

LETTER TO THE EDITOR

Letter by Voicu et al Regarding Article, “Derivation and Validation of the CREST Model for Very Early Prediction of Circulatory Etiology Death in Patients Without ST-Segment–Elevation Myocardial Infarction After Cardiac Arrest”

To the Editor:

We read with great interest the study by Bascom et al¹ regarding the predictors of circulatory failure (CF)-related death after resuscitated cardiac arrest (CA). Identifying patients with CA at high risk of CF-related death is important because circulatory assistance devices, such as venoarterial extracorporeal membrane oxygenation, could improve systemic and cerebral circulation until cardiac contractility and vascular resistance recover, potentially preventing CF-related death in some patients.

In 2016, our team published a similar study,² including out-of-hospital patients with CA without and also with ST-elevation myocardial infarction because these patients may also be at risk of CF-related death and may be potential candidates for venoarterial extracorporeal membrane oxygenation.

On the basis of multivariate analysis in the retrospective cohort, a logistic score estimating the risk of CF-related death was determined, comprising 2 variables: presence of shock on admission, defined as hypotension not responding to fluids and requiring catecholamines, and initial arterial pH. The area under the curve of the model was 0.812 (0.750–0.865) in the derivation and 0.818 (0.724–0.890) in the validation cohort. Patients presenting with shock and arterial pH ≤ 7.11 had a probability >0.5 of CF-related death. Therefore, we believe that the model by Bascom et al¹ (area under the curve of 0.73 in the derivation and 0.68 in the validation cohort) may become even more accurate if arterial pH and lactate concentration, another powerful predictor of CF-related death ($P < 0.0001$) in univariate analysis in our cohort, were taken into account.

In addition, we emphasize the similarity between the definition of shock by Bascom et al¹ as “hypotensive patients despite vasopressors” and that of the INTERMACS (Interagency Registry for Mechanically Assisted Circulatory Support) class 1 of cardiac failure, “hypotension despite rapidly escalating inotropic support,” a severity criterion suggesting by itself temporary circulatory assistance according to recent guidelines.³ Could the authors comment on why they used this definition of shock because this is not obvious in the Methods section? Moreover, was there a specified time interval of hypotension before declaring patients hypotensive despite catecholamine treatment?

We agree with the authors that left ventricular ejection fraction must be taken into account, but the issue of measurement timing also needs to be discussed—on admission, 4 hours later, and later because more hemodynamic instability occurs 4 to 7 hours after admission and could alter the contractility even further after admission.⁴

Last, we believe that the main role of these scores is to participate in the complex process of deciding on timely circulatory support. It was recently shown⁵ that some patients with CA benefit from venoarterial extracorporeal membrane oxygenation because 27% of 94 patients receiving venoarterial extracorporeal mem-

Sebastian Voicu, MD, PhD
Bruno Megarbane, MD, PhD
Georgios Sideris, MD, PhD

brane oxygenation support for refractory shock after out-of-hospital CA survived, depending on the degree of organ failure. Therefore, circulatory support may be useful in this population, especially when implemented early, and we hope that predictive scores will be refined in future studies to identify patients at high risk of CF-related death in an effort to improve survival.

ARTICLE INFORMATION

Affiliations

Service de Réanimation Médicale et Toxicologique, Université Paris Diderot, Sorbonne Paris Cité, APHP, Hôpital Lariboisière, 2 Rue Ambroise Paré, France (S.V., B.M.). Service de Cardiologie, Université Paris Diderot, Sorbonne Paris Cité, APHP, Hôpital Lariboisière, 2 Rue Ambroise Paré, France (G.S.).

Acknowledgments

The authors thank Dr Nicolas Deye from the Medical and Toxicological Intensive Care Unit in Lariboisière Hospital for sharing his insights regarding the prognostic factors after resuscitated cardiac arrest.

Disclosures

None.

REFERENCES

1. Bascom KE, Dziodzio J, Vasaiwala S, Mooney M, Patel N, McPherson J, McMullan P, Unger B, Nielsen N, Friberg H, Riker RR, Kern KB, Duarte CW, Seder DB; International Cardiac Arrest Registry (INTCAR). Derivation and validation of the CREST model for very early prediction of circulatory etiology death in patients without ST-segment-elevation myocardial infarction after cardiac arrest. *Circulation*. 2018;137:273–282. doi: 10.1161/CIRCULATIONAHA.116.024332.
2. Voicu S, Baud FJ, Malissin I, Deye N, Bihry N, Vivien B, Brun PY, Sideris G, Henry P, Megarbane B. Can mortality due to circulatory failure in comatose out-of-hospital cardiac arrest patients be predicted on admission? A study in a retrospective derivation cohort validated in a prospective cohort. *J Crit Care*. 2016;32:56–62. doi: 10.1016/j.jcrc.2015.11.007.
3. van Diepen S, Katz JN, Albert NM, Henry TD, Jacobs AK, Kapur NK, Kilic A, Menon V, Ohman EM, Sweitzer NK, Thiele H, Washam JB, Cohen MG; American Heart Association Council on Clinical Cardiology; Council on Cardiovascular and Stroke Nursing; Council on Quality of Care and Outcomes Research; and Mission: Lifeline. Contemporary management of cardiogenic shock: a scientific statement from the American Heart Association. *Circulation*. 2017;136:e232–e268. doi: 10.1161/CIR.0000000000000525.
4. Laurent I, Monchi M, Chiche JD, Joly LM, Spaulding C, Bourgeois B, Cariou A, Rozenberg A, Carli P, Weber S, Dhainaut JF. Reversible myocardial dysfunction in survivors of out-of-hospital cardiac arrest. *J Am Coll Cardiol*. 2002;40:2110–2116.
5. Pinet de Chambrun M, Bréchet N, Lebreton G, Schmidt M, Hekimian G, Demon-dion P, Trouillet JL, Leprince P, Chastre J, Combes A, Luyt CE. Venoarterial extracorporeal membrane oxygenation for refractory cardiogenic shock post-cardiac arrest. *Intensive Care Med*. 2016;42:1999–2007. doi: 10.1007/s00134-016-4541-y.

Letter by Voicu et al Regarding Article, "Derivation and Validation of the CREST Model for Very Early Prediction of Circulatory Etiology Death in Patients Without ST-Segment–Elevation Myocardial Infarction After Cardiac Arrest"
Sebastian Voicu, Bruno Megarbane and Georgios Sideris

Circulation. 2018;138:118-119

doi: 10.1161/CIRCULATIONAHA.117.032873

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Copyright © 2018 American Heart Association, Inc. All rights reserved.

Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the
World Wide Web at:

<http://circ.ahajournals.org/content/138/1/118>

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in *Circulation* can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the [Permissions and Rights Question and Answer](#) document.

Reprints: Information about reprints can be found online at:
<http://www.lww.com/reprints>

Subscriptions: Information about subscribing to *Circulation* is online at:
<http://circ.ahajournals.org/subscriptions/>