

Racial Misclassification of American Indians: Its Effect on Injury Rates in Oregon, 1989 through 1990

ABSTRACT

Objectives. We assessed the extent to which injury rates among American Indians in Oregon are underestimated owing to misclassification of race in a surveillance system.

Methods. The Oregon Injury Registry, a population-based surveillance system, was linked with the Indian Health Service patient registration file from Oregon, and injury rates for American Indians were calculated before and after correcting for racial misclassification.

Results. In 1989 and 1990, 301 persons in the Oregon registry were coded as American Indian. An additional 89 injured persons who were coded as a race other than American Indian in the registry were listed as American Indian in the Indian Health Service records. The age-adjusted annual injury rate for health service-registered American Indians was 6.9/1000, 68% higher than the rate calculated before data linkage. American Indian ancestry, female sex, and residence in metropolitan counties were associated with a higher likelihood of concordant racial classification in both data sets.

Conclusion. Injury rates among American Indians in an Oregon surveillance system are substantially underestimated owing to racial misclassification. Linkage of disease registries and vital records with Indian Health Service records in other states may improve health-related data regarding American Indians. (*Am J Public Health.* 1993;83:681-684)

Jonathan R. Sugarman, MD, MPH, Robert Soderberg, BS, Jane E. Gordon, PhD, and Frederick P. Rivara, MD, MPH

Introduction

American Indians experience morbidity and mortality from injury at a rate exceeding that for any other race in the United States¹ and specifically in the state of Oregon.² It is possible that even the reported rates are underestimates of the true burden of injuries among American Indians because of racial misclassification in vital records and morbidity registries. For example, more than one third of the infants in the United States whose birth certificates are coded as American Indian and who die within the first year of life are classified as members of other races on their death certificates, resulting in factitiously low American Indian infant mortality rates.³ Significant rates of racial misclassification of American Indians have been described in a tumor registry in Washington⁴; in end-stage renal disease data sets in Washington, Oregon, and Idaho⁵; and on death certificates of American Indians who received services at an urban Indian health clinic in Seattle.⁶ However, to our knowledge, the extent to which American Indian injury rates are underestimated owing to racial misclassification is unknown.

To examine this question, we conducted a study that linked the Oregon Injury Registry with a patient registration file of American Indian Oregon residents registered with the Indian Health Service (IHS). In addition, we examined selected risk factors that might be associated with the likelihood of discordant racial classification between the two data sets.

Methods

The Oregon Injury Registry is a population-based surveillance system for in-

juries resulting either in death or in hospital admission for at least 1 calendar day.⁷ Surveillance of acute care hospitals is accomplished by standard, computerized reports provided voluntarily by hospitals on floppy disks to the Oregon Health Division. Information on fatal injuries is collected from the hospitals for each such patient who died in the hospital, and from death certificates supplemented by information in the state medical examiner's records. We examined data reported to the Oregon registry in 1989 and 1990. The 1989 surveillance included all deaths and 50% of the state's 67 acute care hospitals, which account for 63% of the state's acute care beds. In 1990, the system included surveillance of all fatalities and of 60% of the state's acute care hospitals, accounting for 68% of Oregon's acute care beds. For hospitalizations, race is reported to the registry by responding hospitals based on routine ascertainment according to each hospital's policy, which may include either patient self-report or observation by hospital staff.

The IHS provides health services without charge to members and descendants of members of federally recognized American Indian and Alaska Native tribes. (In this report, we designate Alaska Natives as American Indians because the two are not separately classified in the Or-

Jonathan R. Sugarman is with the IHS in Seattle, Wash. Robert Soderberg and Frederick P. Rivara are with the Harborview Injury Prevention and Research Center at the University of Washington, Seattle. Jane E. Gordon is with the Oregon Health Division, Portland.

Requests for reprints should be sent to Jonathan R. Sugarman, MD, MPH, IHS Epidemiology Program, 2201 6th Ave, Room 300, Seattle, WA 98121.

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TABLE 1—Injury Rates among American Indians, before and after Linkage with the Indian Health Service (IHS) Patient Registration File, Oregon Injury Registry (OIR), 1989 through 1990

Data Source	Number of Injured Persons	Age-Adjusted Rate
Persons originally coded as American Indian on OIR, before linkage	301	4.1/1000 ^a
Persons coded as American Indian on either OIR or IHS patient registration file, after linkage	390	5.5/1000 ^a
American Indian persons from IHS file included on OIR, regardless of original racial coding on OIR	255	6.9/1000 ^b

^aUsing 1990 census Oregon American Indian population as denominator.
^bUsing American Indians in IHS patient registration file as denominator.

TABLE 2—Proportion of IHS-Registered American Indians Who Coded as American Indian in the Oregon Injury Registry (OIR), by Blood Quantum, 1989 through 1990

American Indian Blood Quantum, %	Proportion Originally Coded as American Indian on OIR
100	77/86 (89.5%)
50–99	36/45 (80.0%)
25–49	9/29 (31.0%)
1–24	1/18 (5.6%)

gon Injury Registry.) The Portland Area IHS maintains a computer file of Oregon residents who have registered for services with it. Applicants provide documentation of tribal membership or American Indian heritage to establish their eligibility for services. The file includes information on American Indian blood quantum. For example, if one parent is full-heritage American Indian and the other is non-American Indian, blood quantum is 50%; blood quantum is 100% if all ancestors are full-heritage American Indian. Although many American Indian tribes require a minimum blood quantum (often 25%) for membership, others grant membership on the basis of descent from a tribal member without regard to proportion of American Indian heritage.⁸

The two data sets were linked by computer algorithm. First, a personal identification code was constructed for each record in both files using the first four letters of the last name, the first initial, and the date of birth. Records with identical personal identification codes in both files

were then examined individually to determine if the names were the same. A second linkage was conducted using Social Security numbers. After the Social Security linkage, the records were individually reviewed and those with identical names and Social Security numbers were considered to be matches even if dates of birth were not identical.

To examine how inconsistent racial classification between the two data sets affected estimated injury rates among American Indians, we calculated age-adjusted rates of injury using three methods. Rates uncorrected for racial misclassification were calculated using the number of individuals who were originally coded as American Indian in the Oregon registry (numerator) and estimates of the number of American Indians living in Oregon from the 1990 census (denominator). Second, we calculated rates using the same denominator but adding to the numerator injured persons who were recorded as being American Indian in the IHS patient registration file but who were coded as members of another race in the Oregon registry. This rate still underestimates the incidence of injuries reported to the registry among American Indians because the number of American Indians in the IHS file ($n = 19\,694$) is approximately 51% of the number of Oregon residents who designated themselves to be American Indian ($n = 38\,496$) in the 1990 census. To calculate a rate for which the numerator and denominator were comparable, we used American Indian persons in the Oregon registry who were included on the IHS file in the numerator, and persons designated as American Indian on the IHS file in the denominator. All age-adjusted rates use the 1980 US population as the reference.

Unconditional logistic regression was used to examine the effect of sex, age, American Indian blood quantum, and county of residence (metropolitan versus nonmetropolitan) on concordance of racial coding between the registry and IHS data sets.⁹ The Mantel Extension Test was used to determine association between injury rates and blood quantum.¹⁰ These analyses were stratified by age. For these calculations, we used only persons included in the IHS patient file for whom blood quantum was listed.

Results

In 1989 and 1990, 301 entries (hospital admissions or fatalities) in the Oregon Injury Registry were coded as American Indian. Of these, 133 (44.2%) were not matched to the IHS patient registration file. An additional 89 persons who were coded as a race other than American Indian on the registry were linked to the IHS file. Two cases coded as American Indian in the registry were listed as non-American Indian in the IHS file. Thus, the number of cases in the registry that were identified as American Indian in at least one of the data sets increased by 29.6% ($n = 390$) after the data linkage. Injury rates among American Indians before and after the data linkage are shown in Table 1. Only 166 (65.1%) of the 255 American Indians on the IHS file identified after the linkage were originally coded as American Indian on the registry. The age-adjusted injury rates for American Indians using only persons who were included in the IHS file in the numerator and denominator was 6.9/1000 persons, 68% higher than the rate calculated based on registry data alone.

After we deleted persons with repeat admissions and those for whom blood quantum was unknown or unspecified on the IHS file, there were 178 IHS-registered American Indians on the Oregon registry. The proportion of IHS-registered American Indians who were coded in as American Indian in the Oregon registry increased consistently with increasing blood quantum (Table 2).

The results of the logistic regression are shown in Table 3. Blood quantum remained strongly associated with concordant classification on both data sets; American Indians with 100% blood quantum were far more likely to be classified as American Indian on the Oregon registry than those with less than 25% blood quantum (odds ratio [OR] = 145.4; 95% confidence interval [CI] = 17.3, 1226). In addition, concordant classification was more

likely among females (OR = 2.9; 95% CI = 1.4, 6.0) and among persons residing in nonmetropolitan counties (OR = 2.4; 95% CI = 1.1, 5.6).

For American Indians on the IHS patient registration file, the likelihood of being injured and appearing on the Oregon registry increased with increasing blood quantum. There was a significant dose-response relationship between crude injury rates and increasing blood quantum; the odds ratio among those with 100% blood quantum compared with those with less than 25% blood quantum was 4.5 (Mantel Extension Test $\chi^2 = 57.4$, $P < .00001$). Among persons with 100% blood quantum, the annual aged-adjusted rate was 14.4/1000 persons, compared with 6.5/1000 persons among those with 50% to 99% blood quantum, 3.8/1000 among those with 25% to 49% blood quantum, and 3.0/1000 among persons with less than 25% blood quantum.

Discussion

Injuries are a leading cause of morbidity and mortality among American Indians in Oregon.^{2,11} Because the annual age-adjusted injury rate among IHS-registered American Indians (6.9/1000 persons) was 68% higher than the rate that would normally be calculated with Oregon Injury Registry data, injury rates among American Indians in Oregon may be substantially underestimated by relying on race as reported as reported to the statewide injury surveillance system.

It is not possible to determine from our data whether the source of inconsistent coding between the two data sets is related to differential racial self-identification by persons at different points in time or to discrepancies between patient self-identification and racial designation by observers in the health care system. From a program-planning and resource allocation standpoint, the inconsistencies in racial misclassification between the registry and IHS records are potentially important because allocation of federal resources sometimes depends on assessments of morbidity and mortality from vital records and disease registries. If morbidity rates of eligible IHS beneficiaries are not accurately reflected in disease or injury registries because cases are racially misclassified, inappropriate decisions regarding the allocation of resources or the monitoring of intervention programs may occur.

A potentially important incidental finding of the study is the "dose-response" relationship between American

	Odds Ratio for Consistent Racial Coding on Both Data Sets	95% Confidence Interval
Age, y		
<24	Referent	
25–44	1.5	0.7, 3.2
≥45	1.5	0.6, 3.8
Sex		
Male	Referent	
Female	2.9	1.4, 6.0
Blood quantum, %		
<25	Referent	
25–49	7.7	0.9, 66.7
50–99	68.0	8.0, 580.9
100	145.4	17.3, 1226
County		
Metropolitan	Referent	
Nonmetropolitan	2.4	1.1, 5.6

^aAmong persons listed as American Indian on the IHS patient registration file.

Indian blood quantum and the likelihood of injury as reported to the Oregon registry. Although higher American Indian blood quantum has been associated with increased rates of diseases such as non-insulin-dependent diabetes mellitus in several tribes,^{12,13} we are unaware of previous demonstrations of American Indian blood quantum being associated with injury risk. Future studies of injury among American Indians should attempt to evaluate whether blood quantum is associated with specific characteristics, such as socioeconomic status, rural residence, or exposure to hazards in the environment, that are known to be associated with injury risk.

There are several limitations to these data. First, because almost half of the self-identified American Indians in Oregon in the 1990 census were not registered with the IHS and were therefore not included in the record linkage, this study probably underestimated the extent of racial misclassification of American Indians in the Oregon registry. How these individuals differ from registered individuals and their actual rates of injury is unknown. In a recent study of racial misclassification of American Indians on death certificates in Washington State, misclassification among American Indian clients of a non-IHS clinic for American Indians was substantially greater than that among persons registered for IHS services.⁶ Second, American Indians represent only 1.4% of the Oregon population, and rates of racial misclassification on diseased registries may

be less in states with a greater proportion of American Indian residents. Third, it is possible that some persons who identified themselves as American Indian to register for the IHS identified themselves as members of a race other than American Indian in the census. If this were the case, rates describing American Indians that use census data in the denominator would be inappropriately increased. Although we have used the term *misclassification* to refer to cases in which racial classification was inconsistent in the two data sets, there is no widely accepted, scientifically valid definition that can be used as a "true" standard by which to classify race conclusively as American Indian. Fourth, because the Oregon registry did not include universal coverage of all hospitals in Oregon during the study period, rates calculated using the registry are underestimates of the actual rate of injury. Finally, it is possible that some non-American Indians were coded as American Indian on the registry. Although a study of end-stage renal disease data maintained by the Health Care Financing Administration found that a number of persons with names highly suggestive of Asian or Pacific Islands origin were classified as American Indian,¹⁴ similar problems were not identified in a recent study of an end-stage renal disease set for Oregon.⁵

This study highlights the need for special attention to surveillance systems including information that can be used to assess the health status of American Indians. Failure to account for potential racial

misclassification may result in inappropriately low estimates of morbidity and mortality among American Indians. Although the IHS patient registration files include only about half the persons identifying themselves as American Indian in the United States, linkage of disease registries and vital records with IHS records in other states may improve health-related data regarding American Indians. □

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