Severe Lead Poisoning: A Changing Demographic Profile?

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Background

- The study examined lead poisonings that result in inpatient admissions, which is generally considered a severe form of lead poisoning
- Severe lead poisoning still occurs in the U.S.
  - E.g., Death of a four year old boy, Minnesota, 2006
- Traditionally associated with specific neighborhood characteristics
  - Inner city, block groups
  - Neighborhoods with lower housing value
  - Houses built before 1950
  - Greater population densities
  - Lower rates of owner-occupied housing
- Also associated with specific demographics
  - African Americans
  - Less educated
- Recent imports - toys made in china - tainted with lead have increased the public's awareness of lead, including its risks and effects

FIGURE. Heart-shaped charm bracelet that is the subject of the voluntary recall announced March 21, 2006, by Reebok International Ltd. and the Consumer Product Safety Commission.

Photo: Consumer Product Safety Commission

Study Goals

1. To what extent does severe lead poisoning occur in the U.S.?
2. Who is most affected?
3. Where do the cases tend to occur?
4. What are the medical charges associated with treatment?
5. Who is paying for treatment?

Methods

Healthcare Cost and Utilization Project (HCUP)

- A family of health care databases, software tools and products
- A Federal-State-Industry partnership
- Brings together the data collection efforts of State data organizations, hospital associations, private data organizations, and the Federal government to create a national information resource of patient-level health care data
- As of 2005, contains 37 states, representing 90% of the U.S. population
- Captures 90% of inpatient discharges in the U.S.
- Does not include DoD or VA admissions
- Captures all cases from each hospital – NOT a sample
- Enables research on a broad range of health issues

http://www.hcup-us.ahrq.gov/overview.jsp

State Inpatient Databases (SID)

- What is the SID?
  - Are data sets within the HCUP program for a specific year from a specific state
  - Captures inpatient admissions
  - Data comes from inpatient bills (UB-92)
- How can the SIDs be used?
  - Enumerate hospitals and discharges within regions or states
  - Compare data from multiple states
  - Assess disparities
  - Assess state-specific trends of inpatient utilization, access, charges and outcomes
- This study used the SID data sets to identify lead poisoning cases that resulted in an inpatient admission
  - Five year window: 1999 – 2003
  - Studied 11 States:

Arizona	Colorado	Florida
Iowa	Massachusetts	Maryland
New Jersey	Oregon	Utah
Washington	Wisconsin	

  - States were selected as a convenience sample
  - Selected lead poisoning cases based on ICD-9 diagnosis codes for lead poisoning
  - Carried out a validation exercise to ensure the ICD-9 codes represented actual lead poisoning cases
    - Supported the validation by comparing records to guidelines for the clinical treatment of lead poisoning
      - The National Guidelines Clearinghouse
- Used zip code files (CACI & Claritas) and U.S. Census data for denominator data
  - U.S. Census data – state level populations, population density
  - CACI & Claritas for racial/ethnic populations within specific zip codes
    - CACI for 1999 & 2000
    - Claritas for 2001, 2002 & 2003

Results

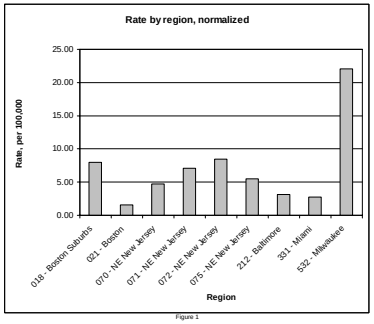

Figure 1

- Of the states studied, urban centers and large metropolitan areas showed the highest rates
- The rates shown to the left are adjusted for population density, using U.S. Census data
- Regions are defined as an area represented by the first three digits of a zip code
- The 532 region demonstrated the greatest improvements, driven by declines of severe lead poisoning in the African American population
  - This region's African American rate in 1999 was 16.7 per 100,000; 2003, 5.39 per 100,000
- NE New Jersey regions have experienced general population shifts, which could potentially impact the rates of those racial/ethnic groups impacted by severe lead poisoning in the future
  - Caucasian population has declined from approximately 1.4 million in 1999 to 1.1 million in 2003
  - Hispanic population has increased from 542,000 in 1999 to 623,000 in 2003

- Medicaid pays for most admissions, closely followed by private insurers
  - Median charge of treatment was $8,420
  - Median length of stay was 5 days

Who Paid

Payer	Percent
Medicare	2.95
Medicaid	49.11
Private	39.32
Self Pay	6.02
No Charge	0.59
Other	2.01

Table 1

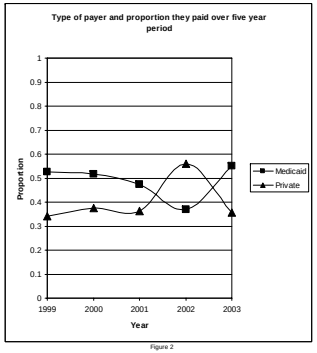

Figure 2

Charges, age & race/ethnicity breakouts of select states

State	Total Cases	Total Estimated Charges	Age 0-4	Age 6-17	Age 18 and up	Race/Ethnicity White	Black	Hispanic	Other
Florida	61	$513,620	44.26%	22.95%	26.23%	31.67%	46.67%	18.33%	*
Iowa	43	$362,060	81.40%	0.00%	*	72.00%	24.00%	0.00%	0.00%
Massachusetts	112	$943,040	84.82%	*	*	33.64%	19.09%	26.36%	11.82%
Maryland	37	$311,540	29.73%	40.54%	*	21.62%	72.97%	*	*
New Jersey	268	$2,256,560	86.19%	8.58%	*	15.08%	48.65%	26.64%	6.95%
Wisconsin	282	$2,374,440	86.43%	9.64%	*	8.54%	61.21%	8.54%	18.51%

Table 2

* Redacted to comply with HCUP privacy requirements

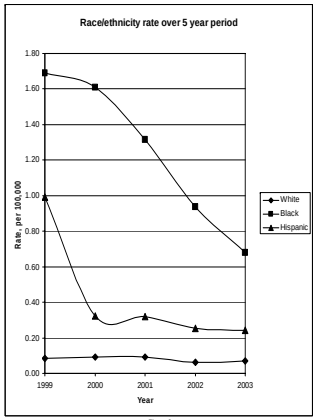

Figure 3

- The rate within the African American population shows a steady decrease, but is still statistically higher than comparison groups
  - Chi square 63.83, DF 2, p<0.0001 in 2000; 2003, chi square 10.07, DF 2, p<0.0065
- African Americans made up 48.10% of all cases; Caucasians, 19.62%; Hispanics, 17.85%
- The reason for the Hispanic drop-off from 1999 to 2000 is unclear and requires further study

Results (cont.)

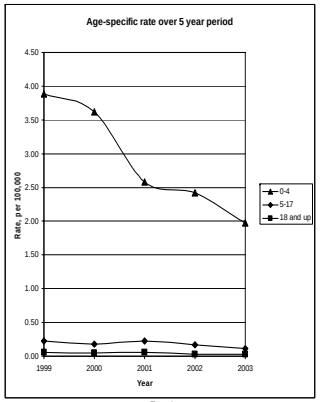

Figure 4

Information not visually depicted:

- The overall median age of a severe lead poisoning case was 2.5 years old; mean, 2.0
- Over 30% of all male cases are over the age of 5; females, only 19%
- Males make up 60% of all cases
- The data show equally steady declines over the five year period for both genders

- The overall rate across the 11 states declined
  - 10 of the 11 states demonstrated declines or remained steady
- Only one state – Iowa – showed an increase
  - Iowa's rate in 1999 was 0.17 per 100,000; 2003, 0.41 per 100,000

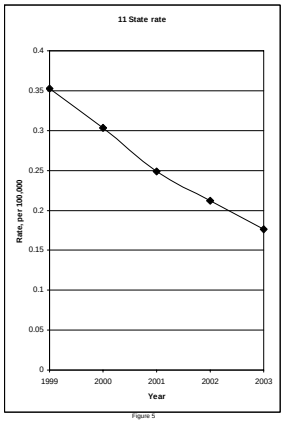

Figure 5

Discussion

- This study found that severe lead poisoning, using inpatient admissions as a signature, does still exist in the U.S
- The HCUP data source is a source of identifying potentially avoidable events and for tracking trends by state, smaller geographical groupings, age groups and race/ethnicity
- The incidence of severe lead poisoning cases exhibit low rates and, across the 11 state analysis, also show steady declines in African American and 0-4 year old populations
- The disparities traditionally associated with lead poisoning are decreasing
- Urban centers still demonstrate higher rates
- Potential weaknesses of this study are the following:
  - The study does not include specific blood lead levels, because administrative data does not include labs
  - The study does not include outpatient cases
- This study compares well with studies using NHANES data:
  - MMWR (2003), SS 10, found that the number of children age 0-3 showed declines in elevated blood lead levels from 1997-2001
  - MMWR (2005), 54, found that African Americans had the highest blood lead levels from 1999-2002; however, this group also showed the greatest declines in blood lead levels
  - This suggests that the 11 states used in this study could potentially be nationally representative
    - Further study is required

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