same amount of patients collected in the same period of time. Therefore, the authors performed something similar to an internal validation for the ICM, compared to an external validation for the additive and logistic EuroSCORE. This methodological bias may justify the better performance of the ICM.

(b) There are some discrepancies in reporting numbers. In the abstract, it is stated that 'the logistic EuroSCORE shows a significant Hosmer-Lemeshow test ($\chi^2_{H\text{-}L} = 19.30$, $p < 0.0001$)'. In the text, the same significant χ^2 value is attributed not to the Hosmer-Lemeshow test within the EuroSCORE model, but to the difference between the receiver operating characteristic (ROC) areas of the ICM vs the logistic EuroSCORE model. In Table 4, the Hosmer-Lemeshow χ^2 value for the logistic EuroSCORE model is reported as 798.756. It is frankly difficult to understand and interpret these figures.

(c) The authors suggest an adjustment for the logistic EuroSCORE, by simply applying a 0.4 multiplier. After this, they claim for non-significant Hosmer-Lemeshow values, although they do not report them. Applying a fixed adjustment to the individual logistic EuroSCORE values simply produces a downward displacement of the logistic regression curve (same β value, constant = 0.4 times unadjusted constant). The Hosmer-Lemeshow χ^2 remains the same, as well as the ROC area. The adjusted model may appear more accurate, but actually has the same calibration and discrimination power of the unadjusted model.

I think that the conclusions of the authors are not supported by enough evidence, and that only an external validation process may determine the actual performance of the ICM.

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Reply to the Letter to the Editor

Reply to Ranucci

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Some years have passed since the CABG Outcome Study [1] was published and we are still answering questions concerning the original methodology already discussed several times. This is the case of Ranucci's letter [2]. We hope this is the very last time.

As usual, we answer in detail:

Concerning the matter of model validation we would like to quote a passage from Iezzoni's book 'Risk adjustment for measuring health care outcomes' [3]: '... How cross-validation is done depends primarily on the size of the data set. If the database is sufficiently large, direct estimates of how the model will perform with new data can be obtained by performing the following steps. First, the data are randomly divided in half. Second, the model is developed on one half of the data and then validated on the other half ...'. We think that a database of 34,310 records can be considered 'sufficiently large' to justify the use of the suggested methodology. As the cross-validation procedure allows obtaining an 'estimate of how the model will perform with new data', we think the conclusion affirming the better performance of the Italian CABG Model (ICM) as compared to the EuroSCORE is not biased.

Moreover, although it could not be considered a real validation, in a recently published work [4] we applied the ICM to an Italian sub-population selected on the basis of the National Hospital Discharge Records (years 2002–2004). The aim was to compare hospitals' performances obtained using the ICM with those derived from a model built on current administrative data. The results confirmed the ICM goodness of fit.

As a final remark, we would like to remind that EuroSCORE, as well as many other works addressing the same issue, used a similar methodology [5]. In fact, EuroSCORE was validated on an external population only some years after its development, application and publication.

Concerning the EuroSCORE logistic model recalibration, contrary to Ranucci's statement, we do not suggest to multiply by 0.4 the logistic EuroSCORE values but the number of the expected deaths. Actually, in this way, the number of the expected and observed deaths in estimated risk classes becomes closer and, as a consequence, the Hosmer–Lemeshow χ^2 becomes not significant ($p = 0.092$).

Finally, concerning the discrepancies in reporting numbers, we admit our fault. Actually, values in the abstract were

wrongly reported. The right numbers are those reported in the text and in Table 4. We apologise for the slip.

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