Use of Geocoding and US Census Data to Assess Determinants of Outcome in Trauma Patients

Krista M. Goodman MD
Lehigh Valley Health Network, Krista_M.Goodman@lvhn.org

John J. Hong MD
Lehigh Valley Health Network, john_j.hong@lvhn.org

Sherrine Eid MPH
Lehigh Valley Health Network, Sherrine.Eid@lvhn.org

Leslie Baga BSN, CCRC
Lehigh Valley Health Network, Leslie.Baga@lvhn.org

Michael M. Badellino MD, MPH, FACS
Lehigh Valley Health Network, Michael.Badellino@lvhn.org

See next page for additional authors

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Authors
Krista M. Goodman MD; John J. Hong MD; Sherrine Eid MPH; Leslie Baga BSN, CCRC; Michael M. Badellino MD, MPH, FACS; and Michael D. Pasquale MD, FACS

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Abstract
A number of studies have linked disparities between patient care and outcomes to socioeconomic status (SES) as well as insurance status and other social factors in a variety of diseases. There have been few possible explanations for this phenomenon. Recently, there has been information gathered about poorer outcomes in trauma patients with these factors. The purpose of our study was to identify outcome differences between patients with and without insurance, specifically breaking down insurance types, and using geocoding technology along with census data to identify these differences. With this data, we hoped to identify tangible reasons for poorer outcomes in the uninsured.

Introduction
• There have been numerous studies published discussing the relationship between clinical outcomes and ecological social factors such as race, ethnicity, socioeconomic status (SES), and insurance status.
• Despite the growing base of research indicating that differences in outcomes exist, there have been few plausible explanations for this phenomenon.

Purpose/Hypothesis
• Identify if and how socioeconomic health influenced outcomes in trauma patients at our institution.
• We hypothesized that by using US Census data and environmental data to test the primary outcome variables, we would identify specific ecological social factors that contributed for outcomes in patients following traumatic injuries.

Methodology
• Replication of our trauma registry from 1 Jan. 2000 – 1 Jan. 2010
• Utilized individual outcomes from trauma cases and environmental data to test the primary outcome variable.
• Patients’/home addresses were taken from our trauma registry and were spatially merged with US Census data using Arc- GIS 10.2 software with a 100 ft. radius.
• Environmental variables were defined as dimensions of social determinants of health, which included the following:
  • % population of poverty
  • % population Hispanic, Black, or White
  • % population with < high school education (US Census 2000 definition: < 20 years old with no high school diploma
  • % population in labor force that is unemployed (US Census 2000 definition: > 16 years old, in labor force, unemployed
  • % population White
  • % population 25 years old with less than high school education
  • % population at poverty
  • % population < 65 years old
  • % population with 65 years of age or older
  • % population White
  • % population Hispanic
  • % population African American
  • % population Asian
  • % population < 65 years of age
  • % population > 16 years old, in labor force, unemployed
  • % population with less than high school education
  • % population at poverty
  • % population White
  • % population Hispanic

Exclusion Criteria
• Patients not identified to (1) SES ≤ 01.0
• Began data endpoint running in 2004

Discussion
In our single-institution evaluation, insurance status is the most important predictor of mortality, conferring a 4-5 times higher risk of death for uninsured patients who do have insurance, regardless of socioeconomic status. Patients for insurance status being such a large contributor to outcomes are unique. Differences in outcome do exist between those who are insured and uninsured. Being uninsured independently increases one’s risk of death at least 4 times for mortality following trauma for patients with ISS greater than 15.

Study Limitations
• Heterogeneity of our study population and the fact that non-economic socioeconomic variable was identified linking why uninsured patients have higher mortality.
• We failed to identify any linking factors explaining why patients without insurance have a higher mortality risk.

Conclusion
• In our single-institution study, insurance status is the most important predictor of mortality, conferring a 4-5 times higher risk of death for uninsured patients who do have insurance, regardless of socioeconomic status. Patients for insurance status being such a large contributor to outcomes are unique. Differences in outcome do exist between those who are insured and uninsured. Being uninsured independently increases one’s risk of death at least 4 times for mortality following trauma for patients with ISS greater than 15.