

The Future of Neurosurgery: A Call to Leadership

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The previous three honored guest papers in this volume have discussed meningiomas, neurosurgical oncology, and third circulation research. In this chapter, I will present three developments that seem to be important in the next decade of neurosurgery, along with a brief discussion of the changing concept of leadership in neurosurgery that may be needed to deal with these developments.

The three developments are: 1) globalization, 2) the patient safety initiative, and 3) neurosurgical neuroscience.

GLOBALIZATION

In the 1980s, the Canadian cultural and literary critic Marshall McLuhan coined the term “The Global Village” to describe a world united by communication, trade, and educational initiatives.⁸ Today, this vision has largely been realized. Globalization is a reality of 21st century world culture, whether in business, music, science, or neurosurgery. The internet, world wide communication systems including cell phones and other satellite-based systems, economic interdependence of all nations, global warming and other common environmental issues, and increasing computer literacy worldwide all create a remarkable change in the world as we know it. Recently, the New York Times writer Thomas Freidman has underscored this development in *The World is Flat*.⁶

In neurosurgery, we must recognize both the challenges and opportunities of globalization. Harvey Cushing understood well the importance of the world community. Among his early trainees were Sir Hugh Cairns, an Australian who went to Oxford after his time in Boston; Kenneth McKenzie, who brought Cushing’s neurosurgery to Toronto; Wilder Penfield, who began the Montreal Neurological Institute; Dimitri Bagdasar, who began neurosurgery in Romania and continues to be remembered in the central neurosurgical institute in Bucharest; and Norman Dott, who brought American neurosurgery to Edinburgh.³ A recent brilliant biography of Cushing by another Canadian, Professor Michael Bliss, suggests that a large part of his contribution to medicine was the international influence he had through his trainees and lecturing.⁴

I have lectured during the last 5 years in South Africa, Morocco, Japan, Korea, China, Australia, Indonesia, Pakistan, Bangladesh, England, France, Germany, Spain, Italy, Greece, Turkey, Argentina, Russia, Switzerland, Columbia, India, the United States, and Canada. I have found amazing similarities among neurosurgeons everywhere. There is now a global approach to our great subspecialty—a desire to achieve surgical excellence and train others; a commitment to increased scientific understanding of the disorders we have to treat; and the excitement of using emerging technology in the service of patients.

Within the world neurosurgical community, there are a number of organizations that are dedicated specifically to world issues in neurosurgery. Chief among them is the World Federation of Neurosurgical Societies (WFNS). Other groups include the Foundation for International Education in Neurosurgery (FIENS), the international efforts of the American Association of Neurological Surgeons (AANS) and the Congress of Neurological Surgeons (CNS), and international subspecialty groups such as the International Society for Stereotactic and Functional Neurosurgery, the International League Against Epilepsy, the International Brain Tumor Association, the International Society of Pediatric Neurosurgery, the International Society of Pituitary Surgeons, and Women in Neurosurgery. There are, of course, other organizations that work with worldwide medical problems that are more general: the World Health Organization (WHO), Doctors without Borders, Mercy Ships, and others listed in *Table 29.1*. These perform the work of international medicine outside of neurosurgery.

Neurosurgery in Developing Countries

Neurosurgery developed late among surgical specialties because of its need for advanced imaging and meticulous surgical techniques. That does not mean that it is unimportant in developing countries today. Neurosurgery is not a luxury subspecialty in medical care. Hydrocephalus, head and spine trauma, brain infections, brain tumors, stroke, and spine degeneration including disc rupture are disabling and important conditions that require appropriate surgical management. With availability of computed tomographic scanners, these become part of mainstream surgical care.

One pattern of neurosurgical development is:

TABLE 29.1. International medical organizations (as listed by the American Medical Association)

Organization	Website
World Medical Association	http://www.wma.net/
World Health Organization—Organisation Mondiale de la Sante	http://www.who.int/home-page
Pan American Health Organization	http://www.paho.org/
United Nations	http://www.un.org/
Global Health Council	http://www.globalhealth.org/
Overseas volunteering opportunities	
International Health Volunteers	http://www.internationalhealthvolunteers.org/
Donation Program for Medical Books and Journals	http://ublib.buffalo.edu/hsl/donationprograms.html
Volunteers in Technical Assistance	http://www.vita.org/
Volunteers in Medicine Institute	http://www.vimi.org/
International Rescue Committee	http://www.theirc.org/
Health Volunteers Overseas	http://www.hvousa.org/
Sight Savers International	http://www.sightsavers.org/
Doctors of the World	http://www.doctorsoftheworld.org/
Doctors Without Borders:	http://www.doctorswithoutborders.org/
Medecins Sans Frontieres USAID	
Project Concern International	http://www.projectconcern.org/
Oxfam America	http://www.oxfamamerica.org/
American Red Cross	http://www.redcross.org/
Operation USA	http://www.opusa.org/
International Medical Corps	http://www.imc-la.org/
UN Humanitarian Affairs: Relief Web	http://www.reliefweb.int/
IMVA: International Medical Volunteers Association	http://www.imva.org/
IRC: International Rescue Committee	http://www.intrescom.org/index.cfm
InterAction: American Council for Voluntary International Action	http://www.interaction.org/
AmeriCares	http://www.americares.org/Home.asp
Physicians With Heart Airlift	http://www.aafp.org/airlift
Partners in Health	http://www.pih.org/
Physicians for Peace	http://www.physiciansforpeace.org/

1. Convince a few neurosurgeons that they should practice in a given country
2. Organize neurosurgeons, especially university teachers, through neurosurgical societies, to focus on:
 - a. Advocacy with the government
 - b. Training within the country
3. Advocate for increased resources in both public and private sectors of healthcare:
 - a. Operating rooms
 - b. Nurses, radiologists, neurologists
 - c. Equipment such as microscopes, aneurysm clips
 - d. Intensive care units
 - e. Centers of excellence
4. Interact with the world community to show what the problems are and what can be done

The present movement to improve healthcare in Asia, Sub-Saharan Africa, and some countries of Central America, should include neurosurgery as a major component. Nations with high technology have a responsibility to assess that technology and to help other countries obtain the technology if it is important for patient care.

World Federation of Neurosurgical Societies

The WFNS is the leading group working on international relations in neurosurgery. Founded in 1955 in Brussels, it has increasingly undertaken the challenges of neurosurgical globalization. Some of its work is summarized in *Table 29.2*.

The WFNS is now composed of 97 national and regional neurosurgical societies, each represented by two delegates to an Executive Committee meeting held every 2

TABLE 29.2. The World Federation of Neurosurgical Societies (WFNS.org)**Objectives, aims, and principles**

To advance neurological surgery in all its aspects by facilitating the personal association of neurosurgeons throughout the world; to aid in the exchange and dissemination of knowledge and ideas in the field of neurosurgery; to encourage research and investigation in neurosurgery and allied sciences

Structure

Administrative Council; Executive Committee composed of the officers and 2 delegates of member societies (4-yr term); World Congress planning committees

Membership

The WFNS is a federation of national and regional neurosurgical societies from around the world. There are 86 national, regional, and multinational general neurosurgical societies, 5 continental associations, and 6 affiliated societies

Activities of the WFNS

- An International Neurosurgical Congress every 4 years, the next in Boston in 2009
- An interim meeting of the Executive committee, usually in collaboration with a national or regional organization, every 4 years in between International Congresses, the next in Nagoya in October 2007
- Education courses in developing countries
- Subspecialty committees in trauma, neuro-oncology, cerebrovascular diseases, many others
- Sponsorship of training centers in underserved areas (presently Rabat, Morocco and Recife, Brazil)
- Support for young neurosurgeons, including the Young Neurosurgeons Award
- Instrument sets of basic neurosurgical instruments provided at low cost to individual neurosurgeons in developing countries
- Zeiss operating Microscopes provided at \$10,000 US to centers in developing countries

Publications

- Website (WFNS.org)
- Reviews in Neurosurgery
- Federation News

Foundations

- The WFNS Foundation (a not-for-profit organization)
- The WFNS Foundation USA (a not-for-profit organization)

Joint collaboration

- Admitted into official relations with the World Health Organization in 1972
- The WFNS continues to contribute to the revisions of the International Classification of Diseases

because of the recent inspired presidencies of Armando Basso, Madjid Samii, Ed Laws, Jacques Brotchi, and many others who have led important initiatives within the WFNS. These leaders work through an Administrative Council that meets one or more times a year. At executive committee meetings with delegates from all countries with significant neurosurgical penetration, it is remarkable to see the inclusiveness and willingness to hear others. The underlying concept is that we can broaden and develop neurosurgery around the world by learning from each other.

The WFNS has several specific initiatives to develop world neurosurgery:

The World Congress of Neurosurgery

Every 4 years the WFNS holds a World Congress of Neurosurgery that brings together the global neurosurgical family. This is a remarkable event—at the last Congress held in Rabat, Morocco in 2005, there were presentations from more than 80 countries. The next Congress will be held in Boston, Massachusetts from August 23–27, 2009, and will be a broad ranging and comprehensive review of world neurosurgery. Special attention is given to young neurosurgeons in these meetings as well as to a diverse representation from many countries.

WFNS Education Courses

The core of the WFNS international mission is the provision of education courses in developing countries around the world. This initiative grew out of an increasing recognition of the need for up-to-date information for neurosurgeons who cannot get to large national meetings and for the opportunity for these neurosurgeons to meet with internationally renowned faculty. Initially developed by Dr. Armando Basso, this program has been led by distinguished neurosurgeons, including James Ausman (United States), Jacques Brotchi (Belgium), Maurice Choux (France), and, presently, Atos De Sousa (Brazil). Participants in the courses provide their own transportation to the countries involved. The teaching program is a comprehensive coverage of much of neurosurgery. A major part of the interaction is the social program that allows all members of the neurosurgical community to talk together.

In the last 5 years, there have been courses in Bucharest, Rumania; Dhaka, Bangladesh; San Salvador, El Salvador; Recife, Brazil; Jakarta, Indonesia; Riyadh, Saudi Arabia; Kuala Lumpur, Malaysia; Shanghai, China; Ho Chi Minh City, Vietnam; Beijing, China; Xian, China; Chisinau, Moldavia; St Petersburg, Russia; Guatemala City, Guatemala; Campos do Jordão-Sao Paulo, Brazil; Mumbai, India; and Bali, Indonesia.

As well as these general courses, there are special courses, such as that in neuro-oncology arranged by Dr. James Rutka and Ab Guha in Jaipur, India in 2004.

years. It sponsors a number of extremely important initiatives in world neurosurgery and has been increasingly characterized by a spirit of cooperation and nondivisiveness that could be a model of world interactions generally. This has occurred

WFNS Web Site

Found at WFNS.org, this web site serves as an information source for world meetings in neurosurgery, for WFNS affairs, for addresses for neurosurgeons, and for world neurosurgery. Originally begun with extreme hard work and dedication by Dr. Eduardo Carroll of Buenos Aires, this site is now maintained by Dr. Gail Rosseau.

Instrument Sets and Microscopes

During the presidency of Madjid Samii, the WFNS began to sponsor microscope and basic instrument sets for neurosurgeons and departments in countries that cannot afford them. The instrument sets, made by Aesculap, are sold for \$2000 US to individual neurosurgeons who may not have the capacity to buy these for themselves—often the WFNS Foundation pays for a set or it is sponsored by a neurosurgical department. The Zeiss operating microscope is sold for \$10,000 US, a great reduction from the usual cost. With these instruments, surgeons in emerging nations can begin to develop a modern neurosurgical practice. There are presently arrangements to have bipolar forceps and possibly endoscopes under the same kind of arrangement.

Reviews in Neurosurgery

This online journal allows timely updating of important topics in neurosurgery; it is edited by Dr. Armando Basso.

World Directory of Neurosurgeons

This project, carried out in conjunction with the CNS, is an important resource for chronicling the 30,000 or more neurosurgeons in the world today. Dr. Richard Perrin, now the secretary of the WFNS, edited the last print edition and there are plans presently to make it an online resource.

Relationships with the WHO

The WFNS is considered a participating organization by the WHO and, under Dr. Armando Basso, is continuing to develop public health initiatives with the WHO. The WFNS was an important contributor to a recent WHO publication on trauma worldwide.

Training Programs

The WFNS is now developing residency programs for neurosurgeons from the developing world. Prof. Abdeslam El Khamlichi in Rabat, Morocco, and Prof. Hildo Acevedo in Recife Brazil, have started to develop such programs—in them, trainees can spend 1 to 4 years in training but must go back into their own countries to work after the training period.

WFNS Foundation

The WFNS Foundation is a not-for-profit organization chartered in Brussels that supports the work of the WFNS and its charitable programs. The WFNS USA is chartered in Virginia and has similar goals. These organizations provide a mechanism for accepting donations for the WFNS.

WFNS Committees

Some committees of the WFNS emphasize international work to be performed in a number of important areas: in subspecialties, in ethics, and in such areas as disaster relief. *Table 29.3* lists some committees that look at international subspecialties. There are many other committees as well.

Further information regarding the WFNS and its work can be found on its website www.wfns.org or by writing to its President, Dr. Jacques Brotchi of Brussels, Belgium, or its secretary Dr. Richard Perrin of Toronto, Canada.

Foundation for International Education in Neurosurgery

FIENS is a United States-based group that sends neurosurgeons to specific countries to help in the actual care of patients and to teach doctors in those countries to recognize and begin to treat neurosurgical diseases. Generally, a surgeon must spend at least 2 weeks at a site.

Presently, FIENS has major programs in Ghana, Honduras, India, Indonesia, and Nepal. There are programs in development in Belize, Kenya, Nigeria, Peru, Philippines, Thailand, and Zimbabwe. Readers interested in learning more regarding this organization should visit the website www.fiens.org or Gail Rosseau, M.D., the FIENS Volunteer Coordinator (Grosseau@cinn.org).

International Initiatives of the CNS, AANS, and Other Organizations

The CNS has been particularly active in developing international programs. It has a great commitment to its international members. At each national meeting, there is an International Luncheon with an international speaker; there is also an international reception that focuses on our overseas guests. This group sponsors five international fellows each year to train in a major neurosurgical center. Recently, the CNS has also worked to combine meetings with other organizations. The 2006 Chicago meeting was done jointly with the German Society of Neurosurgeons; the 2005 meeting was with the European Association of Neurosurgical Societies. In 2007, the CNS will meet with the Italian Neurosurgical Society in Rome and the European Association of Neurosurgical Societies in Glasgow.

The AANS has similar commitments to international neurosurgery. It has hundreds of international members. It has a fellowship for international visiting surgeons and its international reception and special events for overseas guests at the AANS annual meeting are particularly important.

Implications of Globalization

With globalization, come several important issues in neurosurgery. Chief among them is the distribution of neurosurgical resources in different countries and in different regions of the same country. In China, for example, the east coast is very well established in neurosurgery, but the inland

TABLE 29.3. Selected Ad Hoc Committees of the World Federation of Neurosurgical Societies**Awards to Young Neurosurgeons**

Rudolf Fahlbusch (Germany), Chairman
Pediatric Neurosurgery
Concezzio Di Rocco (Italy), Chairman
Stereotactic And Functional Neurosurgery
Andres M. Lozano (Canada), Chairman
Neurotraumatology
Franco Servadei (Italy), Chairman
Neuro-Oncology
Raymond Sawaya (United States), Chairman
Neurorehabilitation & Reconstructive Neurosurgery
Yoichi Katayama (Japan), Chairman
Education & Training
Atos Alves De Sousa (Brazil), Chairman
Skull-base Surgery
Takeshi Kawase (Japan), Chairman
Spine
Ed Benzel (United States), Chairman
Peripheral Nerve Surgery
Eduardo Fernandez (Italy), Chairman
Cerebrovascular Diseases & Therapy
Bernd Richling (Austria), Chairman
Radiosurgery
Douglas Kondziolka (United States), Chairman
Liaison Committee of WFNS/WHO
Armando Basso (Argentina), Chairman
Young neurosurgeons forum
Gail Rosseau (United States), Chairperson
Women In Neurosurgery
Yoko Kato (Japan), Chairperson
Disaster Relief
Scott Robertson (United States), Chairman
Neuro-Endocrine
Nelson Oyesiku (United States), Chairman
WFNS Coordinating Committee For International Initiatives
Tetsuo Kanno (Japan), Chairman
Ethics In Neurosurgery & Medico-Legal Affairs
Felix Umansky (Israel), Chairman
Accreditation Committee
Madjid Samii (Germany), Chairman
Medal of Honor
Edward Laws (United States), Chairman
Neuromodulation Committee
Damianos Sakas (Greece), Chairman
Neurosurgical Technological Improvement Committee
Amir Samii (Germany), Chairman

seems to be less well developed. In Africa, there are moderately well-developed practices of neurosurgery along the Mediterranean coast and in South Africa, but not very well-developed groups in sub-Saharan Africa⁵; *Table 29.4* gives a partial representation of this problem. The tension between high technology and lesser capacity can be felt both between countries and within them. It is increasingly clear that countries or institutions with advanced technologies have an obligation to assess those technologies as part of their mission. Examples of such high technologies are intraoperative imaging, spine instrumentation, stimulant or implants, stereotactic procedures, or use of programmable valves for hydrocephalus. It is incumbent on groups that have these technologies to define their use and application. This is not a one-way transfer of information. Industrialized countries can often learn about triage and the less expensive approaches from less industrialized countries.

Jacques Brotchi, President of the WFNS, exemplifies the attitude that is necessary as we develop world neurosurgery today: "I shall focus my energy on education and ethics in neurosurgery, the quality of life of all patients, support to our member societies, to neurosurgeons whichever country they may live in, and in particular, those in poor, developing countries."¹⁰

The Patient Safety Initiative

The movement for patient safety is a major thrust of healthcare around the world today. This has immense applications to neurosurgery and other subspecialties. Directly or indirectly, this movement is responsible for the most far-reaching changes that have occurred in American medicine in the last decade. In America, these include Health Care Finance Administration (HCFA) and Health Insurance Portability and Accountability Act (HIPAA) regulations, diminished work hours for residents, and increasing litigation.

HCFA rules mandate that an attending surgeon must document all the services that he or she bills for—there is a concern of patients and insurers that patients may not be getting the services from their doctor but rather from a trainee. These have greatly added to the burden of the attending physician for dictation and other documentation.

HIPAA regulations are based on the problem of patient confidentiality and the concern that physicians may not pay attention to the rights of patients for protection of healthcare information.

The Joint Commission on the Accreditation of Health Care Organizations (JCAHO) has made patient safety a major thrust of its unannounced site visits for accreditation.

The 2007 National Patient Safety Goals are:

- Improve the accuracy of patient identification.
- Improve the effectiveness of communication among caregivers.

TABLE 29.4. Distribution of neurosurgeons in the world

	Population (millions)	Neurosurgeons	Ratios (adjusted)
World	6656	33,193	1:275,000
North America	570	6546	1:81,000
South America	405	4422	1:123,000
Central America	40.4	185	1:358,000
Europe	900	8856	1:121,000
Asia	3800	12,288	1:336,000
Australia	56	162	1:205,000
Africa	800	700	1:1,238,000

From, El Khamlichi A: African neurosurgery: Current situation, priorities and needs. *Neurosurgery* 48:1344–1347, 2001. WHO website. http://www.who.int/mental_health/neurology/neurogy_atlas_results-9–11.

- Improve the safety of using medications.
- Reduce the risk of healthcare associated infections.
- Accurately and completely reconcile medications across the continuum of care.
- Reduce the risk of patient harm resulting from falls.
- Encourage patients' active involvement in their own care.
- The organization identifies safety risks inherent in its patient population.

These safety goals have now been required for all organizations accredited by JCAHO.

An unpleasant aspect of the patient safety movement for the surgeon is the increasing number of malpractice claims that is part of neurosurgery in some states. These have made premiums as high as \$200,000 in some states. Although the reasons for this increase in malpractice claims are complex, patient safety is often cited as a reason.

Patient safety has large-scale implications for the patterns of care as well. Trauma centers, spine centers, brain tumor centers, and stroke centers have developed because patients prefer to be treated in a specialized environment. There is a potential fragmentation of neurosurgery possible in this situation as multidisciplinary groups take time and attention away from the central neurosurgical core department.

Recent changes in our residency programs similarly have major roots in the patient safety movement. These include the 80-hour workweek for residents and core competencies developed for them. The reason given for doing this is to prevent fatigue in residents.

The patient safety movement will certainly spread further and promises to have ever more important implications. With globalization, it will become the mantra of healthcare organization worldwide. It has led to institutions feeling that they are so vulnerable that they must have quality assurance programs that transcend the tradition of professional surgeons to police themselves. Above all, it is now important to be a team player in the hospital, and those who don't understand this are bound to be diminished.

NEUROSURGICAL NEUROSCIENCE

The final theme that will characterize neurosurgery during the next decade is neurosurgical neuroscience. This is an amazing time for neurosurgical neuroscience. There are accumulating data in brain tumor treatment, cerebral protection, central nervous system regeneration, spinal cord injury, treatment of epilepsy, movement disorder surgery, psychiatric treatments, and brain-machine interfaces that have remarkable implications for neurosurgery.^{1,7} Could we administer nontoxic immune agents, SRNAs or specific receptor blockers locally for brain tumors to halt their growth? Can we use hypothermia or drugs to protect the brain during surgery, for example, by preventing apoptosis? Can we encourage neurites to regrow in the correct channels by producing nanochips to guide them? Can we develop machines that will interface with the brain or cranial nerve to allow patients to move or hear by bypassing the normal neural structures? These are all real possibilities in the neurosurgical neuroscience of the future.

Despite these exciting possibilities, neurosurgery as a scientific discipline is presently threatened and vulnerable. At the same time, the neuroscientific opportunities for neurosurgery are unprecedented in the United States, the challenges are also unprecedented. There are several reasons for this threat:

1. The increasing professionalism of research. The biomedical research empire involves many billions of dollars. Most of the National Institutes of Health (NIH) investigators champion basic science as the best way to study disease. There may be tension between the goal of the NIH, which is to improve health, and the grant review process, usually performed by basic scientists and valuing only fundamental scientific inquiry. Recent changes made by Dr. Elias Zerhouni, the director of the NIH since 2002, are attempting to change this process. These changes include a roadmap for research, which emphasizes translational research.⁹

2. Decreasing commitment of neurosurgeons to science as part of their enterprise. There seems to be greater emphasis on clinical productivity and administrative work, especially among chiefs, that diminishes departmental interest in research. This may lead to loss of academic departmental status for neurosurgeons and has major implications for the future of neurosurgery. If our neurosurgical leaders are not truly interested in research initiatives, our specialty will become just another trade. There is an increasing pressure for our hospitals to make this happen.

3. There are uncertain career paths for translational investigators, scientists who try to apply basic science to clinical problems. For both basic investigators who deal with laboratory animals or intracellular systems, and for clinical scientists who do population and clinical trial studies, there are well-developed models. For translational investigators, career paths are not as clear. Fortunately, the roadmap described by the NIH has a strong bias toward this kind of research, and it is very likely that it will increase substantially in the future.

CHANGING MODELS OF LEADERSHIP

One of the most important changes occurring in the present environment is the changing expectation of neurosurgical and other leaders in the academic community. In the past, chairs of department were often surgeons, who, by their research or clinical work, distinguished themselves. They were, similar to Harvey Cushing, triple or quadruple threats. They were able to have a significant clinical practice, to run a research laboratory, to administer a department, and to teach residents and students.^{2,3}

This may no longer be a viable model. The institution will require that the Chairman of Neurosurgery be a collaborative and integral part of the institution as a whole. He or

she will have to be an executive to carry out the mandate of the institution. The future neurosurgical leader will be distinguished in the institution not by his or her own laboratory or clinical work, but by how much he or she fits in with the mold of the institution.²

This is a remarkable and important change in neurosurgical leadership, one whose implications are yet to be developed. If we are to increase our global presence, to increase patient safety as a goal, and to incorporate the advances of neurosurgical neuroscience, we will have to develop leaders who can advocate for neurosurgery but also be part of the texture of their institutions as a whole. This is a daunting task. No longer requiring (or tolerating) the neurosurgical prima donnas, institutions will incorporate neurosurgery into a routinized and careful plan for growth. This reality presages interesting times for all of us.

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