Letters to the Editor

Risk Factors for Inpatient Suicide Do Not Translate Into Meaningful Risk Categories—All Psychiatric Inpatients Are High-Risk

To the Editor: The study of suicide among psychiatric inpatients in Denmark between 1997 and 2006 by Madsen and associates[1] is an important contribution to the literature because it is the largest study on the topic to date, it is one of only a few studies to have used systematically collected prospective data, and it is the only study to have considered the effects of time at risk due to differences in the duration of hospital stay. We recently conducted a systematic review and meta-analysis of 28 controlled studies on this topic[2] and found that the length of hospital stay was significantly associated with the risk of suicide as an inpatient.[2] It is therefore likely that at least some of the findings of earlier studies were affected by time at risk. For example, we found that patients with diagnoses other than schizophrenia or mood disorder were at a lower risk of inpatient suicide, a finding that might be explained by those patients spending less time in hospital.

In addition to the failure to consider time at risk, the studies we included in our meta-analysis were prone to type II errors because of the large number of factors they examined. Some studies examined more than 200 factors, all but 1 used P value of $< .05$ as the level of significance, and none of the studies used a Bonferroni correction for multiple significance tests. Every individual study reported some associations as significant that we found to be nonsignificant by meta-analysis.[2]

Both our meta-analysis[2] and the study by Madsen et al[1] found that patients who had made a prior suicide attempt were at the greatest risk of inpatient suicide, with odds ratios of 3.95 and 4.99, respectively. We were also able to meta-analyze the association between inpatient suicide and a "high-risk" categorization derived from multivariate models in 7 studies and calculated a pooled odds ratio for suicide of 10.9 with a sensitivity of 64% and a specificity of 85%. Type II errors almost certainly inflated the sensitivity, specificity, and odds ratio of the high-risk models because about half of the included factors were not associated with suicide by meta-analysis and almost a third of the factors in the high-risk models appeared as both risk factors and protective factors in different models.[3] Using the base rate of inpatient suicide reported by Madsen and colleagues of 1 suicide per 1,278 admissions and the figures for sensitivity and specificity derived by meta-analysis, it can be estimated that as few as 3 in 1,000 patients categorized as being at high risk could be expected to go on to commit suicide while in the hospital. It would be of considerable interest to know if a multivariate model derived from Madsen and colleagues' study had a higher positive predictive value.

Not only is the predictive value of high-risk categorization for inpatient suicide very low, but the use of the term *low-risk* in this setting is misleading. Madsen and associates[1] reported a suicide rate for inpatients in Danish psychiatric hospitals of 860 per 100,000 per year and a suicide rate for the Danish population of 11.9 per 100,000 per year, suggesting that the risk of suicide among all inpatients is more than 70 times greater than that of the general population. Hence, inpatients categorized as being at "low risk" are much more likely to commit suicide than members of the general community.[3]

Future studies of inpatient suicide should follow the example of Madsen et al[1] and include a time-at-risk analysis to control for the effect of differing lengths of stay on other risk factors. However, from the data that are available, it is clear that there is no such thing as a group of psychiatric inpatients that can realistically be considered to be at low risk of suicide. Instead of attempting to estimate the risk of suicide, we should do our utmost to make our wards as safe as possible and to provide the highest quality psychiatric care to all patients.

REFERENCES

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