patients (according to the International Committee of the Red Cross recommendations) in the operating room. When blood transfusion is absolutely required, whole blood is available for use at most frontline facilities as opposed to separated blood components.

In hospitals that provide obstetrical care, the capacity for blood transfusion is required as a part of our Comprehensive Emergency Obstetric and Neonatal Care policy. While not standard, MSF is sometimes able to maintain a small blood bank in these hospitals using specialized refrigerators depending on the resources and permissions at that particular location. Otherwise, a living donor blood bank is established, where people have already been preidentified and screened for emergency blood donation. As a matter of policy, all donor blood is tested at MSF facilities, even if it is coming from the local national blood transfusion centers. It is primarily the tertiary MSF facilities located in more urban and well-resourced settings that have classic blood banks and are therefore able to handle trauma resuscitation in more traditional ways with the use of separated blood components.

In summary, we agree with Pasquier *et al.*[1] that this is an area of global public health significance. While we are unable to answer their questions regarding causes of mortality and incidences of blood transfusions at this time, we hope to investigate these further in the future. The various practices mentioned regarding blood transfusion capabilities and practices at MSF facilities have evolved to be dependent on the context of the facility's location and purpose. We feel that such an approach might potentially provide the initial outline for future programmatic work in this arena across the disparate healthcare settings found in low- and middle-income countries. We thank you for prompting the conversation on this very important topic.

## Competing Interests

The authors declare no competing interests.

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*(Accepted for publication June 16, 2016.)*

# Prediction Model for In-hospital Mortality Should Accurately Predict the Risks of Patients Who Are Truly at Risk

*To the Editor:*

With great interest, we read the article by Le Manach *et al.*[1] The article presents a prediction model for postoperative in-hospital mortality with very good discriminative abilities (C statistic of 0.93 in a validation cohort). However, we contend the conclusion that the predictive model is well calibrated.

A prediction model should first and foremost provide accurate predicted probabilities. When validating a prediction model, it is essential to answer the question whether predicted probabilities correspond to observed probabilities, especially for patients who may have a clinically relevant risk of the predicted outcome.

The reported calibration plot (fig. 2 in the article[1]) seems to show a well-calibrated model. However, the calibration plot is truncated at a predicted probability of 0.10, and the plot shows only 9 out of 10 deciles. Patients with the highest risks seem to have been omitted from the reported calibration plot. Figure 3 of the article[1] shows the observed mortality in the validation cohort for a wider range of risk scores. Supplemental Digital Content 3 reports the predicted probabilities for all Preoperative Score to Predict Postoperative Mortality (POSPOM) scores. If we overlay the predicted probabilities for all POSPOM scores onto figure 3 of the article,[1] we observe that the prediction model greatly overestimates the in-hospital mortality risk in the high-risk patients (fig. 1). Although the high-risk patients form only a small group, they are in fact the patients for whom the prediction model is most clinically relevant. We would not want to be the physician who communicates a 62% risk of death to a patient (POSPOM value of 40) while the actual risk is 23%.

From the results presented in the article, it is impossible to deduce what the reason is for the discrepancy in the results. There are several inconsistencies in the reporting of the predicted probabilities. The text of the article mentions a predicted probability of 5.65% for a POSPOM value of 30, whereas the Supplemental Digital Content reports a predicted probability 7.403%. There is no way to reconstruct the predicted probability as the model's intercept is not reported. It is possible that the predicted probabilities in Supplemental Digital Content 3 are wrong, which then could explain the overestimation of the in-hospital mortality risk. Even then, it would still be a necessity to report a continuous calibration plot of the model for the entire range of predicted probabilities, with a histogram within that calibration plot.

We believe that the prediction model may be of great value to both physicians and patients, but only after the overestimation of the high-risk patients has been addressed.

## Competing Interests

The authors declare no competing interests.

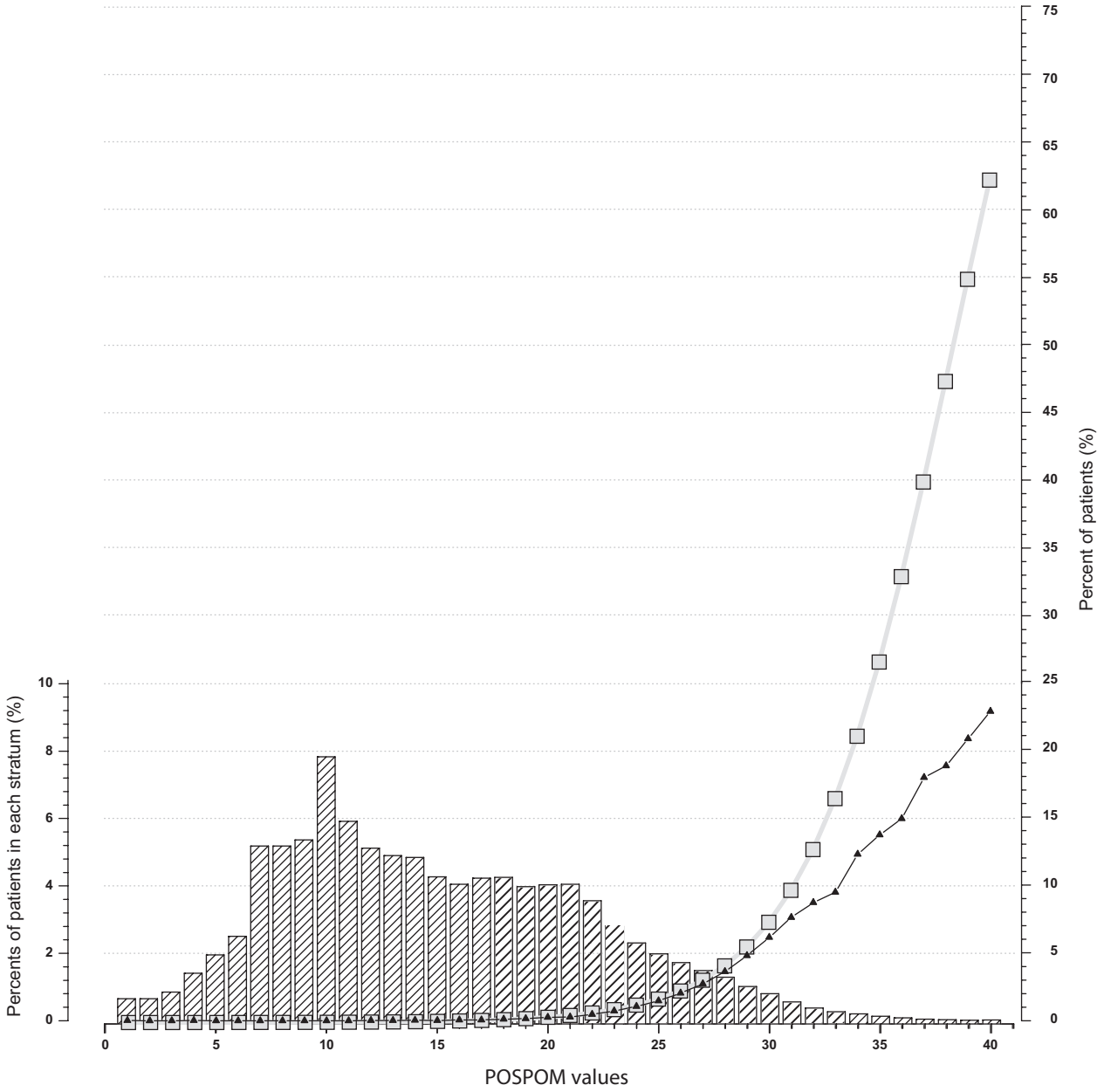


**Fig. 1.** Distribution of the Preoperative Score to Predict Postoperative Mortality (POSPOM) values in the validation cohort (n = 2,789,932) in relation to the observed in-hospital mortality rate (*solid line*) at each POSPOM value. *Gray line* is the predicted probability according to Supplemental Digital Content 3 of the article by Le Manach *et al*.[1]

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*(Accepted for publication June 16, 2016.)*

*In Reply:*

We thank Kappen *et al.* for their interest in our article describing the development of the Preoperative Score to Predict Postoperative Mortality (POSPOM).[1] The inconsistencies are consequences of an unfortunate error in the text (in the validation cohort, a POSPOM score equal to 30 was associated to a predicted in-hospital mortality of 7.40%, and not 5.65%). All tables and figures have been verified and corrected. An erratum has been issued and appears in this issue.[2]

In our validation cohort of 2,789,932 patients, only 22,136 (0.79%) had a predicted risk of in-hospital