

# Financial Expenditures for the Care of Cerebrovascular Disease Patients in an Urban Setting

CEREBROVASCULAR DISEASE CONSTITUTES a major problem in the United States. It is estimated that more than 400,000 new cases of stroke develop in the American population each year and more than 200,000 deaths per year are attributed directly to this disorder (1). Direct expenditures in the United States for diagnostic and rehabilitative services for stroke victims were estimated at \$445.2 million in 1962 (2). This figure was undoubtedly a conservative estimate since certain items of cost could not be isolated. Almost half of the expenditures were for hospital care.

Along with an increasing awareness of the magnitude of the problem, convincing evidence has emerged of the potential for primary prevention, particularly through hypertension control programs (3-8). Major studies conducted through programs organized at community and institutional levels emphasize a team approach to care and early rehabilitation (9-12). The ever-increasing cost of all medical care, including preventive services, is well known. Primary prevention and rehabilitation programs might be expected to reduce cost burdens as well as the inestimable human suffering

and disability caused by cerebrovascular disease.

Although summary national estimates of the cost of care of affected patients are available, there is little specific knowledge of the cost burden of such catastrophic and chronic conditions to individual communities. Such information might be useful in further stimulating local interest in program development, in helping to quantify and categorize local costs, and in estimating the savings that might result from improved provision of services and preventive programs. Additionally, such a study could place national summary figures into better perspective for interpretation at the community level.

In this report, we analyze expenditures and reimbursements for the care of stroke patients in 1971 in Orleans Parish (County), La., an urban county encompassing the City of New Orleans. Specifically described are the charges for the care of cerebrovascular disease (CVD) patients and the reimbursements to providers for institutional care (including care in hospitals, extended care facilities, and nursing homes) and for noninstitutional care (including home health care and

rehabilitation services).

## Methods

**Facilities eligible.** All acute-care general medical-surgical hospitals and all extended care facilities, nursing homes, and noninstitutional care agencies were considered eligible for the study and invited to participate if (a) they were in operation in 1971 and (b) they provided care to patients with cerebrovascular disease. The noninstitutional category included those rendering home health care (nurses, health aides, and so forth), medical social services, and rehabilitation services to nonhospitalized patients. Private practitioners of medicine and outpatient clinics were excluded after our initial inquiries revealed that case identification and data collection would be too complex given the available resources.

**Facilities reporting.** Ten of the 13 eligible hospitals participated in the study. One small, proprietary hospital refused to participate and two voluntary, general hospitals (one with fewer than 50 beds) could not provide financial data from billing records for the year specified. The participating hospitals accounted for 93 per-

cent of the available general hospital beds in the city and 85 percent of the general hospital beds in the greater metropolitan area in 1971.

Both extended care facilities and all of the nine nursing homes provided the requested data. Nine other noninstitutional providers were identified and considered eligible for participation, including four home health care agencies and five providers of specialized rehabilitation services. Of these, three home health agencies and four noninstitutional rehabilitation agencies participated.

**Data collection.** The universe of patients with a diagnosis of cerebrovascular disease (ICDA 430-438) (13) who were served during 1971 was identified from the records of each participating provider. For hospitalized patients, a recorded discharge diagnosis from one of the designated ICDA categories was accepted. An admitting or referral diagnosis in one of the specified categories served to identify CVD patients served by other providers (for example, nursing homes, home health agencies, and so forth). In some instances, this identification entailed a search of actual case

records generated during the study year.

Various descriptive information on all CVD cases served by each provider had been collected as part of a larger study. For our study, either all cases or a random sample of the cases from each provider involving service to the patient were selected. In those instances in which a sample population was studied, a probability sample was drawn; its size was determined by a consulting statistician. The individual billing records of the provider that pertained to the study cases were then analyzed and summarized. Specific charge categories and all sources of payment were identified so that the data could be entered in established categories on precoded forms. In all instances, the data extraction was done by one of the investigators or by a responsible agent of the provider.

Table 1 shows the number of institutions participating in the study by type, the total number of cases in which patients with a diagnosis of cerebrovascular disease were served, and the number of cases studied from the sample for each type of facility. It should be noted that cases do not cor-

respond to the actual number of patients since an individual patient might have been admitted more than once to a single facility or to multiple facilities. Eighty-two percent of the billing records requested from the hospitals and 100 percent of the bills requested from other providers were received. The discrepancies were due to inability to locate billing records. The billing records for 13.9 percent of the hospitalized patients with a diagnosis of CVD (ICDA 430-438) were analyzed. Data were obtained on 100 percent of the CVD patients

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Table 1. Total cases of patients with cerebrovascular disease (CVD) served, number of these cases in study, and average charge per case, by type of health care facility, Orleans Parish, 1971

Type of facility	All eligible facilities	Facilities reporting	Cases served <sup>1</sup>	Cases studied	Average charge per case <sup>2</sup>
Hospitals .....	13	10	3,347	465	\$1,541
Proprietary .....	2	1	12	12	498
Nonprofit .....	8	6	2,372	272	1,552
Government .....	3	3	963	181	1,528
Extended care facilities, proprietary .....	2	2	217	121	1,718
Nursing homes .....	9	9	167	167	2,338
Proprietary .....	3	3	43	43	1,960
Nonprofit .....	6	6	124	124	2,470
Home health care agencies ..	4	3	267	116	522
Proprietary .....	2	2	182	80	765
Nonprofit .....	2	1	85	36	365
Noninstitutional rehabilitation agencies .....	5	4	77	62	103
Proprietary .....	1	1	50	35	86
Nonprofit .....	4	3	27	27	133
All facilities .....	33	28	4,075	931	1,497
Proprietary .....	10	9	504	291	1,204
Nonprofit .....	20	16	2,608	543	1,542
Government .....	3	3	963	97	1,528

<sup>1</sup> Since patients may have received services from multiple providers, the total number of cases does not represent the total number of CVD patients in the community.

<sup>2</sup> Averages are based on actual cases re-

viewed in the sample from each type of facility and are derived from total charges in each category of service.

NOTE: Cerebrovascular disease (CVD)—ICDA 430-438.

served by one extended care facility and on a sample of 25 percent of those served at the other. About 43 percent of the records on CVD patients served by home health agencies were studied. Data were obtained on 100 percent of the cases from three non-institutional rehabilitation agencies and on a 70 percent sample of the cases from a fourth.

At three government-operated hospitals, itemized billing data could not be obtained because of the per diem charge system used. Specific data on itemized charges, by category of service, and on the sources of payment for services were obtained from all other providers. Charges for physician services are included in the overall per diem charges in government hospitals. These charges could not reasonably be determined in other institutions.

## Results

**Accrued charges for care.** Table 1 details the average charges incurred by patients with a diagnosis of cerebrovascular disease who were served in 1971 by the various institutions and agencies participating in the study. The average charges were based on data obtained for the sample we reviewed from each type of facility. With several exceptions, these average charges generally seem comparable among the various facilities if account is taken of the type of sponsorship. The reasons for the variations were not explored, but the data presented show the relative number of CVD patients served by the various types of providers. It is noteworthy that one small proprietary hospital served only 12 CVD patients at a low average charge per patient. Further inquiry revealed, however, that this hospital

transferred CVD patients to other institutions as soon as possible because of limited inhouse facilities. It is also noteworthy that the average expenses incurred per admission were similar in governmental and nongovernmental hospitals, even though data on length of stay obtained in another phase of our study revealed that the average for CVD patients was longer in government hospitals (24 days) than in nongovernment hospitals (11.8 days). This may have been partly because the governmental institutions were referral centers serving more remote areas and retained patients longer for extended rehabilitation services.

The vast majority of the charges incurred by patients was for hospital care (table 1). The average accrued charges for management per CVD case were similar in hospitals and extended care facilities. Comparatively few patients were served by the home health and rehabilitation agencies, which had low average charges per case compared with the average institutional charges. Although the average charge per CVD case was

highest in nursing homes, the small number of CVD patients in these facilities accounted for the relatively low overall cost burden at this level of care.

Table 2 shows the average charges per CVD patient in the inpatient facilities according to the major categories of services provided. The averages are derived from the total of the charges in each category as ascertained from the sample studied and based on the total number of patients in the samples from these facilities. As expected, room and board accounted for the largest portion of the charges in all facilities. In hospitals this item was followed by miscellaneous services, drugs, and diagnostic services. In extended care facilities, on the other hand, the average charge for rehabilitation services was substantially larger than in hospitals; the average charges for diagnostic services were relatively low. In nursing homes, the average charge for nursing-home-based rehabilitation services was negligible.

The average charges per case for various services rendered by home health and noninstitutional

rehabilitation agencies are summarized as follows:

Type of service	Average charge <sup>1</sup>
Nursing . . . . .	\$116
Physical therapy . . . . .	103
Speech therapy . . . . .	32
Occupational therapy . . . . .	3
Social services . . . . .	5
Home aide . . . . .	181
All services . . . . .	\$440

<sup>1</sup> Averages are based on actual cases reviewed in the sample from each type of facility and are derived from total charges in each category of service.

Averages are based on the total charges for the items of service as determined from the sample selected from these agencies. The most significant average charges were for home aide and nursing services, followed by physical therapy.

The estimated total charge for care rendered by all providers was determined by multiplying the estimated average charge per patient in the sample selected from each provider's universe by the total patients with CVD served by that facility. The sum of these charges constituted the estimated financial burden of care of the CVD patients from each type of facility (table 3). Table 3 also shows the estimated total charge for care in all facilities. The aggregated charges totaled approximately \$6 million in 1971. This estimate does not include charges for physician services at nongovernment hospitals nor for outpatient care in hospitals; nor does it include estimates of the charges for care in nonparticipating facilities. Approximately 85 percent of the charges were incurred for in-hospital care (\$5,160,000). An estimated \$764,000 (12.5 percent) was accrued for services in nursing homes and extended care facilities, and an estimated \$147,000

Table 2. Average charge per cerebrovascular disease (CVD) case, by type of service and of health care facility, Orleans Parish, 1971

Type of service	Hospitals <sup>1</sup>	Nursing homes	Extended care facilities
Room and board . . . . .	\$ 720	\$2,236	\$1,311
Laboratory . . . . .	116	.....	16
X-ray . . . . .	79	.....	4
Drugs . . . . .	180	100	104
Physical therapy . . . . .	15	(2)	159
Speech therapy . . . . .	.....	.....	13
Occupational therapy . . . . .	3	.....	27
Miscellaneous . . . . .	398	2	84
All services . . . . .	\$1,511	\$2,338	\$1,718

<sup>1</sup> Government hospitals are excluded.

<sup>2</sup> Total charge for sample for nursing-home-based rehabilitation services was \$34.

NOTE: Average charges are based on actual cases reviewed in sample from each type of facility and are derived from total charges in each category of service.

**Table 3. Estimated total charges per cerebrovascular disease (CVD) case, by type of health care facility, Orleans Parish, 1971**

Type of facility	Facilities reporting	Charges (in thousands)
Hospitals .....	10	\$5,159
Extended care .....	2	373
Nursing homes .....	9	391
Home health care and noninstitutional rehabilitation agencies .....	7	147
<b>All facilities .....</b>	<b>28</b>	<b>\$6,070</b>

NOTE: Estimates based only on data obtained from facilities participating in the study.

(2.8 percent), for services provided by home health and noninstitutional rehabilitation agencies.

**Sources of reimbursement.** Figure 1 indicates the percentage of actual sources of payment for the care of the study population in all of the participating hospitals. The cost of care in Federal hospitals, based on established per diem costs, accounted for 30 percent of expenditures. Medicare payments comprised 40 percent of reimbursements; Medicaid payments comprised only 7 percent of the total. Blue Cross and other insurance carriers each accounted for 6 percent of the payments. Nine percent of the charges were paid from personal resources.

Figure 2 depicts the percentage of reimbursements for care of CVD patients in hospitals, excluding Federal institutions. Medicare payments amounted to 57 percent of the total reimbursements, Medicaid 10 percent, Blue Cross 9 percent, and other insurance 8 percent. Personal payments provided 13 percent of the total spent for in-hospital care.

Figure 3 shows the origin of payments for care in nursing homes and extended care facilities. As noted, the Medicaid program contributed 51 percent of total reimbursements, Medicare 21 per-

cent, personal payment 19 percent, and other sources 9 percent. The percentage of out-of-pocket payment was higher for care in these facilities as compared with other types of agencies. Figure 4 shows the sources of payment for care rendered by home health and rehabilitation agencies. The distribution of the burden among the payment sources indicates that Medicare assumed the major portion of the charges (50 percent). Medicaid payments accounted for 19 percent of the total, personal payments for 15 percent, and other sources for 16 percent.

### Discussion

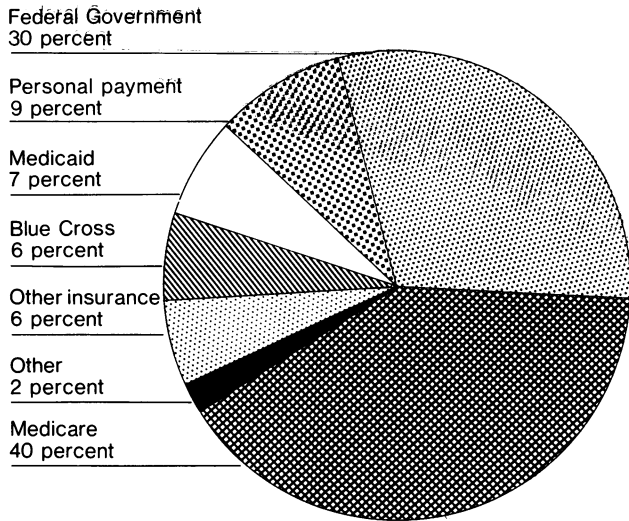
Several limitations of our study necessarily affect the conclusions which might be drawn. No attempt was made to ascertain the number of persons with cerebrovascular disease receiving services in the community, and some patients may have had more than one admission or referral for services during the study year. Hence, no estimate of the average spent for the care of individual CVD patients in the community for all services could be derived.

Second, data were not analyzed according to the locus of residence of the study subjects, and certainly a number of the people receiving services within the par-

ish resided in suburban areas outside its boundaries. However, participating hospitals in the parish represented more than 85 percent of the beds in the metropolitan area. Other participating agencies and institutions in the study were similarly concentrated within the parish. Thus, the study results can reasonably be expected to reflect the charges for services rendered to CVD patients from the metropolitan community.

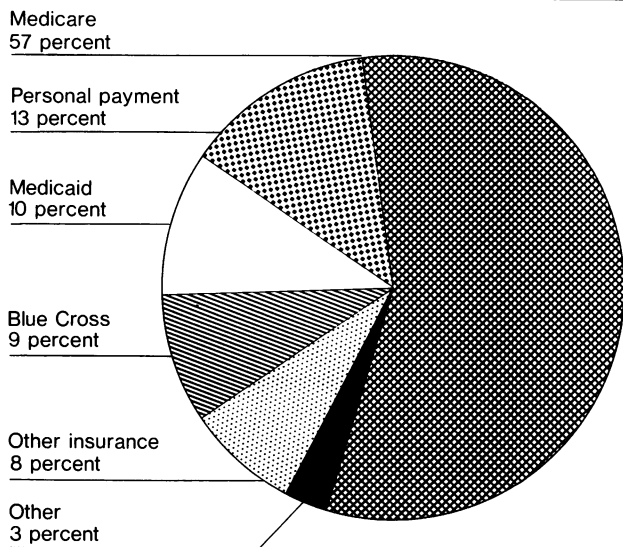
Finally, we made no attempt to establish the accuracy of the physicians' discharge diagnoses for the hospitalized patients by record review, nor to establish whether cerebrovascular disease was the primary reason for admission to hospitals or for care in other facilities. However, a study elsewhere (14), based on chart review, indicated that more than 70 percent of the patients with a discharge diagnosis of stroke definitely or probably had such a condition, and that only 6 percent were likely to have had another condition. Moreover, in this regard, other data simultaneously collected in our study of cases of hospitalized patients indicated that in more than two-thirds of the cases, the diagnoses were in the more specific and acute categories of CVD (ICDA 430-436). Others were classified in the more general, ill-defined categories. It seemed reasonable to assume that cerebrovascular disease constituted the primary reason for admission of the majority classified in the acute and more specific categories, or at least that it figured prominently in determining length of stay and the types of services received. As for those classified in the more ill-defined categories (ICDA 437-438), it is less likely that CVD was an underlying reason for admission. However, it might also

Figure 1. Sources of payment for hospital care of patients with cerebrovascular disease, Orleans Parish hospitals, 1971



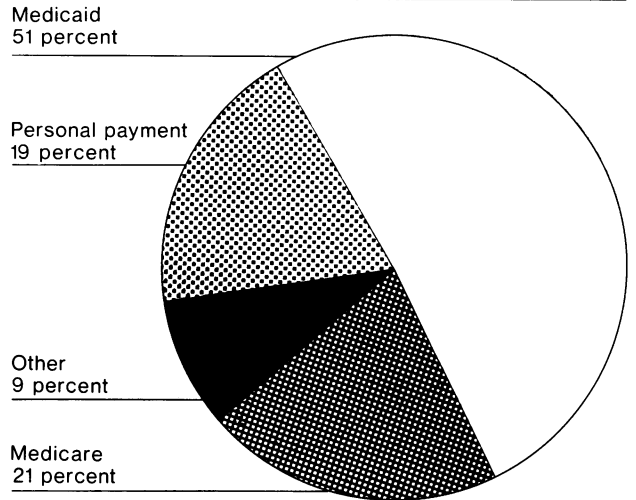
NOTE: Percentages based on data obtained from 10 participating hospitals.

Figure 2. Sources of payment for hospital care of patients with cerebrovascular disease, including Federal institutions, Orleans Parish hospitals, 1971



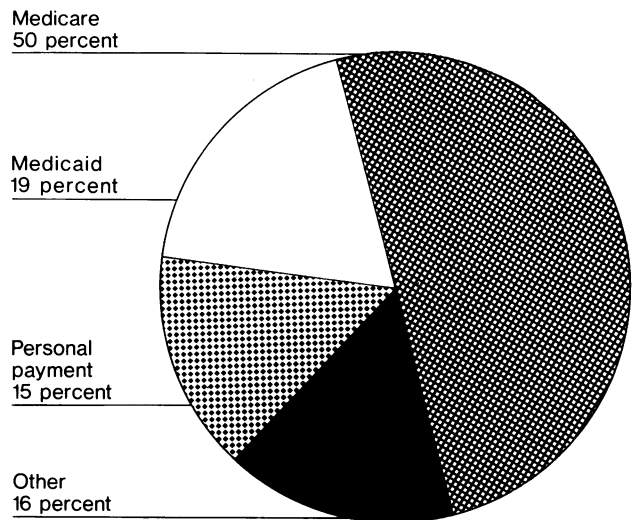
NOTE: Percentages based on data obtained from 8 participating hospitals.

Figure 3. Sources of payment for nursing homes and extended care facilities for cerebrovascular disease cases, Orleans Parish, 1971



NOTE: Percentages based on data obtained from 9 participating nursing homes and 2 extended care facilities.

Figure 4. Sources of payment for care provided patients with cerebrovascular disease, home health and noninstitutional rehabilitation agencies, Orleans Parish, 1971



NOTE: Percentages based on data obtained from 3 participating home health care agencies and 4 noninstitutional rehabilitation agencies.

be assumed that cerebrovascular disease or related conditions contributed significantly to determining the extent and types of services rendered. Although similar discrepancies might also apply to the cases of patients receiving care from nonhospital providers, the

nature of the services (nursing home, rehabilitation, and home care services) would seem to make this possibility less likely. Even after allowance for these limitations and deficiencies, the resulting more refined and more conservative estimates of the charges

for care of patients with CVD-related problems would probably still remain substantial.

Total charges for the services rendered by providers of health care do not necessarily reflect the costs of that care. Moreover, the total charges as established in

this study undoubtedly included some charges for services that were not of a medical care nature. However, more than 80 percent of all charges for care in non-Federal facilities were covered by third party carriers, including Medicare and Medicaid, and such reimbursement probably more clearly reflects the true costs of the care rendered.

As might be expected, most of the financial burden for the care of CVD patients is generated by hospital care. This would be the area in which a primary prevention program would have the greatest beneficial cost-impact on medical care services. Indeed, if only 10 percent of the admissions for illness in the acute or specific CVD diagnostic categories were obviated in a primary prevention program, an estimated cost saving of more than \$300,000 for hospital care in the community could result, based on the average costs derived from 1971 figures. This estimate does not include other projected savings in nursing home, home care, rehabilitation, and other services, not to mention the productivity of the persons affected. Given the prominence of hypertension as a major treatable etiological factor in stroke and the success of proper management in preventing disease and recurrence, such an expectation is not unreasonable.

As already noted, the highest expenditures in the hospital care category were for room and board, followed by diagnostic services and drugs. It was discouraging to see how little of the care-dollar was spent for rehabilitation services, particularly since the billing records in non-Federal hospitals indicated that fewer than 10 percent of the CVD patients received these services. It may be that, in some instances, these services were

provided by resources outside the institution, by nursing staff in the course of care, or by agencies after the patient's discharge from the hospital. However, the efficacy of early rehabilitation intervention in stroke cases has been demonstrated and is well worth the expenditure of resources (10, 12, 15).

The percentage of the total charges that derived from nonhospital services was surprisingly low (15 percent). The smaller percentage of the total charges was for home health and other noninstitutional services (2.5 percent), with nursing homes and extended care facilities accounting for 6 to 7 percent. Also, when the number of admissions to services in the various facilities was considered as a percentage of the total (4,075), then the percentage of admissions for care in extended care facilities (5.3 percent), nursing homes (4.1 percent), and home health and other rehabilitation agencies (8.4 percent) seemed small. This was particularly so when the numbers of admissions to nonhospital services and the charges were compared with those for hospital care. That the total admissions of CVD patients to nursing homes were relatively few and the fact that the expenditures for care in these facilities were relatively low was encouraging. However, it was surprising that fewer than 10 percent of the total CVD cases were identified in the records of the home health and rehabilitation agencies and that so little of the care-dollar was expended for services provided by these agencies. Admittedly we did not gather data to indicate what percentage of patients actually might have benefited by referral for such services. Obviously, however, the cost of such services is far lower than for institutional care. Fur-

thermore, Bryant and associates (16) have noted striking differences in a population of CVD patients receiving home care after discharge from hospitals as compared with a similar group not receiving such care. Coordinated referral for home care services resulted in shorter hospital stays, lower average care costs, fewer admissions for recurrent disease, and fewer deaths. Given the cost of institutional care, it is suggested that the cost-benefit of a coordinated management and referral program would in itself be significant.

As to the sources of reimbursements to the various providers (excluding Federal hospitals), Medicare assumed fiscal responsibility for the largest portion of the CVD patients' hospital care. The large role of Medicare in these reimbursements undoubtedly reflects the fact that cerebrovascular disease is most often a disease of the elderly. Similarly, Medicare paid 50 percent of the charges for home health and other noninstitutional care. Medicaid assumed the largest share of the cost burden of nursing home and extended care charges. This fact probably reflects the personal financial exhaustion that can ensue from long-term institutional care and the consequent need for dependence on other assistance. It was surprising, however, to see what high percentages of the charges for care in each provider category were settled by personal payment (13 to 19 percent). Included would have been payments for noninsured services, co-payments, and deductibles. Whether lack of insurance in given instances might have influenced referral decisions or the duration of service and, if so, the extent of such influence, could not be determined.

A charge and cost perspective is a narrow one from which to consider cerebrovascular disease. That few illnesses rival CVD as a cause of disability and extended suffering is reason enough to plan, implement, and evaluate programs directed toward its prevention and the rehabilitation of those affected. The realization that our current methods of dealing with stroke are also very costly in terms of dollar expenditures can only add to our resolve to improve the services to potential stroke patients and those already affected.

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## SYNOPSIS

VERRONE, GESWALDO A. (Indian Health Service, Public Health Service), and NOE, MICHAEL F.: *Financial expenditures for the care of cerebrovascular disease patients in an urban setting. Public Health Reports, Vol. 92, May-June 1977, pp. 272-279.*

A study was undertaken to determine the magnitude of the charges and costs and the sources of reimbursements for the care of cerebrovascular disease (CVD) patients in an urban setting, Orleans Parish (County), Louisiana, in 1971. The study helps to put national data on the cost-burden of cerebrovascular disease into perspective at the community level. It is thought that such data may prove useful in planning and evaluation of intervention programs and more coordinated ap-

proaches to care. All hospitals, nursing homes, extended care facilities, and noninstitutional sources of care (home health and rehabilitation agencies) that were identified as providing services to CVD patients were invited to participate in the study, and a sample of such cases was selected from each participating facility. The billing records for these cases were then reviewed and analyzed to determine charges by category of service and sources of reimbursement. At government institutions, per diem rates were used to determine costs.

Total charges for care of the CVD patients amounted to \$6,070,000. Hospital care generated the major charge, amounting to \$5,159,000 (85 percent of the total charges) during the study year. Nursing home care charges totaled \$391,000 (6.5 per-

cent), extended care services \$373,000 (6.1 percent), and home health care and noninstitutional rehabilitation services \$147,000 (2.4 percent).

Analysis of the data according to type of service revealed that only a small percentage of the care dollar was spent for rehabilitation services. The greatest amounts were spent for room and board in institutional facilities and for drugs, diagnostic services, and miscellaneous other services in hospitals. Average expenditures per CVD case for rehabilitation services in institutions were highest in extended care facilities, being much lower in hospitals and negligible in nursing homes. Average expenditures for care by noninstitutional health service agencies were highest for home aide services, followed by nursing and rehabilitation services.