

Developing a neurology training program in Honduras: A joint project of neurologists in Honduras and the World Federation of Neurology

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Abstract

One of the major barriers to the provision of quality care for patients with neurological disorders in developing countries is a low ratio of neurologists per inhabitants, the World Health Organization recommends one neurologist per 100,000. In 1998 Honduras had one neurologist per 325,000 inhabitants and all the neurologists were trained outside the country. The Education Committee of the World Federation of Neurology (WFN), in collaboration with the Postgraduate Direction of the National Autonomous University of Honduras, the Honduran Neurological Association, and the Honduran Secretary of Health helped establish the country's first Neurology Training Program in 1998. This program was established using a problem- and epidemiological-oriented methodology with oversight by an external WFN review board. By 2006 the program has resulted in a 31% increase in the national neurologist ratio per inhabitant, significantly improved the quality of patient care and promoted research in the neurosciences. The Honduras Neurology Training Program has provided a valuable model for other developing countries with similar needs for neurological care. Based on this Honduras experience, members of the Education Committee of the WFN have established guidelines for neurology training programs in developing countries.

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1. Introduction

An analysis recently published by the World Health Organization (WHO) and the World Federation of Neurology (WFN) showed that the leading neurological health problems in the world are epilepsy, cerebrovascular disease, headache, Parkinson's disease and other movement disorders, neuropathies, neuroinfections, cognitive disorders, vertebral disorders, head trauma, multiple sclerosis and other demyelinating disorders [1,2]. According to WHO 11% of the world's population die from a neurological disease [1,2]. Cerebrovascular diseases are the second leading cause of

death in the world [1–4]. In developing countries, many neurological diseases are often due to preventable causes such as neuroinfections (brain parasitosis, malaria, tuberculosis, and AIDS), birth trauma, and nutritional deficiencies [1,5,6]. Recent changes in the epidemiological profile of developing countries, especially related to increasing survival rates, are increasing the prevalence of chronic diseases such as diabetes and hypertension, which increases the incidence of neurologic conditions. Even though life expectancy is rising in these regions, the percentage of years spent with neurologic disability is also rising [1,7].

The significant burden of neurological disease in developing countries is compounded by the small number of practicing neurologists. The commitment of the WFN to the prevention and treatment of neurological disorders worldwide is reflected in their assistance to developing

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countries to improve neurological care by promoting education and research [8]. The involvement of the WFN in the initial development and ongoing evaluation of the Neurology Training Program in Honduras exemplifies this commitment [8]. The strategies, process, and experience with this pilot Neurology Training Program have contributed to developing a model program tailored for a specific country's needs while meeting more universal standards for education and health care.

2. Methods

2.1. Process for creating the Honduran Neurology Training Program

2.1.1. Assessment of needs in neurological care

The need for improved and expanded neurological services in Honduras was evident to the Honduran Association of Neurology (WFN Chapter). In 1997, members of the Association received the support of the National Autonomous University of Honduras (UNAH) to perform a feasibility study for a Neurology residency program. In February of 1998, following a visit to Honduras by WFN Secretary Dr. Clifford Rose, faculty members of the Neurology Department at Hospital Escuela UNAH were encouraged to request assistance from the WFN to develop a Neurology Training Program. Site visits from WFN officials helped in assessing the needs for the initiation of this program.

A broad-based assessment of the scope and quality of several indicators of neurological care in Honduras from 1996 to 1998 demonstrated that the ratio of neurologists per inhabitant was 1:325,000, significantly below the WHO recommendation of 1:100,000 [9–13]. Only 0.2% of all Honduran physicians were neurologists. Rehabilitation, neurophysiology, neuroradiology, pediatric neurology, and epilepsy services were in a developmental stage, insufficient to meet patient demand in both public and private health centers. The low percentage of hospital consultations with neurologists was in stark contrast to the need for such consultations as 20% of the population was in need of neurological services [10,11]. Neurological care was primarily provided through the services of internal medicine and pediatrics, with limited neurology services available in public hospitals.

2.1.2. Establishing formal collaboration with local institutions and with the World Federation of Neurology

In close collaboration with the Honduran Secretary of Health, the UNAH became the primary sponsoring institution with ultimate responsibility for the program. The Education Committee of the WFN became the external sponsoring institution. A thorough evaluation by a WFN committee of international neurologists with expertise in neurology education concluded that the Neurology Department and UNAH had the necessary human and material resources to offer an effective, high-quality 3-year training program in

Neurology. This evaluation included a critical site visit by the WFN Education Subcommittee (TM and APS). They assessed facilities, conferred with prospective program faculty members, and discussed the prospective program with administrative officials of Hospital Escuela UNAH, and the Honduran Secretary of Health. A coordinator of the evaluation and development process was appointed (MTM). The Neurology Training Program was developed in the months following these activities and was formally approved by the University Council of the UNAH on October 29, 1998. Shortly thereafter, the first four residents were accepted into the adult Neurology residency program.

2.1.3. Assessing material and human resources

Participating institutions provided the basic resources for the education of Neurology residents. The number and type of patients was found to be appropriate for inpatients and outpatients. Adequate contemporary facilities were available for offices, clinical laboratory, electrophysiologic and imaging studies and record-keeping.

Critical existing material resources included diagnostic tools (brain and spinal cord CT and MRI scans, visual and auditory evoked potentials, EEG, EMG/NCV) which were available at existing public and private facilities in and around Tegucigalpa, the capital of Honduras. An appropriate collection of paper and electronic neurology journals and the technology to access additional updated scientific information online were also available to the program. A Program Director accountable for the administrative and educational operation of the program together with a multidisciplinary faculty team qualified and committed for teaching and research were appointed. Key personnel resources included an accomplished and motivated group of specialists trained in neuroradiology, neuropathology, psychiatry, and neurosurgery.

Given the limits of existing resources in Honduras, collaboration with other institutions in providing visiting faculty, research opportunities, and rotations in outside neurology departments has been invaluable in promoting a high standard of neurological education within the residency program. To date, the program has received collaborative support from the Dutch Neurological Society, Spanish Neurological Society (SEN), Horowitz Foundation, Honduran Epilepsy Society, Honduran Neurological Association, Salvador Moncada Foundation, Instituto de Neurociencias (Honduras), University of California in Los Angeles, Hospital Henri Gastaut (Saint Paul Center in Marseilles, France), National Institute of Neurology and Neurosurgery of Mexico, Neurological Institute of La Havana (Cuba), Baylor University (Houston, Texas), the University of Vancouver in Canada, the Wolfson Institute at the University College of London, the University Hospital of La Paz in Madrid, the Laboratory of Molecular Medicine and Neuroscience of the National Institute of Neurological Disorders and Stroke, the National Institutes of Health, the Alicante University (Spain), the National Institute of Nutrition "Salvador Zubirana"

(Mexico), the Greenwood Genetic Center (Greenwood, South Carolina), the Medical University of South Carolina, and Loma Linda University, Pitie Salpêtrière at Paris and Liege University at Belgium.

2.1.4. Designing the curriculum for the program

Collaborating institutions agreed on a written program curriculum. This was based on specific national needs and educational goals, with defined requirements for acceptance into the program. The program also defined a philosophical doctrine and a pedagogical system. The national and international organizations collaborating in the creation of the program reached a consensus that: (1) the program should be tailored to the patient needs of Honduras and the surrounding region; (2) significant teaching should be provided by peers. Thus the program should not be too small; (3) clearly defined educational goals for each of the 4 years of the program should be developed by faculty; (4) a minimum of 6 months of supervised research and clinical experience outside of Honduras was to be provided; (5) teaching should be problem based and patient oriented in appropriate settings with minimal use of didactic lectures; (6) frequent evaluative meetings with involved faculty and other institutions should be held; (7) the WFN would be the advisor to the developing program. The philosophical framework for these guidelines consists of an integration of three axes, Psychomotor (skills-based), Cognitive (knowledge-based), and Ethical-affective (values-based). The framework was derived from the assumption that a well-trained and effective neurologist must be able to obtain appropriate clinical data and then use such data systematically to reach syndromic, anatomical, and etiological conclusions which lead to a sound treatment plan in a grounded ethical context.

The program defined educational goals based on problem-based methodology and included 1 year of Internal Medicine, 3 years of Neurology, and an international interchange through visiting professors and external rotations. The education process included six areas: academic, clinical, research, social, bioethical, and administrative. Specific guidelines describing the curriculum and the process for a program development are part of this document.

2.1.5. Continuing development of the program

2.1.5.1. Establishing a systematic program evaluation.

Both internal (biannual) and external (annual) reviews of the pedagogical and administrative programs by the Direction of Postgraduate Education of the UNAH and WFN Education Committee were scheduled. All program components and training processes of the Honduran Neurology Training Program, including educational and research elements, are evaluated internally on an annual basis. In addition, external evaluation was performed by representatives of the Education Committee of the WFN in September 1998, March 2000, March 2001, November 2002, November 2003, February 2004, February 2005 and February 2006. During

the 2002, 2004, and 2006 visits, certification and re-certification processes for neurologists were established jointly by the Honduran Neurological Association, the Honduran Neurology Board, and the WFN. The most recent 2006 external evaluation found “the program continues to function at a very high level, comparable to excellent programs elsewhere in the world.” The neurology residents’ training “clearly conforms to the WFN Guidelines on Training Programs in Neurology—the standard by which we judge all programs.” “Furthermore, we are beginning to see evidence that the ultimate goal—the improvement in health of Honduran citizens—is beginning to be reached”.

2.1.5.2. *Fund raising for the program.* To cover the needs for program development, a fund raising plan was started in 1998. Local and international funds (Dutch Neurological Society, Spanish Neurological Society and Horowitz Foundation) have been used to cover costs of diagnostic neurophysiology equipment, access to WFN and WHO supported neurological educational literature and materials, rotations in foreign neurology services, research protocols, and sub-specialty fellowships for some residents who graduate from the program. Additionally, the program raised funding for continuing medical education of the faculty.

3. Results

3.1. Improvement in the neurologist–population ratio

In November 2002, the first four graduating Neurology residents successfully completed the certification process, which included oral and written examinations. As of December 2005, a total of nine neurologists have graduated from the program. These new neurologists currently represent 31% of the neurologists in Honduras. One of the most significant consequences of the Neurology Training Program in Honduras has been this improvement in the neurologist–population ratio by 31% from 1:325,000 to approximately 1:233,000 between 1998 and 2006. This decreasing ratio should continue to result in better patient care both in rural areas and at the Hospital Escuela in Tegucigalpa, where teamwork with other specialties is promoted by the program. In 1998 only 10% of people in Honduras with neurological disorders had ever consulted a neurologist (unpublished data). It is reasonably expected that with the increasing number of neurologists in the country, the percentage of people who are able to see a neurologist will increase.

3.2. Improved quality of neurological care

Neurological care began improving at UNAH soon after the Neurology Training Program was established. Concurrent with the training program was the development of established guidelines for clinical evaluation, diagnosis, and treatment of uncommon as well as common neurological diseases. This resulted, for the first-time, diagnosis and

subsequent local treatment of diseases including Tropical Spastic Paraparesis, Creutzfeldt-Jakob disease, Huntington's Chorea, Rett syndrome, and others confirmed by molecular biology and neuropathological studies. Following completion of the standard Neurology Training Program, foreign sub-specialty training has been achieved by two former Neurology residents and a Neurology junior faculty member in epilepsy (U.S.A.), stroke (Mexico), and neuromuscular diseases (Spain). Several thousand neurological consultations are performed each year, giving the general population better access to neurological care through the Neurology residents and faculty.

However, there is still room for improvement in the morbidity and mortality of many of the common neurological disorders. A major thrust to further improve the diagnosis, treatment, and outcomes of the most common neurological diseases in Honduras will most likely require neuroepidemiological research, which has been incorporated into the Neurology Training Program.

3.3. Teaching and research

Teaching of other general and specialty residents, medical students, nurses, and other health care personnel was set as an important goal of the resident's training. An important product of the Honduran Neurology Training Program has been its contribution to the knowledge of the epidemiology of neurological diseases of the country. Epidemiological data from Honduras indicated that, as in the rest of the world, neurological diseases present a significant public health problem, constituting up to 20% of consultations to public health services [9–11]. The combined effort of Neurology residents, medical students, and faculty also results in the promotion of public health interventions and alternative treatments. Residents also participate in courses on ethics.

According to population-based studies, the most prevalent disorders in Tegucigalpa were headache (125.9/1000), epilepsy (13.4/1000), neuropathies (8.9/1000), cerebrovascular disease (5.7/000), cognitive disorders (3.2/1000), and sleep disorders (1.4/1000) [10,11]. Research protocols have been completed in the genetics of the epilepsies, stroke, neurocysticercosis, neurovirology, Alzheimer's and APOE4, multiple sclerosis, nutrition, anthropology, cognitive neurology, treatment gap in epilepsy, epilepsy quality of life and migraine [14–26]. Three of these studies received the Annual Award on Clinical Research by the Honduran College of Physicians.

Since epilepsy is life threatening as well as a major public health problem in Honduras, basic epidemiological and clinical research in this disorder has been of particular value. One of the most important projects to date started when the School of Medical Sciences of UNAH requested the Neurology Training Program to coordinate the National Epilepsy Study that was conducted by physicians in Social Service from 1999 to 2002. Following a survey of 135,126 Hondurans, this study determined a national epilepsy

prevalence of 5.4/1000 and an incidence ranging from 48 to 254/100,000 inhabitants, with regional variations and a strong relation to preventable causes [8,10,15]. Other research has been developed as part of the graduation thesis protocol, and studies on epilepsy prevalence, epilepsy genetics, and stroke have been presented during Postgraduate Congresses of 2002 and 2003. In 2003 and 2004, theses on the first population-based stroke studies from Honduras were presented at the Postgraduate Congress. These studies determined a stroke prevalence of 5.7/1000 and incidence of 65.6/100,000 inhabitants, with hypertension as the most important associated risk factor [25].

4. Discussion

4.1. Next steps: guidelines for neurology training in developing countries

The epidemiological panorama outlined for Honduras is similar in many ways to that of other developing countries. A broad analysis of the capacity of existing neurological care, prevention, and rehabilitation services for such countries will assess region-specific needs for the training of more neurologists. Given the WFN experience in Honduras, it is apparent that training programs in neurology can and should be established in countries where there are pressing neurological health needs that are not being addressed [26]. With the support of local universities and health authorities and adequate material and human resources, programs of effectiveness and excellence can be successfully developed with national and international collaboration [22].

Based on this Honduras experience, members of the Education Committee of the WFN established guidelines for the development of Neurology Training Programs. Such guidelines should prove a valuable resource for other countries with an interest in and commitment to developing and implementing their own Neurology Training Programs.

5. World Federation of Neurology guidelines for training in neurology

5.1. Definition

Neurology is a medical specialty concerned with the diagnosis and treatment of all diseases involving the central, peripheral, and autonomic nervous systems. For these diseases, the neurologist is often the principal care physician, and may render all levels of care commensurate with his training. The guidelines contained herein were particularly developed for training programs in developing countries.

5.2. Duration and scope of training

A complete training in neurology requires at least 4 years. The first year or more should comprise a broad clinical

experience in general internal medicine. Trainees should spend no more than 2 months in neurology during this time.

5.3. Goals and objectives

The purpose of the program is to prepare the physician for the independent practice of clinical neurology. This training must be based on supervised clinical work with increasing responsibility for outpatients and inpatients. It should have a foundation of organized instruction in the basic neurosciences.

5.4. Program design

All educational components of a residency program should be related to program goals. The program design and structure should be clearly stated and approved by the WFN.

5.5. Program institutions

One sponsoring institution must assume the ultimate responsibility for the program. This responsibility extends to trainee assignments at all participating institutions.

Assignment to a participating institution should be based on a clear educational rationale, integral to the program curriculum, with clearly stated activities, objectives and responsibilities. The institution should provide an educational experience not otherwise available. When multiple participating institutions are used, there should be assurance of the continuity of the educational experience. Assignment to a participating institution requires a letter of agreement.

5.6. Program personnel and resources

There must be a single Program Director responsible for the program. The person designated with this authority is accountable for the operation of the program and should be a member of the staff of the sponsoring institution. The WFN should be notified in the event of an anticipated change of Program Director.

The Program Director should possess documented neurologic, administrative and educational expertise. He should be in good standing and based at the primary teaching site. The Program Director and faculty are responsible for the general administration of the program and for the establishment and maintenance of a stable educational environment. Adequate lengths of appointment for the Program Director and faculty are essential to maintaining such an environment. The length of appointment for the Program Director should provide for continuity of leadership.

The Program Director should oversee and organize the activities of the educational program in all institutions that participate in the program. This includes selecting and supervising the faculty and other program personnel at each participating institution, appointing a local site director, and monitoring appropriate trainee supervision at all participat-

ing institutions. He is responsible for preparing an accurate statistical and narrative description of the program, as well as updating annually both program and trainee records.

The Program Director must seek the prior approval of the WFN for any changes in the program that may significantly alter the educational experience of the trainees. Such changes, for example, include addition or deletion of a participating institution, change in the educational program or change in the administrative structure.

The Program Director is responsible for monitoring trainee stress, including mental or emotional conditions inhibiting learning, and drug- or alcohol-related dysfunction. Both the Program Director and faculty should be sensitive to the need for timely provision of confidential counseling and psychological support services to trainees. Situations that demand excessive service or that consistently produce undesirable stress on trainees must be recognized and modified.

5.7. Faculty

At each participating institution, there should be a sufficient number of faculty with documented qualifications to instruct and adequately supervise all trainees in the program. The faculty must include a Program Director and a minimum of 4 neurology faculty who provide clinical service and teaching and who devote sufficient time to the program to ensure basic and clinical education for trainees. A faculty to trainee ratio of 1:1 is appropriate.

This faculty should have diverse interests and skills in an appropriate range of teaching and research. They should ensure adequate clinical opportunities for trainees; and provide continued instruction through seminars, conferences, and teaching rounds.

Faculty with special expertise in all the disciplines related to neurology should be available on a regular basis to the trainees. These disciplines should include neuro-ophthalmology, neuromuscular diseases, cerebrovascular disease, epilepsy, movement disorders, critical care, clinical neurophysiology, behavioral neurology, neuroimmunology, infectious disease, neuro-otology, neuroimaging, neuro-oncology, pain management, neurogenetics, child neurology, the neurology of aging, sleep disorders and psychiatry.

The faculty must devote sufficient time to the educational program to fulfill their supervisory and teaching responsibilities. They must demonstrate a strong interest in the education of trainees, demonstrate competence in both clinical care and teaching abilities, and must support the goals and objectives of the educational program of which they are a member. They should demonstrate commitment to their own continuing medical education by participating in scholarly activities.

The teaching faculty should periodically evaluate the use of the resources available to the program, the contribution of each institution participating in the program, the financial and administrative support of the program, the volume and

variety of patients available to the program for educational purposes, the performance of members of the teaching staff, and the quality of supervision of trainees.

The physician faculty should possess appropriate specialty expertise and be appointed in good standing to the staff of an institution participating in the program. They are responsible for establishing an environment of inquiry and scholarship as well as an active research component. There should be regular participation in clinical discussions, rounds, journal clubs and research conferences. Trainees should be encouraged to participate in a supervised research activity.

5.8. Resources

It is the Program Director's responsibility to ensure that the number and character of patients is appropriate. They should be diversified as to age and sex, short-term and long-term neurologic problems, and inpatients and outpatients. They should include emergency and intensive care problems.

Adequate contemporary clinical laboratory facilities that report the results of necessary laboratory in a timely manner should be available. There should be facilities for electrophysiologic and imaging studies. Chart and record-keeping systems should be available.

Trainees should have access to an adequate medical library which includes electronic retrieval of information from medical databases. Ideally, trainees should have their own space devoted to quiet study and information retrieval.

5.9. Trainees

The WFN and the host institution will approve the number of trainees based upon written criteria that include the adequacy of resources for trainee education, faculty–trainee ratio, institutional funding, and the quality of faculty teaching. Attempts should be made to have an equal number of trainees at each level of training. Appointments should be as flexible as possible, especially for trainees who have responsibility for child care. Each program should have an equitable vacation plan for trainees, in accordance with overall institutional policy. A minimum of two trainees at each level should be a goal.

5.10. Program curriculum

The program design and sequencing of educational experiences will be approved by the WFN as part of the initial review process. The program must possess a written statement that outlines its educational goals with respect to the knowledge, skills, and other attributes of trainees for each major assignment and for each level of the program. This statement must be distributed to trainees and faculty, and must be reviewed with trainees prior to their assignments. The Program Director, with assistance of the faculty, is

responsible for developing and implementing the academic and clinical program of trainee education by:

- (a) preparing and implementing a comprehensive, well-organized, and effective curriculum, both academic and clinical, which includes the presentation of core specialty knowledge supplemented by the addition of current information.
- (b) providing trainees with direct experience in progressive responsibility for patient management.

Trainees must regularly attend seminars and conferences in the following disciplines: neuropathology, neuroradiology, neuro-ophthalmology, neuromuscular diseases, cerebrovascular diseases, epilepsy, movement disorders, critical care, clinical neurophysiology, behavioral neurology, neuroimmunology, infectious diseases, neuro-otology, neuroimaging, neuro-oncology, sleep disorders, pain management, neurogenetics, rehabilitation, child neurology, the neurology of aging, and general neurology. There must be gross and microscopic pathology conferences and clinical pathological conferences. Trainees must have increasing responsibility for the planning and supervision of the conferences. Trainees must learn about major developments in both the basic and clinical sciences relating to neurology. They must attend periodic seminars, journal clubs, lectures in basic science, didactic courses, and meetings of local and national neurological societies.

Patient care, teaching and research must be present in every training program. Patient care responsibilities must ensure a balance between patient care and education that achieves for the trainee an optimal educational experience consistent with the best medical care. Patient care responsibilities must include inpatient, outpatient, and consultation experiences.

The program must include a minimum of 18 months of clinical adult neurology with management responsibility for patient care. This must include at least 6 months of inpatient experience in adult neurology and at least 6 months of outpatient experience in clinical adult neurology.

Trainees in neurology must have experience with neurological disorders in children under the supervision of a child neurologist. This should consist of a minimum of 3 months in clinical child neurology with management responsibility in patient care.

Each Program must provide an opportunity for trainees to participate in research or other scholarly activities.

The Program must require its trainees to become competent in the areas listed below to the level expected of a new practitioner. Programs should provide educational experiences as needed in order for their trainees to demonstrate the following:

- (a) Patient care that is compassionate, appropriate, and effective for the treatment of neurologic diseases and the promotion of health.

- (b) Medical knowledge about established and evolving biomedical, clinical, and cognate sciences, as well as the application of this knowledge to patient care.
- (c) Practice-based learning that involves the investigation and evaluation of care for their patients, the appraisal and assimilation of scientific evidence, and improvements in patient care.
- (d) Interpersonal and communication skills that result in the effective exchange of information and collaboration with patients, their families, and other health professionals.
- (e) Professionalism, as manifested through a commitment to carrying out professional responsibilities, adherence to ethical principles, and sensitivity to patients of diverse backgrounds.

5.11. Teaching rounds

Clinical teaching rounds must be supervised by the faculty. They should occur at least 5 days per week. Trainees must present cases and their diagnostic and therapeutic plans.

5.12. Clinical teaching

Trainees must have instruction and practical experience in obtaining an orderly and detailed history from the patient, in conducting a thorough general and neurological examination, and in organizing and recording data. The training must include the indications for, and limitations of, clinical neurodiagnostic tests and their interpretation. Trainees must learn to correlate the information derived from these neurodiagnostic studies with the clinical history and examination in formulating a differential diagnosis and management plan.

Trainees should participate in the evaluation of and decision-making for patients with disorders of the nervous system requiring surgical management. The existence of a neurosurgical service with close interaction with the neurology service is essential.

The trainees must participate in the management of patients with psychiatric disorders. The program must include at least 1 month experience in clinical psychiatry, including cognition and behavior. The experience should take place under the supervision of a psychiatrist. They should learn about the psychological aspects of the patient–physician relationship and the importance of personal, social, and cultural factors in disease processes and their clinical expression. Trainees must learn the principles of psychopathology, psychiatric diagnosis, and therapy and the indications for and complications of drugs used in psychiatry.

Trainees must learn the basic principles of rehabilitation for neurological disorders and if possible, should spend 1 month on an academic rehabilitation service.

Trainees must participate in the management of patients with acute neurological disorders in an emergency department.

Trainees in neurology must have experience in neuroimaging that ensures a familiarity with and knowledge of all relevant diagnostic and interventional studies necessary to correlate findings with other clinical information for the care of patients. At a minimum this should include magnetic resonance imaging, computerized tomography and neurosonology. This may be accomplished as an integral part of supervised inpatient or outpatient care during required adult and pediatric neurology rotations, where neurology trainees should review and interpret their own patient's neuroimaging studies under supervision. Additional experience is desirable during rotations on neurosurgery or in subspecialty areas where neuroimaging is particularly relevant to patient care. An organized elective rotation in neuroradiology should be available to those with interests that will require an in-depth understanding of neuroradiology.

Trainees must receive instruction in the principles of bioethics and in the provision of appropriate and cost-effective evaluation and treatment.

Trainees must receive instruction on recognition and management of physical, sexual and emotional abuse.

A formal curriculum is required for bioethics, cost-effective care, and palliative care, including adequate pain relief as well as psychosocial support and counseling for patients and their families.

5.13. Teaching responsibilities

Teaching of other trainees, medical students, nurses, and other health care personnel is an important aspect of the trainee's training.

5.14. Progressive responsibility

Programs should provide opportunities for increasing responsibility and professional maturation of trainees. Early clinical assignments must be based on direct patient responsibility for a limited number of patients. Subsequent assignments must place trainees in a position of taking increased responsibility for patients. Night call is essential in accomplishing these goals. Adequate faculty supervision is essential throughout the program. Neurological training must include assignment on a consultation service.

5.15. Basic science

Trainees must learn the basic sciences on which clinical neurology is founded, including neuroanatomy, neuropathology, neurophysiology, neuroimaging, neuropsychology, neural development, neurochemistry, neuropharmacology, molecular biology, genetics, immunology, epidemiology and biostatistics. The didactic curriculum developed to satisfy this requirement must be organized and complete and will be reviewed by the WFN Residency Review Committee. The basic science component should be explicitly described and specific goals and objectives should be developed.

5.16. Electives

Trainee assignments need not be identical and elective time should accommodate an individual trainee's interests and previous training. Elective time should be a minimum of 3 months and may include rotation to an academic neurology service outside of the country.

5.17. Trainee duties and the working environment

Providing trainees with a sound didactic and clinical education must be carefully planned and balanced with concerns for patient safety and trainee well-being. Each program must ensure that the learning objectives of the program are not compromised by excessive reliance on trainees to fulfill service obligations. Didactic and clinical education must have priority in the allotment of trainee's time and energy. Duty hour assignments must recognize that faculty and trainees collectively have responsibility for the safety and welfare of patients.

All patient care must be supervised by qualified faculty. The Program Director must ensure, direct, and document adequate supervision of trainees at all times. Trainees must be provided with rapid and reliable systems for communicating with supervising faculty. Faculty schedules should be structured to provide trainees with continuous supervision. Faculty and trainees must be able to recognize the signs of fatigue and adopt and apply policies to prevent and counteract its potential harmful effect.

Duty hours are defined as all clinical and academic activities related to the residency program. Duty hours do not include reading and preparation time spent away from the duty site. Duty hours should be limited to about 80 h per week, averaged over a 4 week period. Trainees should be provided with 1 day in seven free from all educational and clinical responsibilities, averaged over a 4 week period, inclusive of call. One day is defined as one continuous 24 h period. Adequate time for rest and personal activities must be provided. Back-up support systems must be provided when patient care responsibilities are unusually difficult or prolonged.

Each program should have written policies and procedures consistent with the above principles which are distributed to the trainees and faculty.

5.18. Evaluation and feedback

The faculty should evaluate in a timely, written and formal manner the trainees they supervise. A yearly evaluation would be appropriate. Each program should have an effective and non-threatening process for assessing trainee performance and for utilizing the results to improve performance and patient care. These evaluations, including recommendations to resolve any deficiencies should become part of the trainee's confidential file in the Department. This file should be available to both faculty and trainee.

Assessments should include medical knowledge, practice based learning, interpersonal and communication skills and professionalism.

The Program Director should provide a final evaluation for each trainee who completes the program. This evaluation should certify that the trainee has demonstrated sufficient professional ability to practice competently and independently. A certificate should be presented to each trainee who has successfully completed the training program.

The performance of the faculty should also be formally and annually evaluated. The evaluations carried out by other faculty and trainees should assess their teaching abilities, commitment to the educational program, clinical knowledge and scholarly activities.

Representative faculty should be organized in a committee to periodically review program goals and objectives; and the effectiveness with which they are achieved. This group should conduct a formal documented meeting at least annually for this purpose and minutes should be kept. Written comments from faculty and trainees should be incorporated into the discussions and steps taken to improve the program should be documented.

5.19. Program evaluation by the WFN

In order to be recognized as an official WFN supervised training program annual on-site reviews by the WFN Residency Review Committee will be required for the first 5 years and thereafter less frequently. This review will consist of interviews with appropriate hospital and university officials, discussions with members of related departments such as medicine and neurosurgery, evaluation of faculty performance and reviews of trainee's skills and development. A report documenting this review with recommended changes will be provided to the Program Director.

6. Goals for WFN neurology training

6.1. General goals

The primary goal of the neurology training program is to provide trainees with the knowledge, skills and experience to practice neurology in both inpatient and outpatient settings with the highest level of competence. At the same time, the program strives to ensure that trainees adhere to the highest ethical standards, and seeks to engender and sustain the qualities of compassion and selfless concern for patients. An additional important aim of the program is to instill the inquisitiveness and learning skills to prepare them for the life-long process of self-education that is essential for the effective practice of neurology. Finally, while stressing these common goals, the program must also accommodate the specific strengths and career goals of individuals with training that has the capacity to be tailored to these individual needs.

These goals are accomplished in the program by providing training in a variety of settings where patients from diverse backgrounds are seen under the supervision of faculty with a broad range of expertise.

6.2. Specific goals

6.2.1. Year 1

The goal of the first year of the program should be to familiarize the trainee with the basic aspects of neurological diagnosis and management, as well as with the neuroscientific principles underlying neurological disease. Trainees in the first year will:

1. Achieve basic competence in obtaining the neurological history and performing a neurological examination on awake and comatose patients.
2. Acquire an understanding of the indications for ordering diagnostic testing, including CT, MRI, angiography, non-invasive vascular studies, EMG, neuropsychological testing and EEG.
3. Acquire the ability to interpret the above studies.
4. Acquire the ability to recognize and initiate management for common neurological emergencies, including increased intracranial pressure, evolving stroke, intracranial hemorrhage, status epilepticus, spinal cord compression and impending respiratory failure due to neuromuscular weakness.
5. Become proficient in recording, organizing and synthesizing a patient's history, examination and diagnostic test results into a coherent written and verbal presentation that effectively conveys the most pertinent information about the patient and provides the basis for discussion of further diagnostic and therapeutic management.
6. Develop the ability to diagnose and therapeutically manage common neurologic problems at a basic level.
7. Learn to distinguish primary neurological problems from those that are primarily psychiatric in etiology or those that arise from primary medical illness.
8. Achieve an understanding of the principles of neurorehabilitation.
9. Receive an introduction to the pathophysiology of neurologic diseases.
10. Develop the ability to use computer searching techniques to seek out information from the published literature.
11. Read, retain, understand and apply reports from the current medical literature to patient problems.

6.2.2. Year 2

In the second year, the skills learned in the first year are solidified and refined. There is emphasis on subspecialty skills and there is increased time for learning the pathophysiology of disease in greater depth. There is also increased management and teaching responsibility and independence in patient care. In this year the trainee is expected to:

1. Achieve an increased level of independence in diagnostic and therapeutic management of neurological management and begin to supervise junior residents in this process.
2. Achieve a basic level of competence in performing EMGs, and an advanced level of competence in the interpretation of EEGs, evoked potentials, CT scans, and MRI scans.
3. Acquire a detailed understanding of the neuroscientific basis for neurology, including molecular biology and genetics, cellular neurophysiology, pathology and cognitive function.
4. Become competent in the basic evaluation and management of neurological problems in pediatric patients. This includes an understanding of the growth and development of the nervous system, diagnostic and therapeutic skills for problems that are unique to infants and children and understanding of how neurological problems that also occur in adulthood are managed differently when they occur in childhood.
5. Gain experience in specific areas of individual interest for each trainee, and initiation of research projects for those trainees interested in basic or clinical research.
6. Begin to formulate career goals.

6.2.3. Year 3

In the third year trainees should be able to function independently in the evaluation and management of patients with neurologic diseases. There is an increased emphasis on teaching, organizational and leadership skills. There is increased time to explore specific areas of neurology that are relevant to the individual trainee's career. By the end of this year trainee should:

1. Demonstrate proficiency and independence in all aspects of neurological evaluation and management.
2. Have interpersonal skills and can lead a clinical team including junior trainees, students and faculty.
3. Refine the ability to organize and balance multiple clinical responsibilities in an efficient and maximally productive manner.
4. Take a primary role in the teaching of students, neurology trainees and trainees in other disciplines particularly neurosurgery, medicine and psychiatry.
5. Pursue areas of specific interest relevant to individual career goals.

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