The Social Determinants of Trauma and Violence: Drivers of Trauma Disparities

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Program Manager
Michigan Trauma Quality Improvement Program
University of Michigan
Objectives

1. Identify the social determinants of trauma and violence.
2. Identify multilevel factors that contribute to trauma disparities.
3. Identify trauma center best practices to reduce trauma disparities.
It’s personal
HOW LONG WILL YOU LIVE?

YOUR ZIP CODE MATTERS
Hurley Medical Center
Flint, Michigan

• Level I Trauma Center
• 500 bed safety net hospital
• High uncompensated care
• 1,700 trauma admits year
  • 70% Blunt
  • 22% Penetrating
  • 8% Burn
1960-70’s Flint one of highest per capita income in the US

1970’s Buick City Complex- Largest Auto Plant in the World

Highest paid lowest educated workforce
1980’s Post Industrialization of Flint
- Disinvestment
- Depopulation
- Urban Decay
- Unemployment
- Poverty
- Crime

Loss of >80,000 GM jobs over 3 decades

Manufacturing Jobs, % of Total Jobs
January 1939 to March 2010

Source: BLS
Flint most violent city (per capita)
• 2010-1st
• 2011-1st
• 2012-1st
2015 FLINT WATER CRISIS

TIME The Poisoning Of An American City

Toxic water. Sick kids. And the incompetent leaders who betrayed Flint

by Josh Foxhoven
I've been poisoned by policy

CHARGED WITH IN VOLUNTARY MANSLAUGHTER

Stephen Busch
Howard Croft
Nick Lyon
Darnell Earley
Liane Shekter-Smith
2017
Flint, Michigan

- One of the poorest cities in US
- Median Income $25,896
- 45% adults below poverty line
- 58% children live below poverty line
- National avg children 18%
What is the role of the trauma center in youth violence prevention?
Curiosity

- Motor Vehicle Crash
- Victim 25 years old
- Black male
- Uninsured
- North end of Flint
- Low SES

- Motor Vehicle Crash
- Victim 25 years old
- White male
- Insured
- South end of Flint
- High SES

Outcomes?
Historically trauma care thought to be immune to disparities?
Reactions

**Clinicians**
- Anger
- Denial
- Defensive
- It can’t be true....
- The data is wrong...
- No one can risk adjust enough...

**Hospital Administrators**
- Uneasy....

Study initially turned down by hospital’s IRB due to fear will make hospital look bad
Trauma Recidivism

• 40% of violently injured youth return with repeat injuries

• 20% are victims of homicide within 5 years of admission

• A recent 2014 longitudinal study found that those with *intentional* trauma were most likely to die from a subsequent violent injury

• Time interval to repeat injury estimated (8 - 24 months)
Background

- Trauma centers required to provide injury prevention programs
- Targeting high risk groups
- Violence often ignored
- Barriers: knowledge, time, funding, safety
Trauma Center Based Youth Violence Prevention Programs: An Integrative Review

Judy Nanette Mikhail¹ and Lynne Sheri Nemeth¹

Abstract
Objective: Youth violence recidivism remains a significant public health crisis in the United States. Violence prevention is a requirement of all trauma centers, yet little is known about the effectiveness of these programs. Therefore, this systematic review summarizes the effectiveness of trauma center–based youth violence prevention programs. Methods: A systematic review of articles from MEDLINE, CINAHL, and PsychINFO databases was performed to identify eligible control trials or observational studies. Included studies were from 1970 to 2013, describing and evaluating an intervention, were trauma center based, and targeted youth injured by violence (tertiary prevention). The social–ecological model provided the guiding framework, and findings are summarized qualitatively. Results: Ten studies met eligibility requirements. Case management and brief intervention were the primary strategies, and 90% of the studies showed some improvement in one or more outcome measures. These results held across both social ecological level and setting: both emergency department and inpatient unit settings. Conclusions: Brief intervention and case management are frequent and potentially effective trauma center–based violence prevention interventions. Case management initiated as an inpatient and continued beyond discharge was the most frequently used intervention and was associated with reduced rearrest or reinjury rates. Further research is needed, specifically longitudinal studies using experimental designs with high program fidelity incorporating uniform direct outcome measures. However, this review provides initial evidence that trauma centers can intervene with the highest of risk patients and break the youth violence recidivism cycle.

Keywords
youth violence, community violence, violent offenders

In the United States, violent injury is the leading cause of death for black males aged 15–24 years, and the second leading cause of death for all young people aged 10–24 years. For every trauma centers and even fewer centers are engaged in youth violence prevention efforts (McDonald et al., 2007; Telliez & Mackersie, 1996). Identified barriers to trauma personnel invol-
## Injury Prevention

<table>
<thead>
<tr>
<th>Level</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Prevention (Universal Prevention)</td>
<td>General population</td>
</tr>
<tr>
<td>Secondary Prevention</td>
<td>At risk youths</td>
</tr>
<tr>
<td>Tertiary Prevention</td>
<td>Youth already injured</td>
</tr>
</tbody>
</table>
Teachable Moment

A period of thoughtfulness that can follow traumatic assault, thereby providing a potential window for trauma center intervention.
<table>
<thead>
<tr>
<th>Table 2. Inclusion Exclusion Criteria.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inclusion Criteria</strong></td>
</tr>
<tr>
<td>- Peer-reviewed studies</td>
</tr>
<tr>
<td>- Evaluated a violence prevention intervention</td>
</tr>
<tr>
<td>- Targeted patients injured by youth violence</td>
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<tr>
<td>- RCTs and observational studies</td>
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</tbody>
</table>
## Selection Flow Diagram

1. **Identification**
   - Records identified through database searching (n = 623)
   - Additional records identified through other sources (n = 6)

2. **Screening**
   - Records after duplicates removed (n = 252)
   - Exclusions based on screening of titles/abstract: unrelated topic, not original study (n = 84)

3. **Eligibility**
   - Records screened (n = 168)
   - Full-text articles assessed for eligibility (n = 15)
   - Full-text articles excluded: Non-youth violence, non-clinical settings, no comparative data (n = 153)
   - Studies included in qualitative synthesis (n = 10)

4. **Included**
   - Studies included in qualitative synthesis (n = 10)
   - Studies excluded: overlapping studies of same program (n = 5)
   - Studies included in quantitative synthesis (meta-analysis) (n = 0)

*Note: The diagram illustrates the selection process of identifying and excluding studies for a systematic review.*
Intervention Groups

**Brief Intervention (BI)**
Time-limited patient intervention contacts (one or two contacts) following screening for hazardous and harmful behaviors

**Case Management (CM)**
Coordination of health services by a case manager who guides the patient through recovery often extending into the community
<table>
<thead>
<tr>
<th>Program</th>
<th>Place</th>
<th>Design</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within Our Reach Program</td>
<td>Chicago, IL</td>
<td>RCT</td>
<td>CM 6 mo</td>
</tr>
<tr>
<td>Violence Intervention Program</td>
<td>Baltimore, MD</td>
<td>RCT</td>
<td>CM up to 2.5 yrs</td>
</tr>
<tr>
<td>Youth Violence Prevention</td>
<td>Washington DC/Baltimore, MD</td>
<td>RCT</td>
<td>CM 6 mo</td>
</tr>
<tr>
<td>SafeERteens</td>
<td>Flint, MI</td>
<td>RCT</td>
<td>BI (comp/MSW)</td>
</tr>
<tr>
<td>Bridging the Gap</td>
<td>Richmond, VA</td>
<td>RCT</td>
<td>BI &amp; CM 6mo</td>
</tr>
<tr>
<td>Caught in the Crossfire</td>
<td>Oakland, CA</td>
<td>Cohort</td>
<td>CM 12 mo</td>
</tr>
<tr>
<td>Wrap Around Project</td>
<td>San Francisco, CA</td>
<td>Cohort</td>
<td>CM 6-12 mo</td>
</tr>
<tr>
<td>Wrap Around Project</td>
<td>Sacramento, CA</td>
<td>Cross-sectional</td>
<td>CM 6-12mo</td>
</tr>
<tr>
<td>Prescription for Hope</td>
<td>Indianapolis, IN</td>
<td>Case Series</td>
<td>CM 6-12 mo</td>
</tr>
<tr>
<td>Project UJIMA</td>
<td>Milwaukee, WI</td>
<td>Case Series</td>
<td>CM 12 mo</td>
</tr>
</tbody>
</table>
Social Ecological Model of Violence

**Societal**
- Poverty
- High crime levels
- High residential mobility
- High unemployment
- Local illicit drug trade
- Situational factors

**Community**
- Rapid social change
- Gender, social and economic inequalities
- Poverty
- Weak economic safety nets
- Poor rule of law
- Cultural norms that support violence

**Relationship**
- Poor parenting practices
- Marital discord
- Violent parental conflict
- Low socioeconomic household status
- Friends that engage in violence

**Individual**
- Victim of child maltreatment
- Psychological/personality disorder
- Alcohol/substance abuse
- History of violent behaviour
<table>
<thead>
<tr>
<th>SEM</th>
<th>Intervention</th>
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</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Anger Management</td>
</tr>
<tr>
<td></td>
<td>Conflict Resolution</td>
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<tr>
<td></td>
<td>Problem Solving</td>
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<td></td>
<td>Goal Setting</td>
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<tr>
<td>Relationships</td>
<td>Family Counseling</td>
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<td></td>
<td>Parenting Skills</td>
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<tr>
<td>SEM</td>
<td>Intervention</td>
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<tr>
<td>-------------</td>
<td>--------------------------------------------------</td>
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<tr>
<td>Community</td>
<td>Housing</td>
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<tr>
<td></td>
<td>Employment</td>
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<td>Job Training</td>
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<td>Tutoring/GED</td>
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<td></td>
<td>Transportation</td>
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<td>Legal Services</td>
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<td></td>
<td>Drivers License</td>
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<tr>
<td></td>
<td>Tattoo Removal</td>
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<tr>
<td></td>
<td>Substance abuse</td>
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<td></td>
<td>Financial Assistance</td>
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<td></td>
<td>Medical/Mental/Dental</td>
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</tbody>
</table>
Partnership is Key

City Officials

Law Enforcement

Public Health

Community

Business Owners

Education
Outcomes

**Self-report measures**
- Validated assessment tools
- Attitudes (aggression)
- Attitudes (self-efficacy)
- Alcohol use
- Drug use
- Weapon carrying
- Fighting

**Direct Measures**
- Reinjury (ED visit or hospitalization)
- Referrals made/utilized
- Post-discharge clinic visits
- Post-discharge ED visits
- Employment (confirmed)
- Rearrest (police data)
- Convictions (court data)

90% studies showed some improvement in outcome measures
Recruitment

• Recruitment took place in the ED/ICU/Floor
• Enrollment rates varied 20% to 97% (average of 55%)
• The average study attrition rate was 18% (range 4%-31%)
• The period from intervention until outcomes were measured varied between as short as 6 weeks to as long as 2.5 years
Case Managers/Navigators

• Social Workers / Nurses

• Former convicts or trauma patients most successful
  • Willingness to trust case managers based on shared cultural experiences

• Deployed to the streets as “violence interrupters”
Case Manager “Dose” and Cost

- Higher case manager exposure in the first 3 months was associated with a higher rate of success.
- The time spent in the program ranged from 3.6 to 7 months
- Average case load 1 CM to 25
- Estimated budget of roughly $320,000 per year for three case managers to treat 50 youths annually.
Cost Benefit

- Difficult to estimate
- Total cost reduction annually estimated: $750,000 to $1.5 million
- Consider linking program to readmission reduction due to Government penalty
- Literature shows that low SES is associated with higher readmission
Take Aways

• Integrate TC with community partners
• Consider former trauma patient as navigator
• Emphasize readmission reduction & injury recidivism to sell to administration
National Network of Hospital based Violence injury Prevention Programs (NNHVP)

www.nnhvip.org

MISSION: Strengthen existing hospital-based violence intervention programs and help develop similar programs in communities across the country.
Public Health Approach

Public Health Model Versus Medical Model
National Academy of Sciences ≈ Institute of Medicine

- 1863 Congressional Charter
- Signed by Pres Lincoln
- Private, non profit agency (Scientists)
- Provide independent, objective analysis and advice to the nation
- Inform public policy
Institute of Medicine

1999
Focus on Quality - Patient Safety

2001
Roadmap to Improve Care
Domains of Quality

- Safety
- Effectiveness
- Patient centeredness
- Efficiency
- Timeliness
- Equitable

*IOM Crossing the Quality Chasm*
What Do We Mean By Quality?
IOM 6 Aims

**Safety** - no needless death, injury, pain or suffering for patients or staff

**Timeliness** - waste no one’s time

**Effectiveness** - care and service will be based on best evidence, informed by patient values and preferences

**Efficiency** - remove all unnecessary processes or steps in processes; streamline all activities

**Equity** - all care and service will be fair and equitable – the system will treat all patients equally

**Patient Centeredness** - all care and service will honor individual patients – their values, choices, culture, social context and specific needs

*Source: Institute of Medicine*
EQUALITY

EQUITY
Health Equity:

ALL people achieve highest attainable level of health.
Social Determinants of Trauma

• Conditions in the *social, physical, and economic environment* in which people are *born, live, work, and age*, including *access* to health care.
Determinants of Health Components

General
- Socio-economic
- Political
- Cultural
- Environmental Conditions

Living and Working Conditions
- Housing
- Health Care Services
- Work / Unemployment
- Education
- Water and Sanitation
- Agricultural And Food

Social Community Network
- Family Support
- Participation with Governmental Processes

Individual & Life Style Factors
- Age
- Sex
- Constitutional Factors
Disparities Deep Dive

Public Health – Psychology – Sociology – Criminal Justice – Education
Looking Beyond Individual Behaviors

Racism

Poverty

Segregation

Income Inequality
Disparities Root Causes

1. Differences in life exposures, opportunities, stressors
2. Differences in access to healthcare
3. Differences in quality of healthcare
Proposed Reasons for Disparities

**Patient**
- Genetics
- Health literacy
- Health behaviors
- Comorbidities

**Provider**
- Communication
- Quality
- Implicit bias

**Hospital**
- Quality
- Poor payor mix
- Minorities
“Over a long period of time, we’ve simply paid more for downstream rescue work than for upstream preventive work.”
— Rishi Manchanda
The Social Determinants of Trauma: A Trauma Disparities Framework

UPSTREAM Social-Ecological (Population) Life Course Lens Medical Model (Individual) DOWNSTREAM

Institutional (Power) | Social Place (Place) | Discrimination (Experiences) | Behaviors (Comorbidities) | Injury | Disparities Research | Trauma Outcomes
---|---|---|---|---|---|---

Disparities Interventions Across the Trauma Care Continuum

Primordial Prevention INEQUITIES Primary Prevention Secondary Prevention DISPARITIES Tertiary Prevention

Detect & Explore Disparities | Integrate Equity into Performance Improvement | Design & Implement Interventions | Evaluate & Sustain Interventions

Social Services Investment Insurance Expansion Reimbursement Reform Early Childhood Investment Health Impact Assessment Parenting/Family Support Education Financing Reform Housing/Legal Services Equity Social skills/Job Training Mental Health/Drug Abuse Environmental Equity Gun Access & Safety Reform Income Inequality Reform Criminal Justice Reform Advocacy Competence

Patient Factors Biomarkers, Epigenetics Attitudes, Beliefs, Education Health Literacy, Preferences Language, Communication Healthcare System Trust Access to Care, Travel Time Engagement, Adherence Admission Risk Screening: • Insurance Status/SES • Childhood Adversity • Violence Exposure • Depression/PTSD • Substance Abuse • Poly Victimization

Hospital Factors Administrative Commitment Social Justice Messaging Disparities Dashboards Align PI/Equity Incentives Hospital Resources/Quality Hospital Volume/Case Mix Teaching Status Financial Stability Percent Minority Population EMR/Informatics Integration Technology Adoption Patient Advocacy Services Safety Net Hospital Support Regionalization of Care

Workforce Factors Workforce Diversification Pt Staff Dis/Concordance Pt Clinician Communication Language Services Disparities Awareness Implicit Bias Awareness Cultural Dexterity Training Patient Centered Care Clinical Competence Provider Volume/Quality Specialist Availability Staffing Mix/Models Multidisciplinary Teams Interprofessional Training

Performance Improvement Stratify Injury and PI Data By: Race, Ethnicity, Gender, SES, Insurance, Language Clinical Decision Support Bundles/Checklists/Protocols Guideline Adherence Screening Brief Intervention Case Management/Navigators Hospital Community Linkages Rehabilitation Access Community Health Rankings Quality Metrics Development Audit/Feedback/Benchmarking Surgical Quality Collaboratives
• Public Health Approach Required
  • Opioid Crisis (Addiction)
  • Mental Health Crisis
  • Violence Crisis
  • Suicide Crisis
  • Terrorist

“We can’t arrest our way out this”
“We can’t shoot our way out of this”
The Public Health Approach to Prevention

- Define the problem: Surveillance
- Identify causes: Risk & protective factor research
- Develop and test interventions
- Implement interventions
- Evaluate interventions

The cycle is continuous, with arrows indicating the flow from one step to the next.
# Trauma Injury Prevention Levels

<table>
<thead>
<tr>
<th>Injury Prevention</th>
<th>Target Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primordial Prevention</td>
<td>Alter underlying determinants (Targets social/economic policies)</td>
</tr>
<tr>
<td>Primary Prevention</td>
<td>General population</td>
</tr>
<tr>
<td>Secondary Prevention</td>
<td>At risk populations</td>
</tr>
<tr>
<td>Tertiary Prevention</td>
<td>Those already injured by violence</td>
</tr>
</tbody>
</table>
Trauma Care Long Thought to be Immune from Disparities?
**Disparities and the Continuum of Trauma Care**

**Host factors**
- Preexisting functional status
- Comorbidities (diagnosed/undiagnosed)
- Obesity / adiposity
- Coping status
- Age
- Gender

**Prehospital factors**
- Emergency medical services
- Scene times
- Access to trauma care
- Geography

**Hospital / Provider factors**
- Trauma center / hospital quality
- Trauma volume/severity
- Provider training
- Unconscious bias
- Race
- Payer status

**Posthospital Care / Rehabilitation**
- Hospital disposition
- Access to high-quality rehabilitation
- Socioeconomic status

**Outcomes**

*Figure 4.* The continuum of trauma care. Factors identified in literature that are thought to impact outcome and lead to disparities in trauma outcomes.
Factors Associated With the Disposition of Severely Injured Patients Initially Seen at Non–Trauma Center Emergency Departments Disparities by Insurance Status

M. Kit Delgado, MD, MS; Michael A. Yokell, ScB; Kristan L. Staudenmayer, MD, MS; David A. Spain, MD; Tina Hernandez-Boussard, PhD, MPH; N. Ewen Wang, MD

Insurance Disparities & Transfers 2014

• Uninsured more likely to be transferred to Trauma Center

• Insured kept at 1st facility
Differences in care?
Race, Ethnicity, and Analgesia Provision at Discharge Among Children With Long-Bone Fractures Requiring Emergency Care

Henry W. Ortega, MD,* Heidi Vander Velden, MS,† Chia-Wei Lin, BS, † and Samuel Reid, MD†

Background: Inadequate treatment of painful conditions in children is a significant and complex problem. The objective of this study was to examine the effect of race/ethnicity on the provision of analgesic medicines at discharge in children treated emergently for a long-bone fracture.

Methods: A retrospective review of all patients during a 1-year period with a long-bone fracture treated in 2 urban pediatric emergency departments was performed.

Results: Eight hundred seventy-eight patients who met our inclusion criteria were identified. Sixty percent of patients received a prescription for an opioid-containing medicine, and 19% received a prescription for an over-the-counter analgesic medicine at emergency department discharge. Patients identified as African American, non-Hispanic, bialaric, and Hispanic/Latino had significantly lower rates of opioid analgesic prescriptions when compared with other ethnic groups. White, non-Hispanic patients had lower rates of over-the-counter analgesic medicine prescriptions provided at discharge. Patients identified as white, non-Hispanic had a higher percentage of fractures that required reduction in the emergency department when compared with other ethnic groups.

Conclusions: Race/ethnicity is associated with different analgesic prescription patterns in children treated in the emergency department for a long-bone fracture.

Key Words: ethnicity, analgesia, fractures

(Pediatr Emer Care 2013;29: 492–497)

Since this sentinel study, other investigators have reported conflicting results.18–20 Clearly, there is substantial variability in the evidence reported to date.

Understanding the role of culture in the experience of pain is of particular importance when one considers that nearly 25% of children younger than 5 years in the United States are Latino and 17% of children in this group are black.21 Consequently, it is important for physicians to consider the impact of ethnicity and race in the management of pain in children. Despite this, few studies have examined the impact of race, ethnicity, and culture on the experience of pain in children.22–25 and only 1 examined cultural differences in analgesic administration in the ED.26 Unfortunately, there is not enough evidence from these few studies to draw any conclusions about racial or ethnic differences in the treatment of pain in children.

Because acute long-bone fracture is the most common presenting complaint for pediatric ED patients with moderate to severe pain,26–28 it provides an ideal population to study these issues.

Currently, no definitive standard of care exists for the management of fracture-related pain in children discharged from ED.12–14 Administration of analgesics influenced by the race/ethnicity of a patient is an unacceptable practice. An increase awareness of clinical factors that affect the provision of analgesic medicines will contribute to the understanding of this important topic and ultimately improve the care of child
Disparities in trauma care: are fewer diagnostic tests conducted for uninsured patients with pelvic fracture?


Department of Surgery, Howard Hughes Medical Institute, 2241 Georgia Avenue, Northwest, Washington, DC 20007, USA; Center for Surgical Trials and Outcomes Research, Johns Hopkins School of Medicine, Baltimore, MD, USA

Abstract

Background: Research from other medical specialties suggests that uninsured patients experience treatment delays, receive fewer diagnostic tests, and have reduced health literacy when compared with their insured counterparts. We hypothesized that these disparities in interventions would not be present among patients experiencing trauma. Our objective was to examine differences in diagnostic and therapeutic procedures administered to patients undergoing trauma with pelvic fractures using a national database.

Methods: A retrospective analysis was conducted using the National Trauma Data Bank (NTDB), 2002 to 2008. Patients aged 18 to 64 years who experienced blunt injuries with pelvic fractures were analyzed. Patients who died on arrival or those with an injury severity score (ISS) less than 9, those with traumatic brain injury, and patients with burns were excluded. The likelihood of the uninsured receiving select diagnostic and therapeutic procedures was compared with the same likelihood in the insured. Multivariate analysis for mortality was conducted, adjusting for age, sex, race, ISS, presence of shock, Glasgow Coma Scale (GCS) motor score, and mechanism of injury.

Results: Twenty-three thousand patients met the inclusion criteria. 82% of these patients were insured and 18% were uninsured. There was no clinical difference in ISS (21 vs 29), but the uninsured were more likely to present in shock (P < .001). The mortality rate in the uninsured was 11.6% vs 5.0% in the insured (P < .001). The uninsured were less likely to receive vascular ultrasonography (P = .01) and computed tomography (CT) of the abdomen (P < .005). There was no difference in the rates of CT of the thorax and abdominal ultrasonography, but the uninsured were more likely to receive radiographs. There were no differences in exploratory laparotomy and fracture reduction, but uninsured patients were less likely to receive transfusions, central venous pressure (CVP) monitoring, or arterial catheterization for embolization. Insurance-based disparities were less evident in level I trauma centers.

Conclusions: Uninsured patients with pelvic fractures get fewer diagnostic procedures compared with their insured counterparts; this disparity is much greater for more invasive and resource-intensive procedures.
Access to Care
At the backend (Hospital Disposition)
Racial and ethnic disparities in discharge to rehabilitation following traumatic brain injury

Ashley D. Meagher, MD, MPH,1,2 Christopher A. Beadles, MD, PhD,3–4 Jennifer Dooley, MSc,1,5 and Anthony G. Charles, MD, MPH1,2,5

1Department of Surgery; 2Cecil G. Sheps Center for Health Services Research; 3Department of Health Policy and Management, Gillings School of Global Public Health; and 4School of Medicine, University of North Carolina at Chapel Hill; and 5Center for Health Services Research in Primary Care, Department of Veterans Affairs Medical Center, Durham, North Carolina

OBJECT Disparities in access to inpatient rehabilitation services after traumatic brain injury (TBI) have been identified, but less well described is the likelihood of discharge to a higher level of rehabilitation for Hispanic or black patients compared with non-Hispanic white patients. The authors investigate racial disparities in discharge destination (inpatient rehabilitation vs skilled nursing facility vs home health vs home) following TBI by using a nationwide database and methods to address racial differences in prehospital characteristics.

METHODS Analysis of discharge destination for adults with moderate to severe TBI was performed using National Trauma Data Bank data for the years 2007–2010. The authors performed propensity score weighting followed by ordered logistic regression in their analytical sample and in a subgroup analysis of older adults with Medicare. Likelihood of discharge to a higher level of rehabilitation based on race/ethnicity accounting for prehospital and in-hospital variables was determined.

RESULTS The authors identified 269,205 TBI incidents: 232,392 non-Hispanic white, 29,611 Hispanic, and 37,202 black. Propensity weighting resulted in covariate balance among racial groups. Hispanic (adjusted OR 0.71, 95% CI 0.68–0.75) and black (adjusted OR 0.94, 95% CI 0.91–0.97) populations were less likely to be discharged to a higher level of rehabilitation than were non-Hispanic whites. The subgroup analysis indicated that Hispanic (adjusted OR 0.79, 95% CI 0.71–0.86) and black (OR 0.87, 95% CI 0.81–0.94) populations were still less likely to receive a higher level of rehabilitation, despite uniform insurance coverage (Medicare).

CONCLUSIONS Adult Hispanic and black patients with TBI are significantly less likely to receive intensive rehabilitation than their non-Hispanic white counterparts, notably, this difference persists in the Medicare population (age >65 years), indicating that uniform insurance coverage alone does not account for the disparity. Given that insurance coverage and a wide range of prehospital characteristics do not eliminate racial disparities in discharge destination, it is crucial that additional unmeasured patient, physician, and institutional factors be explored to eliminate them.
Racial/Ethnic and Insurance Status Disparities in Discharge to Posthospitalization Care for Patients With Traumatic Brain Injury

Wendy G. Kane, MS, MPH; Dagan A. Wright, PhD; Rongwei Fu, PhD; Kathleen F. Carlson, PhD

**Objectives:** Professional, posthospitalization care (PHC) can improve outcomes among patients with traumatic brain injury. We examined disparities in discharge to PHC by patients’ race/ethnicity and insurance type. **Participants:** A total of 6061 adults hospitalized for unintentional traumatic brain injury in Oregon, 2008 to 2011. **Main Outcome Measure:** Posthospitalization care was assessed on the basis of discharge disposition. Multivariable logistic regression was used to estimate effects of race/ethnicity and insurance on referral to PHC while controlling for potential confounders. Generalized estimating equations were used to calculate odds ratios (ORs) and 95% confidence intervals (CIs), accounting for clustering of data by hospital. **Results:** 28% of patients were discharged to PHC. While controlling for potential confounders, Hispanics were less likely to be discharged to PHC,
Racial Disparities in Outcomes after Spinal Cord Injury


Abstract

Spinal Cord Injury (SCI) is an acute trauma to the neural elements resulting in temporary or permanent sensory and motor deficit. Studies have indicated that although 66% of SCI occur in Caucasians, there are a growing number of other racial groups affected by SCI. Furthermore, there has been a lack of research concerning racial disparities in outcomes following SCI. As such, a retrospective analysis using the National Trauma Data Bank (NTDB) from 2000 to 2009 was performed. African Americans, Caucasians, Hispanics, Asians, and Native Americans were included in the study. We calculated adjusted odds ratios (OR) to examine the relationship between racial backgrounds and mortality, length of intensive care unit (ICU) stay, length of hospital stay, in-hospital complications, and patient disposition. Our results showed that significant differences were found in length of hospital stay, with African American and Hispanic populations having longer hospital stays than Caucasians. For all type complications, African Americans (OR 1.228, confidence
Is it Race, SES, or Insurance?
Disparities in trauma care and outcomes in the United States: A systematic review and meta-analysis


Accreditation Statement
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The Association of Race, Socioeconomic Status, and Insurance on Trauma Mortality

Judy N. Mikhail, PhD, MSN, MBA, RN ■ Lynne S. Nemeth, PhD, RN ■ Martina Mueller, PhD ■ Charlene Pope, PhD, MPH, RN ■ Elizabeth G. NeSmith, PhD, APRN-BC ■ Kenneth L. Wilson, MD ■ Michael McCann, DO ■ Samir M. Fakhry, MD

ABSTRACT

Background: Although race, socioeconomic status, and insurance individually are associated with trauma mortality, their complex interactions remain ill defined.

Methods: This retrospective cross-sectional study from a single Level I center in a racially diverse community was linked by socioeconomic status, insurance, and race from 2000 to 2009 for trauma patients aged 18–64 years with an injury severity score more than 9. The outcome measure was inpatient mortality. Multiple logistic regression analyses were performed to investigate confounding variables known to predict trauma mortality.

Results: A total of 4,007 patients met inclusion criteria. Individually, race, socioeconomic status, and insurance were associated with increased mortality rate; however, in multivariate analysis, only insurance remained statistically significant and varied by insurance type with age. Odds of death were higher for Medicare (odds ratio [OR] = 3.63, \( p = .006 \)) and other insurance (OR = 3.02, \( p = .007 \)) than for Private Insurance. However, when grouped into ages 18–40 years versus 41–64 years, the insurance influences changed with Uninsured and Other insurance (driven by Tricare) remaining predictive in the younger age group, while Medicare remained predictive in the older age group.

Conclusions: Insurance type, not race or socioeconomic status, is associated with trauma mortality and varies with age. Both Uninsured and Tricare insurance were associated with mortality in younger age trauma patients, whereas Medicare was associated with mortality in older age trauma patients. The lethality of the Tricare group warrants further investigation.

Key Words
Health care disparities, Insurance type, Race, Socioeconomic status, Trauma mortality
Age Race Paradox
Age Race Paradox

- Blacks higher odds of mortality ages <65
- Whites higher odds of mortality >65

Objective: The objective of our study was to determine if differences in outcomes at treating facilities can help explain these age-based racial disparities in survival after trauma.

Background: It has been previously demonstrated that racial disparities in survival after trauma are dependent on age. For patients younger than 65 years, blacks had an increased odds of mortality compared with whites, but among patients 65 years or older the opposite association was found.

Methods: Data on white and black trauma patients were extracted from the Nationwide Inpatient Sample (2003–2009) using International Classification of Diseases, Ninth Revision, Clinical Modification diagnosis codes. Standardized observed-to-expected mortality ratios were calculated for individual treating facilities, adjusting for age, sex, insurance status, mechanism of injury, overall injury severity, head injury severity, and comorbid conditions. Observed-to-expected ratios were used to benchmark facilities as high-, average-, or low-performing facilities. Proportions and survival outcomes of younger (range, 16–64 years) and older (≥65 years) patients admitted within each performance stratum were compared.

Results: A total of 954,476 patients from 1137 facilities (8.3% high-performing, 85% average-performing, and 6.7% low-performing) were analyzed. Younger black patients had a higher adjusted odds of mortality compared with younger white patients [odds ratio, 1.19; 95% confidence interval, 1.11–1.27], whereas older black patients had a lower odds of mortality compared with older white patients [odds ratio, 0.81; 95% confidence interval, 0.74–0.88]. A significantly greater proportion of younger black patients were treated at low-performing facilities compared with both younger white patients and older black patients (49.6% vs 42.2% and 38.7%, respectively; P < 0.05).

Conclusions: Nearly half of all young black trauma patients are treated at low-performing facilities. However, facility-based differences do not seem to explain the paradoxical age-based racial disparities after trauma observed in the older population.

Keywords: elderly, hospital performance, outcomes, racial disparities, trauma

The concept of racial disparities after trauma is not new. In a meta-analysis of studies assessing the effects of race on posttraumatic outcomes, black patients were found to be 19% more likely to die after trauma compared with white patients. More recently, analysis of data from the Nationwide Inpatient Sample (NIS) suggested that these racial disparities in survival after trauma may be dependent on age. In patients younger than 65 years, we demonstrated that black patients had a significantly higher odds of mortality compared with white patients, consistent with previous studies. However, for patients older than 65 years the opposite was true; after correcting for patient comorbidities and other covariates, older black patients actually had a lower odds of death than older white patients.

The cause of this paradoxical difference in trauma outcomes is currently unclear. There are some data to suggest hospital-based effects may play a role in race-based disparities after trauma within the younger population. In a nationwide analysis of more than 400,000...
Effect of Age/Race

- State of California 2012
- Comparison of ages <65 to >65
- Young Black/Hispanic higher mortality
- Older Whites higher mortality
Is it the Hospital?
• 2012 NTDB Study
• TC stratified by % minority
• Robust risk adjustment
• Disproportionately minority TC’s:
  • Higher odds of mortality

Who are these TC’s?
• Larger hospitals
• More often Level I centers
• More often University hospitals
Trends in Racial Disparities for Injured Patients Admitted to Trauma Centers

Laurent G. Glance, Turner M. Osler, Dana B. Mukamel, J. Wayne Meredith, Yue Li, Feng Qian, and Andrew W. Dick

Objective. To determine whether outcome disparities between black and white trauma patients have decreased over the last 10 years.

Data Source. Pennsylvania Trauma Outcome Study.

Study Design. We performed an observational cohort study on 191,887 patients admitted to 28 Level I and Level II trauma centers. The main outcomes of interest were (1) death, (2) death or major complication, and (3) failure-to-rescue. Hospitals were categorized according to the proportion of black patients. Multivariate regression models were used to estimate trends in racial disparities and to assess whether the source of racial disparities was within or between hospitals.

Principal Findings. Trauma patients admitted to hospitals with high concentrations of blacks (>20 percent) had a 45 percent higher odds of death (adj OR: 1.45, 95 percent CI: 1.09–1.92) and a 73 percent higher odds of death or major complication (adj OR: 1.73, 95 percent CI: 1.42–2.11) compared with patients admitted to hospitals treating low proportions of blacks. Blacks and whites admitted to the same hospitals had no difference in mortality (adj OR: 1.05, 95 percent CI: 0.87, 1.27) or death or major complications (adj OR: 1.01; 95 percent CI: 0.90, 1.13). The odds of overall mortality, and death or major complications have been reduced by 32 percent (adj OR: 0.68; 95 percent CI: 0.54–0.86) and 28 percent (adj OR: 0.72; 95 percent CI: 0.60–0.85) between 2000 and 2009, respectively. Racial disparities did not change over 10 years.

Conclusion. Despite the overall improvement in outcomes, the gap in quality of care between black and white trauma patients in Pennsylvania has not narrowed over the last 10 years. Racial disparities in trauma are due to the fact that black patients are more likely to be treated in lower quality hospitals compared with whites.

Key Words. Race, disparities, trauma

Pennsylvania Study

• 2013
• 28 Level I’s and II’s
• TCs with higher % Black Pts
• 45% higher risk of death
• Within hospital no disparity
Minority Trauma Patients Tend to Cluster at Trauma Centers with Worse-Than-Expected Mortality

Can This Phenomenon Help Explain Racial Disparities in Trauma Outcomes?

Adil H. Haider, MD, MPH, Zain G. Hashmi, MBBS, Syed Naseer Zafar, MBBS, MPH, Xuan Hui, MD, ScM, Eric B. Schneider, PhD, David T. Efron, MD, Elliott R. Haut, MD, Lisa A. Cooper, MD, MPH, Ellen J. MacKenzie, PhD, and Edward E. Cornwell, III, MD

- 2013 Ann Surg
- NTDB Analysis
- Robust Risk Adjustment
- Disproportionate minority TC’s Higher Mortality
- No Disparity Within Hospital Care
Universal insurance and an equal access healthcare system eliminate disparities for Black patients after traumatic injury

Muhammad Ali Chaudhary a, Meesha Sharma a, Rebecca E. Scully a, Daniel J. Sturgeon a, Tracey Koehlmoos b, Adil H. Haider a, and Andrew J. Schoenfeld a,c

a Center for Surgery and Public Health, Brigham and Women’s Hospital, Harvard Medical School, Boston, MA
b Uniformed Services University of Health Sciences, Bethesda, MD
c Department of Orthopaedic Surgery, Brigham and Women’s Hospital, Harvard Medical School, Boston, MA

ABSTRACT

Background. Although inequities in trauma care are reported widely, some groups have theorized that universal health insurance would decrease disparities in care for disadvantaged minorities after a traumatic injury. We sought to examine the presence of racial disparities in outcomes and healthcare utilization at 30- and 90-days after discharge in this universally insured, racially diverse, American population treated for traumatic injuries.

Methods. This work studied adult beneficiaries of TRICARE treated at both military and civilian trauma centers 2006–2014. We included patients with an inpatient trauma encounter based on International Classification of Diseases, 9th revision (ICD-9) code. The mechanism and severity of injury, medical comorbidities, region and environment of care, and demographic factors were used as covariates. Race was considered the main predictor variable with Black patients compared to Whites. Logistic regression models were employed to assess for risk-adjusted differences in 30- and 90-day outcomes between Blacks and Whites.

Results. A total of 87,112 patients met the inclusion criteria. Traditionally encountered disparities for Black patients after trauma, including increased rates of mortality, were absent. We found a statistically significant decrease in the odds of 90-day complications for Blacks (OR 0.91; 95% CI 0.84–0.98; P < 0.01). Blacks also had lesser odds of readmission at 30-days (OR 0.87; 95% CI 0.79–0.94; P = 0.002) and 90-days (OR 0.88; 95% CI 0.79–0.93; P < 0.001).

Conclusion. Our findings support the idea that in a universally insured, equal access system, historic disparities for racial and ethnic minorities, including increased postinjury morbidity, hospital readmission, and postdischarge healthcare utilization, are decreased or even eliminated.
Big Picture Actions

01 Detect and explore disparities
02 Integrate equity into quality improvement
03 Design and implement interventions
04 Evaluate and sustain interventions
Trauma Center Access Interventions

• Triage & Activation Criteria
• Admit & Transfer
• Collect & report injury surveillance & QI data by
  • Race, ethnicity, gender, age, language
Trauma Patient Assessment Interventions

• Admission Risk Screens
  • Childhood adversity
  • Violence exposure
  • Depression
  • Post traumatic stress
  • Substance abuse
  • Poly-victimization
Hospital Interventions

• Leadership commitment
• Disparities dashboards
• Trauma center financial support
• EMR integration/informatics
• Tracking/reminder systems
• Symptoms (Pain) Management

• Adverse events/readmissions
• Length of stay/complications
• Health literacy programs
• Patient preference
• Patient engagement
Workforce and Teams Interventions

- Diversity programs
- Disparities awareness
- Equity/social justice messaging
- Cultural competency training
- Multidisciplinary quality teams

- Align QI/Equity/Incentives
- Multi-level interventions
- Efficacy effectiveness research
- Violence prevention programs
  - Implementation evaluation
  - Cost effectiveness
Clinical Practice Interventions

- Clinical Decision Support
- Bundles/checklists/protocols
- Case managers/navigators
- Screening brief intervention
- Care transitions, hand offs
- Nurse led home visitation
- Hospital community linkages
Social Services Investment (Advocacy)

- Insurance expansion
- Early childhood investment
- Parenting/family support
- Education reform
- Housing/legal services
- Social skills/job training
- Mental health services
- Substance abuse services
- Environmental land use
- Income inequality reform
- Policing & Sentencing Reform
- Legal, judicial, advocacy
- Health Impact Assessments
Michigan

<table>
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<tr>
<th>Rank</th>
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<th>Health Outcomes</th>
<th>Length of Life</th>
<th>Quality of Life</th>
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Genesee (GE)

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Quality of Life

| Poor or fair health | 20%  | 19-20% | 12%  | 17% |
| Poor physical health days | 4.4  | 4.2-4.5 | 3.0  | 4.3 |
| Poor mental health days | 4.4  | 4.3-4.6 | 3.1  | 4.4 |
| Low birthweight | 10%  | 10-11% | 6%   | 8%  |

Additional Health Outcomes (not included in overall ranking)

| Health Factors | 76   |
| Health Behaviors | 76   |
Questions?