Understanding Racial/Ethnic Variation in Pediatric Trauma Care and Outcomes

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Children’s Hospital of Philadelphia (CHOP)
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Impact of ED Workday Factors on Physician Bias

- Physicians in the ED have moderate pro-white implicit bias (Mean IAT = 0.55)
- Greater post-shift bias associated with:
  - Caring for more patients during shift
  - ED overcrowding
- 90% of eligible participants enrolled

Johnson et al, Presented at Pediatric Academic Societies 2014 Manuscript in Progress
Public Health Impact of Injuries

1 Child
Every hour, one child dies from an injury.

1 in 5
About 1 in 5 child deaths is due to an injury.

4 Seconds
Every 4 seconds, a child is treated for an injury in an emergency department.

CDC, 2010
Pediatric Injury Disparities

- Increased risk of injury among black children
- Increased mortality
  - 37% greater for black children
  - 20% greater for Hispanic children

Hayes, J Natl Med Assoc, 2005
Hakmeh, Acad Emer Med, 2010
## Preliminary Data: Processes of Care

<table>
<thead>
<tr>
<th></th>
<th>Total (n=1306)</th>
<th>White NH (n=628, 48%)</th>
<th>Black NH (n=454, 35%)</th>
<th>Hispanic (n=88, 7%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED Length of Stay (LOS)</td>
<td>271 (±154)</td>
<td>258 (±143)</td>
<td>300 (±158)</td>
<td>267 (±175)</td>
</tr>
<tr>
<td>mean min + SD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital LOS, median</td>
<td>1 (1-1)</td>
<td>1 (1-2)</td>
<td>1 (1-3)</td>
<td>2 (1-2.5)</td>
</tr>
<tr>
<td>days (IQR)</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Data from the 2013 CHOP Trauma Performance Improvement Database
Socio-ecologic Model for Understanding Pediatric Trauma Disparities

Racial/Ethnic Variation in Trauma Care

Racial/Ethnic Variation in Trauma Outcomes
Specific Aim 1

To determine the association of patient, parent, and physician characteristics with racial/ethnic variations in care and outcomes of injured children.
Aim 1 Hypotheses

H1a: Black and Hispanic patients admitted for injuries will experience lower quality of care (based on national quality indicators) and poorer outcomes.
H1b: **Parents** of black and Hispanic children will express greater mistrust and perceptions of bias. This may impact communication and care preferences, which can influence processes of care and outcomes for their children.
Aim 1 Hypotheses

H1c: Variations in **physician** decision-making, communication patterns, and unconscious bias regarding trauma care will impact quality of care and outcomes for black and Hispanic children.
Aim 1 Methods

• Study design
  – Prospective cohort of children admitted for injuries

• Study site
  – CHOP, Level I Pediatric Trauma Center
  – 1300 trauma admissions a year
  – Racially diverse population
    • 48% White NH, 35% Black NH, 7% Hispanic
Aim 1 Participants/Data Source

• White NH, Black NH, and Hispanic patients admitted for blunt or penetrating injuries
• CHOP Trauma Database
• Electronic Medical Records

• Survey of accompanying parent/caregiver during hospital admission

• One time survey of ED, trauma, and orthopedic attendings
• Link provider data to patients they care for
Aim 1 Variables

<table>
<thead>
<tr>
<th>Independent</th>
<th>Patient race/ethnicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Outcome</td>
<td>American College of Surgeons Committee on Trauma quality indicators (e.g., length of stay, type/timeliness of testing and procedures)</td>
</tr>
<tr>
<td>Secondary Outcome</td>
<td>Mortality, complications, discharge disposition</td>
</tr>
</tbody>
</table>

Racial/Ethnic Variation in Care | Racial/Ethnic Variation in Outcomes
Explanatory Variables

• Demographics (e.g., age, sex, insurance, zip code)
• Injury-related (e.g., injury mechanism and severity)
• Comorbidities

• Demographics (e.g., language, education, income)
• Culturally-based (e.g., mistrust, discrimination, bias)
• Psychosocial (e.g., health beliefs)
• Open ended (e.g., ED and hospital experience)

• Demographics (e.g., race, gender, years of experience)
• Implicit Racial Bias
• Explicit Racial
Specific Aim 2

To examine the relationship between healthcare system-level characteristics and racial/ethnic variations in care and outcomes of injured children

H2: Hospital system characteristics (e.g. overall mortality, trauma designation, pediatric volume) will partially explain racial/ethnic differences in care and outcomes
Aim 2 Study Design

- Study Design
  - Retrospective analysis of data from the National Trauma Data Bank (NTDB)

- Inclusion Criteria
  - White NH, Black NH, and Hispanic children
  - \( \leq 15 \) years
  - Blunt and penetrating injuries
  - 2008-2012
## Aim 2 Variables

<table>
<thead>
<tr>
<th>Category</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independent</td>
<td>Patient race/ethnicity</td>
</tr>
<tr>
<td>Primary Outcome</td>
<td>Mortality</td>
</tr>
<tr>
<td>Secondary Outcome</td>
<td>Complications, discharge disposition</td>
</tr>
<tr>
<td>Secondary Process of Care</td>
<td>American College of Surgeons Committee on Trauma quality indicators</td>
</tr>
<tr>
<td>Patient Level Confounders</td>
<td>Demographics, injury related, comorbidities</td>
</tr>
<tr>
<td>System Level Mediators/Confounders</td>
<td>Overall mortality, % of minorities served by the hospital, trauma volume, pediatric designation, zip code, geographic region</td>
</tr>
</tbody>
</table>
Data Analysis Plan

• Generalized mixed effect models
• Path analysis
• Sample size calculations (80% power, $\alpha = 0.05$)
  – Aim 1
    • 434 patients/parents
    • 26 providers
  – Aim 2
    • 2,160 patients
Career Development Plan
# Mentorship

<table>
<thead>
<tr>
<th>Name, Title</th>
<th>Expertise</th>
<th>Meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Said Ibrahim, MD, MPH</strong></td>
<td>Primary Mentor</td>
<td>Biweekly</td>
</tr>
<tr>
<td>Professor of Medicine, Penn</td>
<td>Former AMFDP Scholar</td>
<td></td>
</tr>
<tr>
<td>Co-Director, VA Center for</td>
<td>National Leader in Disparities Research</td>
<td></td>
</tr>
<tr>
<td>Health Equity and Research</td>
<td>NIAMS K24</td>
<td></td>
</tr>
<tr>
<td>Promotion</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Doug Wiebe, PhD</strong></td>
<td>Injury Epidemiology</td>
<td>Biweekly</td>
</tr>
<tr>
<td>Assoc. Professor of Epidemiology</td>
<td>Geography and Public Health</td>
<td></td>
</tr>
<tr>
<td>Penn</td>
<td>NTDB</td>
<td></td>
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<tr>
<td>Co-Director, Cartographic Lab</td>
<td></td>
<td></td>
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<tr>
<td><strong>Scott Lorch, MD, MSCE</strong></td>
<td>Pediatric Disparities</td>
<td>Weekly</td>
</tr>
<tr>
<td>Assoc. Professor of Pediatrics</td>
<td>Parent Trust</td>
<td></td>
</tr>
<tr>
<td>Director, CHOP Center for</td>
<td>PI on 5 NIH R01 grants</td>
<td></td>
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<tr>
<td>Pediatric Disparities</td>
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<th>Meetings</th>
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</table>
| **Rui Xiao, PhD**  
Assist. Professor of Biostatistics, Penn | Biostatistical mentor  
Oversee database management and data analysis | Biweekly to Monthly |
| **Dennis Durbin, MD, MSCE**  
Professor of Pediatrics, Penn  
Director, CHOP Office of Clinical and Translational Research | Career Development Mentor  
International leader in pediatric injury research | Monthly |
| **Michael Nance, MD**  
Professor of Surgery, Penn  
Chair, Pediatric Trauma, CHOP | Consultant  
Pediatric trauma, clinical and research  
NTDB Quality Subcommittee | Quarterly |
Career Development Goals

• Goal 1: To develop the methodological tools necessary to conduct rigorous research on pediatric healthcare disparities
  – Courses
    • NIMHD Translational Health Disparities Course (2wks)
    • Geography and Public Health (1 semester)
    • Outcomes Research (1 semester)
  – Local meetings/seminars
    • Trauma Video Review (1.5 hr/mo)
    • CHOP Center for Pediatric and Perinatal Disparities (2 hr/mo)
    • CHOP Center for Injury and Research Prevention (1.5 hr/mo)
Career Development Goals

• Goal 2: To develop the management and leadership skills necessary to become an independent investigator
  – Experiential
    • Parent recruitment in the acute care setting
    • Database development and management
    • Human resource management and leadership
  – Academic Productivity
    • Publish 3 manuscripts/year
    • R series grant submission during year 3 (R21 or R01)
  – National Conferences
Career Development Goals

- Goal 3: To use my research and clinical expertise to influence hospital, state, and national policies to improve child health
  - Courses
    - Disparities Leadership Program (1 yr- 4 live meetings, 5 calls)
    - Achieving Evidence-Based Health Policy (1 semester)
  - Local meetings/seminars
    - Penn Center for Emergency Care Policy Research lab (2 hr/mo)
    - CHOP PolicyLab (1 hr/wk)
Summary/Implications

- Patient Parent Provider Triad
- Hospital
- Healthcare System
- Community
- Nation

Racial/Ethnic Variation in Trauma Care

Racial/Ethnic Variation in Trauma Outcomes
Long-Term Career Goal

• Save the world ...

...one child at a time!
Extra Slides
Path analysis

Patient Race

Patient

Parent

Provider

Processes of Care

Clinical Outcome
**What is the IAT?**

<table>
<thead>
<tr>
<th>Category</th>
<th>Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black</td>
<td>![Black Images]</td>
</tr>
<tr>
<td>White</td>
<td>![White Images]</td>
</tr>
<tr>
<td>Good</td>
<td>JOY, LOVE, WONDERFUL, PLEASURE, LAUGHTER, HAPPY</td>
</tr>
<tr>
<td>Bad</td>
<td>TERRIBLE, HORRIBLE, EVIL, AWFUL, AGONY, HURT</td>
</tr>
</tbody>
</table>

**Demonstration available at:** [https://implicit.harvard.edu/implicit/](https://implicit.harvard.edu/implicit/)
<table>
<thead>
<tr>
<th>Variable</th>
<th>Scale/Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical mistrust</td>
<td>Health Care System Distrust Scale</td>
</tr>
<tr>
<td>Experiences of discrimination</td>
<td>General Ethnic Discrimination Scale</td>
</tr>
<tr>
<td>Perceptions of healthcare bias</td>
<td>Commonwealth Fund Healthcare Quality Survey</td>
</tr>
<tr>
<td>Health Beliefs</td>
<td>Health Beliefs Questionnaire</td>
</tr>
<tr>
<td>Demographics</td>
<td>Standard questionnaire</td>
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## Research Timeline

<table>
<thead>
<tr>
<th>Specific Aim</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aim 1a (patient data collection)</td>
<td></td>
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<tr>
<td>Aim 1b (parent survey)</td>
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<tr>
<td>Aim 1c (physician survey)</td>
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<tr>
<td>Aim 1 Data Analysis</td>
<td></td>
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<tr>
<td>Aim 2 (NTDB data analysis)</td>
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<tr>
<td>R21/01 planning/writing/submission</td>
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<tr>
<td>Manuscripts</td>
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