Racial and Ethnic Disparities in the Use of Cardiovascular Procedures: Associations with Type of Health Insurance

David M. Carlisle, MD, PhD, Barbara D. Leake, PhD, and Martin F. Shapiro, MD, PhD

ABSTRACT

Objectives. This study examined whether disparities in the use of cardiovascular procedures exist among African Americans, Latinos, and Asians relative to White patients, within health insurance categories.

Methods. Hospital discharge records (n = 104 952) of Los Angeles County, California, residents with possible coronary artery disease were analyzed.

Results. After adjustment for confounders, lower odds of procedure use were found for African American and Latino patients for most types of insurance. Asians and Pacific Islanders had odds of procedure use similar to those of White patients. Disparities were absent among the privately insured.

Conclusions. Racial and ethnic disparities in procedure rates were evident in all types of insurance except private insurance. (*Am J Public Health.* 1997;87:263–267)

Introduction

Coronary heart disease is the leading cause of death among African American, Latino, and Asian American populations, although mortality and risk factors for coronary heart disease vary among these groups relative to the non-Hispanic White population of the United States.[1–3] Unadjusted death rates for ischemic heart disease per 100 000 population were 130 for African Americans, 42 for Latinos, 62 for Asians, and 213 for Whites in California in 1993.[4] However, even among patients with known or suspected coronary heart disease, previous research has demonstrated decreased use of high-technology invasive cardiac procedures among African Americans in comparison with White patients.[5–18] We recently reported similar disparities for Latino and Asian patients.[19]

Other studies have documented the association between payer type and the use of services to treat coronary heart disease.[18,20–22] To date, however, investigations of race- or ethnicity-associated disparities related to type of payer have been selective studies within an insurance category (i.e., Medicare[11–14]) or a specific health care delivery system (i.e., the Veterans Administration system[16,17]).

Thus, the role of health insurance categories in shaping interracial–interethnic disparities has not been completely investigated. Privately insured patients have been shown to have higher rates of invasive cardiovascular procedure use than uninsured patients,[20] but does this effect apply equally to privately insured African Americans? Uninsured patients have been shown to have lower rates of such procedure use[21]; does this apply to uninsured Whites as well?

We performed this analysis to determine whether disparities related to race or ethnicity persist across primary health insurance strata in the use of three invasive high-technology cardiovascular procedures: coronary artery angiography, coronary artery bypass graft surgery, and coronary artery angioplasty. To do so, we again focused on the patient population at high risk for undergoing these procedures that was the subject of our previous analysis: residents of Los Angeles County hospitalized with a primary discharge diagnosis of possible coronary artery disease between 1986 and 1988. Our null hypothesis was that patterns of ethnicity-related disparities in the use of these procedures would exist across all health insurance strata.

Methods

Data Sources and Sample

Administrative data abstracted from medical records were obtained from the California Hospital Discharge Data Set[23] on all patients discharged from California hospitals between January 1, 1986, and December 31, 1988. Submitted data are reviewed for accuracy both by the submitting institution and by the Office of Statewide Health Planning and Development.

All patients with principal discharge diagnoses of acute myocardial infarction

The authors are with the Division of General Internal Medicine and Health Services Research, School of Medicine, University of California, Los Angeles.

Requests for reprints should be sent to David M. Carlisle, MD, PhD, Division of General Internal Medicine and Health Services Research, UCLA School of Medicine, B-537 Factor Bldg, Los Angeles, CA 90095-1736.

This paper was accepted August 13, 1996.

TABLE 1—Distribution of Insurance Category for Total Study Population and by Racial/Ethnic Group: Los Angeles County, California, Hospital Discharge Data, 1986 through 1988

	Total (n = 104 952), %	White (n = 74 282), %	African American (n = 13 211), %	Latino (n = 13 214), %	Asian (n = 4245), %
Procedure					
CATH	27.0	29.8	17.7	20.1	28.2
CABG	10.1	11.5	4.4	7.1	12.7
PTCA	8.8	10.2	4.3	5.0	8.9
Insurance type					
Private	24.2	26.4	16.4	19.6	24.3
Medicare	46.5	51.1	38.5	34.1	28.8
Medicaid	8.0	4.6	13.5	18.8	19.4
Health maintenance organization	14.0	13.1	19.6	12.7	16.8
None	6.3	4.0	10.6	14.0	9.9
Other	1.0	0.9	1.4	0.9	0.8[a]
Primary diagnosis					
Acute myocardial infarction	21.5	22.5	18.7	18.4	20.9
Unstable angina	23.4	23.4	22.5	24.6	23.1[a]
Angina	15.2	14.7	16.9	16.5	14.5[a]
Chronic ischemia	17.4	19.4	9.6	12.6	21.2
Chest pain	22.5	19.9	32.3	27.9	20.5[a]
Female	44.2	41.3	55.1	51.4	38.4
No. comorbidities					
None	12.5	12.5	11.1	14.0	11.8[a]
1–3	54.4	54.4	54.0[a]	54.0[a]	58.1
4–6	25.0	25.1	26.7	23.6	22.6
7+	8.1	8.1	8.3[a]	8.5[a]	7.6[a]
Age, y					
30–39	4.0	2.8	8.0	6.4	3.4
40–49	11.6	9.6	18.1	15.8	13.5
50–64	35.5	33.6	40.3	40.1	38.4
65–74	27.8	29.8	20.8	23.0	29.5[a]
75+	21.2	24.2	12.8	14.7	15.1
Admission type					
Emergent	39.2	36.7	48.9	42.8	40.9
Urgent	40.7	40.9	39.1	41.9	38.1
Elective	20.1	22.4	12.1	15.3	21.0
Procedure volume[b]					
CATH0	10.0	8.0	17.2	14.0	10.7
CATH1	13.2	11.5	22.3	14.7	10.7[a]
CATH2	12.0	12.0	10.0	13.5	13.8
CATH3	64.8	68.5	50.6	57.8	64.8
CABG0	27.8	26.0	38.9	28.1	23.3
CABG1	23.8	20.1	23.4	43.5	28.9
CABG2	25.0	28.0	19.3	16.1	16.8
CABG3	23.5	25.9	18.4	12.4	31.1
PTCA0	40.0	33.6	53.6	54.4	39.1
PTCA1	26.9	28.6	20.0	24.8	25.7
PTCA2	10.7	11.9	6.5	9.4	6.5
PTCA3	23.5	26.0	20.0	11.5	28.7

Note. CATH = coronary artery angiography; CABG = coronary artery bypass graft surgery; PTCA = percutaneous transluminal coronary artery angioplasty.
[a]Proportion not significantly different from that of White patients ($P < .05$ by two-tailed chi-square analysis).
[b]0 = 1–20 procedures per year; 1 = 20–100 procedures per year; 2 = 101–200 procedures per year; 3 = more than 200 procedures per year.

(*International Classification of Diseases,* 9th revision, Clinical Modification [ICD-9-CM] codes 410, 410.0 through 410.9), unstable angina (411.1), angina pectoris (413, 413.0, 413.1, 413.9), chronic myocardial ischemia (414, 414.0, 414.1, 414.8, 414.9, 414.10, 414.11, 414.19), or chest pain (786.50 through 786.52, 786.59) were identified. A list of zip codes obtained from the US Postal Service was used to exclude patients whose zip codes of residence fell outside Los Angeles County. To reduce the possibility of redundancy in the sample introduced by patient transfers, we excluded all patients admitted from or discharged to other acute care hospitals. Additional exclusions included patients discharged from federal hospitals and all other institutions other than general acute care facilities, patients less than 30 or more than 89 years of age, Native American or Eskimo patients, those with race listed as either unknown or other, and those discharged from hospitals not performing these procedures.

Study Variables

The primary procedure and the first 12 secondary procedures were used to determine whether a patient underwent coronary arteriography (ICD-9-CM procedure codes 37.21 through 37.23), coronary artery bypass graft surgery (36.2, 36.10 through 36.20), or coronary artery angioplasty (36.01, 36.02, 36.05) while hospitalized.

Independent variables used in this study were patient ethnicity (African American, Asian, White, or Latino), age (30 through 39, 40 through 49, 50 through 64, 65 through 74, 75 through 89 years), gender, principal diagnosis, number of secondary diagnoses (as a measure of severity of illness), admission type (elective, urgent, or emergent), and primary payer. Payer categories consisted of Medicare, Medicaid, private (including Blue Cross/Blue Shield), health maintenance organization (HMO), and uninsured (a category including "self-pay," "indigent services," and "no charge" patients). An additional categorical variable was used to permit adjustment for the number of procedures performed per year at the hospital to which the patient was admitted. Procedure volumes were categorized as less than 20, 20 through 100, 101 through 200, and more than 200 procedures per year. Dummy variables were created for each of the four race/ethnicity categories and the six insurance categories (e.g., privately insured African American patients, Latinos enrolled in HMOs, Asians with Medicaid as their primary payer).

Data Analysis

Multiple logistic regression (controlling for the potential confounders of primary diagnosis, age, gender, comorbidities, admission type, and hospital procedure volume) was performed to investigate the relationship between use of each procedure and the ethnicity–insurance categories. The observational unit for these analyses was each hospital discharge.

For each of the three procedures, five health insurance–specific analyses were performed with White patients within the insurance category as the reference group. For instance, privately insured White patients were the reference group for the private insurance race/ethnicity comparisons.

Results

More than 3 million Los Angeles County residents were discharged from California hospitals between 1986 and 1988. Our study population consisted of the almost 105 000 discharged patients from this group who met our eligibility criteria. The study population underwent 28 356 coronary artery angiographies, 10 604 coronary artery bypass graft surgeries, and 9190 coronary artery angioplasties during the 3-year period (Table 1). Slightly more than two thirds of the study population consisted of White patients.

Important differences existed in the distribution of type of primary payer and other potential confounders across ethnic groups. Most of these differences were significant by chi-square test. For example, White patients were significantly more likely to have Medicare or private health insurance, whereas African Americans, Asians, and Latinos were more likely to not have health insurance or to be Medicaid recipients. African Americans, Asians, and Latinos were also more likely to be admitted with a diagnosis of chest pain and to be female, younger, and admitted emergently. African Americans and Latinos were less likely to be admitted to hospitals performing large volumes of procedures.

Table 2 presents the odds of receiving each of the three invasive cardiovascular procedures for each of the ethnicity and health insurance categories. Odds ratios (and 99% confidence intervals) are first presented without adjustment for potential confounders. These odds ratios demonstrate that, before the introduction of potential confounders, African Ameri-

TABLE 2—Unadjusted and Adjusted Odds Ratios (and 99% Confidence Intervals) of Undergoing Three Kinds of Cardiovascular Procedures for African Americans, Latinos, and Asians, by Health Insurance Category

	CATH			CABG			PTCA		
	African American	Latino	Asian	African American	Latino	Asian	African American	Latino	Asian
Unadjusted									
Health maintenance organization	0.46 (0.39, 0.54)	0.63 (0.52, 0.75)	0.81 (0.63, 1.05)	0.35 (0.27, 0.45)	0.68 (0.53, 0.87)	1.10 (0.81, 1.48)	0.35 (0.27, 0.47)	0.56 (0.42, 0.75)	0.90 (0.63, 1.28)
Medicaid	0.60 (0.48, 0.74)	0.75 (0.63, 0.90)	1.41 (1.18, 1.79)	0.34 (0.23, 0.50)	0.63 (0.48, 0.83)	1.38 (1.00, 1.92)	0.45 (0.28, 0.72)	0.55 (0.37, 0.81)	0.84 (0.50, 1.39)
Medicare	0.68 (0.62, 0.75)	0.80 (0.73, 0.89)	0.99 (0.83, 1.17)	0.45 (0.38, 0.53)	0.72 (0.62, 0.84)	1.08 (0.85, 1.36)	0.49 (0.41, 0.59)	0.64 (0.54, 0.76)	0.97 (0.73, 1.27)
Private	0.59 (0.52, 0.67)	0.62 (0.55, 0.70)	1.00 (0.85, 1.18)	0.42 (0.34, 0.53)	0.57 (0.47, 0.69)	1.11 (0.89, 1.40)	0.53 (0.43, 0.65)	0.47 (0.39, 0.58)	1.00 (0.80, 1.26)
No health insurance	0.29 (0.21, 0.40)	0.39 (0.31, 0.51)	1.07 (0.76, 1.50)	0.13 (0.06, 0.27)	0.49 (0.34, 0.72)	1.73 (1.11, 2.68)	0.13 (0.06, 0.28)	0.27 (0.17, 0.44)	0.81 (0.45, 1.45)
Adjusted[a]									
Health maintenance organization	0.80 (0.67, 0.96)	0.78 (0.64, 0.96)	0.80 (0.61, 1.05)	0.65 (0.48, 0.89)	0.90 (0.66, 1.22)	1.16 (0.80, 1.68)	0.60 (0.44, 0.82)	0.78 (0.56, 1.07)	0.73 (0.49, 1.08)
Medicaid	0.84 (0.67, 1.06)	0.86 (0.71, 1.05)	1.38 (1.07, 1.78)	0.50 (0.33, 0.77)	0.80 (0.59, 1.09)	1.22 (0.85, 1.77)	0.82 (0.50, 1.35)	1.19 (0.79, 1.81)	1.03 (0.60, 1.76)
Medicare	0.91 (0.82, 1.01)	0.88 (0.79, 0.98)	0.94 (0.78, 1.14)	0.59 (0.49, 0.72)	0.79 (0.67, 0.94)	0.82 (0.62, 1.08)	0.71 (0.58, 0.86)	1.01 (0.83, 1.22)	0.85 (0.64, 1.15)
Private	0.99 (0.85, 1.14)	0.94 (0.82, 1.07)	1.01 (0.84, 1.22)	0.80 (0.61, 1.04)	1.09 (0.88, 1.36)	0.99 (0.75, 1.29)	0.94 (0.75, 1.18)	0.89 (0.72, 1.11)	0.92 (0.71, 1.19)
No health insurance	0.51 (0.36, 0.71)	0.50 (0.38, 0.66)	0.82 (0.57, 1.19)	0.33 (0.15, 0.71)	0.93 (0.61, 1.42)	1.15 (0.69, 1.90)	0.40 (0.18, 0.88)	0.90 (0.53, 1.53)	0.68 (0.36, 1.29)

Note. Comparisons were made with White patients. CATH = coronary artery angiography; CABG = coronary artery bypass graft surgery; PTCA = percutaneous transluminal coronary artery angioplasty.
[a]Adjusted for primary diagnosis, age, gender, number of comorbidities, admission type, and hospital procedure volume.

cans and Latinos were consistently less likely to undergo coronary artery angiographies, coronary artery bypass graft surgeries, or coronary artery angioplasties across each of the insurance categories. Asian patients in our sample were at least as likely as White patients to undergo each of the three invasive procedures within each of the insurance categories.

Adjustment for potential confounders substantially reduced racial/ethnic disparities in procedure rates, yet significant ($P < .01$) differences remained within several health insurance categories. The most profound disparities in the use of each procedure existed for uninsured African American and Latino patients. Among discharged patients with an HMO or Medicare designated as the primary payer or those who were uninsured, disparities were found within four of six ethnicity–procedure categories. Among Medicaid recipients, such a disparity was found only for African Americans undergoing coronary artery bypass graft surgery (although trends approaching statistical significance were noted for every other ethnicity–procedure category). Only among discharged patients with private insurance as the primary payer were ethnicity-related disparities in the odds of undergoing an invasive cardiovascular procedure not found. Except for Asian Medicaid recipients, who were more likely to undergo coronary artery angiography, no disparities were found for Asian patients.

Discussion

To our knowledge, the analyses presented here are the first to evaluate ethnicity-related disparities in cardiovascular procedure use across a wide range of health insurance categories for African Americans and Latinos relative to Whites. Our findings refute our initial hypothesis that ethnicity-related disparities in invasive cardiovascular procedure use are uniformly distributed among health insurance categories. The most important finding may be the lack of ethnicity-related disparities in the odds of receiving all three procedures for privately insured African Americans and Latinos.

The finding that HMO enrollment does not ameliorate ethnicity-related disparities for African Americans and Latinos is also of particular concern. Cost of care is unlikely to provide an explanation for this finding because, traditionally, HMOs have required little or no cost sharing, particularly for these relatively expensive procedures.[24,25] This finding may instead be due to recognized difficulties that patients of varying social classes and primary languages have in accessing services in HMO environments.[26]

Do these results shed further light on why ethnicity-related disparities in the use of medical services exist? Clearly, African Americans, Asians, Latinos, and Whites appear to interact with the health care environment in different ways, especially with regard to the role of health insurance status. While these results support the concept that additional factors (including but not limited to cost sensitivity, practice style variation, personal preferences, factors that shape preferences such as suspicion of or lack of trust in health care providers, fear of long-term disability with ensuing income loss, and even overt discrimination) not encompassed by the data used for the current analysis may be of more particular relevance to this issue, they demonstrate that such factors are not consistent across health insurance categories. This finding also supports earlier work suggesting that bias in the clinical decision-making process may play a prominent role in ethnicity-related disparities in health care.[5,27] Additional research, including analysis of medical records, patient and provider attitudinal data, and appropriately robust measures of socioeconomic status, is necessary to further explore this issue.

Several methodologic and sampling limitations may have affected these analyses. First, no adjustment was made for socioeconomic status, because the administrative data used for this analysis did not contain patient-specific measures of socioeconomic status. To the extent that ethnicity-related disparities are related to a socioeconomic effect, such disparities will be attenuated.[26,28–31] Second, previous studies have shown that coronary artery angiography, coronary artery bypass graft surgery, and coronary artery angioplasty are often performed for less than appropriate indications.[32,33] Unfortunately, the appropriateness of the use of these various procedures cannot be assessed from administrative data sets owing to the lack of important clinical information such as the degree or extent of coronary artery stenosis.[34] However, no evidence exists that there are differences in appropriateness for the procedures studied among patients from different racial or ethnic groups.

These results do have important policy-related implications. Perhaps most important, they suggest that increased reliance on the use of HMOs, particularly among African Americans, may not eliminate ethnicity-related disparities in the use of expensive, high-technology medical services. On the other hand, despite the increased cost-sharing strategies of traditional private insurance, the freedom of provider and hospital selection such insurance provides may be beneficial in reducing these disparities. It is possible, therefore, that as recipients of employment-related health insurance decrease their enrollment in traditional private insurance plans and increase their enrollment in HMOs, ethnicity-related disparities in the use of invasive cardiovascular procedures will persist and may even be exacerbated. □

References

1. Gillum RF. Coronary heart disease in Black populations: I. mortality and morbidity. *Am Heart J.* 1982;104:839–851.
2. Mitchell BD, Stern MP, Haffner SM, Hazuda HP, Patterson JK. Risk factors for cardiovascular mortality in Mexican American and non-Hispanic Whites. *Am J Epidemiol.* 1990;131:423–433.
3. Klatsky AL, Armstrong MA. Cardiovascular risk factors among Asian Americans living in northern California. *Am J Public Health.* 1991;81:1423–1428.
4. *Vital Statistics of California, 1993.* Sacramento, Calif: Department of Health Services, State of California; 1995.
5. Maynard C, Fisher LD, Passamani ER, Pullum T. Blacks in the Coronary Artery Surgery Study (CASS): race and clinical decision making. *Am J Public Health.* 1986;76:1446–1448.
6. Wenneker MB, Epstein AM. Racial inequalities in the use of procedures for patients with ischemic heart disease in Massachusetts. *JAMA.* 1989;261:253–257.
7. Ford E, Cooper R, Castaner A, Simmons B, Mar M. Coronary arteriography and coronary bypass surgery among Whites and other racial groups relative to hospital-based incidence rates for coronary artery disease: findings from NHDS. *Am J Public Health.* 1989;79:437–440.
8. Hannan EL, Kilburn H Jr, O'Donnell JF, Lukacik G, Shields EP. Interracial access to selected cardiac procedures for patients hospitalized with coronary artery disease in New York State. *Med Care.* 1991;29:430–441.
9. Maynard C, Litwin PE, Martin JS, et al. Characteristics of Black patients admitted to coronary care units in metropolitan Seattle: results from the Myocardial Infarction Triage and Intervention Registry (MITI). *Am J Cardiol.* 1991;67:18–23.
10. Gittelsohn AM, Halpern J, Sanchez RL. Income, race, and surgery in Maryland. *Am J Public Health.* 1991;81:1435–1441.
11. Udvarhelyi IS, Gatsonis C, Epstein AM, Pashos CL, Newhouse JP, McNeil BJ. Acute myocardial infarction in the Medicare population: process of care and clinical outcomes. *JAMA.* 1992;268:2530–2536.

12. Goldberg KC, Hartz AJ, Jacobsen SJ, Krakauer H, Rimm AA. Racial and community factors influencing coronary artery bypass graft surgery rates for all 1986 Medicare patients. *JAMA.* 1992;267:1473–1477.
13. Escarce JJ, Epstein KR, Colby DC, Schwartz JS. Racial differences in the elderly's use of medical procedures and diagnostic tests. *Am J Public Health.* 1993;83:948–954.
14. Ayanian JZ, Udvarhelyi IS, Gatsonis CA, Pashos CL, Epstein AM. Racial differences in the use of revascularization procedures after coronary angiography. *JAMA.* 1993; 269:2642–2646.
15. Johnson PA, Lee TH, Cook EF, Rouan GW, Goldman L. Effect of race on the presentation and management of patients with acute chest pain. *Ann Intern Med.* 1993;118:593–601.
16. Whittle J, Conigliaro J, Good CB, Lofgren RP. Racial differences in the use of invasive cardiovascular procedures in the Department of Veterans Affairs medical system. *N Engl J Med.* 1993;329:621–627.
17. Peterson ED, Wright SM, Daley J, Thibault GE. Racial variation in cardiac procedure use and survival following acute myocardial infarction in the Department of Veterans Affairs. *JAMA.* 1994;271:1175–1180.
18. Blustein J, Arons RR, Shea S. Sequential events contributing to variations in cardiac revascularization rates. *Med Care.* 1995;33: 864–880.
19. Carlisle DM, Leake BD, Shapiro MF. Racial and ethnic differences in the use of invasive cardiac procedures among cardiac patients in Los Angeles County, 1986 through 1988. *Am J Public Health.* 1995;85: 352–356.
20. Wenneker MB, Weissman JS, Epstein AM. The association of payer with utilization of cardiac procedures in Massachusetts. *JAMA.* 1990;264:1255–1260.
21. Langa KM, Sussman EJ. The effect of cost-containment policies on rates of coronary revascularization in California. *N Engl J Med.* 1993;329:1784–1789.
22. Kuykendall DH, Johnson ML, Geraci JM. Expected source of payment and use of hospital services for coronary atherosclerosis. *Med Care.* 1995;33:715–728.
23. *Patient Discharge Data.* [1986–1988] Sacramento, Calif: Data Users Support Group, California Office of Statewide Health Planning and Development.
24. Luft HS. *Health Maintenance Organizations. Dimensions of Performance.* New Brunswick, NJ: Transaction Inc; 1987.
25. Morrison EM, Luft HS. Health maintenance organization environments in the 1980s and beyond. *Health Care Financing Rev.* 1990;12:81–90.
26. Nolan RL, Schwartz JL, Simonian K. Social class differences in utilization of pediatric services in a prepaid direct service medical care program. *Am J Public Health.* 1967;57:34–47.
27. Finucane TE, Carrese JA. Racial bias in presentation of cases. *J Gen Intern Med.* 1990;5:120–121.
28. Bombardier C, Fuchs VR, Lillard LA, Warner KE. Socioeconomic factors affecting the utilization of surgical operations. *N Engl J Med.* 1977;297:699–705.
29. Billings J, Zeitel L, Lukomnik J, Carey TS, Blank AE, Newman L. Impact of socioeconomic status on hospital use in New York City. *Health Aff.* 1993;12:162–173.
30. Epstein AM, Stern RS, Weissman JS. Do the poor cost more? A multihospital study of patients' socioeconomic status and the use of hospital resources. *N Engl J Med.* 1990;322:1122–1128.
31. McMahon LF Jr, Wolfe RA, Griffith JR, Cuthbertson D. Socioeconomic influence on small area hospital utilization. *Med Care.* 1993;31(suppl 5):YS29–YS36.
32. McGlynn EA, Naylor CD, Anderson GM, et al. Comparison of the appropriateness of coronary angiography and coronary artery bypass graft surgery between Canada and New York State. *JAMA.* 1994;272:934–940.
33. Hilborne LH, Leape LL, Bernstein SJ, et al. The appropriateness of use of percutaneous transluminal coronary angioplasty in New York State. *JAMA.* 1993;269:761–765.
34. Connell FA, Diehr P, Hart LG. The use of large data bases in health care studies. *Annu Rev Public Health.* 1987;8:51–74.

Visit APHA on the World Wide Web!

The APHA Home Page on the World Wide Web offers the latest information on APHA membership, the newest book titles and publication ordering information, other Association news, and updates on the most important public health issues. The site changes regularly, so visit often!

The Internet address is:

http://www.apha.org/