

Printemps Urg'Ara 2023

Dr Julie FREYSENSE ^{PhD}

Pr Matthieu HEIDET ^{MD, PhD}

Disparités internationales dans l'Arrêt Cardiaque : travaux issus de RéACanROC

 **ReACanROC**

an international research network

- 
- Aucun conflit d'intérêt

POURQUOI ?

ACEH

TRANSAT

SYSTÈMES PRÉHOSPITALIERS : DEUX TYPES



ANGLO-AMÉRICAIN



FRANCO-ALLEMAND

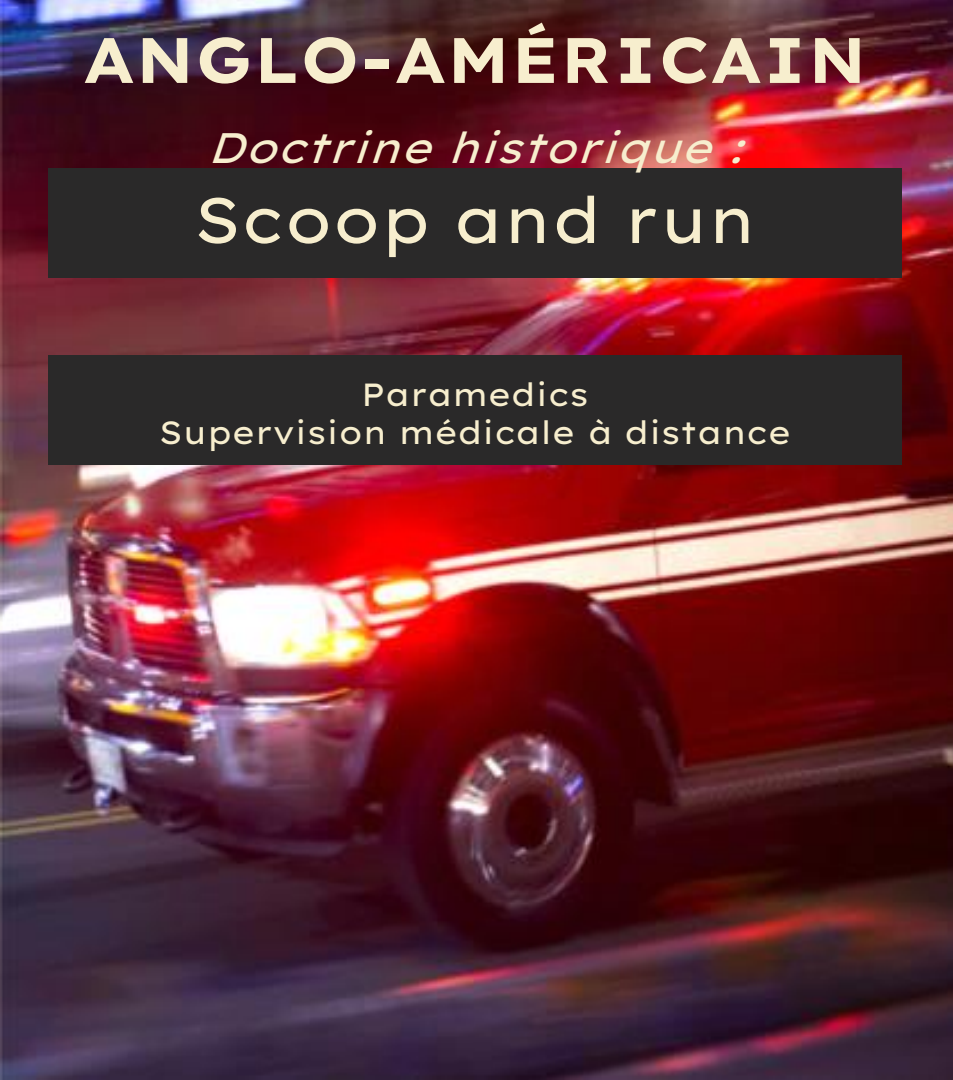
ANGLO-AMÉRICAIN

Doctrine historique :

Scoop and run

Paramedics

Supervision médicale à distance



FRANCO-ALLEMAND

Doctrine historique :

Stay and stabilize

Médicalisation de l'avant



ANGLO-AMÉRICAIN

Doctrine historique :

Scoop and run

Paramedics
Supervision médicale à distance

Arriver sur les lieux
Ramener le patient à l'hôpital
Aux urgences +++

LE PLUS VITE POSSIBLE

FRANCO-ALLEMAND

Doctrine historique :

Stay and stabilize

Médicalisation de l'avant

Arriver sur les lieux
Ramener le patient à l'hôpital
Dans le service adapté

DANS LE JUSTE DÉLAI

ANGLO-AMÉRICAIN

Doctrine historique :

Scoop and run

Paramedics
Supervision médicale à distance

Arriver sur les lieux
Ramener le patient à l'hôpital
Aux urgences +++
LE PLUS VITE POSSIBLE

= Sécurité civile

Firefighters

Paramedics

FRANCO-ALLEMAND

Doctrine historique :

Stay and stabilize

Médicalisation de l'avant

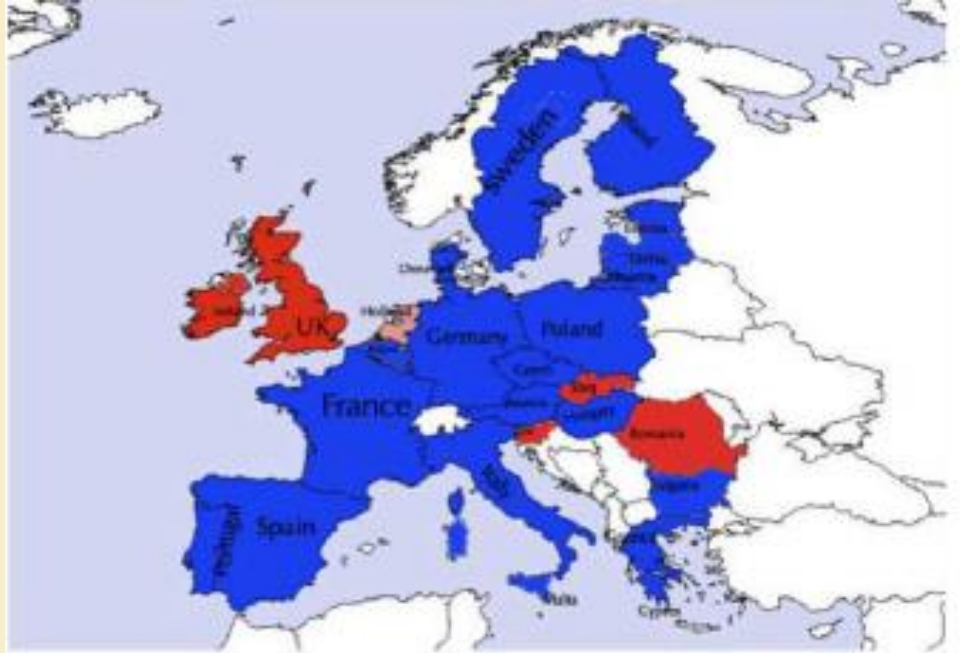
Arriver sur les lieux
Ramener le patient à l'hôpital
Dans le service adapté
DANS LE JUSTE DÉLAI

= Santé publique

Secouristes

SMUR

EN EUROPE



ANGLO-AMÉRICAIN

FRANCO-ALLEMAND



300,000 morts/an

Problème de SP majeur

Plafond de verre ?



300,000 morts/an
Problème de SP majeur
Plafond de verre ?



Systèmes multi-niveaux
Paramedics
Médecins
Court-circuit SU ?



ACEH

300,000 morts/an

Problème de SP majeur

Plafond de verre ?



EMS

Systèmes multi-niveaux

Paramedics

Médecins

Court-circuit SU ?



GEO

Territoires variés

Population

Densité

Géographie

Available online at www.sciencedirect.com

Resuscitation

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

Clinical paper

International variation in survival after out-of-hospital cardiac arrest: A validation study of the Utstein template
**Table 2b – Characteristics of EMS treatment and patient outcomes for all cases by registry.**

	Arrest N = 6782	German resuscitation registry N = 3776	Helsinki cardiac arrest registry N = 1367	Irish OHCA N = 1976	Oslo and Akershus Registry N = 775	SJA-WA cardiac arrest registry N = 2316	ROC N = 39,637	CAVAS Project N = 8522	Swedish Register of CPR N = 8711	Taipei OHCA registry N = 2,791	VACAR N = 8658	VICAR N = 1448
Call to EMS assessment, mean (SD)	10.1 (5.0)	10.1 (12.5)	10.9 (4.6)	16.6 (48.8)	10.5 (4.7)	–	9.0 (11.0)	–	10.9 (10.5)	22.3 (84.3)	11.3 (7.1)	17.7 (66.2)
EMS chest compressions	0.0%	0.0%	100.0%	99.6%	0.0%	95.6%	99.6%	84.9%	99.3%	98.0%	94.6%	0.0%
Missing or unknown	100.0%	100.0%	0.0%	0.4%	100.0%	0.0%	0.0%	0.0%	0.2%	0.0%	0.0%	100.0%
Shocks given, %	52.6%	45.4%	49.0%	38.5%	40.8%	36.4%	34.9%	8.6%	38.4%	11.7%	43.5%	92.6%
Missing or unknown	0.8%	0.0%	0.4%	4.5%	0.4%	0.0%	0.1%	0.0%	4.8%	1.4%	0.0%	0.0%
Assisted ventilation, %	–	–	96.6%	96.7%	78.1%	97.1%	97.9%	68.2%	97.0%	99.7%	92.9%	0.0%
Missing or unknown	100.0%	100.0%	1.8%	3.2%	0.3%	0.0%	0.1%	0.0%	0.2%	0.0%	0.0%	100.0%
Drugs, %												
Epinephrine	–	83.6%	78.7%	52.3%	44.7%	6.0%	77.6%	0.0%	76.9%	19.1%	69.2%	75.7%
Other drugs	–	8.6%	1.0%	0.0%	4.7%	0.0%	2.3%	0.0%	0.6%	0.1%	2.5%	2.1%
No drugs	–	7.6%	20.3%	47.7%	50.6%	94.0%	20.1%	100.0%	22.5%	80.8%	26.2%	22.2%
Missing or unknown	100.0%	0.2%	0.1%	1.3%	0.0%	0.0%	0.4%	0.0%	0.6%	0.0%	0.1%	0.0%
ROSC before ED, %	34.7%	32.4%	49.2%	19.2%	35.1%	15.2%	29.0%	–	–	12.2%	38.4%	30.0%
Missing or unknown	0.3%	1.1%	0.0%	6.3%	0.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	0.0%
ROSC at ED arrival, %	–	25.1%	42.7%	13.8%	29.2%	13.9%	22.6%	1.8%	–	–	32.9%	–
Missing or unknown	100.0%	1.0%	0.0%	7.5%	0.0%	0.0%	8.3%	0.0%	100.0%	100.0%	0.8%	100.0%
Hospital admission, %	39.9%	26.1%	43.0%	–	27.7%	18.0%	23.7%	20.4%	18.3%	26.6%	–	–
Missing or unknown	1.0%	1.0%	0.0%	100.0%	0.0%	0.0%	64.2%	0.0%	0.0%	0.0%	100.0%	100.0%
Survival to hospital discharge, %	20.0%	12.7%	22.1%	6.0%	12.8%	9.0%	7.9%	6.6%	8.5%	6.8%	12.4%	11.4%
Survival to discharge with CPC 1 or 2, %	18.6%	8.4%	19.6%	5.3%	11.6%	–	4.3%	1.8%	94.3%	2.8%	–	8.8%
Missing or unknown	1.5%	1.5%	0.0%	0.8%	0.0%	100.0%	64.0%	0.0%	93.6%	0.9%	100.0%	0.0%

EMS, Emergency Medical Service; SD, Standard deviation; ED, Emergency Department; CPC, Cerebral Performance Category.



ELSEVIER

Available online at www.sciencedirect.com

Resuscitation

Journal homepage: www.elsevier.com/locate/resuscitationEUROPEAN
RESUSCITATION
COUNCIL

Clinical paper

**International variation in survival after
out-of-hospital cardiac arrest: A validation
study of the Utstein template**
**Table 2b – Characteristics of EMS treatment and patient outcomes for all cases by registry.**

	Arrest N = 6782	German resuscitation registry N = 3776	Helsinki cardiac arrest registry N = 1367	Irish OHCA N = 1978	Oslo and Akershus Registry N = 775	SJA-WA cardiac arrest registry N = 2316	ROC N = 39,637	CAVAS Project N = 8522	Swedish Register of CPR N = 8711	Taipei OHCA registry N = 2,791	VACAR N = 8658	VICAR N = 1448
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EMS chest compressions	0.0%	0.0%	100.0%	99.6%	0.0%	95.6%	99.6%	84.9%	99.3%	98.0%	94.6%	0.0%
Missing or unknown	100.0%	100.0%	0.0%	0.4%	–	–	–	–	–	0.0%	0.0%	100.0%
Shocks given, %	52.6%	–	–	–	–	–	–	–	–	11.7%	43.5%	92.6%
Missing or unknown	0.8%	–	–	–	–	–	–	–	–	1.4%	0.0%	0.0%
Assisted ventilation, %	–	–	–	–	–	–	–	–	–	99.7%	92.9%	0.0%
Missing or unknown	100.0%	–	–	–	–	–	–	–	–	0.0%	0.0%	100.0%
Drugs, %	–	–	–	–	–	–	–	–	–	–	–	–
Epinephrine	–	–	–	–	–	–	–	–	–	19.1%	69.2%	75.7%
Other drugs	–	–	–	–	–	–	–	–	–	0.1%	2.5%	2.1%
No drugs	–	–	–	–	–	–	–	–	–	80.8%	28.2%	22.2%
Missing or unknown	100.0%	–	–	–	–	–	–	–	–	0.0%	0.1%	0.0%
ROSC before ED, %	34.7%	–	–	–	–	–	–	–	–	12.2%	38.4%	30.0%
Missing or unknown	0.3%	1.1%	0.0%	6.3%	0.0%	0.0%	0.0%	100.0%	100.0%	0.0%	0.0%	0.0%
ROSC at ED arrival, %	–	25.1%	42.7%	13.8%	29.2%	13.9%	22.6%	1.8%	–	–	32.9%	–
Missing or unknown	100.0%	1.0%	0.0%	7.5%	0.0%	0.0%	8.3%	0.0%	100.0%	100.0%	0.8%	100.0%
Hospital admission, %	39.9%	26.1%	43.0%	–	27.7%	18.0%	23.7%	20.4%	18.3%	26.6%	–	–
Missing or unknown	1.0%	1.0%	0.0%	100.0%	0.0%	0.0%	64.2%	0.0%	0.0%	0.0%	100.0%	100.0%
Survival to hospital discharge, %	20.0%	12.7%	22.1%	6.0%	12.8%	9.0%	7.9%	6.6%	8.5%	6.8%	12.4%	11.4%
Survival to discharge with CPC 1 or 2, %	18.6%	8.4%	19.6%	5.3%	11.6%	–	4.3%	1.8%	94.3%	2.8%	–	8.8%
Missing or unknown	1.5%	1.5%	0.0%	0.8%	0.0%	100.0%	64.0%	0.0%	93.6%	0.8%	100.0%	0.0%

EMS, Emergency Medical Service; SD, Standard deviation; ED, Emergency Department; CPC, Cerebral Performance Category.

1.8 % to 94.3 % ?

■ BLS?

■ ALS?

■ MICU?

Advanced Life Support vs. Basic Life Support for Patients With Trauma in Prehospital Settings: A Systematic Review and Meta-Analysis

Yutaka Kondo^{1*}, Tatsuma Fukuda², Ryo Uchimido³, Masahiro Kashihara⁴, Soichiro Kato⁵, Hiroshi Sekiguchi⁶, Yoshito Yamami⁷, Toru Hifumi⁷ and Kei Hayashida⁸

Advanced vs. Basic Life Support in the Treatment of Out-of-Hospital Cardiopulmonary Arrest in the Resuscitation Outcomes Consortium

Michael Christopher Kurz^{1,2*}, Robert H. Schmicker³, Brian Leroux⁴, Graham Nichol⁵, Tom P. Aufderheide⁶, Sheldon Cheskes^{7,8}, Brian Grunau⁹, Jamie Jasti¹⁰, Peter Kudenchuk¹¹, Gary M. Vilke¹², Jason Buick¹³, Lynn Wittwer¹⁴, Ritu Sahni¹⁵, Ronald Straight¹⁶, Henry E. Wang¹⁷, for the ROC Investigators

Association of Prehospital Advanced Life Support by Physician With Survival After Out-of-Hospital Cardiac Arrest With Blunt Trauma Following Traffic Collisions

Japanese Registry-Based Study

Tetsuya Fukuda, MD, PhD^{1,2}, Naoko Ohada-Fukuda, MD³, Yutaka Kondo, MD, PhD^{4,5}, et al.

Outcomes with advanced versus basic life support in blunt trauma

Michael S. Farrell¹, Benjamin Emery, Richard Caplan, John Getchell, Mark Cipolite, Kevin M. Bradley
Christiana Care Health System, 4755 Ogletown Stanton Rd, Suite 1320, Newark, DE, 19713, USA

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

Prachi Sanghavi, BS¹, Anupam B. Jena, MD, PhD^{2,3,4}, Joseph P. Newhouse, PhD^{2,4,5,6}, et al.

Out-of-hospital cardiac arrest (OHCA) attended by mobile emergency teams with a physician on board. Results of the Spanish OHCA Registry (OSHCA)

Fernando Rosell-Ortiz^{1,2*}, Xavier Escalada Roig³, Patricia Fernández del Valle⁴

Outcomes of Basic Versus Advanced Life Support for Out-of-Hospital Medical Emergencies

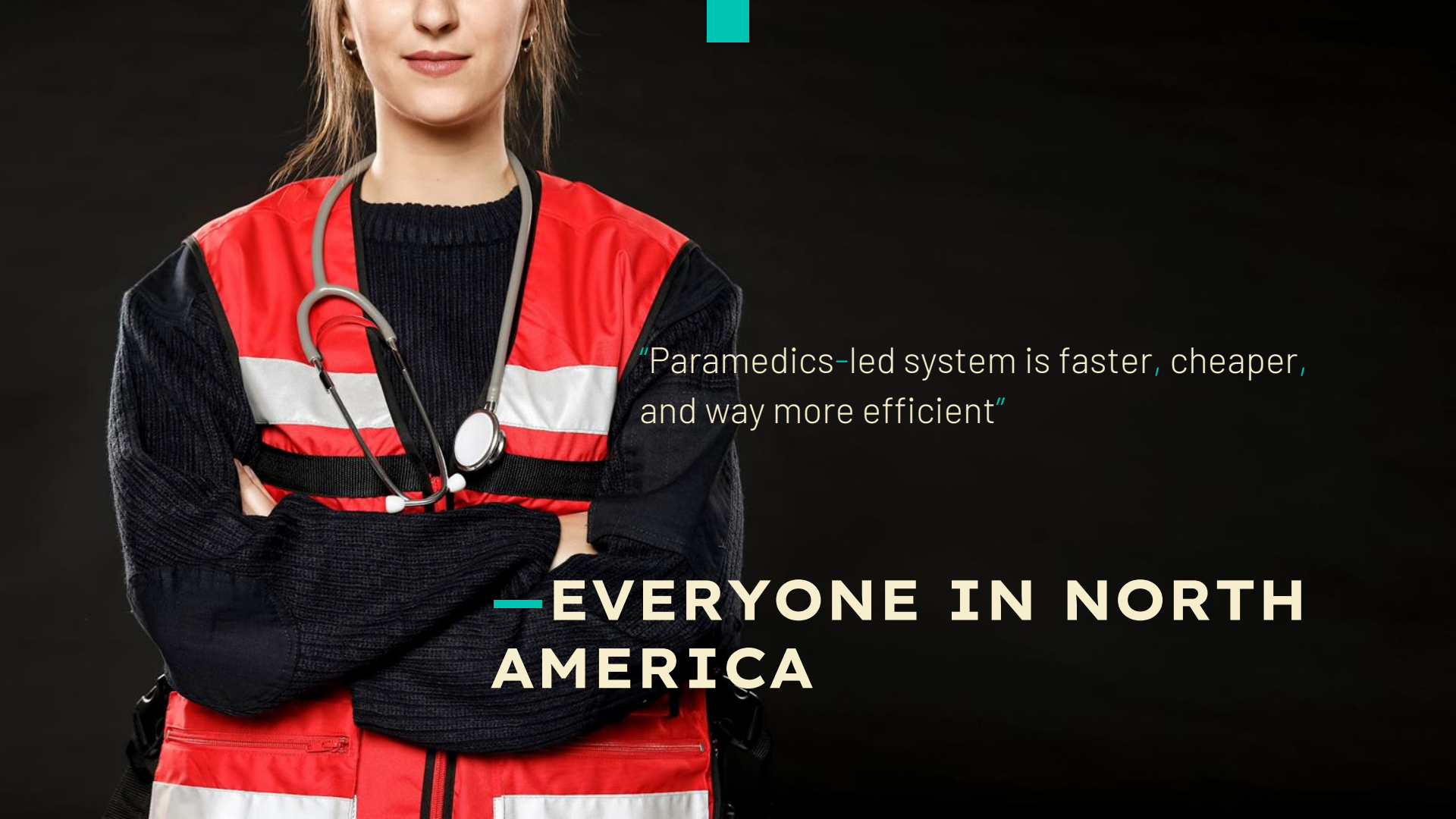
Prachi Sanghavi, PhD¹, Anupam B. Jena, MD, PhD², Joseph P. Newhouse, PhD³, Alan M. Zaslavsky, PhD⁴
Author, Article and Disclosure Information

Outcomes from out-of-hospital cardiac arrest in Metropolitan Taipei: Does an advanced life support service make a difference? ☆☆☆

Matthew Huei-Ming Ma^{a,*}, Wen-Chu Chiang^a, Patrick Chow-In Ko^a,

Association between early advanced life support and good neurological outcome in out of hospital cardiac arrest: A propensity score analysis

Laurianne Michelland MD^{1,2,3} | Frédéric Adnet MD, PhD^{2,3} | Joséphine Escutnaire PhD⁴ | Chloe Baker MD^{2,3} | Hervé Hubert MD, PhD⁴ | Sylvie Chevreton MD, PhD¹



"Paramedics-led system is faster, cheaper,
and way more efficient"

— **EVERYONE IN NORTH
AMERICA**



Ce qui est fait...



LE PROCESSUS

PHASE UNE

Alignement &
fusion des bases
Sept.2019 -Jun.2022



CanROC

Est. 2010
N=103,900

Adultes, non-traumatiques, EMS-
treated



RéAC

Est. 2011
N=134,292

Adultes, non-traumatiques, EMS-
treated

CanROC

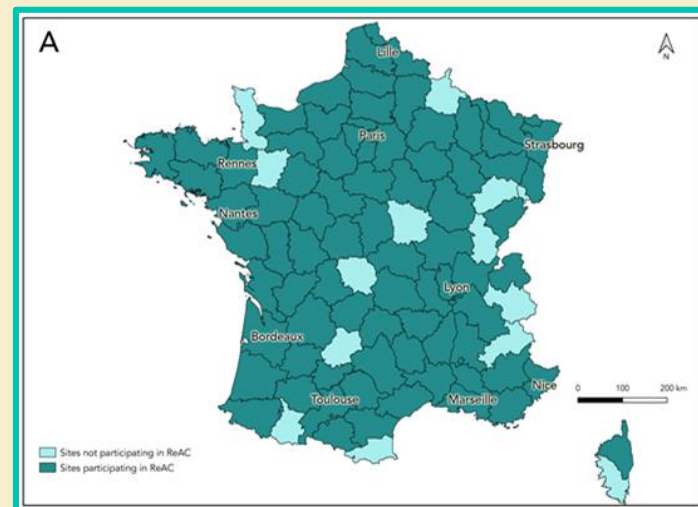


2 provinces

Expansion nationale en cours

(Pop. couverte = 20 millions)

RéAC



90%

Des SMUR

(Pop. couverte = 60 millions)



Réseau de recherche (+ comité directeur)
Registre international de
L'ARRÊT CARDIAQUE EXTRAHOSPITALIER

> [Resuscitation](#). 2020 Jul;152:133-140. doi: 10.1016/j.resuscitation.2020.05.008. Epub 2020 May 15.

ReACanROC: Towards the creation of a France-Canada research network for out-of-hospital cardiac arrest

Matthieu Heidet¹, Laurie Fraticelli², Brian Grunau³, Sheldon Cheskes⁴, Valentine Baert⁵, Christian Vilhelm⁵, Hervé Hubert⁵, Karim Tazarourte⁶, Christian Vaillancourt⁷, John Tallon⁸, Jim Christenson³, Carlos El Khoury⁹; Gr-ReAC CanROC investigators

Affiliations + expand

PMID: 32422245 DOI: [10.1016/j.resuscitation.2020.05.008](#)

Heidet M, et al. Resuscitation. 2020. PMID: 32422245

> [Emerg Med J](#). 2022 Jul;39(7):547-553. doi: 10.1136/emered-2020-211073. Epub 2021 Jun 2.

Rationale, development and implementation of the ReACanROC registry for out-of-hospital cardiac arrests in France and Canada

Matthieu Heidet^{1 2 3}, Hervé Hubert^{4 5}, Brian E Grunau^{6 7 8 9}, Sheldon Cheskes^{10 11}, Valentine Baert^{4 5}, Laurie Fraticelli^{12 13}, Julie Freyssenge^{12 14}, Eric Lecarpentier¹⁵, Audra Stitt¹¹, John M Tallon^{6 9}, Karim Tazarourte^{14 16}, Courtney Truong¹¹, Christian Vaillancourt^{17 18}, Christian Vilhelm⁵, Kosma Wysocki¹¹, Jim Christenson^{6 7 8}, Carlos El Khoury^{12 14 19}; Gr-ReAC and CanROC investigators

Affiliations + expand

PMID: 34083429 DOI: [10.1136/emered-2020-211073](#)

Heidet M, et al. Emerg Med J. 2022. PMID: 34083429





LE PROCESSUS

PHASE UNE

Alignement &
fusion des bases
Sept.2019 -Jun.2022

PHASE DEUX

Comparaisons
Echelle locale
Jun.2022-Dec.2022

● Méthodes

Metro Vancouver vs. Rhône

ACEH 2014-2018 (CanROC ou RéAC)

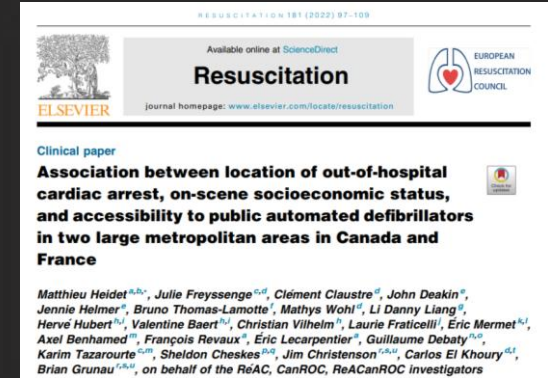
Niveau socio-économique (SES) à l'échelle IRIS (INSPQ ou French-EDI)

- Q1 (moins défavorisé) à Q5 (plus défavorisé)

Registres publics DAE

Critères de jugement

- Distance ACEH - plus proche DAE
- Temps de marche A/R simulé
- Pronostic



● Résultats

Metro Vancouver : N = 6,187 vs. Rhône : N = 3,239

Metro Vancouver Q5

- DAE plus éloignés
(79% > 400m vs. 67%, $p < 0.01$)
- DAE moins accessibles
(97% > 3 min vs. 91%, $p < 0.01$)
- Survie plus faible
(9% vs. 13%, $p < 0.01$)
- Pronostic neurologique plus mauvais
(6% vs. 9%, $p = 0.01$)

Rhône Q5

- DAE plus proches
(50% vs. 57%, $p < 0.01$)
- DAE pas moins accessibles
(85% vs. 86%, $p = 0.79$)
- Aucune association pronostique

Survie à la sortie de l'hôpital/30 jours → Aucun effet de l'accès au DAE dans le Rhône

Modèle univarié Vancouver

- DAE ≥ 3 min : ↘ ROSC
(OR 0.39, 95 % CI [0.24, 0.64])
- DAE ≥ 3 min : ↘ survie à la sortie
(OR 0.19, 95 % CI [0.10, 0.36])

Modèle multivarié Vancouver

- DAE ≥ 3 min : aucun effet sur le ROSC
- DAE ≥ 3 min : ↘ survie à la sortie
(OR 0.41, 95 % CI [0.23, 0.74])



LE PROCESSUS

PHASE UNE

Alignement &
fusion des bases
Sept.2019 -Jun.2022

PHASE DEUX

Comparaisons
Echelle locale
Jun.2022-Dec.2022

PHASE TROIS

Comparaisons
Echelle nationale
Dec.2022-Mai2023

2012 to 2019

Canada

n=40,342



DÉLAIS EMS PLUS COURTS

6 min [5-8] vs. 10 min [7-14]



MOINS D'AED POSÉ PAR TÉMOIN

4% vs. 8%



RYTHME CHOCABLE PLUS FRÉQUENT

22% vs. 18%

France

n=58,259

2012 to 2019

Canada

n=40,342



DÉLAIS EMS PLUS COURTS

6 min [5-8] vs. 10 min [7-14]



MOINS D'AED POSÉ PAR TÉMOIN

4% vs. 8%



RYTHME CHOCABLE PLUS FRÉQUENT

22% vs. 18%

France

n=58,259



RCP PLUS FRÉQUENTE

99,8% vs. 82,2%



ARRÊT RCP PLUS FRÉQUENT

75% vs. 49%



DÉLAI 1ère DOSE ADRÉ PLUS LONG

24 min [18-32] vs. 18 min [15-23]

2012 to 2019

Canada

n=40,342



**MEILLEURE SURVIE
À LA SORTIE**

11% vs. 6%

France

n=58,259



**PRONOSTIC NEUROLOGIQUE
SIMILAIRE***

84% vs. 84%

*Parmi les patients vivants de statut connu

2012 to 2019 Pédiatrie

Canada
n=795

France
n=1,326

■ **PLUS DE
NOURISSONS (<1 AN)**

40% vs. 30%

■ **DÉLAIS EMS
PLUS COURTS**

6 min [5-7] vs. 10 min [6-13]

■ **RYTHME CHOCABLE
SIMILAIRE**

6,8% vs. 6,3% (p = 0,7)



2012 to 2019 Pédiatrie

Canada
n=795

■ **PLUS DE
NOURISSONS (<1 AN)**

40% vs. 30%

■ **DÉLAIS EMS
PLUS COURTS**

6 min [5-7] vs. 10 min [6-13]

■ **RYTHME CHOCABLE
SIMILAIRE**

6,8% vs. 6,3% (p = 0,7)

France
n=1,326

■ **RCP
PLUS FRÉQUENTE**

99,7% vs. 53,9%

■ **ARRÊT RCP
PLUS FRÉQUENT**

66% vs. 17%

■ **DÉLAI 1ère DOSE ADRÉ
PLUS LONG**

25 min [19-32] vs. 19 min [15-23]



2012 to 2019 Pédiatrie

Canada
n=795

France
n=1,326

 **MEILLEURE SURVIE
À LA SORTIE**

11,5% vs. 8,3%

 **MOINS BON
PRONOSTIC NEUROLOGIQUE***

69% vs. 80%



*Parmi les patients vivants de statut connu





**Ce qu'il reste à
faire...**

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Alignement &
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Sept.2019 -Jun.2022

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Comparaisons
Echelle locale
Jun.2022-Dec.2022

PHASE TROIS

Comparaisons
Echelle nationale
Dec.2022-Mai2023

PHASE QUATRE

Analyses appariées
Essais cliniques, etc.
Mai.2023-...

QUELLES IMPLICATIONS ?

- **Poursuite de l'exploration des déterminants cachés**
 - Définitions ?
 - Géographiques ?
 - Socio-économiques ?
 - Pratiques ?
 - Organisationnelles ?
- **Phase d'accès aux données...**
- **SUR BASES NATIONALES !**



**WE NEED
YOU**



THANK YOU

And all CanROC / RéAC collaborators who made this project come true

Special thanks to

Jim Christenson, Brian Grunau, Sheldon Cheskes, Christian Vaillancourt, Courtney Truong & Kosma Wyzocki
Hervé Hubert, Valentine Canon, Carlos El Khoury, Karim Tazarourte, Mathys Wohl, Clément Claustre & Eric Lecarpentier

- SEE YOU DOWN THE ROAD!