Prevalence of Aortic Aneurysms in the Twin Cities Metropolitan Area, 1979–84

DAVID E. LILIENFELD, MD
JUDITH BAXTER, PhD
J. MICHAEL SPRAFKA, PhD

When this study was undertaken, Dr. Lilienfeld was Assistant Professor of Community Medicine at the Mount Sinai School of Medicine, New York, NY. He is now Senior Epidemiologist at the EMMES Corporation, Potomac, MD. Dr. Sprafka is Associate Professor of Epidemiology, and Dr. Baxter is a Research Assistant in Epidemiology at the University of Minnesota School of Public Health, Minneapolis, MN.

This study was supported in part by the National Institutes of Health grants K08-ES00161 and R01-HL23727.

Tearsheet requests to Dr. Lilienfeld, 11325 Seven Locks Rd., Suite 214, Potomac, MD 20854, telephone 301-299-8655.

Synopsis

The discharge summaries for Minneapolis-St. Paul metropolitan area residents hospitalized during 1979–84 were reviewed for diagnoses of aortic aneurysms. Annual age-specific and age-adjusted sex-specific hospital discharge diagnosis rates were calculated for all aortic aneurysms, dissecting aortic aneurysms, thoracic aortic aneurysms (nondissecting), and abdominal aortic aneurysms (nondissecting).

For each aortic aneurysm type, hospital discharge diagnosis rates were found to increase with age for both men and women. Abdominal aortic aneurysms were the most common type reported (age-adjusted annual rates for men varied between 40.6 and 49.3 per 100,000 population; for women, between 6.8 and 12.0 per 100,000 population). Men were noted to have higher rates for each aneurysm type. An increasing temporal trend was observed for all aortic aneurysms and abdominal aortic aneurysms among men. These findings are reviewed in light of recent data on mortality from aortic aneurysms in the United States.

THE EPIDEMIOLOGIC profile of aortic aneurysms is not presently well characterized. Cigarette smoking has been associated with the development of abdominal aortic aneurysms, while hypertension is thought to be related to dissecting aortic aneurysms (*1–3*). Our groups at the Mount Sinai School of Medicine and the University of Minnesota recently examined trends in mortality from aortic aneurysms in the United States from 1951 through 1981 and found that, for the first 17 years of that period, there were marked increases in age-adjusted aortic aneurysm mortality for both nonwhites and whites (*3*).

We also found that for the period between 1968 and 1976, such mortality plateaued, and for the last 5 years of the period examined, the rates declined slightly. The interpretation of the decline in mortality from aortic aneurysms is difficult, insofar as it may represent a real decline in incidence, a real decline in the case-fatality rate, or a combination of both. Also complicating the interpretation of these trends was the introduction of ultrasound technology in the 1970s, which facilitated diagnosis of these conditions.

The current study was undertaken to observe the prevalence patterns of aortic aneurysm in the Minneapolis-St. Paul metropolitan area. If mortality from aortic aneurysms declined because of a decline in the case-fatality rate, we reasoned that the prevalence for aortic aneurysms would either remain constant or would rise. (The former could occur if the survivorship after successful treatment was short, that is, 10 years or less.) If the mortality decline was due to a decrease in incidence, then the prevalence would decline. One way to estimate prevalence for rare diseases such as aortic aneurysms is to examine their hospital discharge diagnosis rates. Also, comparison of aortic aneurysm morbidity patterns in the Twin Cities with those in the United States might allow the identification of geographic differences in morbidity. Such differences could provide clues to the etiologies of these conditions.

Materials and Methods

All discharges from acute care hospitals (with the exception of discharges from the Veterans Affairs Medical Center) in the seven-county Minneapolis-St. Paul metropolitan area have been collected on a quarterly basis since late 1976. Magnetic tapes of

Table 1. Annual hospital discharge diagnosis rates per 100,000 population for all aortic aneurysms and abdominal aortic aneurysms for Minneapolis-St. Paul metropolitan area residents, by sex, age, and calendar year, 1979–84

Year	Ages 30–44 years		Ages 45–54 years		Ages 55–64 years		Ages 65–74 years		Age-adjusted [1]	
	Rates of hospitalization	Number of hospital discharges	Rates of hospitalization	Number of hospital discharges	Rates of hospitalization	Number of hospital discharges	Rates of hospitalization	Number of hospital discharges	Rates of hospitalization	Number of hospital discharges
	All aortic aneurysms among men									
1979	2	4	6	6	68	52	215	93	46.7	155
1980	1	2	9	8	69	53	208	91	46.3	154
1981	2	4	5	5	89	61	256	113	56.6	183
1982	1	2	15	14	73	58	234	104	52.4	178
1983	2	4	12	11	84	68	254	114	57.1	197
1984	1	3	13	12	77	63	252	114	55.2	192
	All aortic aneurysms among women									
1979	[2]	[2]	1	1	8	7	72	44	12.0	52
1980	...	...	2	2	21	18	47	29	11.5	50
1981	1	3	1	1	13	11	48	30	10.1	45
1982	...	...	2	2	11	10	37	23	8.0	35
1983	1	2	3	3	7	6	30	19	6.8	30
1984	0	1	...	...	17	15	58	37	11.7	53
	Abdominal aortic aneurysms among men									
1979	...	...	5	5	61	46	189	82	40.6	133
1980	...	...	9	8	61	47	190	83	41.8	138
1981	...	...	2	2	66	52	229	101	46.4	155
1982	...	...	10	9	66	57	213	95	46.3	156
1983	...	...	9	8	71	57	229	103	49.3	168
1984	1	[2]	8	7	65	53	229	104	48.2	166
	Abdominal aortic aneurysms among women									
1979	...	...	...	...	8	7	47	29	8.3	36
1980	...	...	2	2	19	16	32	20	9.0	38
1981	...	...	1	1	8	7	39	24	7.4	32
1982	...	...	2	2	8	7	21	13	5.1	22
1983	...	...	...	...	5	4	24	14	4.4	19
1984	...	...	...	...	10	9	55	35	9.8	14

[1] Age-adjusted to 1970 U.S. population. [2] No discharge diagnoses.

these listings for the period January 1, 1979, through December 31, 1984, were reviewed for all cases in which an aortic aneurysm was listed in the discharge diagnosis list (*4*). The review was limited to 30–74-year-old residents of the seven-county Twin Cities metropolitan area, as determined by zip code. The age, sex, year, and type of aneurysm (dissecting [ICD–9 rubric 441.0], thoracic [ICD–9 rubrics 441.1 and 441.2], and abdominal [ICD–9 rubrics 441.3 and 441.4]) were abstracted for each case. The discharges were then tabulated by year, and within each year, by age- and sex-specific strata for each of the four types of aneurysms listed. Population estimates for each of the five noncensal years examined for the Minneapolis-St. Paul metropolitan area were obtained from the Minnesota Agency for Planning (an agency of the Minnesota State government). Census data were used in the development of a linear model to calculate population estimates in noncensal years (*5*).

The corresponding age- and sex-specific hospital discharge diagnosis rates for each aneurysm type were then calculated. Age-adjusted hospital discharge diagnosis rates were calculated by the direct method, using the 1970 U.S. population as the standard (*6,7*). Ratios of the corresponding annual age-specific and age-adjusted diagnosis rates for men and women were also calculated from the hospital discharges. Temporal trends in the age- and sex-specific rates were assessed using the Cochran-Armitage test (*8*). Since the population of the Minneapolis-St. Paul metropolitan area includes few nonwhites (less than 4 percent), no examination of race-specific rates was attempted (*5*).

Results

The annual age-specific diagnosis rates on hospital discharges for all aortic aneurysms for the Twin Cities metropolitan area for the period 1979 through 1984 are shown in table 1. For both sexes, for each of the years examined, the hospitalization

Table 2. Annual hospital discharge diagnosis rates per 100,000 population for dissecting aortic aneurysms and thoracic aortic aneurysms for Minneapolis-St. Paul metropolitan area residents, by sex, age, and calendar year, 1979–84

Year	Ages 30–44 years		Ages 45–54 years		Ages 55–64 years		Ages 65–74 years		Age-adjusted [1]	
	Rates of hospitalization	Number of hospital discharges	Rates of hospitalization	Number of hospital discharges	Rates of hospitalization	Number of hospital discharges	Rates of hospitalization	Number of hospital discharges	Rates of hospitalization	Number of hospital discharges
Dissecting aortic aneurysms among men										
1979	1	2	...	...	1	1	14	6	2.6	9
1980	0	1	...	...	4	3	7	3	1.8	7
1981	([2])	([2])	1	1	5	4	7	3	2.3	8
1982	...	...	1	1	6	5	...	...	1.5	6
1983	2	4	3	3	7	6	9	4	4.3	17
1984	...	...	4	4	5	4	15	17	4.2	15
Dissecting aortic aneurysms among women										
1979	...	...	1	1	...	...	10	6	1.7	7
1980	...	...	...	...	0	1	3	2	0.4	3
1981	1	3	...	...	5	4	3	2	1.9	9
1982	...	...	...	...	1	1	2	1	0.5	2
1983	1	2	1	1	1	1	3	2	1.3	6
1984	...	...	...	...	6	5	2	1	1.5	6
Thoracic aortic aneurysms among men										
1979	1	1	...	...	7	5	7	3	2.8	9
1980	...	...	...	...	3	2	9	4	1.9	6
1981	0	1	2	2	3	2	14	6	3.1	11
1982	0	1	3	3	1	1	20	9	3.8	14
1983	([2])	([2])	...	...	2	2	11	5	2.0	7
1984	0	1	1	1	4	3	7	3	2.1	8
Thoracic aortic aneurysms among women										
1979	...	...	...	...	...	...	11	7	1.5	7
1980	...	...	...	...	1	1	8	5	1.3	6
1981	...	...	...	...	...	...	6	4	0.8	4
1982	...	...	...	...	2	2	14	9	2.4	11
1983	...	...	2	2	1	1	3	2	1.2	5
1984	0	1	...	...	1	1	...	...	0.2	2

[1] Age-adjusted to 1970 United States population. [2] No discharge diagnoses.

rates increase with increasing age. The age-specific rates for men are consistently greater than those for women, with the exception of those 30–44-years-old, for which there were less than 10 hospital discharge diagnoses. The annual age-adjusted rates for men are approximately two to three times those for women. A significant ($P<0.05$) increasing temporal trend exists for men but not for women.

The annual hospital discharge diagnosis rates for abdominal aortic aneurysms for male and female Twin Cities residents ages 30–74 years for the period 1979 through 1984 are shown in table 1. The hospital discharge diagnosis rates increase with age for both men and women. The age-specific rates are uniformly greater (by as much as ninefold) for men than for women in each year. The age-adjusted rates for men are also greater than those for women by a factor that is fourfold. A significant ($P<0.05$) increasing temporal trend exists for men but not for women.

The annual hospital discharge diagnosis rates for dissecting aortic aneurysms for men and women in the Twin Cities for the period 1979 through 1984 are shown in table 2. Although the overall numbers of hospitalizations are relatively small, some general statements can be made. For both sexes, the rates for the older age groups are notably higher than those for the younger ones. The age-adjusted rates for both men and women show no temporal trend. The annual age-adjusted rate for men is greater than for women for each of the years examined.

In table 2, the annual age-specific and age-adjusted diagnosis rates for thoracic aortic aneurysms for men and women in the Minneapolis-St. Paul metropolitan area for the period 1979 through 1984 are shown. As with abdominal aortic aneurysms, the rates increase with age in each of the 6 years examined for both sexes. The age-adjusted rates for both men and women show no trend with time.

Discussion

The etiology of aortic aneurysms is not known. Previous work has suggested that hypertension may be related to the occurrence or rupture of dissecting and thoracic aneurysms (*1,3,9*). There is general concurrence on the importance of those factors that are related to atherosclerotic plaque formation in the etiology of abdominal aortic aneurysms (*3,10*). Various other factors, such as copper deficiency, have also been suggested to have etiologic significance for abdominal aortic aneurysms (*11*).

As previously noted, mortality from aortic aneurysms increased markedly in the United States between 1951 and 1968, after which the mortality rate declined somewhat (*3*). Surgical intervention for aortic aneurysms developed in the 1950s and 1960s has likely contributed to the observed trends.

On hospital discharges, the annual diagnosis rates for dissecting thoracic and abdominal aortic aneurysms for the Twin Cities were constant during the period 1979–84, suggesting that the decreased mortality was the result of a decline in the case-fatality rate (assuming that the mortality trends observed from 1979–81 continued through 1984). There are several reasons why the findings of this study appear to be valid. First, for both sexes, abdominal aortic aneurysms had the highest diagnosis rates followed by thoracic and dissecting aneurysms—similar to the United States mortality data (*3*). Second, for each type of aneurysm, the diagnosis rates increased with age; the same pattern was seen in the U. S. mortality data. Hence, the demographic patterns in these morbidity data mirror those seen in the United States mortality data.

The finding that the hospitalization rate for aortic aneurysms (all types) has not changed in this population during the 6 years examined accords well with the findings of Melton and coworkers (*1*). They found that the incidence of abdominal aortic aneurysms in the Rochester, MN, population increased during the period 1950–80, with much of the increase noted in the earlier years. The Rochester population is approximately 90 miles south of the Twin Cities and shares many features with the Twin Cities population, such as its demographic profile and the types of health care given to the population. The demographic profiles for people with incident aortic aneurysms reported by Melton and coworkers are similar to both those found in this study and those reported in mortality data for the nation as a whole.

Melton and coworkers also noted that there had been a slight decline in the incidence of thoracic aortic aneurysms in Rochester, between 1950 and 1980. Although we found that the hospitalization rate for such aneurysms has been constant in the Twin Cities, it is possible that the number of cases of thoracic aneurysms was too small in the Twin Cities population to observe any significant changes. Also, it should be noted that the decline in the incidence of thoracic aneurysms seen in Rochester was greatest during the early portion of the observation period, that is, in the 1950s and 1960s, whereas the observation period in this study is the late 1970s and early 1980s. Nonetheless, it would be useful for similar studies to be conducted in other areas of the nation to determine if the decline in the case-fatality rate inferred from this study can be seen in other population groups.

In conclusion, we found that there was no temporal increase in the hospital discharge diagnosis rate among Twin Cities residents during 1979 to 1984 for all aortic aneurysms, nor for any of the abdominal, thoracic, or dissecting types. We observed that the diagnosis rate on hospital discharges tends to increases with age, regardless of the type of aneurysm present. Also, men tend to have higher rates than do women of the same age.

References

1. Melton, L. J. III, et al.: Changing incidence of abdominal aortic aneurysms: a population-based study. Am J Epidemiol 120: 379–386 (1984).
2. Auerbach, O., and Garfinkel, L.: Atherosclerosis and aneurysm of aorta in relation to smoking habits and age. Chest 78: 85–89 (1980).
3. Lilienfeld, D. E., et al.: The epidemiology of aortic aneurysm: mortality trends in the United States, 1951–1981. Arteriosclerosis 7: 637–643 (1987).
4. World Health Organization: ICD-9-CM (International Classification of Diseases, 9th Revision). Geneva, 1979.
5. U.S. Bureau of the Census: Coverage of the national population in the 1980 census by age, sex, and race. Preliminary estimates by demographic analysis. Current Population Rep P-23, No. 117. U.S. Government Printing Office, Washington, DC, February 1982.
6. U.S. Bureau of the Census: Estimates of coverage of the population by sex, race, and age-demographic analysis. 1970 Census of Population and Housing PHC (E)-4. U.S. Government Printing Office, Washington, DC, 1974.
7. Lilienfeld, A. M., and Lilienfeld, D. E.: Foundations of epidemiology, ed. 2. Oxford University Press, New York, 1980.
8. Armitage, P.: Statistical methods in medical research. Blackwell Publishers, Oxford, 1971.
9. Schlatmann, T., and Becker, A. E.: Pathogenesis of dissecting aneurysm of aorta. Comparative histopathologic study of significance of medical changes. Am J Cardiol 39: 21–26 (1977).
10. Gore, I., and Hirst, A. E., Jr.: Arteriosclerotic aneurysms

of the abdominal aorta: a review. Prog Cardiovasc Dis 16: 113–149 (1973).
11. Tilson, M. D., and Davis, G.: Deficiencies of copper and a compound with ion-exchange characteristics of pyridinoline in skin from patients with abdominal aortic aneurysms. Surgery 94: 134–141 (1983).

Do Anti-Smoking Media Campaigns Help Smokers Quit?

W. JAMES POPHAM, EdD
LANCE D. POTTER, MA
DILEEP G. BAL, MD, MPH
MICHAEL D. JOHNSON, PhD
JACQUOLYN M. DUERR, MPH
VALERIE QUINN, MEd

Dr. Popham is Director of IOX Assessment Associates and Professor Emeritus of University of California, Los Angeles. Mr. Potter is senior associate of IOX Assessment Associates. All the other authors are with the Chronic Diseases Control Branch, California Department of Health Services. Dr. Bal is Chief of the branch, Dr. Johnson is Chief, Evaluation Unit, Tobacco Control Section, Ms. Duerr is Chief, Media Campaign Unit, Tobacco Control Section, and Ms. Quinn is Analyst, Media Campaign Unit.

This investigation was funded by the California Department of Health Services. The views expressed, however, do not necessarily reflect those of the department.

Tearsheet requests to Dr. W. James Popham, 5301 Beethoven St., Suite 109, Los Angeles, CA 90066; tel. 310-822-3275.

Synopsis

As part of an evaluation of the 1990–91 anti-tobacco media campaign carried out by the California Department of Health Services, a study was conducted among 417 regular smokers who had quit during the period of the media campaign. In brief telephone interviews, all respondents identified up to three events or experiences that had influenced them to quit.

In response to uncued questions, 6.7 percent of those interviewed indicated that they had been influenced to quit by an advertisement they had seen or heard on radio, television, or billboards. In response to direct questions about the media campaign, 34.3 percent of the respondents indicated that the media campaign's advertisement had played a part in their decision to quit.

Applying the 6.7 percentage to the number of Californians who quit smoking in 1990–91, it can be estimated that for 33,000 former smokers, the anti-tobacco media advertisements were an important stimulus in their quit decision. Multiplying the 34.3 percent by the number of former California smokers who quit in 1990–91, the estimate of former smokers for whom the media campaign's advertisements played at least some part in their decision to quit rises to 173,000 persons.

While causal attributions from such investigations should be made with caution, the evidence suggests that the 1990–91 campaign did influence substantial numbers of smokers in California to quit.

STATEWIDE ANTI-SMOKING media campaigns have recently been carried out in several States, most notably Minnesota, Michigan, and California. Because such media-based interventions are invariably expensive and require expertise not readily available in public health, policymakers in other States may wonder whether anti-tobacco media campaigns yield effects consonant with their costs. Although one aim of anti-smoking media campaigns is to get smokers to quit, little evidence exists regarding the role of these campaigns in helping people to stop smoking. This report describes an investigation designed to address that issue.

Although previous evaluations of media-based health education programs did not engender optimism regarding the effectiveness of such campaigns (*1*), more recent studies of media campaigns against smoking prompted Flay to be encouraged regarding their potential impact on adult smoking cessation (*2,3*). Illustrative of these investigations are several Australian studies of anti-smoking media campaigns recently reported by Pierce and colleagues (*4,5*). Optimism about anti-smoking media campaigns may be particularly warranted in an era when societal disapproval of smoking has been increasing (*6*). Anti-smoking media-based programs initiated prior to the 1980s may have been "swimming against the secular stream of increasing