
Antiepileptic Medication in Chronic Care Facilities

Results of a review of the medical records of 773 patients in seven nursing homes, Montgomery County, Md.

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ANTIEPILEPTIC drugs have been used in recent years to prevent epilepsy (1,2), to treat cardiac arrhythmias (3), and to treat a broad range of other diseases and disorders (4). Therefore, patients cannot be identified as having epilepsy solely on the basis of their use of antiepileptic drugs; the indications for such usage should be documented in the patients' medical records. The present study was undertaken to determine the frequency of and the indications for the use of antiepileptic medications in chronic care facilities, as well as to obtain a general view of the therapeutic regimens used in such facilities.

Seizure phenomena among the elderly are associated primarily with lesions of the brain and may vary with the patient's age and the time course of the disease (5,6). In chronic care facilities, seizures are often observed by the nursing staff, and the physician must either treat the patient on the basis of a history of seizures or wait for further seizures. Also, some patients in chronic care facilities who are taking antiepileptic drugs have no documented records of their need for the

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drugs. In such instances, the physician who may be only recently acquainted with the patient's history is forced to decide whether to continue the medication or to reevaluate the indications for therapy.

The incidence of epilepsy varies with age—it is highest during the first year of life, declines precipitously during childhood, increases slightly during adolescence, and remains relatively low until after 60 years of age when a sharp rise occurs (7,8). Undoubtedly, some cases of epilepsy among the elderly remain undiagnosed, either because of the stigma attached to the disorder or the lack of a definitive diagnostic evaluation.

Definitive diagnosis of epilepsy is often inconvenient or considered unnecessary for patients with short life expectancies, particularly when they have other serious or fatal diseases. Even when these patients are given only symptomatic treatment, strange combinations of therapeutic regimens often prevail. In determining a patient's initial drug and dosage, as well as the sequence for additional drugs, the physician also should consider recent findings on absorption, distribution, excretion, and biotransformation of antiepileptic drugs and their interactions (9).

Nursing Home Survey

Seven randomly selected nursing homes were surveyed in Montgomery County, Md. All were chronic care, skilled nursing facilities licensed by the State. Each facility had 24-hour nursing supervision, and each patient had a personal physician. The charts of all 773 patients in these facilities were reviewed, and 44

patients who were on any of the following antiepileptic medications (10) were selected for the study. Patients for whom phenobarbital or diazepam were prescribed for sedation or muscle relaxation were not included.

<i>Generic name</i>	<i>Trade name</i>
phenobarbital	Luminal
mephobarbital	Mebaral
diphenylhydantoin	Dilantin
trimethadione	Tridione
mephenytoin	Mesantoin
paramethadione	Paradione
phenacemide	Phenurone
metharbital	Gemonil
phensuximide	Milontin
primidone	Mysoline
methsuximide	Celontin
ethooin	Peganone
ethosuximide	Zarontin
diazepam	Valium

The age, sex, diagnosis, and medication regimens were obtained from the charts of all the study patients; however, the current weights of most of the patients were not recorded on the charts. Ward nurses who knew the patients' medical histories from the time they were admitted to the homes were questioned about observed seizure events. Additionally, all available medical records of patients receiving antiepileptic medications but with no recorded diagnosis of epilepsy were reviewed.

Results

Each of the seven nursing homes had some patients who were receiving antiepileptic medications. The 44 study patients had been in the facilities for an average of 18 months. The distribution of these patients was as follows:

<i>Number of patients in each nursing home</i>	<i>Patients on antiepileptic drugs</i>	
	<i>Number</i>	<i>Percent</i>
1. 51	4	7.8
2. 80	5	6.2
3. 80	4	5.0
4. 149	14	9.4
5. 91	2	2.1
6. 170	9	5.2
7. 152	6	3.9
Total	44	5.6

The 44 study patients were grouped according to the following criteria:

- Group 1: epilepsy diagnosed
- Group 2: epilepsy not diagnosed—seizure observed or documented on chart
- Group 3: postcraniotomy seizure prophylaxis
- Group 4: cardiac arrhythmia
- Group 5: epilepsy not diagnosed—seizure neither observed nor documented on chart

The ages, primary diagnoses, and antiepileptic medications for the 44 patients are shown in the table. Diphenylhydantoin, phenobarbital, and diazepam were the only drugs being used for the treatment of seizures.

Diagnosed epilepsy was documented in the medical records of 6 or 13 percent of the 44 patients; their average age was 62.8 years. The largest daily dosage of

antiepileptic medication prescribed was 300 mg of diphenylhydantoin plus 120 mg of phenobarbital for one of the six patients; another patient was receiving only 100 mg of diphenylhydantoin daily.

The 18 patients for whom epilepsy had not been diagnosed but who had had one or more seizures that were observed by the nursing staff or documented in their charts comprised about 41 percent of the 44 patients on antiepileptic drugs and 2.33 percent of the total 773 patients surveyed. Their average age was 77.6 years.

The two patients, average age 58.6 years, receiving diphenylhydantoin as a postcraniotomy seizure prophylaxis represented 4.5 percent of the 44 study patients and the one patient on this drug for cardiac arrhythmia, 2.3 percent. The 17 patients, average age 71.9 years, with no history of epilepsy and no seizure observed or documented comprised 39 percent of the study patients and 2.29 percent of the total population surveyed.

Among the survey population of 773 patients, there were 152 with diagnosed cerebral vascular accidents, including stroke, cerebral embolism, cerebral thrombosis, cerebral infarction, as well as cerebral vascular accident. Eight of these patients, with diagnosed cerebral vascular accidents or cerebral thrombosis, were receiving antiepileptic medications (group 2, table).

Discussion and Conclusions

Among the 44 patients on antiepileptic medications, no documented reason for the prescription of these drugs was available for 17. The process of transferring patients to chronic care facilities is often plagued by delays or other difficulties. Accurate records may not accompany the patients; sometimes they are sent later, and sometimes they are never sent. Occasionally, the physician's summary is lost during the transfer process. Also, diagnostic evaluations are often made less frequently for elderly patients because of the increased risk due to their age.

The total daily dosages of antiepileptic agents prescribed for the patients in groups 2 and 5 (see table) raise the following questions: Is the blood level of diphenylhydantoin for persons receiving only 100 mg daily sufficient for an antiepileptic effect? Is the administration of diphenylhydantoin only when a seizure occurs a valid method for treating seizure disorders? Recommended medical practice requires the use of accurate body weights in the calculation of the milligram per kilogram dosage of an antiepileptic drug. Moreover, blood levels should be determined to insure that the dosage prescribed maintains a blood level within the therapeutic range (11).

Administration of diphenylhydantoin intramuscularly must be reconsidered in view of recent findings that it crystallizes in muscle and, as a result, blood levels of the drug are inadequate (12,13). Certainly, the condition of the patient with seizures and the efficacy of the dosage of any antiepileptic agent must be reevaluated periodically to assure optimum treatment.

Diagnostic groupings and primary diagnoses of 44 patients on antiepileptic medications, by age and type of medication

Diagnostic group and primary diagnosis	Age of patient	Antiepileptic drugs, in milligrams ¹		
		Diphenylhydantoin	Phenobarbital	Diazepam
1. Epilepsy diagnosed				
Epilepsy	25	200		
Epilepsy with—				
Arteriosclerosis	78	200		
Arteriosclerosis	86	300	48	
Cerebral atherosclerosis	71	100		
Chronic brain syndrome	62	300	120	
Alcoholism	55	300	90	
2. Epilepsy not diagnosed; seizure observed or documented				
Cerebral vascular accident	81	100		² 5
Cerebral vascular accident	80	300		
Cerebral vascular accident	65	300	96	
Cerebral vascular accident	64		64	
Cerebral vascular accident	79		96	
Cerebral vascular accident	84			³ 2
Cerebral vascular accident	70	³ 200		15
Cerebral thrombosis	88	150		
Chronic brain syndrome	66		128	
Subdural hematoma	74	150		
Fracture, left hip	79			² 10
Fracture, left hip	89	³ 200		15
Fracture, left hip	88			³ 2
Congestive heart failure	82		128	
Atherosclerotic heart disease	84	200		10
Carcinoma of liver	76	200		² 10
Carcinoma of breast	69	300	96	
Carcinoma of breast	79			15
3. Postcraniotomy				
Diabetes mellitus	59	300		
Glioblastoma multiforme	57	400		
4. Cardiac arrhythmia				
Cerebral vascular accident	75	300		
5. Epilepsy not diagnosed; seizure neither observed nor documented				
Cerebral vascular accident	85	150		
Cerebral vascular accident	71	200	128	
Cerebral vascular accident	84			20
Cerebral vascular accident and Parkinson's disease ..	89	300		³ 2
Cerebral atherosclerosis	85	² 100		
Cerebral atrophy	63	200		
Chronic brain syndrome	77	300		
Chronic brain syndrome	84		128	
Progressive brain disease	24	300	60	
Atherosclerotic heart disease	85	300		
Atherosclerotic heart disease	82		32	
Atherosclerotic heart disease	59	400	48	
Parkinson's disease	71	200		
Carcinoma of lung	75	300		
Brain tumor	63	300		30
Diabetes mellitus	54	300		
Muscular dystrophy	72	300		

¹Total daily dosage, given orally unless otherwise indicated.
²Given intramuscularly, only if seizure was observed.

³Given only if seizure was observed.

The occurrence of a seizure during or after a cerebral vascular accident in 8 of 18 patients noted to have had seizures but not previously diagnosed epilepsy is of interest (see table); these 8 patients represented 5.2 percent of the 152 who had cerebral vascular accidents.

In another series of 140 autopsy-proved cases of cerebral infarction or cerebral hemorrhage, or both, convulsive seizures had occurred in 12.5 percent (14). The differentiation between seizures that signal the onset of a cerebral infarction and those that occur after the infarct requires prospective documentation.

If we assume that the epileptic patients in group 1 had longstanding diagnosed seizures, that the use of antiepileptic drugs by patients in groups 3 and 4 is explained by their primary diagnosed conditions, and that the reasons for antiepileptic therapy for the patients in group 5 are unclear, then only the 18 patients in group 2 had experienced new seizures. These 18 patients comprised 2.3 percent of the total population surveyed; their average age was 77.6 years. Thus, the incidence of new seizures was 2,300 per 100,000 population. This incidence is markedly higher than the 50 per 100,000 annual rate for the same age group in Rochester, Minn., reported by Kurland (7); however, aged patients in chronic care facilities are not representative of the elderly members of a community. Although our data are based on 1.5 years, our annual incidence rate is about three times that reported by Kurland.

The most recent data available from the National Center for Health Statistics show that in 1967 there were 584,052 beds in U.S. nursing homes. We cannot know how many patients in these homes have seizures after admission and the percentage who receive antiepileptic drugs until further studies are carried out on a random sample of the patients in the various types of nursing home facilities in the country. If our percentages of 2.3 in group 2 and 2.2 in group 5 in a population of 773 patients can be considered representative, however, then these percentages can be applied to the total number of U.S. nursing home patients. Thus, it may be calculated that about 12,849 patients are being treated with antiepileptic agents without documented indications for the prescription of these drugs. Additionally, we may assume that 13,443 other patients with previously undiagnosed epilepsy have experienced a seizure episode.

The study results indicate that the need for antiepileptic medication must be better documented for optimum treatment of patients with seizures, that the incidence of new seizure episodes among elderly patients was significantly higher than that expected from previous studies, and that a review of medical records of patients in nursing homes does not allow differentiation between seizures heralding or resulting from a cerebral infarction.

References

1. Rapport, R. L., and Penry, J. K.: Pharmacologic prophylaxis of posttraumatic epilepsy: A review. *Epilepsia* 13: 295-304 (1972).
2. Rapport, R. L., and Penry, J. K.: A survey of attitudes toward the pharmacological prophylaxis of posttraumatic epilepsy. *J Neurosurg* 38: 159-166 (1973).
3. Bigger, J. T., Schmidt, D. H., and Kutt, H.: Relationship between the plasma level of diphenylhydantoin sodium and its cardiac antiarrhythmic effects. *Circulation* 38: 363-374 (1968).
4. Bogoch, S., and Dreyfus, J.: The broad range of use of diphenylhydantoin: bibliography and review. Dreyfus Medical Foundation, New York, 1970.
5. Fine, W.: Epileptic syndromes in the elderly. *Gerontol Clin* 8: 121-133 (1966).
6. Madison, D., and Niedermeyer, E.: Epileptic seizures resulting from acute cerebral anoxia. *J Neurol Neurosurg Psychiatry* 33: 381-386 (1970).
7. Kurland, L. T.: The incidence and prevalence of convulsive disorders in a small urban community. *Epilepsia* 1: 143-161 (1959-1960).
8. Feuerstein, J., Weber, M., and Kurtz, D.: Statistical study of epilepsy appearing after the age of 60 years. *Sem Hop Paris* 46: 3125-3128 (1970).
9. Woodbury, D. M., Penry, J. K., and Schmidt, R. P., editors: Antiepileptic drugs. Raven Press, New York, 1972.
10. Swinyard, E. A., and Goodman, L. S.: Introduction. In Antiepileptic drugs, edited by D. M. Woodbury, J. K. Penry, and R. P. Schmidt. Raven Press, New York, 1972, p. 3.
11. Kutt, H.: Diphenylhydantoin: relation of plasma levels to clinical control. In Antiepileptic drugs, edited by D. M. Woodbury, J. K. Penry, and R. P. Schmidt. Raven Press, New York, 1972, pp. 211-218.
12. Serrano, F. E., et al.: Plasma diphenylhydantoin values after oral and intramuscular administration of diphenylhydantoin. *Neurology (Minneapolis)* 23: 311-317 (1973).
13. Wilensky, A. J., and Lowden, J. A.: Inadequate serum levels after intramuscular administration of diphenylhydantoin. *Neurology (Minneapolis)* 23: 318-324 (1973).
14. Richardson, E. P., Jr., and Dodge, P. R.: Epilepsy in cerebral vascular disease. *Epilepsia* 3: 49-65 (1954).