

Unleaded: the Efficacy of the HELP Lead Safe Center in Reducing Blood Lead Levels in Children

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5 December 2002

Childhood Lead Poisoning and Blood Lead Levels

- Factors affecting BLLs
 - Housing Conditions
 - Age
 - Seasonality
 - Nutrition and Diet
- Exposure to low levels
 - nervous system /kidney damage, learning disabilities, speech/language/behavioral problems, decrease muscle/bone growth, hearing damage
- Exposure to high levels
 - Increased risk of seizures, severe brain damage, death

The HELP Lead Safe Center (LSC)

- Created in 1998 by the Health and Educational Leadership for Providence
- Provides non-medical case management and in-home education
- Program Components:
 - Family case management (education/awareness)
 - Case managers work with and educate landlords
 - The LSC hosts St. Joseph Hospital Lead Clinic

The LSC Referral Process

- Universal Screening is required by law for children under the age of 6
 - All BLL results reported back to RI DOH
- Determination of priority level:
 - $< 15 \mu\text{g/dL}$ - no action
 - Persistent $15\text{-}19 \mu\text{g/dL}$ - referral to LSC
 - $> 20 \mu\text{g/dL}$ - referral to LSC
- Referrals added to LSC Database
 - Case numbers assigned to individuals but refer to the entire family

Thesis Questions

- How effective is LSC in:
 - Enrolling majority of referrals into the program
 - Lowering BLLs of poisoned children
 - Lowering BLLs of other family members
 - Reducing number of repeat referrals per child
 - Increasing likelihood of an inspection acceptance
 - Ensuring lasting effect after program ends (i.e. keeping the BLLs down)

Thesis Questions

- Do the following variables have a significant effect on BLLs:
 - Successful completion of the program
 - Length of case
 - Age of child when referred
 - Number of times child is referred
 - Family mobility

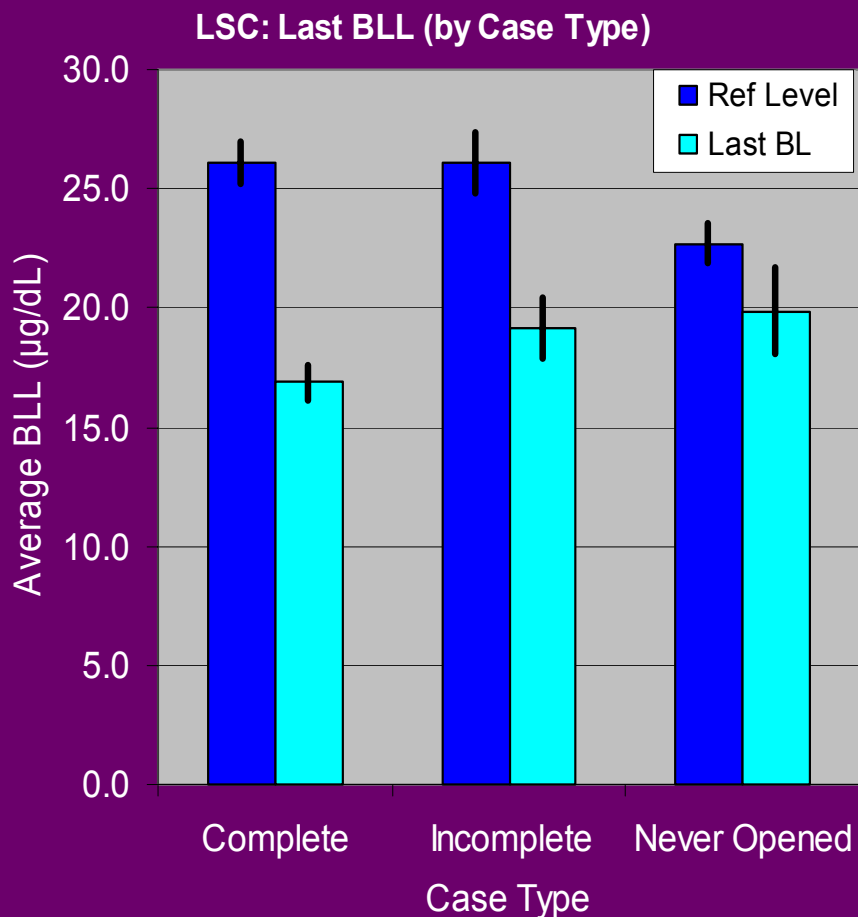
Methodology

- Source data:
 - LSC's Database
 - Statewide Lead data from RI DOH
- LSC closed cases divided into three categories:
 - Completed (C)
 - Incomplete (I)
 - Never Opened (N)
- All data manipulated using Access and Excel

Results

- N= 829 closed cases (updated as of July 1, 2002)
 - 384 (46%) completed
 - 216 (26%) incomplete
 - 229 (28%) never opened
- Average referral BLL varied by case type
 - Completed- 26.1 (± 0.9) $\mu\text{g/dL}$
 - Incomplete- 26.1 (± 1.2) $\mu\text{g/dL}$
 - Never opened- 22.7 (± 0.9) $\mu\text{g/dL}$
- As did the last BL test before the case closed
 - Completed- 16.9 (± 0.8) $\mu\text{g/dL}$
 - Incomplete- 19.1 (± 1.3) $\mu\text{g/dL}$
 - Never opened- 19.9 (± 1.8) $\mu\text{g/dL}$

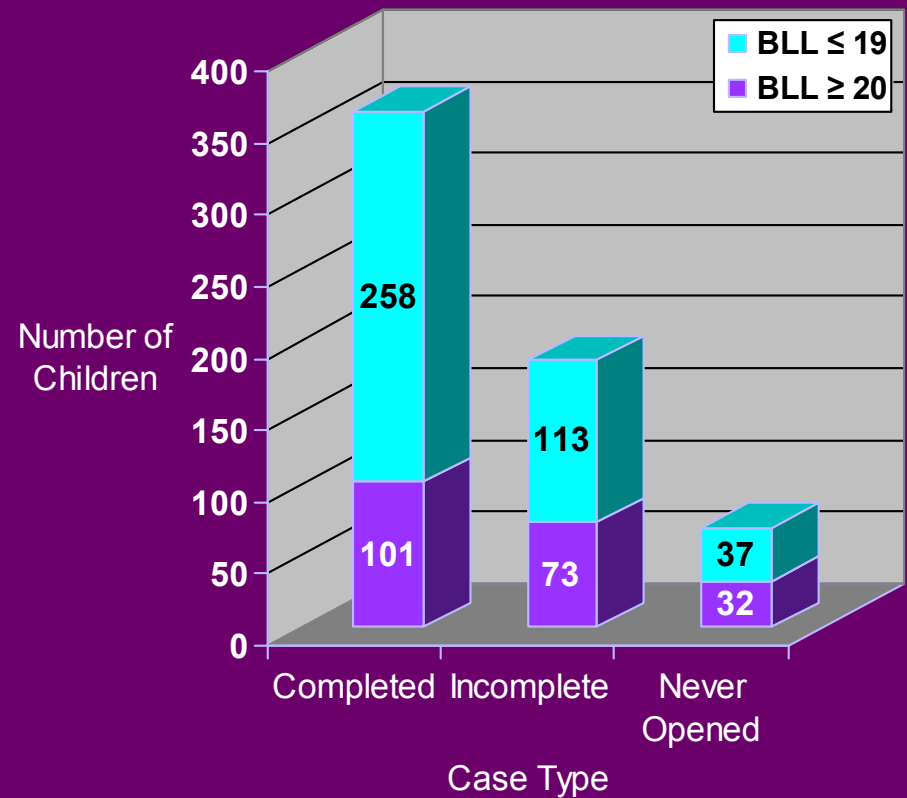
Referral BLL v Last BLL



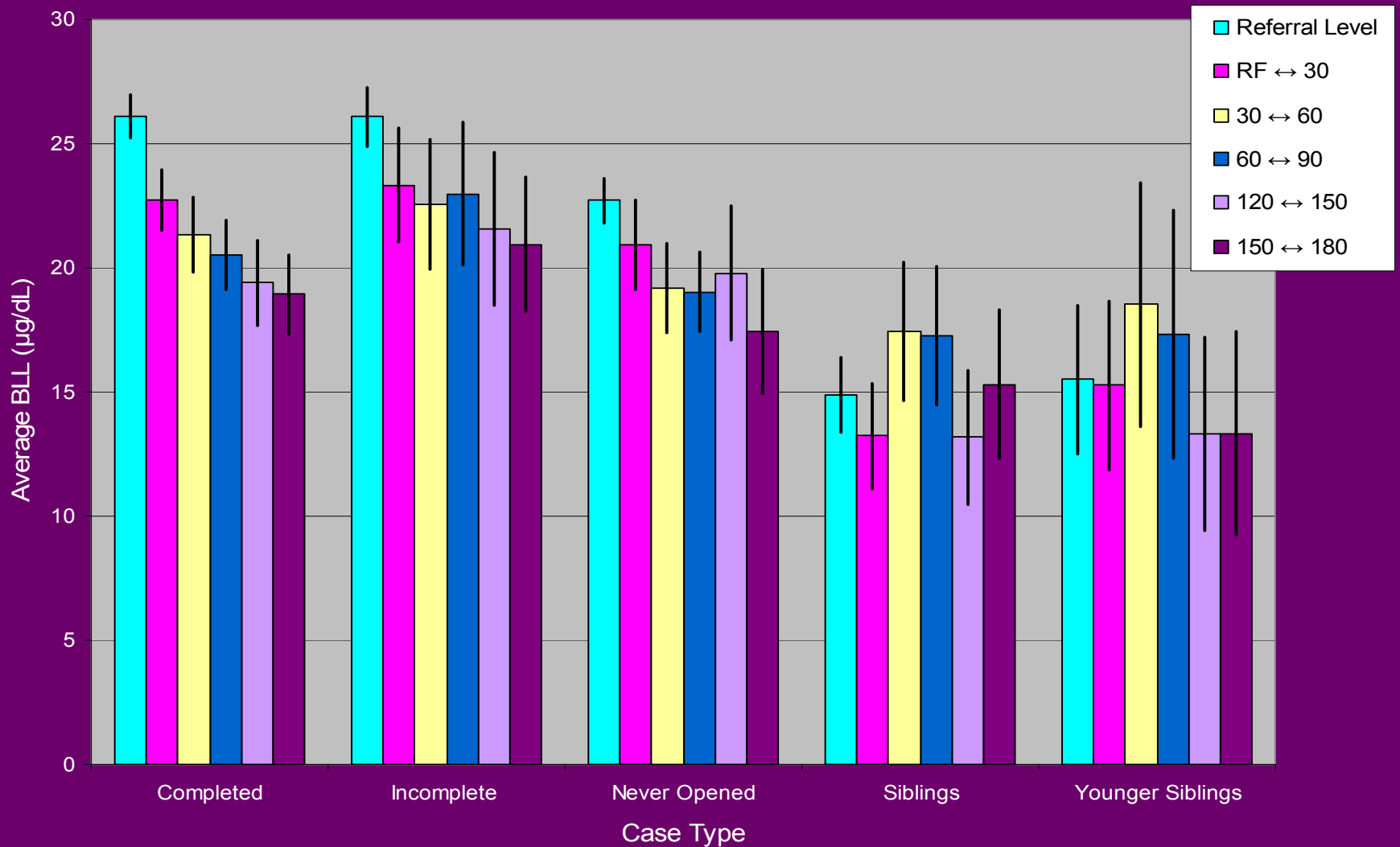
- Absolute BLL Reduction:
 - C- 9.3 (± 0.9) $\mu\text{g/dL}$
 - I - 7.5 (± 1.3) $\mu\text{g/dL}$
 - N- 5.1 (± 1.9) $\mu\text{g/dL}$
- Days between Referral BLL and Last BLL
 - C- 126 days
 - I - 98 days
 - N- 37 days
- Reduction rate ($(\mu\text{g/dL})/\text{day}$)
 - C- 0.07
 - I - 0.08
 - N- 0.1

Breakdown of Children with Last BLLs $\geq 20 \mu\text{g}/\text{dL}$

- % children with BLLs $\geq 20 \mu\text{g}/\text{dL}$ at the close of the case
 - 28.1% (completed)
 - 39.2% (incomplete)
 - 46.4% (never opened)
- Amount of time between last BL and close of case
 - C- 58 days
 - I - 57 days
 - N- 20 days



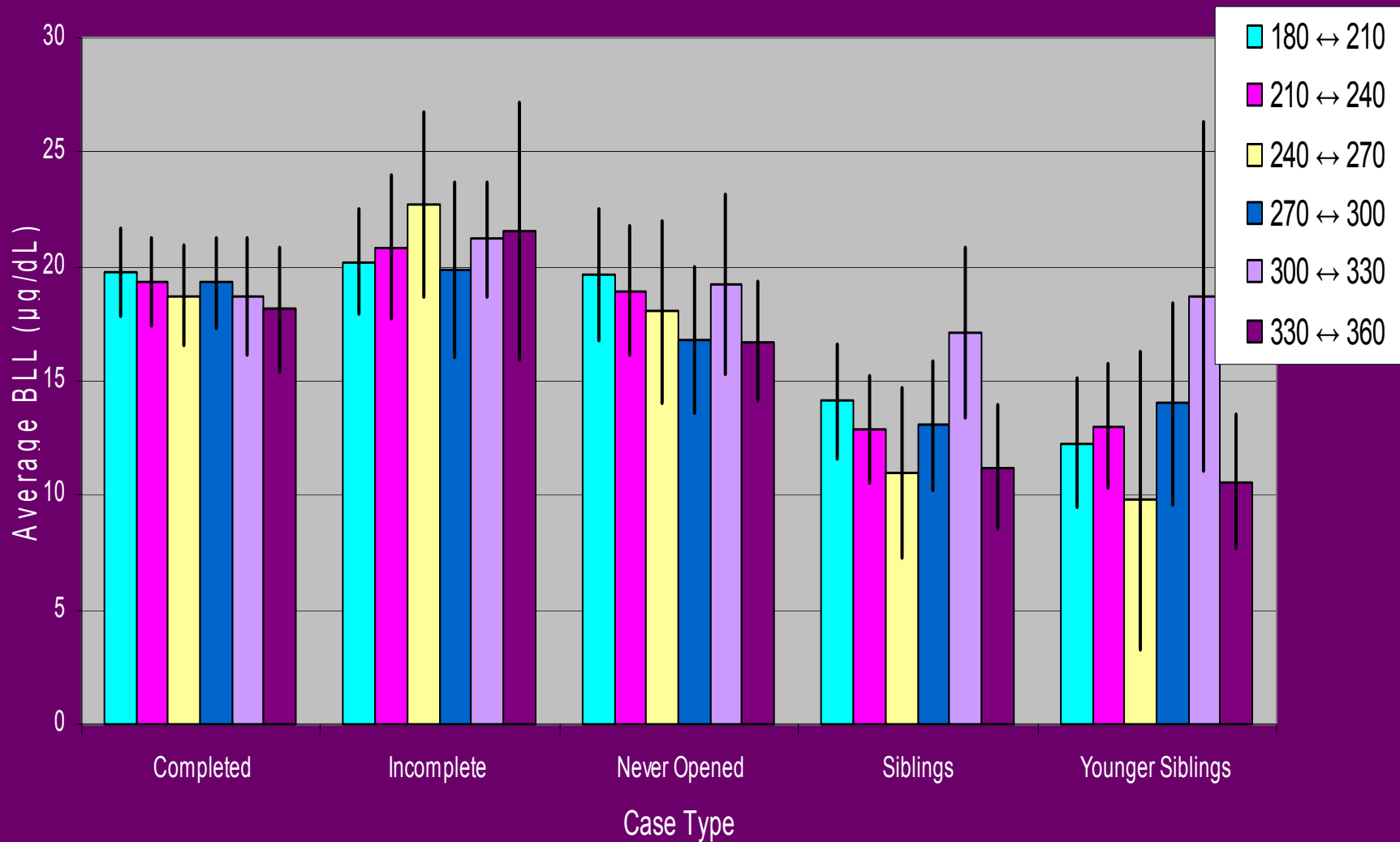
Average BLL Referral Date to 180 Days



BLL Progression During the Case

- Average BLLs for all case groups remained elevated after 180 days
- Only significant BLL decrease (in a 30 day period) occurred in first 30 days after referral for completed cases
- BLLs of siblings did not decrease during course of case

Average BLL 180 Days to 360 Days

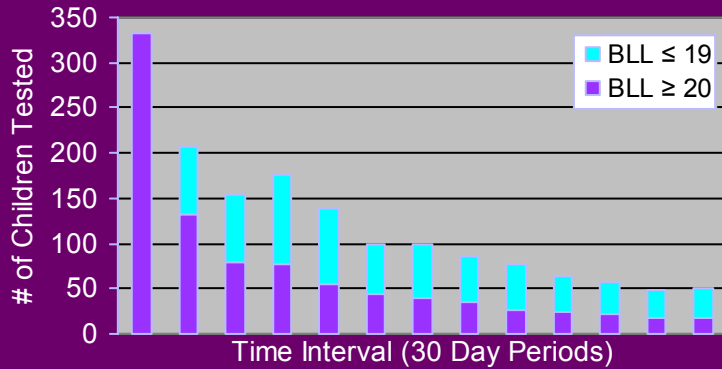


Lasting Effect?

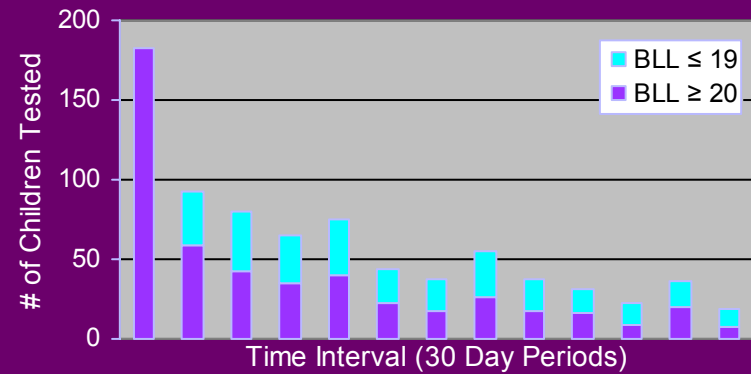
- BLLs 360 days after referral date remain elevated for all cases
- BLLs at 360 days did not increase significantly from 180 days
- Fewer children are tested as time from referral increases

of Children Tested and BLL Results (RD to 360 Days)

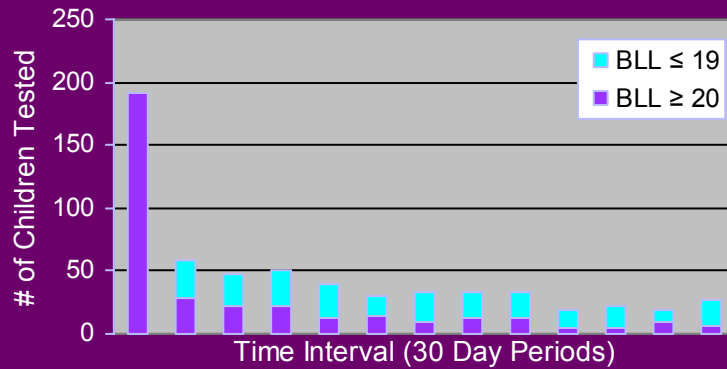
Completed Cases



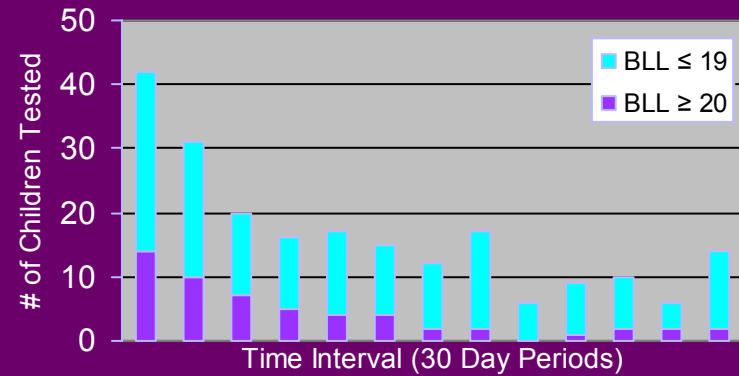
Incomplete Cases



Never Opened Cases



Younger Siblings



Percent of Children with BLLs ≥ 20 $\mu\text{g}/\text{dL}$ (After the RD)

	30 days after RD	180 days after RD	360 days after RD
Completed	63.8%	39.4%	33.3%
Incomplete	64.1%	44.7%	42.1%
Never Opened	50%	30.3%	22.2%

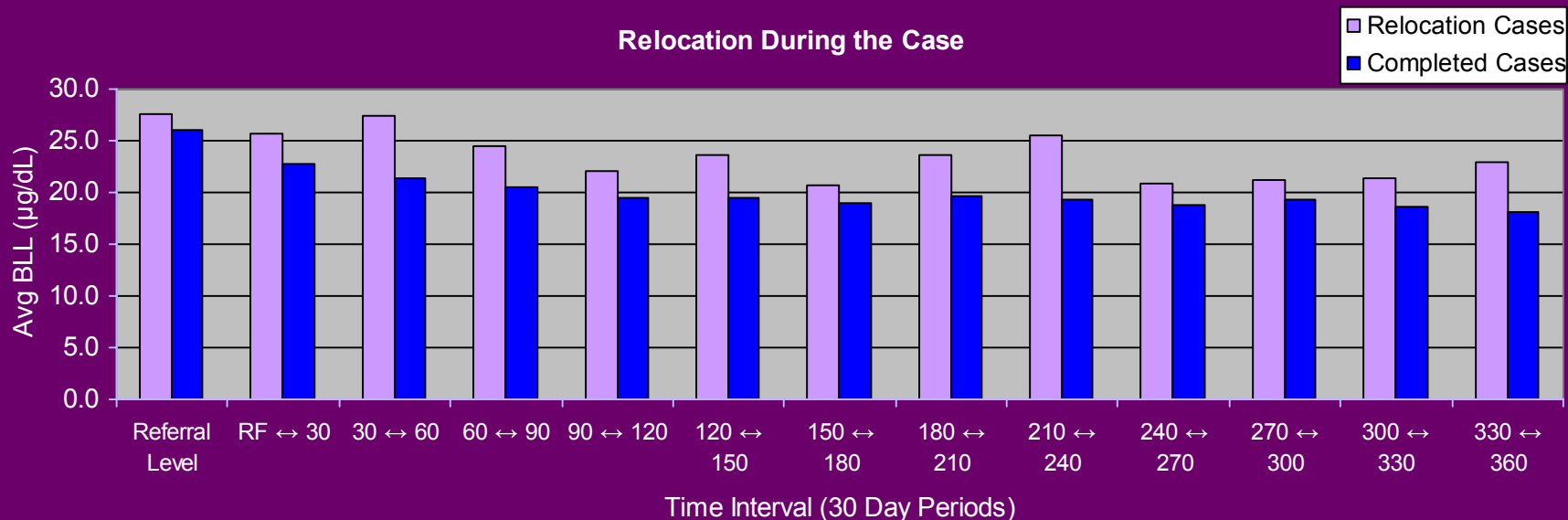
- # of tests drops significantly after the referral date
 - Possibility that children with higher BLLs may be screened more often

Addresses with Multiple Poisonings

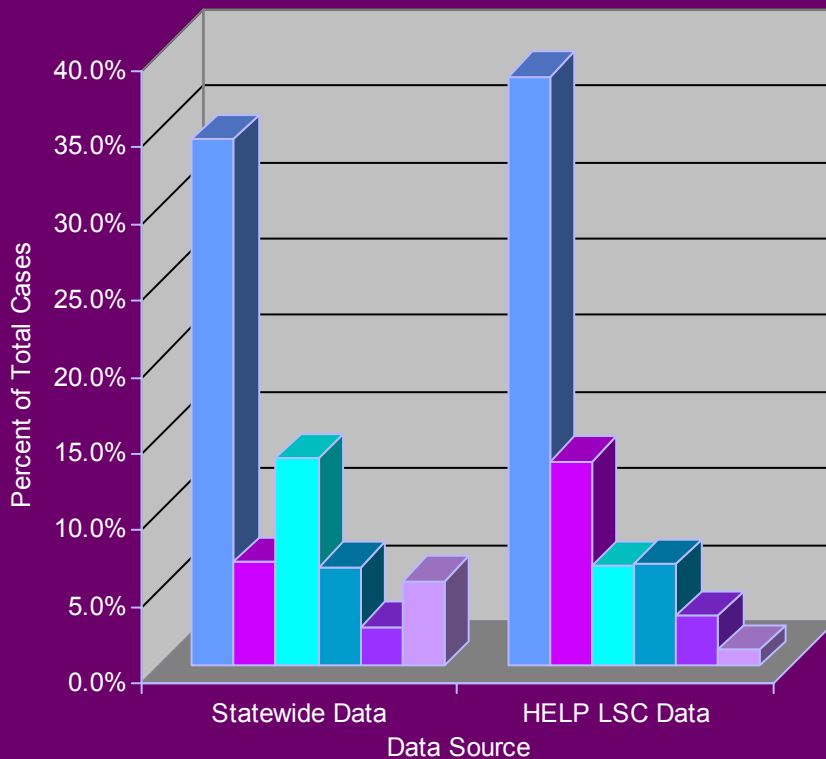
- N= 1,025 addresses
 - 137 (13 %) had more than one poisoning leading to a referral to LSC
- 115 (15%) of 778 children were referred to LSC more than once
 - 65 % were poisoned in the same house

Family Mobility

- 137 of the cases involved relocation of primary residence (likely an underestimation)
- Change in residence during course of LSC program does increase BLLs slightly but no significant difference from completed cases



Housing Inspection Results (LSC v Statewide Data)



- Inspection refusal rate
 - 13.3% LSC
 - 6.7% Statewide
- Abatement complete
 - 38.4% LSC
 - 34.3% Statewide

■ Abatement Complete
■ Refused Inspection
■ Child Moved
■ No Response
■ Referred to Legal/Code Enforcement
■ No Violation

Data Caveats

- Number of BL screening tests per child drops off significantly as cases progress
 - Children with higher BLLs tested more often?
- Database design and entry options often not used consistently among caseworkers
- Future research should approach case management evaluation in a more integrated manner
 - Qualitative measurements (educational performance, reduced lead exposure, etc.)

Conclusions

- Lead safe housing does not equal lead free or risk free
- Rhode Island's strategy for lead poisoning does not address the root issue- cleaning up the lead
 - Social programs focusing on education and awareness are not reducing BLLs in children
 - Programs will be more effective if conducted in partnership with reparations

Thanks To...

- 😊 Harold Ward (Brown)
- 😊 Jeremy Giller and the rest of the HELP
LSC staff
- 😊 Patrick MacRoy (RI DOH)
- 😊 Christopher Mooney (Brown)
- 😊 Rachel Morello-Frosch (Brown)
- 😊 Everyone else for their time, suggestions,
and expertise