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# Clinical Hypertension in Native Americans: A Comparison of 1987 and 1992 Rates from Ambulatory Care Data 

## SYNOPSIS

THE AUTHORS EXAMINED THE PREVALENCE of clinically diagnosed hypertension among all American Indian and Alaska Native outpatients served in Indian Health Service (IHS) facilities in fiscal year 1992, and compared these rates with a similar analysis done in 1987. In this report they provided data on that analysis as well as on the association between hypertension and diabetes.

The 1992 overall estimated age-adjusted prevalence of clinically diagnosed hypertension in adults older than age 15 was $10.4 \%$, compared with $10.9 \%$ in 1987, a small but significant decrease. Considerable variation exists in hypertension prevalence rates in American Indian communities as analyzed by IHS service area.

This report represents an attempt to use ambulatory patient care data to demonstrate a means for ongoing surveillance of a chronic disease for the entire service population of the IHS. This comprehensive data set represents approximately $60 \%$ of the entire U.S. American Indian and Alaska Native population. Based on the ongoing nature of this ambulatory patient care data system, this model for hypertension surveillance permits a unique opportunity for longitudinal evaluation of quality improvement efforts for the American Indian and Alaska Native populations served by the IHS.

National health surveys provide information on the rates of hypertension and its control among several minority populations in the United States. Because American Indians living on reservations are not included in national health surveys, systematic longitudinal data are not available from sources such as the National Health and Nutrition Examination Survey (NHANES) to assess the burden of hypertension and its consequences, as well as trends over time, in this heterogeneous population. However, several other data sources are available, and they suggest that hypertension rates are variable in different groups of American Indians and Alaska Natives (1). This variability challenges our efforts to understand the epidemiology of hypertension in this population and to target effective control programs.

Estimates of hypertension prevalence among American Indians and Alaska Natives are available from one national survey and regional studies

Table I. Comparison of age-specific rates (per 100) of diagnosed hypertension in American Indians and Alaska Natives, 1992 versus 1987

| Age | Age-Specific Rate <br> 1987 | Age-Specific Rote <br> 1992 |
| :--- | :---: | :---: |
| $15-44$ | 3.3 | 3.1 |
| $45-64$ | 19.2 | 17.5 |
| $\geq 65$ | 27.9 | 25.6 |
| Age-Adjusted Rate* | 10.9 | 10.4 |
| * Adjusted to the 1980 U.S. Census, age $\geq 15$ years |  |  |

(1,2). This report examines the prevalence of clinically diagnosed hypertension among all American Indian and Alaska Native outpatients served in Indian Health Service (IHS) facilities in fiscal year 1992, and compares these rates with a similar analysis done in fiscal year 1987 (1). In addition, data are reported on the association between hypertension and diabetes.

## Methods

The IHS is a health care system serving over 1.3 million American Indian and Alaska Native members of federally recognized tribes residing on or near Indian reservations throughout the United States. This represents $60 \%$ of those who self-identified as American Indian or Alaska Native in the 1990 census. In the IHS system, clinical and demographic information for each outpatient encounter at IHS and tribal facilities are collected based on the clinical impression(s) of the primary care provider at the time of the visit. The 432 IHS facilities that use this system of data collection were included in this analysis. These facilities provide care to approximately $85 \%$ of American Indian and Alaska Native individuals residing in the facility catchment areas (2). To identify individuals with diagnoses of hypertension, diabetes, or both, we examined data from outpatient visits for fiscal year 1992 (1 October 1991 to 30 September 1992). IHS clinical providers routinely diagnose hypertension using the clinical criteria suggested by the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure (3). Unique patient identifiers were used to eliminate duplicate entries, ensuring that each person diagnosed was counted only once.

We derived the population estimates used to calculate hypertension and diabetes rates with these data from the number of individuals who self-identified as American Indian and Alaska Native in the 1990 census and resided in geographic areas in which the IHS has responsibility to provide care. We based a projection to the intercensus year 1992 on linear trend analysis of 10 years of Indian birth and death data.

To estimate the extent that diabetes and hypertension occurred in the same patient, we cross-matched
patients diagnosed with diabetes with those diagnosed with hypertension. Differences in rates were analyzed by comparing $95 \%$ confidence intervals for 1987 and 1992 rates, adjusted to 1980 census data.

We computed population estimates for the 1987 data using an exponential extrapolation method. We excluded California area data from the calculation of total IHS hypertension prevalence in 1992 so we could compare 1992 data with the 1987 rate for which no California data were reported.

## Results

The 1992 overall estimated age-adjusted prevalence of clinically diagnosed hypertension among American Indians and Alaska Natives older than 15 was $10.4 \%$, compared with the $10.9 \%$ rate reported in 1987, as shown in Table 1. The age-specific prevalence increased markedly with age: Approximately $25 \%$ of adults over the age of 65 had a diagnosis of hypertension.

Considerable variation existed in hypertension prevalence rates among the American Indian and Alaska Native communities as analyzed by IHS service area (see Table 2). We observed the highest rates in northern Plains and Woodlands culture groups (range: $12.2 \%$ to $14.4 \%$ ) compared with lower rates in the Pacific Northwest and Alaska (range: $5.6 \%$ to $7.5 \%$ ). In 8 of the 11 service areas, and in the overall rate, hypertension prevalence rates from 1987 to 1992 differed at the $P<0.05$ level.

There was considerable overlap between hypertension and diabetes (Table 3). Overall, $31.2 \%$ of the patients with diabetes had diagnosed hypertension, compared with the $37.2 \%$ rate reported in 1987. As with diagnosed hypertension alone, significant variability existed between IHS service areas. In general, compared with the 1987 figures, the prevalence of hypertension in patients with diabetes seems to have remained unchanged.

## Conclusions

This study represents an attempt to use ambulatory patient care data as a means for ongoing surveillance of a chronic disease for the entire 1.3 million service population of the IHS without resorting to special data collection efforts. This comprehensive data set represents approximately $60 \%$ of the U.S. American Indian and Alaska Native populations (2).

Overall, a small decrease in hypertension prevalence rates was observed between 1987 and 1992. This might reflect a true decrease in the burden of hypertension experienced by American Indian and Alaska Native communities. Alternatively, it may reflect the fact that the published 1987 rates were calculated using service population estimates based on the 1980 census, whereas the 1992 rates were determined from population estimates

Table 2. Comparison of age-adjusted prevalence rates (per 100) of diagnosed hypertension by cultural and geographic grouping and IHS service area, 1987 versus 1992, in people ages $>15$

| Cultural and Geographic Group IHS Service Area | 1987 |  | 1992 |  | po* |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  | Age-Adjusted* Rote | 95\% Cl | Age-Adjustede Rate | 95\% CI |  |
| Plains Tribes |  |  |  |  |  |
| Aberdeen | 12.6 | 12.3-13.0 | 11.3 | 11.0-11.6 | <0.05 |
| Billings | 12.2 | 11.7-12.7 | 12.6 | 12.2-13.0 | ns |
| Woodlands Tribes |  |  |  |  |  |
| Bemidji | 17.0 | 16.6-17.4 | 14.4 | 14.0-14.8 | <0.05 |
| Nashville | 14.0 | 13.5-14.5 | 11.7 | 11.3-12.1 | <0.05 |
| Oklahoma | 11.9 | 11.7-12.1 | 12.2 | 12.0-12.4 | ns |
| Southwestern Tribes |  |  |  |  |  |
| Albuquerque | 11.3 | 11.0-11.6 | 9.6 | 9.3-9.9 | <0.05 |
| Navajo | 8.5 | 8.3-8.7 | 8.9 | 8.7-9.1 | <0.05 |
| Phoenix | 10.8 | 10.6-11.1 | 10.5 | 10.3-10.7 | ns |
| Tucson | 10.7 | $10.1-11.3$ | 7.9 | 7.5-8.4 | <0.05 |
| Pacific Coastal Tribes |  |  |  |  |  |
| Alaska | 6.8 | 6.6-7.0 | 7.5 | 7.3-7.7 | <0.05 |
| California | No data | N/A | 5.6 | 5.4-5.8 | N/A |
| Portland | 8.8 | 8.5-9.1 | 7.4 | 7.2-7.7 | <0.05 |
| All IHS (excludes California) | 10.9 | 10.8-11.0 | 10.4 | 10.3-10.5 | <0.05 |
| All IHS |  |  | 9.9 | 9.8-10.0 | - |

[^0]Table 3. Prevalence of hypertension among patients with diabetes, ages $>15$ by cultural and geographic grouping and IHS service area, 1987 versus 1992

| Cultural and Geogrophic Group IHS Service Area | 1987 |  | 1992 |  | Z* | pat |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Diabetes ( $n$ ) | \% of DM with HTN | Diabetes ( n ) | \% of DM with HTN |  |  |
| Plains Tribes |  |  |  |  |  |  |
| Aberdeen | 4586 | 31.3 | 4698 | 25.1 | 6.64 | <0.05 |
| Billings | 1913 | 33.4 | 2246 | 26.0 | 5.22 | <0.05 |
| Woodlands Tribes |  |  |  |  |  |  |
| Bemidji | 2638 | 44.2 | 3283 | 33.0 | 8.83 | <0.05 |
| Nashville | 2082 | 43.3 | 2478 | 35.6 | 5.31 | <0.05 |
| Oklahoma | 9711 | 47.5 | 10775 | 31.0 | 24.20 | <0.05 |
| Southwestern Tribes |  |  |  |  |  |  |
| Albuquerque | 3040 | 29.2 | 3704 | 31.3 | -1.87 | ns |
| Navajo | 5682 | 31.2 | 7615 | 32.6 | -1.71 | ns |
| Phoenix | 2638 | 44.2 | 3283 | 33.0 | 8.83 | <0.05 |
| Tucson | 1214 | 32.9 | 1488 | 30.2 | 1.5 | ns |
| Pacific Coastal Tribes |  |  |  |  |  |  |
| Alaska | 675 | 30.7 | 852 | 34.9 | -1.73 | ns |
| California | - | - | 2597 | 30.7 | - | - |
| Portland | 1467 | 37.2 | 1810 | 25.1 | 7.50 | <0.05 |
| All IHS (excludes California) | 38835 | 37.2 | 46089 | 31.2 | 18.40 | <0.05 |
| All IHS |  |  | 48686 | 31.2 | 18.63 | <0.05 |

based on 1990 census figures. A greater number of people self-identified as American Indian and Alaska Native in the 1990 census (2); therefore, the 1987 rates could be somewhat inflated because smaller denominators were used. A third explanation for the decrease in prevalence is that it may represent underrecording or underdiagnosis bias.

There are chart review surveys done within the IHS Diabetes Program, described elsewhere (4), as well as unpublished community-based surveys in the entire adult population of certain areas, which report almost two-fold higher rates of hypertension in the population when compared with rates generated from the ambulatory patient
care data set described in this study. Hypertension rates in this data set may be underestimated because not all hypertensive subjects were seen in IHS clinics. However, this is likely to have had a small impact; chronic diseases, such as hypertension, are likely to be captured in this data system, even with episodic or partial care, because data is entered at many access locations in the system, including pharmacies where patients receive medications without charge, even for outside prescriptions.

One source of data on hypertension in Native Americans that can provide overall national estimates is the special Survey of American Indians and Alaska Natives
(SAIAN), conducted as part of the 1987 National Medical Expenditure Survey (NMESII) (5). This survey provided information on self-reported high blood pressure. The SAIAN included a sample of American Indians and Alaska Natives living on or near federally recognized American Indian and Alaska Native reservations who were eligible to receive care provided or supported by the IHS. The prevalence of hypertension in adults reported by the SAIAN population was $22.7 \%$, which did not differ from a comparable rate in the U.S. population of $22.8 \%$. These estimates are twice those reported for adults in this study, suggesting underrecording of this diagnosis.

Despite the issues of method of diagnosis, the data show clearly that there is significant variability in the rates of hypertension in the various American Indian and Alaska Native communities. This leads to the logical conclusion that programs targeting this problem need to be regionally and(or) tribally based. This model has been used successfully for the IHS Diabetes Program, where diabetes coordinators, mostly physicians and nurses based in each region, are familiar with local diabetes-related data and issues, and are thus able to provide relevant technical assistance to tribes and providers caring for this population. Moreover, this model for hypertension surveillance, based on the ongoing nature of this ambulatory patient care data system, permits a unique opportunity for longitudinal evaluation of quality improvement efforts for the American Indian and Alaska Native populations served by the IHS.

## References

1. Broussard, B., and others: Clinical hypertension and its interaction with diabetes among American Indians and Alaska Natives. Estimated rates from ambulatory data. Diabetes Care 16: 292-296, January 1993.
2. Indian Health Service: Trends in Indian health, 1993. Division of Program Statistics, Rockville, MD, 1994. pp. 1-11.
3. Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure: The fifth report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. Arch Int Med 153: 154-183, January 1993.
4. Mayfield, J., and others: Assessment of diabetes care by medical record review: the Indian Health Service model. Diabetes Care 17: 918-923, July 1994.
5. Johnson, A., and Taylor, A.: Prevalence of chronic diseases: a summary of data from the Survey of American Indians and Alaska Natives. National Medical Expenditure Survey Data Summary 3. AHCPR Publication No. 91-0031. U.S. Government Printing Office, July 1991.

[^0]:    * Age-adjusted to the 1980 U.S. census
    ** ns = not significant

