COMPARISON OF HOSPITAL ADMISSIONS FOR CEREBROVASCULAR DISEASE IN MICHIGAN AND NORTH CAROLINA

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ABSTRACT: Hospital admission rates and death rates for cerebrovascular disease differ markedly between states. Hospital admission data were analyzed: (a) to ascertain why death rates from this disease group are lower in Michigan than in North Carolina and (b) to clarify whether hospital care in either state has inadequacies that can be corrected quickly. Among both whites and blacks of the same age, case-fatality ratios were higher in North Carolina than in Michigan. Subarachnoid and cerebral hemorrhages were diagnosed more often in the southern state. For both areas, the records showed a marked underreporting of hypertension and diabetes mellitus as secondary conditions in the hospital admissions; elevated blood pressures were about equally common in each state but were treated more vigorously in Michigan. Secondary diagnoses of respiratory disease and use of anti-infective agents were reported more frequently in North Carolina. In contrast, diabetes mellitus was more prevalent in Michigan admissions.

Some reasons for these findings are advanced, particularly as they relate to diagnostic and treatment patterns. Finally, the need for more detailed research is emphasized to create guidelines for better hospital care of cerebrovascular disease.

Through the use of existing data, we shall try to ascertain why the death rates from cerebrovascular disease are lower in Michigan than in North Carolina. We hope also to clarify whether hospital care for this disease group in either state has inadequacies that can soon be corrected.

In 1970 and 1971, Michigan and North Carolina were similar in health resources, except for a lower physician-to-population ratio in North Carolina. Nevertheless, death rates from cerebrovascular disease have been consistently higher in North Carolina than in Michigan for similar age, sex, and racial groups. To discover why this difference occurs, one specific purpose of this study was to compare the characteristics of admissions for cerebrovascular disease to 132 short-term hospitals in Michigan with admissions to 76 hospitals in North Carolina for the same two years. We also compared the frequency of important secondary diagnoses and treatment activities, since they further influence the likelihood of survival.

Comparing the records of patients hospitalized for the same disease, but in different parts of the country can be useful. Studies of hospital records are more informative and revealing than the analyses of death.
records, a common practice in the past.\textsuperscript{1-4} Although incomplete, hospital records contain more detailed information about patients and their diseases and treatment than do death certificates.\textsuperscript{5} Also, the medical diagnoses for older hospital patients, although imperfect if we wish complete accuracy, are more valid than those given as causes of death; many older persons die at home or in nursing homes after incomplete diagnostic efforts or without a physician in attendance.\textsuperscript{5}

Many studies have documented the geographic differences in death rates for cerebrovascular disease.\textsuperscript{6} Among whites in the United States, for example, age-adjusted death rates for this disease group are highest in the southeastern states, intermediate in the midwest, and lowest in the less populated southwestern and mountain states.\textsuperscript{1} Kuller and others have shown that the large geographic differences in death rates correlate directly with the incidence of hospitalized cerebrovascular disease, especially for men.\textsuperscript{2} They also showed that low admission rates coincided with low case-fatality ratios for hospital patients; their findings indicated that the physicians in the low admission areas did not keep the numbers down by caring for the mildly ill outside the hospital.

Rates for cerebrovascular disease in different locations may also depend on the accessibility, quality, and amount of health care available in each area. Kurtzke points out, for example, that the range of death rates for cerebrovascular disease is widest in those states where physicians are scarce and that death rates are lower where the physician-to-population ratios are higher.\textsuperscript{3} He believes that errors in reporting cause these findings. However, a more recent study of deaths among U.S. veterans suggests that this is not the case and that other factors play a part.\textsuperscript{4} The well-established variations in the frequency of cerebrovascular disease and the different conclusions drawn from the available data form the background of this study.

**BACKGROUND**

Michigan is a midwestern state with mild summers and cold winters; its population was 8.9 million in 1970.\textsuperscript{7} It had about 4.6 short-term hospital beds for each 1,000 population; the annual discharge rate was 151 per 1,000 population for all conditions. At any one time, Michigan's short-term hospitals had 3.7 inpatients per 1,000 population.\textsuperscript{8}

Neither state had a significant number of beds in chronic disease or geriatric hospitals in 1970. Within their nursing care and related facilities Michigan had 45.4 beds and North Carolina 44.4 beds per 1,000 population aged 65 years and older. In 1970, Michigan had more nonfederal physicians, with 1.29 per 1,000 population, compared with 0.92 in North Carolina. Osteopaths made up 17\% of these physicians in Michigan and 0.5\% in North Carolina.