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Lead Poisoning among US Hispanic Children

In their article on lead poisoning in Massachusetts, Sargent et al. stated that "There have been few epidemiological studies of lead poisoning in Hispanic children."[1] The authors did not cite any studies of lead levels among Hispanic children. Lead data have been published for Mexican-American, Cuban, and Puerto Rican children from the Hispanic Health and Nutrition Examination Survey (HHANES),[2–4] and Mexican-American children from the third National Health and Nutrition Examination Survey (NHANES).[5,6] Both HHANES and NHANES III suggest that Hispanics have an elevated risk of lead poisoning. Screening program results also demonstrate a higher rate of elevated blood lead among Hispanics.[7]

During the period of 1982 to 1984, 4.9% of 4- to 5-year-old Mexican-American children in the Southwest, and 10.6% of 4- to 5-year-old Puerto Rican children in the New York City metropolitan area were found to have lead levels at least 25 ug/dl—higher than those for non-Hispanic Whites during the period of 1976 to 1980.[2] These findings are relevant to the Massachusetts study because 52.6% of Hispanics in Massachusetts are Puerto Rican. More recently, NHANES III found that 1% of 1- to 2-year-old Mexican-American children had lead levels of at least 25 ug/dl during the period of 1989 to 1991, compared with 0.4% of non-Hispanic Whites and 1.4% among non-Hispanic Blacks.[5] The trends for 3- to 5-year-olds were similar (0.7%, 0.4%, and 0.8%, respectively).

A similar pattern was seen in the case identification rates and the odds ratios, given by Sargent et al., by percentages of the population who were Hispanic or Black (Table 2).[1] When race and Hispanic ethnicity were included as separate variables in the logistic model, the relationship between the percentage Hispanic and lead poisoning among newborn to 4-year-olds became statistically insignificant at the .05 level. We have concerns about the use of race and ethnicity separately for two reasons. First, the terms "race" and "ethnicity" frequently are used interchangeably in the United States. In most daily and practical applications, Hispanics are considered a "race." Second, the overlap of Blacks and Hispanics (e.g., Black Hispanics) could be highest in the areas with nonzero case identification rates (larger, nonrural communities). For example, 16% of Boston's Hispanic population is Black, compared with 8.9% of Massachusetts' Hispanic population.

Although the decennial census uses two separate questions to collect race and ethnicity data, the data can be analyzed in a combined format using the categories non-Hispanic White, non-Hispanic Black, and Hispanic. It would be interesting to see whether the percentage Hispanic would have been statistically significant using this constructed variable. □

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Note. The views expressed here are the authors' and do not necessarily reflect the official position of the Office of Minority Health or the Bureau of the Census.

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Sargent and Colleagues Respond

We appreciate the letter from Carter-Pokras and Harrison, which provides an accurate summary of current knowledge of the epidemiology of lead exposure among Hispanic children; we would like to note that we did not cite 1994 papers on National Health and Nutrition Examination Survey (NHANES) III data because we drafted our manuscript in 1992.

The authors ask an important question about lead exposure among racial subgroups of ethnically Hispanic children. Carter-Pokras and Harrison suggest using 1990 census data on race in Hispanics to construct different independent variables. In response to their request, we first subtracted persons who identified themselves as "Black Hispanic" from the numerator of the "percent population black" variable. The new variable, percent non-Hispanic Black, was highly correlated with the old variable ($r = 0.993$). Consequently, substitution of "percent non-Hispanic Black" for "percent population Black" in the original model had no appreciable effect on the magnitude or significance of the odds ratio for this variable (OR = 1.04 for the old and the new variables). In addition, "percent population Hispanic" continues to be insignificant at the .05 level when added to this new model.

Carter-Pokras and Harrison also suggest constructing three Hispanic variables: "White Hispanic," "Black Hispanic," and "other Hispanic." We constructed two variables, "percent population Black Hispanic" and "percent population non-Black Hispanic." We chose only two categories because we hypothesize that children of African heritage may be at higher risk for lead exposure for biological reasons; thus, we are primarily interested in determining if communities with Hispanics of African heritage show higher risk of lead poisoning after controlling for effects of poor housing and poverty. We know of no evidence that factors other than poverty and poor housing affect risk of lead exposure in the other Hispanic racial subgroups. Table 1 (on the next page) shows the model resulting from inclusion of these two variables.

This model suggests that the odds for lead poisoning in a community increases by an average of 1.44 for each 1% increase in the Hispanic Black population and

TABLE 1—Logistic Regression Model[a] for the Relationship between the Likelihood of Lead Poisoning (Blood Lead ≥ 25 μg/dL) at the Community Level and Independent Variables

Variable	Unit of Measurement	Independent Effect: Change in Odds Ratio	95% Confidence Interval
Median per capita income	1000	0.92	0.88, 0.95
% population non-Hispanic Black	1%	1.03	1.02, 1.04
% population Black Hispanic	1%	1.44	1.26, 1.62
% population non-Black Hispanic	1%	0.97	0.95, 0.99
Poverty scale[b]	1%	1.03	1.001, 1.05
% housing built before 1950	1%	1.02	1.01, 1.03
Screening rate	1%	1.02	1.01, 1.03

[a]Compare with odds ratios for the regression model in Table 3 of Sargent JD, Brown MJ, Freeman JL, Bailey A, Goodman D, Freeman DH. Childhood lead poisoning in Massachusetts communities: Its association with sociodemographic and housing characteristics. *Am J Public Health.* 1995;85:528–534.

[b]The sum of the values for percentage of female-headed households with children <18 years, percentage with children ≤5 years in poverty, and percentage of houses not owner-occupied, divided by 3.

decreases by an average 0.97 for each 1% increase in the Hispanic non-Black population after controlling for the effects of poverty, old housing, and screening rate. We caution that the findings should be considered preliminary and subject to validation in other ecological studies, as well as in studies of individual children. However, the results are consistent with the idea that a biological or cultural factor may be present that places children of African-Hispanic descent at higher risk for lead exposure. This finding also underlines the importance of including racial subgroups of Hispanics in epidemiological research. □

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Trends in Restraint Prevalence in US Nursing Homes, 1990 through 1994

Restraints traditionally employed in nursing homes include lap belts, Posey vests, wrist and ankle cuffs, and chairs with locking lap trays. By 1983, a mounting body of research suggested that physical restraints were associated with increased falls and injuries, as well as other adverse effects: dehydration, poor appetite, circulatory obstruction, cardiac stress, skin breakdown, functional decline, and resident anger, combativeness, and demoralization.[1–7] These findings led to a growing sentiment that restraint use in the United States was excessive.

In October 1990, federal regulations for a revised nursing home survey process took effect, which included severe restrictions on the use of restraints.[8] Figure 1 details nationwide trends in restraint use during and after implementation of the regulations. By late 1990, nursing homes had significantly reduced restraint use, clearly in response to the new surveys. Skilled nursing facility restraint use dropped from 33.5% (3rd quarter, 1990) to 23.5% in 1991. Nursing facility restraint use dropped from 24.4% to 19.6% in the same period.

A 1989 Health Care Financing Administration report estimated that approximately 40% of nursing home residents in the late 1980s were restrained.[9] However, numerous facilities were attempting to reduce restraints prior to 1990, in anticipation of new survey expectations. Therefore, the drop in restraint prevalence from the late 1980s to 1991 is greater than that suggested in Figure 1.

Currently, American nursing home residents are less likely to be restrained than they were 5 years ago. Restraint prevalence in skilled nursing facilities appears to have leveled off at about 22% of all residents. Nursing facilities consistently restrain fewer residents than skilled nursing facilities: about 19% in 1994. As nursing facilities care for a less disabled and confused resident population than skilled nursing facilities, staff may perceive less need to employ restraints. An alternate explanation is that skilled nursing facilities may operate under a more "medical" model than nursing facilities in which restraint use is more accepted.

Does 20% represent a reasonable level for restraint use in nursing homes? Probably not. One study targeted 16 facilities in four states with high restraint use. The project succeeded in reducing the proportion of restrained residents from 41% (over all study facilities in 1991) to an average of 4%.[10]

There is considerable variation among states in restraint use. In Iowa and Nebraska, only 7.7% of all skilled nursing facility residents were restrained. However, in Wisconsin, Nevada, Minnesota, Alaska, and Pennsylvania, over 30% of these residents were restrained. Low levels of restraint use were observed in several states known to have aggressive restraint-reduction programs (e.g., New Hampshire, Florida, Oregon). Nursing-facility restraint prevalence ranged from 0% restrained in Arizona to 57.8% restrained in South Carolina. Differences in resident health or disability in different states probably do not "explain" such broad variations. Certainly, there are no empirical studies that identify extreme health and behavioral distinctions between residents in high restraint-use and low restraint-use states. Therefore, non–resident-related explanations (of restraint prevalence by state) may be the more accurate ones.

Currently, the authors are initiating a national study to evaluate facility- and state-level determinants of restraint use in nursing homes. Study results may help to explain the causes of state differences.

If enacted, proposed legislation to shift programmatic responsibility for Medicaid to the individual states is likely to reverse the reductions achieved. The intractability of many nursing homes and states towards reducing restraints indicates that regulatory consistency and more comprehensive educational programs may be necessary to improve the lives of our institutionalized elderly. □

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