

Evaluation of Case Management Services for Lead Poisoned Children In Rhode Island

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Rhode Island mandates that all children under the age of six be screened for lead annually, and that all lead test results be reported to the RI Department of Health. Following the recommendations of the Centers for Disease Control and Prevention (CDC), the Rhode Island Childhood Lead Poisoning Prevention Program (RI CLPPP) considers children under the age of six with a venous blood lead level (BLL) ≥ 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$) to be lead-poisoned.¹ Health effects below this level are well documented;^{2,3} however, due to lack of efficacious interventions below 10 $\mu\text{g}/\text{dL}$, RI CLPPP has retained this threshold as its “action level” for childhood lead poisoning.

The services offered to lead poisoned children in RI vary depending on the severity of the poisoning. (Table 1) Case management services are offered through one of four certified lead centers, non-profit Medicaid-funded agencies.

In 2007, RI CLPPP conducted an evaluation of case management services. The three main objectives of the evaluation were to determine if: 1) there were demographic differences between families accepting and refusing services; 2) parental knowledge of lead increased after receiving services; and 3) case management services had an impact on children’s BLLs.

METHODS

Data from three databases maintained by the RI Department of Health were linked in order to conduct the analyses.

A total of 827 children were referred to case management between January 1, 2004, and December 18, 2006. The complete dataset was used to calculate acceptance rates of case management services. The remaining analyses were conducted on a subset of data that excluded 340 cases with incomplete data, either because the cases were on-going or lost to follow-up. This subset of data included 487 cases where families had successfully completed case management services, or had refused services.

Parent knowledge was measured using an assessment tool comprised of

eleven multiple-choice questions. The family completed the assessment during the first visit (pre-test) and again several visits later (post-test). Scores on the pre- and post-test were compared to determine if there was a change in knowledge after case management services were administered.

RESULTS

Of the 827 referrals made to case management during the study period, 611 (73.9%) accepted services. The acceptance rate for case management services increased from 68.1% in 2004 to 84.5% in 2006, while the refusal rate declined during this time. (Figure 1)

The subset of 487 cases for which there was complete data was used to compare the demographic characteristics of families accepting services with those refusing services. (Table 2) The two groups are similar in terms of mother’s education, primary language spoken, and race/ethnicity.

Figure 1. Lead Poisoning Case Management Capture Rates, Rhode Island, 2004-2006

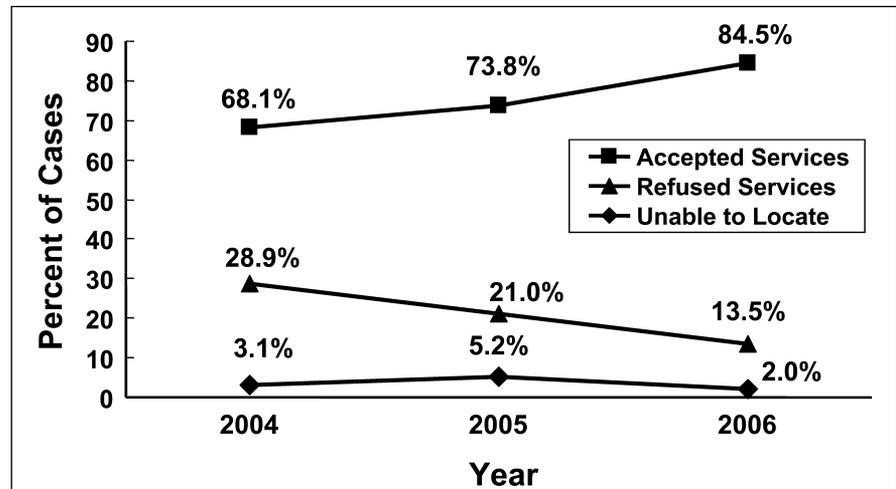


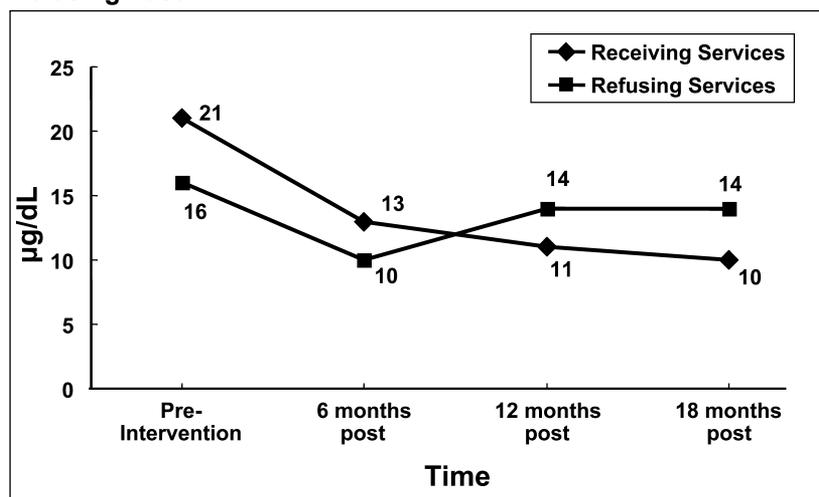
Table 1. Lead Action Levels in Rhode Island

Category	Action Level	Action
Elevated Blood Lead Level	One venous blood lead level 10-14 $\mu\text{g}/\text{dL}$	Family is sent educational material about lead poisoning in the mail. Beginning in January 2008, these children are also offered an in-home lead education visit.
	One venous blood lead level 15-19 $\mu\text{g}/\text{dL}$	Family is referred to a lead center for an in-home lead education visit and a visual assessment to identify lead hazards.
Persistent Lead Poisoning	Two venous blood lead levels 15-19 $\mu\text{g}/\text{dL}$ done between 90-365 days apart	Family is referred to a lead center for an in-home lead education visit and a visual assessment to identify lead hazards, AND the family is offered an environmental inspection.
Significant Lead Poisoning	One venous blood lead level ≥ 20 $\mu\text{g}/\text{dL}$	

Table 2. Demographic Characteristics of Families Accepting Case Management Services Compared to Families Refusing Case Management Services

	Accepted Services (N=300)		Refused Services (N=187)	
	#	%	#	%
Mother's Education				
Less Than High School	80	26.7%	50	26.7%
High School	84	28.0%	60	32.1%
More Than High School	45	15.0%	37	19.8%
Unknown/Missing	91	30.3%	40	21.4%
Primary Language				
English	186	62.0%	136	72.7%
Spanish	29	9.7%	13	7.0%
Other	7	2.3%	4	2.1%
Unknown/Missing	78	26.0%	34	18.2%
Race/Ethnicity				
White	109	36.3%	92	49.2%
Black	37	12.3%	15	8.0%
Hispanic	59	19.7%	24	12.8%
Other	19	6.3%	15	8.0%
Unknown/Missing	76	25.3%	41	21.9%

Figure 2. Changes in Blood Lead Levels Over Time: Children Accepting Case Management Services Compared to Children Refusing Case



Parental lead knowledge was assessed using a pre- and post-test format. The average score on the pre-test was 62.0%; the average score on the post-test was 85.5%. Post-test scores were not associated with the number of home visits received or parent's primary language. However, post-test scores did increase slightly the longer families were enrolled in case management.

An analysis was also conducted to determine the rate of change in the BLLs of children before and after case management services. Six months after referral to case management services, children accepting services had a mean BLL decline of 8 µg/dL; those refusing services had a 6 µg/dL decline. At twelve months after referral, the BLLs of those accepting services had declined an additional 2 µg/dL, while the BLLs of those children refusing services had increased by 4 µg/dL. The blood lead levels of children accepting services declined another 1 µg/dL by 18 months after referral, while the BLLs of those who refused did not change. (Figure 2) Overall, the children receiving services had a greater decline

in average BLLs from 20.9 µg/dL to 9.8 µg/dL, compared to 15.9 µg/dL to 14.1 µg/dL among the children that refused. This decline was significant among those children accepting services.

DISCUSSION

The percent of families accepting case management services has increased in recent years, indicating that RI CLPPP is reaching more families of lead-poisoned children. This can be explained, perhaps, by the fact that case managers have smaller caseloads, which allows them to dedicate more time to each family, and be more persistent when offering services. The demographics of the families accepting and refusing services are similar, indicating that our outreach efforts are not missing a particular subgroup. The increase in scores on the lead knowledge assessment from the pre-test to the post-test suggests that the educational component of the case management services are effective in increasing parents' awareness and knowledge about lead. The results of the analysis suggest that the BLLs of children receiving services decrease more steadily than those refusing services. This indicates that case management is one of many factors that can have a positive impact on a child's blood lead level.

REFERENCES

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Disclosure of Financial Interests

The authors have no financial interests to disclose.