

Relevance in Undergraduate Neurological Teaching

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SUMMARY: *About 10% of patients consulting a family practitioner have neurological complaints, and about 2% ultimately receive a neurological diagnosis. As it is not possible to train enough neurologists for these patients, graduating medical students must be competent and confident in assessing neurological problems, particularly those that are common, treatable or require emergency management.*

An evaluation was made of the neurological problems commonly seen in

family practice, the difficulties in managing neurological problems by the family practitioner and the criteria for referral to a neurologist. To evaluate the teaching of medical students and house staff, the types of problems seen in a teaching hospital neurology service were examined.

As a result of this study an approach to the training of physicians is outlined to assist them to handle confidently and competently the neurological problems they will see in daily practice.

RÉSUMÉ: *Environ 10% des patients qui consultent un médecin de famille ont des maladies neurologiques, et environ 2% de ces patients ont finalement un diagnostic neurologique. Parce que nous ne pourrions jamais entraîner assez de neurologues pour venir à bout de tous ces problèmes, nous devons voir à ce que les étudiants en médecine qui graduent soient compétents et confiants dans l'évaluation des problèmes neurologiques, particulièrement ceux qui sont communs, traitables et qui requièrent des soins d'urgence.*

Pour évaluer les problèmes avec lesquels l'étudiant en médecine qui gradue doit être familier, une évaluation fut entreprise pour déterminer quels problèmes neurologiques sont vus couramment en pratique générale. Nous avons étudié aussi quelles difficultés le médecin de famille avait dans le traitement de problèmes neurologiques et quels problèmes il pensait qu'il était nécessaire de référer à un neurologue.

Pour évaluer les types de problèmes utilisés dans l'enseignement aux étudiants en médecine et au personnel, nous avons examiné en plus les problèmes types rencontrés au cours de l'enseignement dans un service de neurologie hospitalier.

Comme résultat de cette étude, il semble clair qu'on peut dresser un tableau des problèmes neurologiques importants en pratique générale, aussi bien parce que les problèmes sont communs, requièrent une thérapie, ou des soins d'urgence. Il est également clair, toutefois, que le médecin de famille a des difficultés importantes dans l'approche, la solution et la conduite à suivre avec ces problèmes neurologiques. Une approche nouvelle dans la préparation des médecins est présentée dans le but de les aider à traiter avec confiance et compétence les problèmes neurologiques qu'ils verront dans une pratique de tous les jours.

About one in ten patients consulting a physician have neurological complaints, and the figure is higher in hospital patients. How are such patients to be assessed and cared for properly?

Dr. Melvin D. Yahr (1975), Chairman of the Executive Committee of the Joint Commission on Neurology, presented a report in June, 1975, suggesting that more neurologists have to be trained for the estimated 16 million man hours per year of neurological care required. The Joint Commission has estimated that optimal neurological care requires 10,000 neurologists. There are approximately 2,700 in the United States now and the Commission suggested the number should be increased by 7,300. In Canada comparable figures would be 1,000 neurologists needed. We presently have about 200. The figures are based on two premises: (1) 75% of neurological patients should be cared for by a neurologist with the remainder cared for by non-neurological physicians; (2) the answer to supplying the unmet neurological care needs is to train more neurologists.

Perhaps there is a different answer to the problem of neurological care in general. A review of neurological problems seen in 25 family practices shows that 80% of the neurological problems seen can be adequately cared for by a well trained family physician. Further, the answer to adequate neurological care is to train physicians to have an effective and confident approach to neurological problems that occur commonly in practice, are treatable, or that require emergency management. A further 10% of patients seen in clinical practice can be effectively

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treated by non-neurological physicians with the help of a single or occasional neurological consultation. About 10% of the neurological problems seen by the primary care physician will require the continuing care of a neurologist.

Despite the comments of the Joint Commission on Neurology, most neurological problems are now being handled by general physicians. We must help them do their job better, not encourage referral of all these problems to a specialist. A number of studies were begun to see what type of neurological problems were common in general practice and which deserved particular emphasis in medical school teaching. What are the problems the family physician has in managing neurological cases, what does he identify as neglected areas in his training, and what diseases require the care or consultation from a neurologist? Using this information an attempt was made to ascertain if the neurological problems seen in hospital were a good basis for teaching and if the current curriculum in neurosciences and neurology adequately prepare the student for practice.

WHAT TYPES OF NEUROLOGICAL PROBLEMS ARE COMMON IN GENERAL PRACTICE?

Twenty-five general practitioners were surveyed to determine the types of neurological problems seen in their practices in one month. Two percent of the patients seen by these practitioners had neurological disorders. This underestimates the number of neurological problems, however, because it reflects only the number of patients who ultimately receive neurological diagnosis. About 10% of patient present with neurological symptoms and pose neurological questions. Many receive a non-neurological diagnosis. For instance, the patient presenting with vertigo who has Meniere's disease, or a patient with peripheral neuropathy who has diabetes, is often not indicated as a neurological problem on the final diagnosis.

In a recent study by the Family Medicine Division, Dalhousie University, 9% of all patients seen had a

Rank No.	Family Practice Diagnosis	Frequency		Total
		Male	Female	
12	Depressive Neurosis	1,486	6,347	7,833
15	Anxiety Neurosis	1,691	4,954	6,645
27	Headache	1,010	2,475	3,485
38	Back Pain Alone	1,168	1,669	2,837
39	Vascular Lesions	1,134	1,620	2,754
58	Vertigo	629	1,216	1,845
69	Tension Headache	294	1,173	1,467
89	Epilepsy	583	639	1,222
113	Syncope	324	641	965
145	Migraine	130	576	706
153	Pernicious Anemia	238	411	649
155	Parkinsonism	376	261	637
163	Organic Psychosis	223	348	571
175	Backache with other neuritis	192	340	532
236	Senile and presenile dementia	71	205	276
253	Backache with sciatica	110	128	238
307	Hysterical neurosis	27	116	143
323	Multiple sclerosis	42	74	116
332	Facial nerve paralysis	34	74	108
357	Anencephaly, microcephaly	30	55	85
363	Cervical spondylosis	55	24	79
364	Tremor	37	41	78
382	Trigeminal neuralgia	20	44	64
400	Aseptic meningitis	24	27	51
411	Ataxia	30	15	45
420	Meniere's Disease	6	35	41
427	Brain tumor	17	21	38
460	Brachial neuritis	11	11	22
530	Stammer and/or stutter	4	2	6
562	Mental retardation	1	1	2

neurological problem, and neurological problems constituted 6% of all the problems presented by the patients (Hennen, 1976).

In the recent large Virginia Study, (Stewart, 1976) 88,000 patients presented to 118 family physicians with 526,196 coded health care problems over a 2 year period. Thirty eight thousand of the final diagnoses were neurological (7%) and others would undoubtedly be found in the general categories of trauma, vascular disease, back pain, alcohol abuse, and mental illness. A much higher percentage of these patients might have presented with neurological symptoms but received a final non-neurological diagnosis. Table I shows some selected diagnoses from The Virginia Study. It is of interest that 80% of all problems seen in family practice were contained in 102 diagnoses, and 23 diagnoses accounted for 50% of all primary health problems.

Frequency is not the only criteria

for the importance of a neurological problem. Meningitis is not common, but it is extremely important as it must be recognized in order to institute therapy immediately. Thus, consideration must be given to diseases that are unusual, particularly if they are serious and treatable. The College of Family Physicians of Canada has compiled an interesting review of the diseases of general practice (1975) which are important for the general practitioner because of the frequency and seriousness of the illness and necessity of intervention. This list included problems for which the family physician should ordinarily be expected to assume responsibility and management.

Three factors are important in determining the emphasis that should be given to medical students and physicians on any disorder.

1. Frequency
2. Potential seriousness
3. The effect of intervention on the outcome

TABLE II

Emphasis Scores for Neurological Diseases in General Practice

Headache	3 x 4 x 4 =	48*
Sleep disorders	5 x 3 x 3 =	45
Epilepsy	2 x 4 x 4 =	32
Vertigo and dizziness	2 x 4 x 4 =	32
Low back pain	3 x 3 x 3 =	27
D.T	1 x 5 x 5 =	25
Meningitis	1 x 5 x 5 =	25
Fractured skull	1 x 5 x 5 =	25
Head Injury	1 x 5 x 5 =	25
Coma	1 x 5 x 5 =	25
Convulsions and fits	1 x 5 x 5 =	25
Tiredness	2 x 3 x 4 =	24
Muscle Cramps	2 x 3 x 4 =	24
Neuroophthalmology	1 x 5 x 4 =	20
Aphasia	2 x 3 x 3 =	18
Migraine	2 x 3 x 3 =	18
Neuritis	2 x 3 x 3 =	18
Stroke	1 x 4 x 4 =	16
Prolapsed L. disc	1 x 4 x 4 =	16
Neurootology	1 x 4 x 4 =	16
Syncope, blackouts	1 x 4 x 4 =	16
Involuntary movements	1 x 4 x 4 =	16
Disturbance of sensation	1 x 4 x 3 =	12
Cerebral palsy	1 x 4 x 3 =	12
Multiple sclerosis	1 x 4 x 3 =	12
Mental retard	1 x 4 x 3 =	12
Organic Psychosis	1 x 4 x 3 =	12
Brain tumor	1 x 5 x 2 =	10
Hysteria	1 x 3 x 3 =	9
Parkinson's	1 x 3 x 3 =	9
Bells Palsy	1 x 3 x 3 =	9
Trigeminal neuralgia	1 x 3 x 3 =	9
Sciatica	1 x 3 x 3 =	9
Meniere's	1 x 3 x 3 =	9
Cervical disc disease	1 x 3 x 3 =	9
Thoracic disc disease	1 x 3 x 3 =	9
Downs syndrome	1 x 3 x 3 =	9
Dementia	1 x 3 x 2 =	6
Herpes Zoster	1 x 2 x 2 =	4

*The first digit in the equation represents frequency, the second potential seriousness, and the third the effect of intervention. All digits are chosen from a scale of 1 to 5; 1 being the least and 5 the most.

A score of 1-5 was given for each of the three factors. The emphasis scores are determined by multiplying the three factors. Frequency x seriousness x intervention = EMPHASIS SCORE. Example: Meningitis 1 x 5 x 5 = 25.

Frequency rating is by the Davee, Koehnlein, and Keating tables which determine the number of visits for diseases in a study of 800 physicians (under 50 -1; 50 to 99 -2; 100 to 249 -3; 250 to 599 -4; over 600 -5.)

The list of emphasis scores dem-

onstrates an interesting approach to the importance of various disorders (Table II). Some are extremely important because they are common; i.e. headaches, sleep disorders, and low back pain; some because of the seriousness to the patient, i.e. meningitis, head injury, coma, epilepsy and brain tumor; and others have a high emphasis score because they are so important to treat, i.e. epilepsy and meningitis.

This is one practical approach to answer part of the question of what the student must know. This does not answer the question "What would we like the student to know?" or "What can the student learn if he is particularly motivated or interested?" We would like the student to know more, but we recognize that there are many other fields of medicine that he must master, and states what we think he must know

to take care of the neurological patients in his practice. With this premise, the Second Neurological Education Workshop in Burlington, Vermont (Barrows and Smith, 1974) outlined the problems and conditions which a graduating medical student should know in neurology, because:

- (a) The conditions require emergency management. (Table III).
- (b) The conditions were common. (Table IV).
- (c) The conditions are treatable and because emphasis on treatable neurological disease fosters a positive approach to Neurology. (Table V).
- (d) The conditions are of importance or interest because they aid in understanding the nervous system or illustrate new developments in the neurosciences. (Table VI).

TABLE III

Neurological Conditions Requiring Emergency Management

- Coma (including the initial management of the unconscious patient and a rational approach to identifying the likely etiology and specific therapy)
- Meningitis
- Status epilepticus
- CNS trauma
- Increased intracranial pressure
- Acute visual failure
- Any rapidly progressive neurological deficit

TABLE IV

Neurological Conditions Which are Common

- Headaches
- Dizziness and vertigo
- Alterations in consciousness
- Weakness
- Pain syndromes
- Strokes
- Seizures
- Peripheral neuropathies
- Parkinson's disease
- Multiple sclerosis
- Mental retardation
- Dementia

TABLE V

Neurological Disorders of Importance because they are Treatable, and because emphasis on Treatable Neurological Disease fosters a Positive Approach to Neurology

- Seizures
- Transient ischaemic attacks
- Trigeminal neuralgia
- Subdural hematoma
- Migraine
- Pernicious anemia
- Temporal arteritis
- Myasthenia gravis
- Wilson's Disease
- Parkinson's Disease
- Polymyositis
- Meningitis

TABLE VI

Neurological Disorders of Importance or Interest because they Aid Understanding of the Nervous System

- Disorders of memory
- Disorders of sleep, including narcolepsy
- or because of Importance in Illustrating New Developments in the Neurosciences
- Slow virus infections
- Herpes simplex encephalitis

WHAT ARE THE DIFFICULTIES THE GENERAL PRACTITIONER HAS IN MANAGING NEUROLOGICAL PATIENTS?

In the survey of family practitioners, eleven of the twenty-five had difficulty doing a neurological examination when it was indicated, and twenty-one had difficulty interpreting neurological findings when they found them. Nineteen thought they had too little factual information about diseases of the nervous system. Eighteen of the twenty-five felt they had difficulty in determining whether investigative procedures should be done for neurological problems. Sixteen had difficulty developing a positive attitude towards neurological disease in general. One of the more important problems identified was a negative attitude which many of these physicians had towards neurological problems. This goes beyond their lack of information or confidence and is one of the prime areas to overcome.

When these physicians were asked to comment on the medical school teaching of neurology, eight said their training was adequate in this area, and seventeen felt that there was too little time devoted to neurology. Thirteen felt that they were inadequately prepared to handle neurological problems when they graduated. Twenty-three of the twenty-five physicians indicated that they would like to have short courses in neurology. (Table VII). The short courses they requested have been organized and the response to them was generally enthusiastic. They were well attended and rated highly by the family practitioners. When organizing post-graduate courses, it pays to ask the family practitioner what he would like to have, rather than decide what he needs to know.

WHAT NEUROLOGICAL PROBLEMS ARE REFERRED TO A NEUROLOGIST?

It is important to determine when the general practitioner requires assistance, either in diagnosing or managing his neurological patients. Six hundred and twenty-four consecutive patients referred for private

neurological consultation were reviewed, classified and compared under the headings used in our neurosciences curriculum. A number of disorders did not fit into these headings, but the disease was included wherever it was most appropriate. (Table VIII).

It is of interest that these figures are identical to the study carried out in the United States on the practice of neurologists. (Rose, 1971). Eighty neurologists identified the last twenty patients they had seen (1,440

TABLE VII

Short Courses in Neurology Requested by Practitioners

Headache and facial pain	18
Neurological examination and diagnostic methods	17
Dizziness and vertigo	17
Pediatric neurological problems	10
Epilepsy and blackouts	7
Pain and its treatment	7
Parkinson's disease	7
C.N.S. trauma	7
Strokes	5
Multiple sclerosis	3

TABLE VIII

Neurological Problems Referred to a Neurologist

Headache	118	18.6%
Epilepsy	89	12.4%
"Functional"	70	11.0%
Cerebrovascular	53	8.4%
Disc disease	32	5.0%
Degenerative CNS disease	32	5.0%
Tumors	31	4.9%
Vertigo and dizziness	31	4.9%
Neuro-ophthalmology	28	4.5%
Multiple sclerosis	24	3.8%
Dementia	20	3.1%
Neuropathy	19	3.0%
Pain syndromes	18	2.8%
Essential tremor	12	1.9%
Post concussion syndrome	10	1.6%
CNS infection	7	1.1%
Narcolepsy	6	.9%
Bladder disturbances	5	.8%
Mental retardation	4	.6%
Drug complications	3	.5%
Other	12	1.9%
TOTAL	624	

patients). A review of the patients seen by neurologists indicates that common problems are commonly referred. A comparable study of the referrals to a pediatric neurologist is shown in Table IX. (Tibbles 1976).

It is imperative that those who assess neurological problems, whether in family practice or in consulting rooms, recognize the importance of psychogenic factors in the precipitation of neurological-like syndromes, or in aggravating neurological problems. In a prospective analysis of 235 consecutive patients (Table X) it was found that anxiety was the primary problem in 8.9% and complicated or aggravated a neurological problem in a further 23.9%. Nine point four percent had chronic or acute anxiety unrelated to the presenting problem. Depression was the primary problem in 5.5%, an aggravating factor in 6.4% and an unrelated problem in 3%. A further 6.5% of patients referred had other psychiatric problems including dementia.

Overall, about 3% of patients seen in family practice are referred to a specialist and 8% of these referrals are to a neurologist. (Metcalf, 1973). The various reasons given for referring patients is of interest to the specialist. These include the need (1) for additional skills and therapy that the family practitioner does not possess, (2) for patient reassurance, (3) for a second opinion in a difficult case, (4) for continuing education, and (5) for convenience.

WHAT NEUROLOGICAL PROBLEMS CONSTITUTE THE CLINICAL TRAINING OF MEDICAL STUDENTS AND INTERNS?

The in-patient neurological problems constitute the basis for the training of medical students and interns. To determine how relevant this experience is, an assessment of 392 successive admissions to the Neurology Service at the Victoria General Hospital, Halifax was carried out. (Table XI). The Neurology Outpatient Service and the experience in the Parkinson's Clinic and special neurological clinic was not assessed, because the number of

TABLE IX

Neurological Problems Referred to a Pediatric Neurologist
(Tibbles, 1976)

		%
Epilepsy	463	23.2
Headaches	203	10.2
Borderland of epilepsy (vertigo, breath holding syncope, nightmares, etc.)	213	10.6
Cerebral Palsy	138	6.9
Cerebral Agenesis	277	13.8
Learning and Communication Disorders	391	19.5
Metabolic Disturbances	17	.8
Behaviour of emotional disorders	149	7.5
Degenerative diseases:		
CNS	38)	
Neuropathies	14) ---	3.7
Myopathies	22)	
Miscellaneous:		
Trauma	34)	
Tumors	16)	
Infection	12) ---	3.7
Stroke	5)	
Other	8)	

students who received this experience is small. The breakdown of pediatric neurological patients in a large teaching pediatric hospital is shown in Table XII.

The problems seen in the hospital are unusual and tend to give a distorted view of the neurological problems seen in practice. This list looks different than the list of patients seen in family practice or referral practice. Students receive a distorted view of common presenting problems such as headache, dizziness and epilepsy. Although unusual and more complex, these patients constitute the bulk of neurological material used to teach undergraduate students, clinical clerks and interns. These patients increase the student's concept that neurological problems are complex, difficult to understand and difficult to manage. One answer to this is to have the students see neurological problems in an ambulatory setting, so that common neurological problems are seen, examined and managed.

Although it is imperative that stu-

dents be able to examine real patients, we are coming to a crisis situation in our hospitals with patients being overutilized for teaching purposes as first, second and third year students spend more and more time on the wards. One alternative method is the use of simulated patients, as demonstrated by Barrows (1971).

CURRICULUM REVIEW:

A review of the curriculum of neurosciences teaching in our medical school led to two initial conclusions;

1. There is more basic science teaching than necessary to understand or manage neurological problems.
2. The neurological problems taught did not reflect the areas that are of importance in clinical practice.

Although there has been a dramatic reduction in basic science teaching from "the old days", this constitutes a sizable portion of the students' studies in medical school. In discussions with students and clinicians, concern is expressed that

TABLE X

Psychiatric Problems Seen in Neurological Practice
(235 CONSECUTIVE REFERRALS)

	Number	Per Cent
ANXIETY:		
Primary problem	21	8.9
Aggravating factor	55	23.9
Unrelated problem	22	9.4
DEPRESSION:		
Primary problem	13	5.5
Aggravating factor	15	6.4
Unrelated problem	7	3.0
Anxiety & Depression	27	11.5
Organic brain syndrome (dementia)	10	4.2
Mental retardation	3	1.3
Psychosis	2	0.9
Sociopathic personality disorders	1	0.4

the separation of the basic sciences from clinical neurosciences makes it difficult for the student to later tie the information together. When taught nerve conduction in physiology, it seems to be an isolated scientific phenomena which the student forgets when he sees patients with peripheral neuropathy.

It is suggested that the undergraduate student gets too much basic neurosciences along with too little concern for what is important for him to know. The basic neurosciences should be taught in relation to clinical problems and not as a separate scientific entity in a different year than the clinical material. This might develop a more interesting neurosciences program and give the students a better basis for understanding the nervous system. An isolated basic neurosciences curriculum reduces their interest in the nervous system and colors their attitudes when they approach the clinical years and practice.

A review of the material being taught in our medical school, the

TABLE XI

Breakdown of Primary Diagnoses, Ward Adult Neurology

Primary Diagnosis	No. of Cases	% of Cases
Cerebrovascular disease	117	29.8
Seizures	75	19.1
Degenerative disease	32	8.2
Neurosis	28	7.1
Headache	20	5.1
Peripheral neuropathy	20	5.1
Infection of C.N.S.	20	5.1
Multiple sclerosis	18	5.0
Dementia	15	3.8
Drug complications	10	2.5
Myopathy	10	2.5
Lumbar and cervical disc syndrome	8	2.0
Neuro-otology	8	2.0
Tumors	7	1.8
Neuro-ophthalmology	4	1.0
TOTAL	392	

TABLE XII

Breakdown of Primary Diagnoses, Pediatric Hospital Neurology (Tibbles 1976)

Primary Diagnosis	No. of Cases	% of Cases
Infections	583	20.04
Febrile seizures	568	19.53
Mental retardation	401	13.78
Epilepsy	351	12.07
Cerebral palsy	309	10.60
Degenerative disorders	265	9.12
Borderland of epilepsy	217	7.41
Myopathy	70	2.4
Neuropathy	69	2.30
Headaches	61	2.09
Tumors	8	.27
Other	5	.17
Learning disorders	1	.03
TOTAL	2,908	

experience of the students and house staff, and the time being spent on various aspects of neurology was carried out. Unfortunately, this did not relate to the areas that were important in clinical practice. The basis for the family practitioner's complaints and problems could be seen. For instance, there has been a tendency to teach by a seed catalogue approach of specific diseases. The physician, however, is invariably presented with signs and symptoms by the patient, and we should teach the student how to approach these undifferentiated problems in terms of diagnosis, investigation and management, rather than teach the specific disease entities in isolation.

DISCUSSION:

Students need a positive attitude towards the understanding of the nervous system and the diseases that affect it. The problem-solving approach appears to be the most successful and stimulating way to do this.

The attitudes and skills required to effectively solve CNS problems requires an increasing emphasis on teaching the neurological examination and more experience in seeing neurological problems during the undergraduate years.

Ability to assess and manage the common neurological problems seen in practice requires a careful definition of what problems are important, and a practical and clear approach and understanding should be given to the medical student in these areas. The less important, less common and less treatable neurological oddities should be left in the domain of the neurologist.

Spaulding (1976) noted that curriculum committees and examining boards were made up of experts who (1) were medical school faculty (2) were teachers and supervisors of residents (3) were subspecialists (4) use sophisticated laboratories (5) were research oriented and (6) were age 35-50. But, "most doctors have NO medical school affiliation, do NOT teach and supervise residents, do NOT use sophisticated laboratories and conduct NO research. In brief, their professional lives differ markedly from that of the experts. This being the case, is it rational to rely on experts to select, by what is largely a subjective process, content for practitioners and residents, most of whom will practice remote from a medical school? Would it not be more sensible to have "users" work with experts on selection groups, the "users" being respected practitioners with charac-

teristics and experiences differing from but complementing those of the academic experts.

A careful assessment must be made of the time and methods required to make the students competent to handle common and important neurological problems. Proficiency in history taking and neurological examination enables the student to approach intelligently neurological problems he has never seen before.

Is the teaching and understanding of neurological problems for general practice simple? No. At the first Neurological Education Workshop at McMaster University, the neurologists were asked to select patients which would generate maximum learning values to undergraduates. The neurologists selected 13 patients and felt that most basic and clinical neurology could be covered by discussion around these problems. (Table XIII)

Although there was discussion about the appropriate and relevant material to offer undergraduate students, the one non-negotiable matter was the necessity of students knowing how to perform a good and competent neurological examination. In reference to the diseases used to teach medical students, it is suggested that the emphasis score and

other data from family practice studies should be considered and evaluated in a medical student program.

Stewart (1976) noting that there were 1800 visits for vertigo in the family practice study in Virginia commented. "I believe that this is a symptom that many of us do not have a good handle on. We probably need to develop greater skills in the precise diagnosis and management of this relatively common complaint. The family physician should be well versed in the management of the epileptic patient in view of the 1200 visits that this diagnosis occasioned." Are we now training our graduating students to competently assess vertigo and to assess and manage epilepsy? Probably not.

The student might attain a more realistic appreciation of his ability to handle neurological problems if he set out to answer five questions on all problems he meets in his training and practice.

1. Is the problem in the nervous system?
2. If it is in the nervous system, at what level is it (muscle, peripheral nerve, cord, brain stem or brain)?
3. What is the probable pathology of the process?
4. What is the likely etiology of this pathological process?
5. What therapeutic measures are required?

Is the approach to relevant neurological problems too mechanistic, too practical, too simplistic? I think not. The program of teaching *process* only has been increasingly rejected by students in recent years

TABLE XIII
*Basic Neurological Problems
for Teaching*

Headache
Vertigo
Dementia
Encephalopathy
Movement disorders
Pain syndromes
Anatomical localization problems
Muscle wasting
Aphasia
Epilepsy
Paresthesiae
Coma
Polyneuritis

and the system of teaching undifferentiated facts and information has a 50-year record of poor results.

The argument about process vs. practicality, of algorithm vs. algebra fades in significance when there is adequate evidence from various areas to show that many physicians have not been taught the basic skills necessary to handle the problems they see every day. We can no longer ignore the fact that we are not providing the graduating medical student with the attitudes, skills and information that will allow him to properly assess and care for the many neurological problems he will encounter in his patients.

When we have trained a new generation of physicians who can do a competent and confident neurological history and examination, manage the common neurological problems and be prepared for the emergency situations, then we can comfortably contemplate the more academic arguments.

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