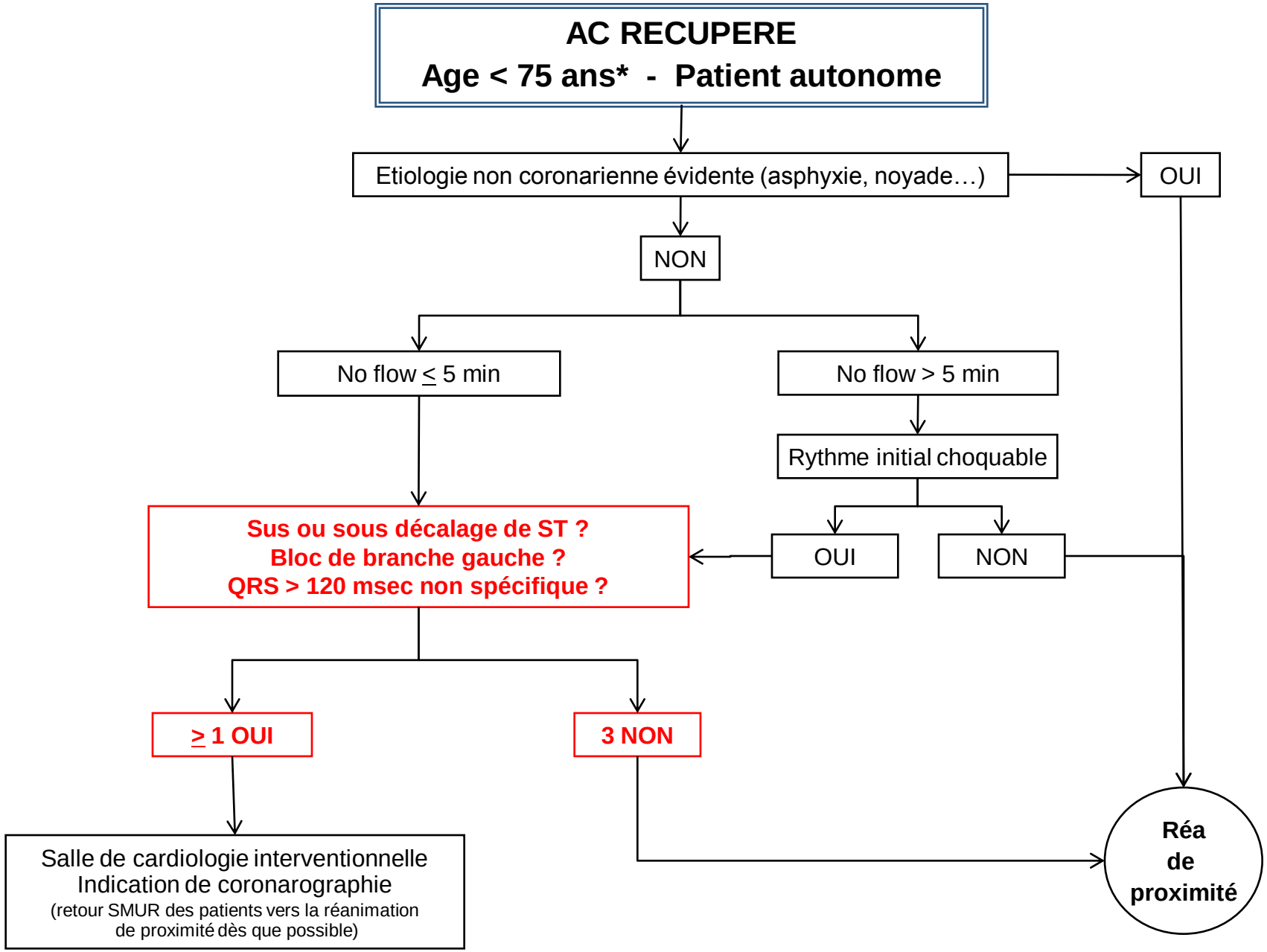


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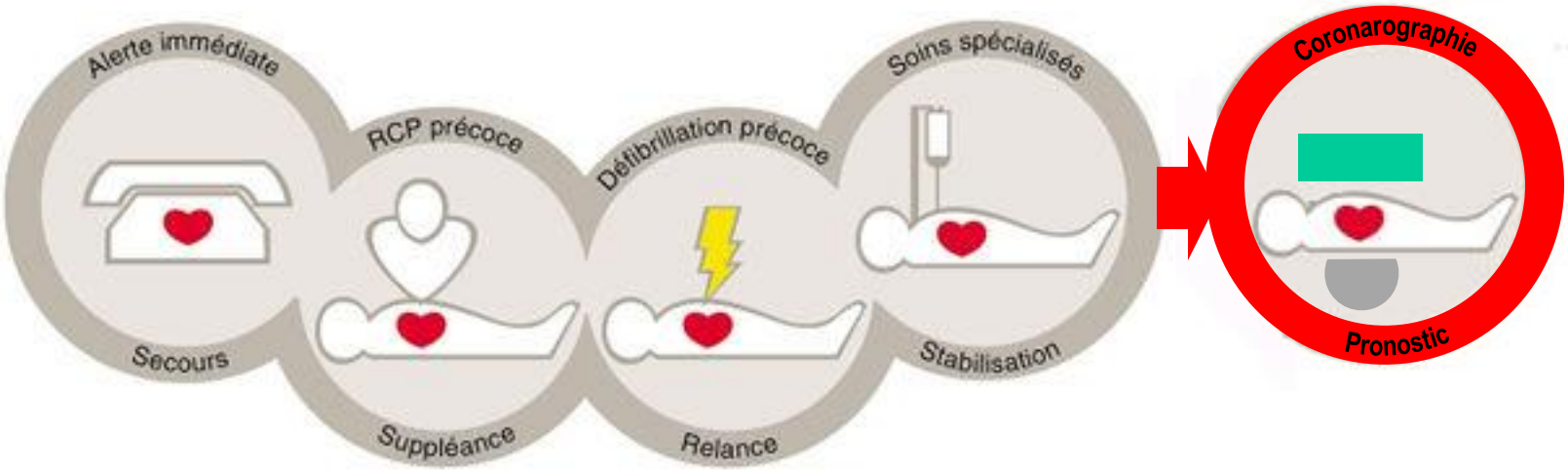
Alerte immédiate
Secours
RCP précoce
Suppléance
Défibrillation précoce
Relance
Soins spécialisés
Stabilisation
Coronarographie
Pronostic