level would be needed to draw conclusions regarding changes in folate exposure of individuals. □

Kathleen M. Koehler, PhD
Shirley L. Pareo-Tubbeh, MS
Richard N. Baumgartner, PhD
Linda J. Romero, MD
Philip J. Garry, PhD

The authors are with the Clinical Nutrition Program, School of Medicine, The University of New Mexico, Albuquerque.

Requests for reprints should be sent to Kathleen M. Koehler, PhD, Clinical Nutrition Program, School of Medicine, The University of New Mexico, 2701 Frontier Place NE, Surge Bldg, Room 215, Albuquerque, NM 87131-5666.

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Are Uninsured Trauma Patients Treated Differently?

The article "Acutely Injured Patients with Trauma in Massachusetts: Differences in Care and Mortality, by Insurance Status" by Haas and Goldman[1] described a retrospective analysis of outcomes and resource utilization for trauma patients aged 15 to 64. The authors claimed to have shown a decreased utilization of resources and increased mortality for uninsured trauma patients that persisted even when the Injury Severity Score was controlled for, implying that physicians caring for trauma patients treated uninsured patients differently from those with insurance. This paper received prominent attention in both Massachusetts and the national press.

We would like to make several observations about the data and the analysis presented in the paper that might temper its conclusions. The text was unclear as to how insurance data were grouped. Many trauma patients have a combination of insurance coverage, including automobile insurance and workman's compensation. It did not appear from the text that such alternative reimbursement sources were considered in the analysis; or if they were, how they were handled.

Injury Severity Scores were calculated with the 1985 edition of the Abbreviated Injury Scale and the 1990 *International Classification of Diseases,* Ninth Revision, Clinical Modification (ICD-9-CM) codes. ICD-9-CM codes that were not recognized by the mapping algorithm may have lead to inaccurate calculation of Injury Severity Scores. It surprised us to find that Table 1 listed Injury Severity Scores ranging from 2 to 76, since the scale has a range from 1 to 75. There appears to have been no one among the 15 000 admissions analyzed who had a score of 1. This seems very unlikely. Review of the trauma registry of a trauma center considered in the analysis for the same period of time revealed 109 patients with an Injury Severity Score of 1.

Furthermore, the authors stated that the most common Injury Severity Score occurring in their data set was 12, which was "concussion associated with loss of consciousness." A score of 12 is possible only when three separate body regions are assigned an Abbreviated Injury Scale score of 2. Concussion, being a single body region phenomenon, could never alone result in an Injury Severity Score of 12. These significant discrepancies call into question the validity of the Injury Severity Score method used in the paper. Another concern is that Injury Severity Score is a noncontinuous variable with some discontinuity in the values it can take; its use in general linear models is methodologically controversial.

Mechanism of injury was available for 32% of the patients in the data set. In this subset, uninsured patients had a significantly increased risk of penetrating injury. In this setting, Injury Severity Scores are known to underestimate injury severity and mortality.[2] The requirement for surgical and rehabilitation services are different between patients with penetrating and blunt injury. This may have influenced the differences in resource utilization observed between insured and uninsured patients. If the proportion of blunt/penetrating injuries were similar for the rest of the patients in the data set, this effect would be more general. Comparison should have been made between subsets of patients with similar injuries such as those with head injury or lower extremity fracture, rather than controlling for Injury Severity Score alone.

We agree that quality of trauma care should be carefully assessed, and we appreciate the effort that Haas and Goldman have made. If the findings of this study are valid, then immediate and drastic remedial action should be taken in our state. We would contend, however, that the analysis presented in their paper is sufficiently flawed as to preclude such a conclusion.

Analysis of trauma registry and billing data from Boston City Hospital (a Level I trauma center included in the Haas and Goldman analysis) for the period of July 1993 to 1994 reveals that insured patients have nearly twice the relative risk of dying of noninsured patients. When injury severity as measured by Injury Severity Score and Revised Trauma Score is controlled for, all differences in mortality and resource utilization between insured and uninsured patients disappear. (These data are currently being prepared for submission to the Journal.) □

Frederick H. Millham, MD
Maria Segui-Gomez, MD, MPH

Frederick H. Millham is with the Department of Surgery, Boston University Medical Center, Boston, Mass. Maria Segui-Gomez is with the Harvard Injury Control Center, Harvard University, Boston.

Requests for reprints should be sent to Maria Segui-Gomez, MD, MPH, Harvard Injury Control Center, 718 Huntington Avenue, Boston, MA 02115.

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Haas and Goldman Respond

Millham and Segui-Gomez raised several issues related to the methods used