Death Rates Versus Deaths

To the Editor:

In the October 24, 2000, issue of Circulation, Morrow et al present a simple, validated scoring system (1 through 14 points) using clinical variables to measure the risk of mortality after ST-elevation myocardial infarction. In this system, risk rises progressively with higher scores and is maximal for a composite score >8. The authors state that a score >6 identifies a segment of the population (12%) that doubles the mean mortality risk of the total population, and they imply that this cohort should be the major target for treatment.

Risk data certainly drive risk-benefit and cost analyses. I am concerned, however, that using the >6-point cutoff ignores almost 60% of the total deaths in this population. Analysis of the absolute number of deaths at 30 days shows a peak at a risk score of 5 and shows that the number of deaths surpasses the mean for scores of 3 to 7. Thus, in terms of targeting total lives at risk, it is the middle, not the upper, risk scores that deserve emphasis. A complementary analysis might combine the high-risk group (best number needed to treat, scores >6) with the mid-risk group (most potential lives to save, scores 3 to 7). At this point, the population essentially divides into halves. One half is a low-risk group (scores 0 to 2) with an average risk of 1.6% and 13% of the total lives to be saved, and the second half is a higher-risk group (scores 3 to 14) with an average risk of 10.8% and 87% of the lives to be saved.

Although the final determination of the target group for any intervention would depend on the risk, benefit, and possibly the cost of that intervention, wouldn’t it be useful to view analyses of death rate and deaths as complementary any time the greatest number of deaths does not concentrate in the highest risk cohort?

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Response

Dr Kessler has raised an important issue to consider in formulating any strategy for targeted acute therapy as well as for primary or secondary prevention. We should first clarify that we did not intend for a Thrombolysis in Myocardial Infarction (TIMI) risk score ≥6 to be taken as a clinical threshold but rather used this score only to give the reader a sense of the distribution of mortality risk between the ~10% of the population at each of the 2 extremes. To the contrary, we deliberately reserved decisions regarding appropriate clinical thresholds along this spectrum for the individual clinician and institution. Furthermore, simple dichotomization of the risk score loses discriminatory information that is likely to be useful in clinical decisions.

Nevertheless, as we consider application of the TIMI risk score for ST-elevation myocardial infarction (STEMI) for specific clinical pathways (eg, development of a triage rule) Dr Kessler’s comments are relevant. It is common in medical decision-making to target a high-risk population for whom a specific intervention may offer the greatest absolute benefit. This “high-risk” approach focuses resources on a small portion of the overall population at risk (the upper tail of a Gaussian distribution), often in an effort to maximize cost-efficiency or to avoid exposure to potential complications of therapy. However, as Dr Kessler points out, the majority of events may occur in the middle-risk group that constitutes the greatest proportion of the population. Though the number needed to treat to avoid each event falls as patient risk increases, so too does the number of patients at risk. These important points serve as a reminder that interventions targeted at more modest reduction in absolute risk across a greater proportion of the population may achieve a greater impact on the number of lives saved. The limitation of such a strategy is that lower-risk patients with little to gain may be subjected to treatments with associated discomfort and risks. For example, while the categorization suggested by Dr Kessler might capture a group with an average risk of 10.8%, there is an ~8-fold gradient in mortality risk within the group.

We agree with Dr Kessler that development of an optimal strategy must take into account not only the magnitude but also the distribution of risk, as well as the benefits, costs, and hazards of therapy.

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