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## Letter to the Editor

### What is the meaning of 'early CAG'?

To the Editor,

We read with great interest the article by Lindgren et al.,<sup>1</sup> who found that no gender differences in electrocardiograph (ECG) findings indicating an early coronary angiography (CAG) in patients with out-of-hospital cardiac arrest (OHCA). Though this study sounds scientific, some critical issues should be discussed.

First, Lindgren et al. defined 'early CAG' as CAG performed on the same day as the OHCA, however, we do not agree with this definition, as this 'early CAG' had a varied time span from several minutes to 24 h. In fact, the 2015 version of European resuscitation council guideline for resuscitation recommended that emergent cardiac catheterisation laboratory evaluation should be performed in surviving adults after OHCA of suspected cardiac origin with ST segment elevation (STE) on the ECG,<sup>2</sup> the 2017 European society of cardiology guideline for acute myocardial infarction also underlined that urgent angiography (within 2 h) should be considered in survivors of cardiac arrest with cardiogenic STE.<sup>3</sup> Thus we are afraid the 'early CAG' put forward by Lindgren et al. did not achieve the 2 h goal recommended by guidelines.

Second, the research aimed to investigate the interaction of gender and utilization of early CAG, CAG findings, comorbidity and outcome. The authors chose age as a continuous variable and adjusted it in their multivariable analysis without checking the interaction between age and sex. However, age is likely to be interacted with the factor of gender in OHCA patients, a compelling study demonstrated that younger women (15–45 years old) had an increased survival rate compared with their counterparts (OR: 1.66, 95%CI: 1.04, 2.64,  $P=0.03$ ), but no difference in discharge rates in the >55 years old cohort between the two gender groups ( $p > 0.05$ ), this interesting phenomenon might be ascribed to the protective hormonal effect among premenopausal women. Therefore, we suggest the authors divide the whole age group into several age groups to study the interaction between the variables of age and gender.<sup>4</sup>

Third, in Table 3 of the commented paper, we are surprised at the result that ischaemic heart disease associated with a lower odds of carrying out early CAG in the group without ST-elevation or left bundle branch block on the ECG (OR: 0.41, 95%CI: 0.24, 0.69,  $P=0.001$ ), which was a bit incredible as evidence showed that coronary artery disease independently correlated with a high odds of early CAG (OR: 3.37,  $P=0.005$ ),<sup>5</sup> So why did the doctors implement the 'early CAG'? For a rising serum concentration of myocardial injury markers like cardiac Troponin T? Perhaps the authors should provide some reasons and relevant data to explain this strange phenomenon.

Furthermore, factors like recurrent arrest, intractable shock, do-not-resuscitate (DNR) order after initial return of spontaneous circulation might be correlated with the survival outcomes of OHCA patients and these factors should be included in their adjusted multivariable survival analysis to get a more accurate result.

#### Competing interests

None.

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#### REFERENCES

1. Lindgren Covaciu L, Smekal D, Lagedal R, et al. Gender differences in utilization of coronary angiography and angiographic findings after out-of-hospital cardiac arrest: a registry study. *Resuscitation* 2019;143:189–95, doi:<http://dx.doi.org/10.1016/j.resuscitation.2019.07.015>.
2. Nolan JP, Soar J, Cariou A, et al. European resuscitation council and European society of intensive care medicine guidelines for post-resuscitation care 2015: Section 5 of the European resuscitation council guidelines for resuscitation 2015. *Resuscitation* 2015;95:202–22, doi:<http://dx.doi.org/10.1016/j.resuscitation.2015.07.018>.
3. Ibanez B, James S, Agewall S, et al. 2017 ESC guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: The Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). *Eur Heart J* 2018;39:119–77, doi:<http://dx.doi.org/10.1093/eurheartj/ehx393>.
4. Morrison J, Schmicker RH, Weisfeldt ML, et al. Effect of gender on outcome of out of hospital cardiac arrest in the Resuscitation Outcomes

- Consortium. *Resuscitation* 2016;100:76–81, doi:<http://dx.doi.org/10.1016/j.resuscitation.2015.12.002>.
5. Lam DH, Glassmoyer LM, Strom JB, et al. Factors associated with performing urgent coronary angiography in out-of-hospital cardiac arrest patients. *Catheter Cardiovasc Interv* 2018;91:832–9, doi:<http://dx.doi.org/10.1002/ccd.27199>.

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