Predicting cardiovascular events

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Marsh [1] has reported a CVD prediction procedure which is “much more accurate” than other methods, and that 94 % of the cases with cardiovascular incidents are predicted correctly by the method. The procedure is a staged one: people predicted to be not at high risk at the first stage are put through a second stage and those not predicted to be high risk at the second stage are advanced to a third stage. If the data from the three stages in Table 3 of the paper are extracted, a 2×2 table of actual and predicted counts can be formed:

Actual cvd	Predicted_cvd		Total
	no	yes	
No	261	1,452	1,713
Yes	35	527	562
Total	296	1,979	2,275

The reported 94 % that are correctly predicted is 527/562, that is, most of the 562 CVD cases are predicted as CVD cases. However, the table also shows that 85 % (1452/1713) of the 1713 people who have no CVD are also

picked up by the procedure, and overall 87 % (1979/2275) of the population would be in the “Predict to CVD” group.

The reason so many are classified as “predicted CVD” is that at each stage of the procedure there is an opportunity for classification to “Predicted CVD”. Cumulatively, over the three stages, too many are so classified. It is akin to lowering the threshold, for example, of a Framingham score, to identify high risk. With a low enough threshold, *any* “predicted correctly” percentage can be achieved (100 % if the threshold is zero!) but of course a low threshold is useless as an identification strategy, because most the non-CVD cases meet the criteria too. Similarly, the Marsh procedure, by staging, effectively creates a very low threshold for admission to “Predicted CVD”. It not a useful strategy, unless one is happy to treat 87 % of the population.

Reference

1. Marsh RW. Predicting cardiovascular events using three stage discriminant function is much more accurate than Framingham or QRISK. Eur J Epidemiol. 2011;26:915–8.

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