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Editorial

# One single variable for predicting the outcome after out-of-hospital-cardiac-arrest (OHCA): A reality or simply chasing El Dorado?



Sudden death due to out-of-hospital cardiac arrest (OHCA) is a major health issue.[1] Despite the continuing effort to improve resuscitation and post-resuscitation care, the prognosis of patients who have a cardiac arrest remains poor. Although modern cardiopulmonary resuscitation (CPR) has existed for more than 50 years, the majority of interventions, other than chest compression, ventilation and early defibrillation, have not been show to improve survival.[1,2] More than half of the survivors sustain neurological injury to some degree, and less than 10% show full recovery and are eventually able to return to work.[1–3] The median survival rate after emergency medical services (EMS)-treated cardiac arrest is 8.4% (3.0–16.3%).[4] The large variation in survival may imply better care in one service than another; however, it is likely that some of these conflicting results are due to differences in the definitions of variables and outcomes.[5] The relative contributions of these factors and variables to survival are still poorly understood but this remains the motivation for chasing El Dorado to search for gold.

In this issue, Bray et al.[6] report the results of a large, original and interesting retrospective cohort study involving analysis of data from patients arriving alive at hospital after resuscitation from OHCA. Their goal was to investigate whether different values of the systolic blood pressure (SBP) at hospital admission were associated with outcome at hospital discharge. Among many interesting data, they concluded that patients with a shockable cardiac arrest rhythm at the scene had maximal survival rates (54%) with a SBP of 120–129 mmHg and with no additional increment above this level. Conversely, progressively lower survival rates were observed in patients with SBP below 90 mmHg for each decrement of 10 mmHg in three groups (80–89 mmHg, <79 mmHg and unrecordable). Although not statistically significant, those who were hypotensive on arrival at hospital were more likely to be female, have arrested in a rural location, have received no bystander CPR, been comatose on arrival at hospital, and had a longer duration of arrest. Systolic blood pressure was not associated with hospital discharge in patients with non-shockable rhythms. From all 3620 eligible cases, just 14% of them were hypotensive (SBP < 90 mmHg) on hospital arrival. It is interesting to correlate interventions such as blood pressure management with better outcome, but we cannot make firm conclusions from this research. It is unknown whether more aggressive management of blood pressure after return of spontaneous circulation (ROSC) in the pre-hospital setting will increase the survivability. The authors were able to include some variables which are lacking in other studies. They included important independent controlled variables in a multivariate logistic regression analysis. Not all patients treated by the EMS using the Australian Resuscitation Council recommendations,[7] had received vigorous fluid resuscitation and blood pressure support in the prehospital phase. Many other factors influence outcome but were not included because they were difficult to record, e.g. volume of fluids, dose of adrenaline, ventilation quality, cause of shockable cardiac arrest, presence of acute myocardial infarction. The more appropriate Cerebral Performance Category[8] was not used as an outcome measure. This study was able to consider difference between patients with shockable and non-shockable rhythms but this may simply reflect the EMS response time. The authors raise the interesting question of whether a low SBP after ROSC following a shockable rhythm is associated with a worse prognosis because it reflects more myocardial injury or inadequate blood pressure management. This would distinguish between SBP as prognostic indicator (more myocardial injury) or something that requires more aggressive blood pressure management by the EMS.

The period during which bystander CPR was provided was included as 'no-flow' time; other researchers would define this as 'low-flow' time. The cause of cardiac arrest was simplified as a dichotomous possibility: cardiac or non-cardiac. Is this the most appropriate way to document cause of cardiac arrest or is it possible to define important subgroups? The problem is that statistical power would be reduced. Fig. 1 is an illustrative attempt to reflect the 'Labiruzzle quiz', a CPR challenge with missing puzzle pieces, where researchers have to collect as many variables as possible and are challenged to select a track based on the best available scientific evidence. Until we all accept and use the Utstein Style, a set of guidelines for uniform reporting of cardiac arrest,[9] researchers will continuing to compare apples with pears and resuscitation research will not progress. The first steps in addressing these concerns have been taken with the creation of the International Liaison Committee on Resuscitation (ILCOR) in 1992. These steps included the adoption of uniform definitions and nomenclature, a glossary of key terms, an updated chain of survival, recommendations based on medical evidence and best practice, and uniform classifications and registration system for resuscitation. Much is still unknown. Better data collection, intervention studies, prospective and, when possible, randomised, multicentre trials, meta-analyses and systematic reviews are all needed to enable robust evidence-based treatment recommendations for CPR.

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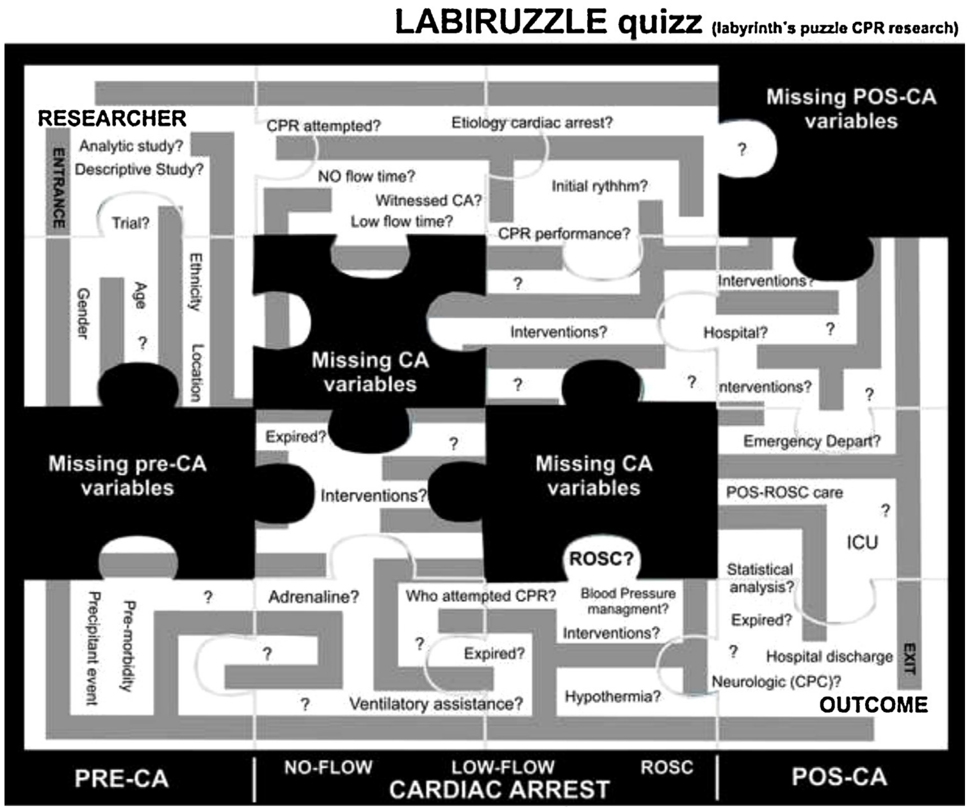


**Fig. 1.** LABIRUZZLE quiz (labyrinth's puzzle CPR research) – Is an illustrative attempt from this editorial to reflect how difficult, full of variable and missing data is the challenging way of all resuscitation researchers. CA (cardiac Arrest); NO-FLOW (NO CPR ongoing); Low-flow (along CPR); ROSC (Return of Spontaneous Circulation).

Resuscitation researchers need to collaborate and share hypotheses. Creation of a web-based multi-centre data management system using the Utstein-style is urgently needed so that we can get closer to the *El Dorado* of Resuscitation.

## Conflict of interest statement

No conflict of interest to report.

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David Szpilman [a,b,c] Q1
[a] *Intensive Care Unit, Hospital Municipal Miguel Couto, Rio de Janeiro, Brazil*
[b] *Medical Director of Brazilian Life Saving Society, SOBRASA, Brazil*
[c] *Medical Commission of International Life-saving Federation, Brazil*

Fernando Eugênio dos Santos Cruz Filho
*Instituto Nacional de Cardiologia, Ministry of Health of Brazil, Brazil*

*E-mail addresses:* david@szpilman.com, szpilman@globo.com (D. Szpilman)

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