MOBILE EEG DIAGNOSTIC UNIT OF THE MICHIGAN EPILEPSY CENTER AND ASSOCIATION

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The total mobile unit service of the Michigan Epilepsy Center and Association (MECA) includes electroencephalography (EEG), neurological consultation, neurological examination, and lectures on epilepsy. From the physician's referral information and the patient's previous medical and hospital contacts and social-medical history, the neurologist adds to the EEG report his diagnostic considerations and suggestions for the continued management of the patient. The referring physician therefore receives both the EEG report and neurological consultation. The very presence of this diagnostic laboratory in an area tends to strengthen the patient-doctor relationship in many instances. One major problem for the mobile unit, which is still not satisfactorily solved, concerns the ideal for which the MECA stands, namely, a total approach, with use of many medical and allied disciplines to determine the causes and the treatment program for each patient.

In 1947, the Michigan Epilepsy Center and Association (MECA) came into existence with a grant from the Society for Crippled Children and Disabled Adults, through its state organization, Detroit and Dearborn Chapters. Three years later the Michigan United Fund assumed the support of the center. This change brought with it increased responsibility to the residents of the state of Michigan for service in the area of epilepsy. Dr. R. Dixon, who was our medical director at that time, and who had recently retired as medical superintendent of Caro State Hospital for Epileptics, suggested a traveling electroencephalography (EEG) service. At that time only two of the four EEG centers in the state were open to use by general practitioners, and these were below the center of the state. There were, however, rumors of the establishment of two additional EEG facilities. In fact, in accordance with the distribution of the population of the state, about 50% lived outside of counties with EEG laboratories. Dr. Dixon's suggestion was to put an EEG unit into a suitable truck and tour the areas of Michigan where EEG service was not readily available. In the summer of 1951 under the direction of Mrs. T. E. Kidder, a traveling EEG unit was put on the road for the first time.

One major problem of our program for the mobile unit, which is still not satisfactorily solved, concerns the ideal for which the MECA stands, namely, a total approach, using many medical and allied disciplines to determine the causes and the treatment program for each patient. A mobile EEG service tends to deny this and perhaps places the EEG in the dubious position of being called upon to form the sole basis for diagnosis. What it can accomplish, however, far outweighs these deterring aspects. This program can (1) offer the medical practitioner the information gained by EEG for the benefit of the patient (the test will confirm his impressions, help in evaluating severity of disturbance, and find possible foci for seizures, as well as contribute to treatment plan); (2) increase the awareness of the physician in treatment possibilities; (3) increase the understanding of the general population about epileptic people and their illness; and (4) encourage, through its use, interest in developing additional local EEG facilities as permanent installations.

Administrative Director of State-Wide Mobile Program (Miss Rolfe); Chairman of the Research Planning Team and Consulting Neurophysiologist (Dr. Derbyshire); and Medical Director (Dr. Bohn), Michigan Epilepsy Center and Association.

Around any such permanent installations stimulated by the mobile program the center can develop the total approach, as it has been developed in Detroit. Here, each referred patient is seen by a neurologist, an internist, a psychiatrist, a pediatrician, a neurophysiologist, a social worker, a psychologist, and a religious consultant. Through mutual discussion, their information about the patient is synthesized into a diagnosis with probable etiologies and appropriate treatment recommendations covering all areas studied.

While falling far short of such a total study, the mobile unit has added, as money has become available, neurological consultation. It has always been the hope to broaden the approach through permanent facilities, or, as a second choice, to expand the mobile services.

Method

Description of Mobile Laboratory.—Finances limited the traveling program to a 10-week period, and weather conditions throughout northern Michigan, which was our primary target, limited the program to the summer. Finances further limited us to producing an EEG technician who was also a truck

driver with a chauffeur's license. Finances again limited us to a moving vehicle of such size that it could be sleeping quarters, office, and EEG laboratory, all in one. A friend of the center, hearing of our needs, offered us the loan of a new 2½-ton trailer of the type used for moving furniture; we would have to rent the tractor. In this large van

Fig. 1.—Mobile unit parked behind hospital.

were such items as a cot, a large easy chair for the patient during the EEG test, an eight-channel Grass EEG instrument, a table, and chairs.

The following year this mobile equipment was replaced by a house trailer and a pickup truck, and in 1954 we were given the present equipment (fig. 1 and 2), which consists of a paneled single-unit truck, donated by a large electrical manufacturing firm. This truck, 30 ft. long by 8 ft. wide by 11 ft. high, was originally custom-built in Ohio for the purpose of displaying electrical equipment. We easily adapted it to our use by dividing the space with a curtain into living and working quarters for two people. It can be driven into any small hospital or clinic grounds, where the unit can obtain water through a 100-ft. hose and its needed 2,000 watts of 110 AC power through a 100-ft. electric extension cable. As assurance against power failure, there is a gasoline-driven generator in the rear of the truck, which can supply enough power with adequate frequency (60-cycle) control to obtain reliable recordings. Derryberry [1] describes a similar truck used for mobile chest x-rays.

The Grass Instrument Company supplied us with a special rubber mounting, such as is used for fastening an engine block to a chassis. Through this, the EEG instrument is bolted to the floor during transportation. It can be unbolted and wheeled about the truck once the unit is parked. The problem of electrical grounding is solved by connecting the ground post of the EEG instrument to the metal structure of the truck. This uses the grounded side of the AC supply as the one common grounding point for both the EEG instrument and the metal body of the truck. The metal body, therefore, becomes the electric shielding. The only troubles which develop occur when the unit is parked under a transformer or when in a heavy rain a double ground is made by the water rising to contact some metal part or wheel of the truck. In most situations less artifact of 60-cycle pickup is encountered than in many hospital laboratories.

In selecting personnel to operate the mobile unit, it has been our experience that the most interested and resourceful technician can be developed in medical or premedical students. The job offers them opportunity to learn more about neurophysiology, history taking, and patient contact and invaluable experience in working with established medical practitioners throughout the state where the medical student is eventually most likely to practice.

We receive in return, from the medical student, a dedicated kind of interest in patients. They have an enthusiastic and warm center-doctor relationship, an insatiable curiosity to develop their understanding in the area of epilepsy, and a medical orientation and vocabulary for this work.

Services Offered.—The total mobile unit service includes EEG, neurological consultation, neurological examination, and lectures on epilepsy. The EEG service offers a standard half-hour test, which can reveal a localization as well as description of general pattern. In addition, activation is often tried, with use of hyperventilation and/or sleep following sedation. Practically any variation of the EEG test

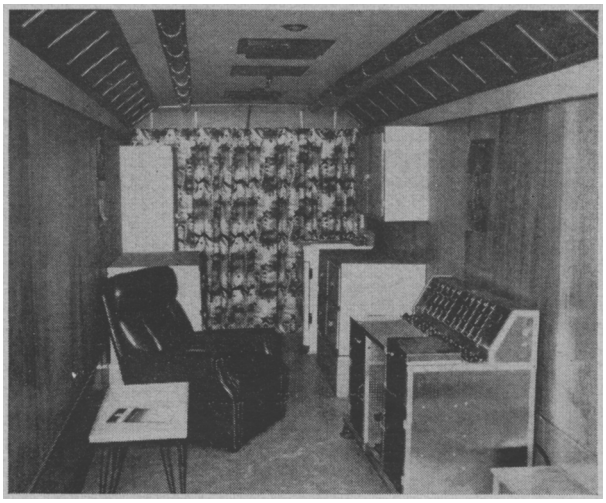

Fig. 2.—Inside of truck looking toward back from co-driver's seat. Curtain shuts off back windows. On right-hand wall are eight-channel electroencephalograph, cabinets for kitchenware above and clothes below, and combination sink, two-burner stove, and refrigerator. At left are chair used for patient during EEG, more storage cabinets, and clothes closet. By moving curtain into position behind EEG instrument, working and living quarters can be separated.

is possible if requested by the referring physician. For example, if the doctor wishes an EEG study to be made in relationship to a glucose tolerance test,

the blood tests can be done in the hospital laboratory concurrently with brief EEG tests of 10 minutes' duration once every hour.

All EEG records taken on the road are mailed to Detroit, where they are read by the neurophysiologist. This report is then given to the neurologist who, by this time, has a complete folder on each patient. It contains a statement from the referring physician relative to present medication, seizure occurrence, and particular problems of management. There is also available to the neurologist a birth record, a detailed history form filled out by patient or parent, and copies of reports from previous hospitalizations or specialized treatments.

From all of this material, the neurologist adds to the EEG report his diagnostic considerations and suggestions for the continued management of the patient. The referring physician therefore receives both the EEG report and neurological consultation. Of the 150 to 200 patients examined each summer, there are occasional problems which require more detailed study. In these instances, the neurologist recommends and offers the physician the further service of a neurological examination of the patient. Neurological clinics are then scheduled at central locations, where the referring physician, neurologist, and neurophysiologist have an opportunity to examine the patient together and to decide upon

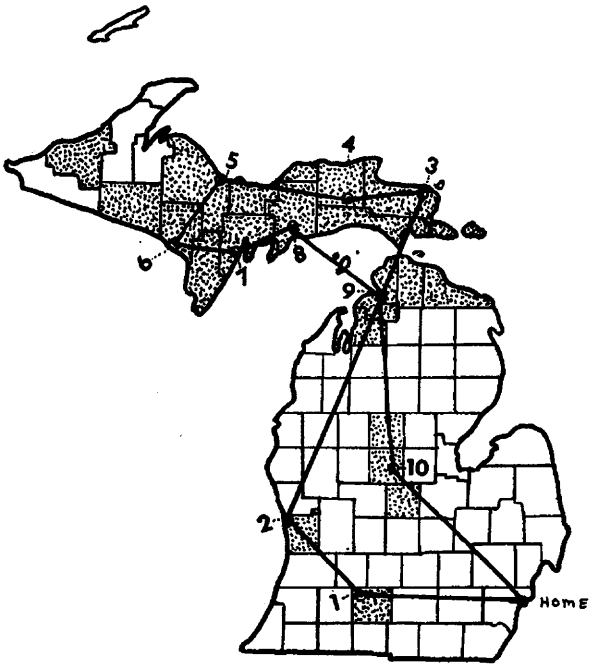

Fig. 3.—Route taken for summer of 1957. Counties serviced are stippled.

further procedures. What hospital or other facility he will choose to carry out these further recommendations is left to the discretion of the referring physician. Occasionally, these mobile services stimulate a county medical society to invite the center's staff to an evening meeting. The staff shares its extensive experiences in the field of epilepsy through the discussion of representative patient problems.

Relations of Center to Patients and Physicians.—The method by which this service reaches the patient and physician has been solved by a somewhat unique procedure. Through the counselors of the Michigan State Medical Society, the services are

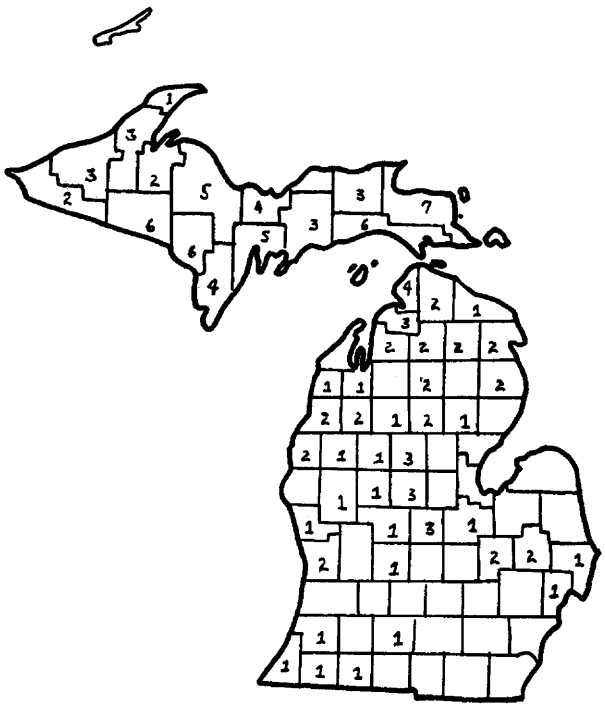

Fig. 4.—Counties covered, 1951-1957. Numerals show total number of visits to each county from 1954 through 1957. Areas without visits (*blank*) are serviced by stationary EEG laboratories. Most frequent visits are to Upper Peninsula area because it is furthest from stationary EEG facilities.

made known to each county medical society. Then, through any interested county medical society, we receive an invitation to bring the mobile service into its area. A letter is sent from the center to each member of the county medical society requesting service, inviting him to refer any of his patients suspected of having convulsions. Upon receipt of the doctor's referral, each patient is contacted, given a history form to fill out, and advised of the time, place, and date for the EEG study.

Administrative Aspects of the Program.—Selection of areas to be covered, contact with county medical societies, and contact with the referring physicians must be done months before the mobile unit begins its 10-week trip on the road. It is important that any group considering a mobile program like this be cognizant of all the planning and administrative procedures that accompany this prelude to the actual summer's trip.

The budget preparation and its justification to the Michigan United Fund are the responsibility of the executive director (R. D. Dennerll). A physician (H. B. Zemmer), as chairman of the state-

wide mobile committee of our board of directors assists in planning the areas to be covered. He also interprets to the officers of state and county societies the services of the mobile program. The voluminous correspondence and the creation of the precise route and schedule are the responsibility of one of us (A. L. R.) throughout the six months before the unit leaves Detroit (fig. 3). In planning a summer's route, we take account of the areas of first requests and areas covered during the last two years, as well as the probable needs of each community. It is desirable to cover all the areas of the state without EEG facilities at least once every three years and to cover them in such a way that the 10 weeks is neither overprogrammed nor underprogrammed.

Responsibility for the medical service rests with one of us (Z. S. B.) as the center's medical director. The education department at the MECA maintains from the inception to the completion of the program a liaison between the center and the communities being served through such mediums as newspapers and radio.

Summary of Mobile Unit Program

Yr.	Counties Served	M.D.s Contacted	M.D.s Referring	Patients Seen	Unit Stops	Mileage
1951.....	11	482	53	95	8	1,329
1952.....	17	90	34	96	5	1,007
1953.....	17	82	34	71	5	682
1954.....	26	396	57	175	8	1,184
1955.....	20	203	60	150	8	1,281
1956.....	14	341	49	123	8	1,301
1957.....	21	399	72	190	10	1,271
Totals...		1,993	359	900	51	8,055
Averages per year.	18	285	51	129	8	1,151

An average of 18% of the doctors contacted referred about 2.5 patients each.

Results

Areas Covered.—In the seven years of mobile unit operation, 54 counties out of a total of 83 have received the service. After about two years, we found that particular localities, especially in the Upper Peninsula, were looking to the center for repeated EEG service. In fact, 12 out of the 15 counties (80%) in the Upper Peninsula have requested and received service for three or more years (fig. 4), compared to 5 out of 39 counties (13%) in the Lower Peninsula during the same seven-year period.

The table represents a summary of the number of counties serviced each year, the number of physicians invited to refer patients, the number who actually made referrals, the number of patients who received the examination, the number of stops made, and the distance the unit traveled. One important problem not revealed in the table is the problem of scheduling appointments and determining the number of days the unit must remain in any stop. It has been our experience that the anticipated number of patients scheduled often differs from the actual number referred, once the unit has arrived. In 1957, we anticipated 147 patients and were asked to see 190. The same summer, the number of physicians who indicated their intent to refer patients before the unit left Detroit was 48. However, the total number of referring physicians at the end of the summer was 72.

Financial Problems.—A charge of $30, which this year represents one-half of the total cost per capita, is asked of each patient with the request that he pay all, or as much as is possible, of this minimal charge. The other half of the cost, which is not asked of the patient, plus whatever part of the $30 he does not pay, is absorbed as part of the operating budget supplied by the Michigan United Fund. The patient is informed that it is the voluntary contributions of the people of Michigan through the Michigan United Fund that makes up this difference. The cost of the mobile program to the center, including prorated administrative expenses, was $12,270 in 1956 and an estimated $13,750 in 1957. Total reimbursement in patient fees was $1,877 in 1956 and $1,760 (to the time of writing) in 1957.

Comment

Implications of EEG Study.—A first concern was to determine if the EEG made in the mobile laboratory was equivalent to the routine EEG in quality. By inspection it appeared to be as free of confusing artifacts as any being currently taken in Detroit. The techniques, electrodes, and length of record were identical. Therefore, the differences and similarities are discovered by comparing the profile of frequency of occurrence of each rating for three sources of patients (comparison groups). These consist of (1) the records from the mobile program; (2) records from the Detroit laboratory of the MECA; and (3) records from a private, voluntary, nonprofit hospital (Harper Hospital). In figure 5*A* is shown the EEG ratings on a five-point scale [2] for the three comparison groups of records. All records were read and rated by the same person (A. J. D.); consequently we can compare the EEG ratings from the three sources. The pattern is the same. In fact, the curves for the traveling records and for those referred to a general hospital are almost identical. The patients sent to the center, however, show a greater number of more disturbed EEG patterns, while those at the private hospital show the least disturbance. To further understand these relations and to further evaluate the reliability of this comparison, the distribution of ages in five-year blocks was compared for these comparison groups. The number of patients found in each age group is expressed as a percentage of the total number of patients in each comparison group. This relationship is graphed in figure 5*B*. The per cent population at 5 to 9 years of age was arbitrarily chosen as the point at which the three

distribution curves were made equal. This point was chosen because it tended to place the three curves most nearly together for less difficulty in comparison. The comparison brings out that all three distributions are similar between 5 and 34 years of age.

The greatest proportion of patients from 0 to 4 years of age is found in the Harper Hospital population because of its large pediatric ward and the many pediatricians on its staff. These 0-to-4-year-old patients are next most commonly found in referrals by general practitioners to the mobile unit. Since both the above groups are reluctant to consider the diagnosis of epilepsy until the patient is older, the center receives the lowest percentage of these patients (infants).

From 35 years of age and over, another deviation occurs. The patients of these older age groups are more commonly referred to the mobile unit and to the general hospital than to the center. This probably is the result of the generally held knowledge that in older patients the onset of seizures most likely is related to organic illness. The tendency, therefore, would be to send a patient in this age group to a neurologist or general hospital, and not to an epilepsy center. Like the general hospital, the mobile unit receives these cases because of the lack of specialists in neurosurgery and neurology in rural areas.

Implications of Traveling Program in Medical Practice and Doctor-Patient Relationships

Diagnostic Implications.—Inasmuch as all patients are referred to the mobile unit by their doctors and because we have the referring physician's material concerning the patient as well as records of his previous hospitalizations, we are in an excellent position to review the medical management prior to the time of the request for EEG and neurological consultation. We find, on the whole, a high degree of excellence of medical practice with convulsive disorders. These physicians use a wide variety of drugs and combination of drugs. The drugs are not always given up to maximum needs for seizure control, but seldom do we find cause to recommend use of different drugs. In some instances, our study may correct, or help clarify, the type of seizure that would necessitate the addition or change to a specific drug of choice for that particular type of seizure. Also, our experience may help the doctor focus treatment in areas other than medication, which also need consideration for seizure control.

Doctor-Patient Relationship.—It has been our experience that the very presence of this diagnostic laboratory in an area tends to strengthen the patient-doctor relationship in many instances. The doctor has something tangible to offer his patient. Too, he has the opportunity to review his patient's progress with the neurophysiologist and neurologist. The patient, in turn, may read of the unit's arrival and is rekindled with new hope so that he returns to his doctor after prolonged absence. In those counties visited in successive summers, we find a closer relationship between the doctor and his patient with seizures, both working toward better seizure control until another "repeat" EEG can be obtained. In this way the attitude of hopelessness, which stems from both the physician and the patient with uncontrolled convulsions, can be changed. Renewed interest and hope offers the opportunity for continued help, newer medications, and a stronger doctor-patient relationship.

Review of Therapeutic Progress.—Annual availability of modern instrumentation to the doctor and to his patients encourages repeated review of therapeutic progress and reduces postponed study. It has acquainted the physician with the use of EEG—its values and its weaknesses—in answering clinical questions. We are impressed that the same questions are behind the medical referral, regardless of the patient's location in the state: 1. Is this

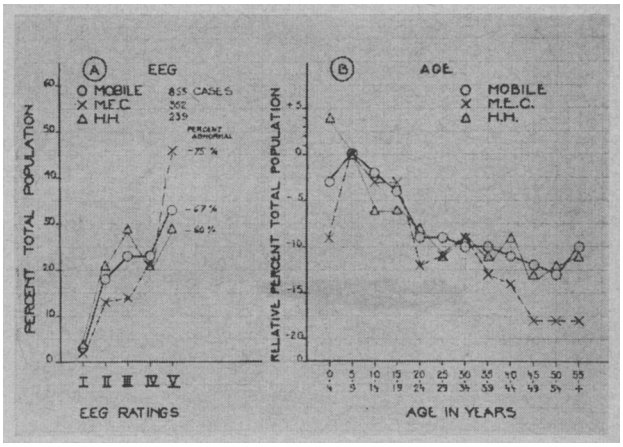

Fig. 5.—*A*, comparison of EEGs from three sources on basis of five-point rating. I=perfectly normal; II=normal; III=borderline normal and borderline abnormal; IV=abnormal; and V=diagnosably abnormal. H. H.=ratings of 239 consecutive cases referred to private hospital with diagnosis of possible convulsive disorder. M. E. C.=ratings of 352 consecutive cases referred to MECA in Detroit for full-team diagnostic examination. These patients have usually had diagnosis of convulsive disorder for some time. Mobile=ratings of 855 cases referred to mobile unit over last seven years. Percentage of abnormal patients gives proportion of patients rated V, IV, and III borderline abnormal. Values in percentage are placed opposite to end of curve representing those data. *B*, comparison of distribution of age of patients referred to three sources used in *A*. Percentages were all made equal at 5-to-9-year range and each plotted as differences from that value.

a convulsive disorder as I suspect? 2. Can this patient be taken off medication now that his seizures have been controlled for two years? 3. What kind of medication would help this patient? 4. Are there other factors, such as emotions or somatic disturbances, which contribute to this patient's seizure occurrence? 5. What capacity does this patient have for such aspects of living as school, marriage,

driving, and working? 6. What are the evidences for some organic disturbance from trauma, infection, or neoplasm as an underlying cause?

As a rule, the report from the center tends to increase the number of patients with "symptomatic" convulsive disorder, as against the essential, or "idiopathic," disorder. We have reduced medication in the well-controlled patients, but, in general, we tend to recommend continuing minimal doses for a longer period than the referring doctor often does. We rarely find reason to disagree with the referring physician's diagnosis.

We constantly attempt to increase the patient's functioning within the range of reality. In one location, 12 recommendations were made concerning seven patients directed toward expanding each patient's social and physical activities. Even with our limited studies, we do find inescapable evidence in 20% of these patients that disturbances in the emotions and in such somatic processes as sugar, water, and energy metabolism contribute to the problem. Both tests and treatment recommendations are suggested in these cases.

Comparison with Other Mobile Programs.—A comparison with other mobile clinics and health units shows significant differences. It is probable that others, like ourselves, have each developed special diagnostic, public relations, and physical features directed to the solution of a particular illness or problem. It has been of interest in reviewing other mobile services to note the differences in methods of transportation, that is, airplane,[3] boat,[4] and truck[5]; in service offered, that is, complete or partial treatment[6] or diagnostic[7] and preventive[8] medical service; and in administration and financing, that is, private,[9] hospital,[5b] government,[10] and voluntary.[11] In none of this extensive review of the literature has there been any previous publication describing a mobile clinic using a delicate EEG instrument. We know that early EEG amplifiers were transported from place to place by Gibbs[11a] in the mid-30's, later in World War II by Schwab,[12] and finally in the Korean war by Caveness.[13] Dr. Caveness had a mobile unit aboard ship.

In review of other mobile programs, we have found that many different methods have been used successfully to relate the mobile program to the local doctor and his patient. These are determined by the financial backing, the finances of the group serviced, and the available local medical facilities.

Implications of Program for Community and MECA

Long before the actual presence of the traveling unit in a community, its arrival is anticipated from agencies whose record pertaining to a patient has been requested by the Detroit center. These agencies then in turn look to the test results as supplementing their information and offering them assistance in their planning for the patient. These agencies are as numerous as they are wide in scope. They may represent the epileptics' interest in school, vocational training, eligibility for Old Age Survivors Insurance benefits, eligibility for guidance and counseling, a legal decision, and many other areas. Obviously, an EEG and neurological consultation cannot offer answers in all of these areas, nor can the report always present an adequate appraisal of the person's individual capabilities. It would be as unfair to use an EEG rating for the sole determination of a patient's capacities as it would be unfair to judge a person according to his IQ rating alone. We do feel that much more needs to be done in making our usefulness felt by social agencies in a community and in the same way gaining from them their particular kinds of information that would help us better to understand a patient's needs, his pressures, and, therefore, his seizures.

However, the problem of answering the many and varied questions raised by the local resources is not solved by mere exchange of information. This is the case whenever the limitation of getting information exists within the program itself. What answers we can give, plus repeated visits to some areas where the physicians have had opportunity to obtain an annual review of their patient's seizure activity demonstrated by EEG, has aroused interest within these communities for permanent facilities to provide a more complete evaluation of the patient. We are encouraged by this attitude and interest. It reflects again the need for studying the epileptic completely, as has been demonstrated for 10 years at the Detroit center.

It has been our experience that the number of referrals to the Detroit center for the complete physical-emotional-social diagnostic evaluation has increased within the areas visited by the mobile unit. Some patients and physicians have felt that the 200 or 300 miles traveled to Detroit is a negligible factor for the information necessary to plan adequately for a patient's treatment program. Again, it is a demonstration of the need for establishing permanent centers in those areas now alert to the value, as well as the limitations, of EEG and, more important, alert to the treatment possibilities now recognized for helping the epileptic.

Summary

Since 1951 the Michigan Epilepsy Center and Association (MECA) has had a mobile electroencephalography (EEG) laboratory. An eight-channel EEG instrument is mounted in a suitable truck and driven over 1,000 miles during a 10-week period each summer. Stops for the mobile unit are arranged prior to the date of departure, and areas visited are determined by invitation from the

county medical societies. EEG studies are made on appointment arranged with the patient at the request of his physician.

The EEG tracings are read by an electroencephalographer. Their accuracy is compared to those obtained at permanent installations at the MECA and at a private hospital. The neurologist at the MECA reviews the EEG readings, the patient's history, copies of previous medical reports, and data from the physician. A copy of the EEG report and the neurologist's suggestions pertaining to management are returned to the referring physician.

This paper describes the administrative problems, costs, geographical distribution of service, and a comparison with other mobile clinics. It discusses the implications of this program with regard to the doctor-patient relationship and to the community. The EEG mobile clinic makes available to an area with a widely scattered population and little concentration of resources this relatively expensive EEG instrument, trained personnel, and technical procedure.

2912 W. Grand Blvd. (2) (Dr. Bohn).

References

1. Derryberry, O. M.: Mass Screening Techniques for Chest Diseases: Industrial Medical Aspects, J. A. M. A. **151**:112-114 (Jan. 10) 1953.

2. Davis, P. A.: Technique and Evaluation of Electroencephalogram, J. Neurophysiol. **4**:92-114 (Jan.) 1941.

3. Ruiz, M. M.: Qué es la Caravana Sanitaria Aérea de Panamá? Bol. Ofic. san. panam. **30**:662-666 (May) 1951.

4. Wickström, J.: Hälsovard i skärgarden, Nord. med. **51**:786-788 (June 3) 1954. Lotte, A. J.: L'hygiène mobile dans les zones aquatiques, Méd. **15**:703-711 (Nov.-Dec.) 1954.

5. (*a*) Consultation mobile de protection maternelle et infantile, Techniques hospitalières **10**:35-44 (Feb.) 1955. (*b*) Bus Takes Clinic to Patients (Traveling Clinic), Hosp. Management **76**:44-45 (Sept.) 1953. (*c*) Kadar, T.: A falusi lakosság mozgó belgyógyászati ellátásának néhány kérdéséröl, Népegészégügy (Budapest) **36**:153-156 (June) 1955. (*d*) Magyar, K., and Krajcsovics, P.: A Mozgó Szakorvosi Szolgálat megszervezése és jelentösége a szarvasi járásban, Népegészegügy **38**:55-57 (March) 1957.

6. (*a*) Arango, M. C.: Mobile Medical Units in Cuba, J. A. M. Women's A. **6**:60 (Feb.) 1951. (*b*) Norris, M. J.: Cerebral Palsy Mobile Unit, Phys. Therapy Rev. **33**:16-20 (Jan.) 1953. (*c*) McQueen, M. E., and Barrett, N. M.: Cerebral Palsy Mobile Unit, Canad. J. Occup. Therapy **29**:39-41 (June) 1953. (*d*) Guiss, L. W.: Detection of Cancer of Lung: Results of Chest X-ray Survey in Los Angeles, California Med. **82**:385-387 (May) 1955. Reference 3.

7. (*a*) Osborn, C. D.: Michigan's Mobile Hearing Units, J. Speech & Hearing Disorders **6**:140-147 (June) 1951. (*b*) Diagnostic Service on Wheels, M. Economics **33**:152 (Nov.) 1956. (*c*) Hilleboe, H. E., and Morgan, R. H.: Mass Radiography of Chest, Chicago, Year Book Publishers, Inc., 1945.

8. (*a*) Ormiston, M., and Coull, M. K.: Mobile Health Unit in Aberdeen (Eng.), Nursing Times **50**:426-428 (April 17) 1954. (*b*) References 3, 4, 5*a*, and 6*a*.

9. References 3 and 7*b*.

10. Milmore, B. K.; Flanders, H. B.; Blum, H. L.; and Mills, M.: Screening Tests for Diabetes Detection Combined with Chest X-ray Survey, California Med. **78**:37-43 (Jan.) 1953. Siegal, W.; Plunkett, R. E.; and Locke, B. Z.: Case Findings from Routine Chest Roentgenograms: Mass Surveys of Communities Versus General Hospital Admissions, J. A. M. A. **157**:435-440 (Jan. 29) 1955. Feig, M., and Jensen, A.: Wisconsin State Board of Health Mobile Unit X-ray Surveys (1949-1951): Report of 499,442 70 Mm. X-rays, 19,759 Referrals, Wisconsin M. J. **54**:151-160 (Feb.) 1955. Jacobson, G.; Lipkis, M. L.; and Hull, C.: Cardiovascular Aspects of Los Angeles County Mass X-ray Survey, Am. Heart J. **47**:860-873 (June) 1954. References 7*a* and *c*, 8*a*.

11. (*a*) Gibbs, F.: Personal communication to the author, 1935. (*b*) References 6*b* and *c*.

12. Schwab, R., and Von Storch, T. J. C.: Personal communication from Dr. Schwab, 1942.

13. Caveness, W. F.: Use of Electroencephalography in Management of Acute Combat Head Injury: United States Navy Photographic Report, Tr. Am. Neurol. A., 1954.

DIABETES IN THE AGED.—First, let me say a word about the incidence of diabetes and its detection at all ages. Approximately 1 per cent of the population has it, and another 1 per cent has it but does not know it. In the wards of hospitals in Boston which we recently surveyed, in a twelve-month period there were 500 patients with surgical lesions of the foot who proved to have diabetes. Ten per cent of them admitted no previous knowledge of the disease. The cost of that group of cases is tremendous, not merely in terms of dollar costs paid by the patient, but in terms of medical and surgical time. The diagnosis of diabetes is still a problem. A good test for sugar in the urine does not exist. With present procedures, a frank case of diabetes can be detected, but not a borderline case. We still are hampered by inadequacies of the fasting blood sugar method. In 1954, five hospitals in Boston tried the experiment of determining the blood sugar level of middle-aged patients without diabetes, one hour after breakfast. Five per cent of the first 300 patients had diabetes which was unrecognized and untreated simply because they had been tested previously by the fasting blood sugar method—which is sure to miss in some cases of diabetes.—Howard Root, M.D., Panel Discussion on Diabetes Mellitus in the Aged, *Journal of the American Geriatrics Society*, June, 1957.