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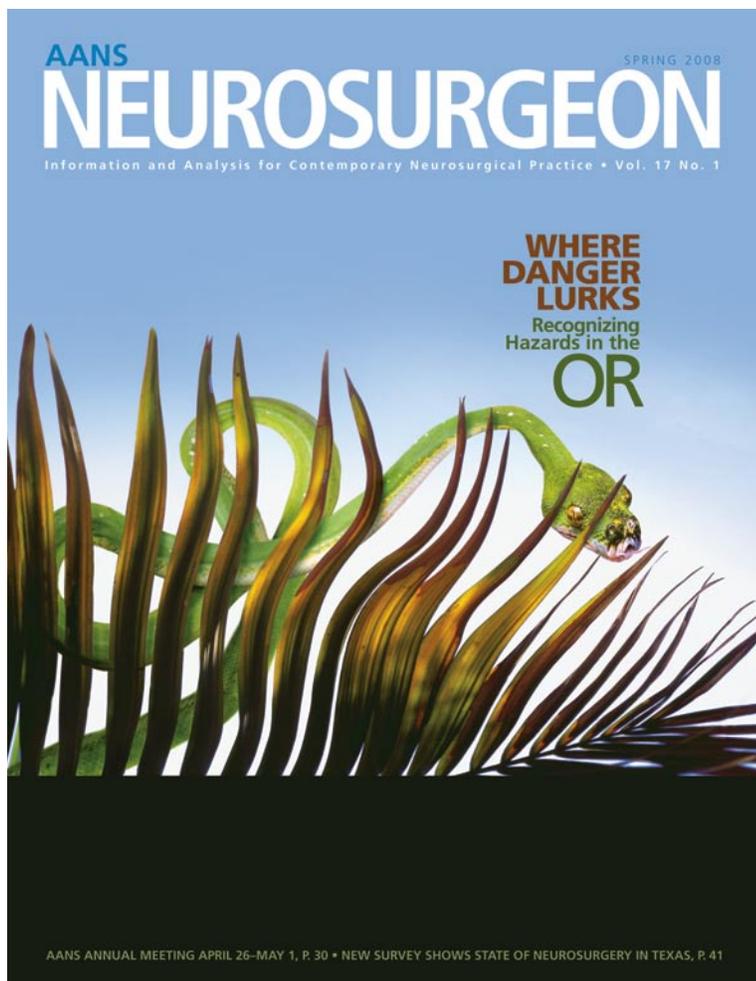
**WHERE  
DANGER  
LURKS**

Recognizing  
Hazards in the

**OR**



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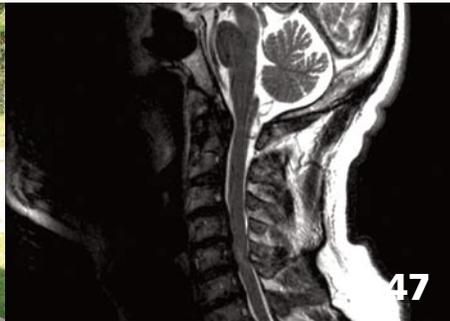
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### AANS MISSION

The American Association of Neurological Surgeons (AANS) is the organization that speaks for all of neurosurgery. The AANS is dedicated to advancing the specialty of neurological surgery in order to promote the highest quality of patient care.

### AANS NEUROSURGEON

The official socioeconomic publication of the AANS, *AANS Neurosurgeon* (formerly *AANS Bulletin*) features information and analysis for contemporary neurosurgical practice.

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### LETTERS

Send your comments on articles you've read in these pages or on a topic related to the practice of neurosurgery to [aansneurosurgeon@aans.org](mailto:aansneurosurgeon@aans.org). Include your full name, city and state, as well as disclosure of any conflicts of interest that might have bearing on the letter's content. Correspondence selected for publication may be edited for length, style and clarity. Authorization to publish the correspondence in *AANS Neurosurgeon* is assumed unless otherwise specified.

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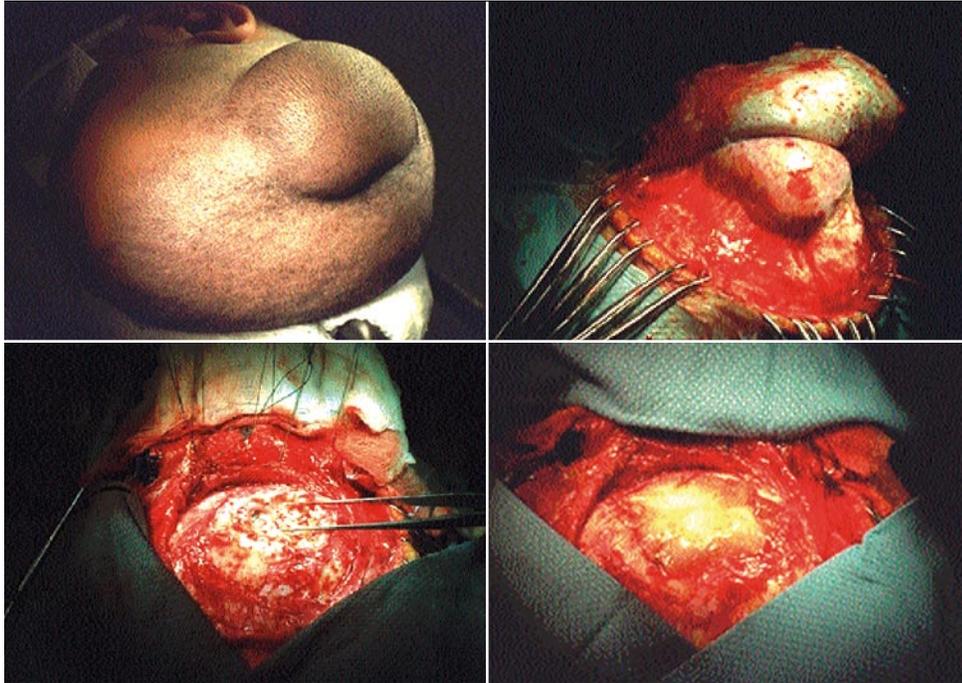
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# FRONTLINES

NEWS TRENDS LEGISLATION



## IN THE LOUPE

The patient presented with a mass on his head (top left). The scalp was reflected, showing an encapsulated mass containing cloudy fluid (top right). Underneath the mass was an area of skull which had been eroded, and in one place the dura had actually been breached by the capsule of the mass (bottom left). After excision of the mass, a cranial defect of approximately 4.5 centimeters was exposed, and an acrylic cranioplasty was performed (bottom right). The wound healed well with both a good anatomical and cosmetic result. The lesion was found to be an epidermoid.

Contributed by Robert A. Fink, MD, FACS, Berkeley, Calif. Dr. Fink reported no conflicts for disclosure.

## Latest SPORT Results Significant Improvement With Surgery

Spinal stenosis patients improve more with surgery than with nonsurgical treatment according to the latest results from Spine Patient Outcomes Research Trial, but patients who choose not to have surgery are likely to improve over time. The paper by Weinstein and colleagues, published in the Feb. 21 issue of the *New England Journal of Medicine*, is the third in a series reporting SPORT study results. The study was launched in 2000 to look at the three most common back conditions leading to surgery: herniated disk with sciatica, spinal stenosis, and spondylolisthesis. In this most recent study, surgical patients saw improvement more rapidly and reported better physical function and less pain than did the nonsurgical patients, who reported only moderate improvement two years after their diagnosis.

“What we now know and can share with our patients is that they have a choice,” Dr. Weinstein

stated. “If they choose surgery, they will improve greatly. However, if their preference is not to have surgery, their condition is not likely to worsen and they will see some improvement over time.”

Enrolled in the study were 289 patients in a randomized group and 365 in an observational group.

Continues ►

▲ **GET IN THE LOUPE.** Compelling digital photos that depict a contemporary event or clinical topic or technique in neurosurgery are sought for In the Loupe. Submit a low resolution image in JPG format to [aansneurosurgeon@aans.org](mailto:aansneurosurgeon@aans.org) with “In the Loupe” in the subject line and a brief description of the photo and its significance in the e-mail message. Submitters must verify copyright ownership of the image and have a 300 DPI resolution image available for publication.

► Continued

As with the other SPORT studies, some patients randomized or who had chosen surgery crossed over to the nonsurgical group and vice versa. At two years, 67 percent of patients randomly assigned to surgery had had surgery, whereas 43 percent of those randomly assigned to nonsurgical care ultimately had surgery. Overall, 400 patients had surgery and 254 received nonsurgical treatment.

In the first study, for herniated disk with sciatica, surgical patients did slightly better than nonsurgical patients but both groups showed significant improvement at one and two years after entering the trial. Studies from the SPORT trial that focus on cost-effectiveness and other measures will be released in coming months. [www.nejm.org](http://www.nejm.org)

## Successful Medical Groups Have This in Common

Better-performing practices are more likely to have formal policies and processes for patient safety, to make investments in the practice, and to have implemented electronic medical records or electronic health records, according to Performances and Practices of Successful Medical Groups: 2007 Report Based on 2006 Data, produced by the MGMA. More than 72 percent of better performers reported that they had formal patient safety policies, compared with 63.2 percent of other groups. More than 14 percent of better performers said that they acquired new laboratory equipment compared with just 6.2 percent of others, and 20 percent said they had built new facilities or acquired or expanded facilities, as opposed to 13.5 percent of others. Significantly more of the better performers said they had added ancillary services. By the end of the 2006, nearly 29 percent of better performers said they had fully implemented EMR/EHR for all physicians and practice locations, and 25 percent had fully implemented the technology in a portion of the practice compared with 13.7 percent of other practices. Better performing practices were defined as those that excelled in profitability and cost management; productivity, capacity and staffing; accounts receivable and collections; and patient satisfaction. [www.mgma.org](http://www.mgma.org)

## More Spine Spending Doesn't Equal Better Health

Although expenses related to back and neck problems have increased substantially in the last decade, outcomes such as functional disability and work limita-

tions do not appear to be improving, according to a study in the Feb. 13 issue of the Journal of the American Medical Association. Martin and colleagues analyzed 1997–2005 data from the nationally representative Medical Expenditure Panel Survey. A total of 23,045 respondents were sampled in 1997, including 3,139 who reported spine problems. In 2005, the sample included 22,258 respondents, including 3,187 who reported spine problems. The researchers found that expenditures were higher in each year for those with spine problems than for those without. From 1997 to 2005 there was an estimated 65 percent inflation-adjusted increase in the total national expenditure for adults with spine problems—including expenses for inpatient, outpatient, emergency department and pharmacy—an increase more rapid than for overall health expenditures. The estimated proportion of people with back or neck problems who self-reported physical functioning limitations increased from 20.7 percent to 24.7 percent from 1997 to 2005. Further, adjusted self-reported measures of mental health, physical functioning, work or school limitations, and social limitations among adults with spine problems were worse in 2005 than in 1997. <http://jama.ama-assn.org>

## Safety Questions? Surgical Patients Would Rather Ask Nurses

Patients prefer to challenge nurses rather than doctors about safety issues related to their care, and women are far more prepared to speak up than men, according to a study in Quality and Safety in Health Care. Davis and colleagues based their findings on a validated survey that assessed the factors influencing patients' willingness to ask healthcare professionals questions related to safety. The 80 survey respondents all had undergone surgery at one London teaching hospital. The results showed that patients were far more likely to ask factual questions of all healthcare professionals, such as the length of their hospital stay, than they were to pose questions that might be perceived as challenging clinical abilities, such as whether the healthcare professional had washed his or her hands. Patients were more willing to ask factual questions of doctors than of nurses, and they were more willing to ask challenging questions of nurses than of doctors. But when doctors encouraged patients to ask challenging questions, patients were more willing to quiz both sets of professionals on safety and quality issues. <http://qshc.bmj.com> **NS**

# WHERE DANGER LURKS

Recognizing Hazards in the

# OR



The medical community recently has focused a great deal of attention on improving patient safety, and appropriately so. However, comparatively little consideration has been given to hazards that affect surgeons and surgical team members in the operating room, and there is a dearth of related information that is specific to neurosurgery. Even discussion of the impact of Bovie smoke, a commonplace element in neurosurgery since Cushing's day, is virtually nonexistent in neurosurgical literature.

Authors in this issue of *AANS Neurosurgeon* address several hazards to personal safety in the operating room. The toxicity of Bovie smoke, radiation exposure from fluoroscopy, blood-borne pathogens, and OR noise, principally from the drill, are among the physical hazards discussed. A more insidious hazard, namely the influence of stress and burnout on neurosurgeons and their careers, also is explored.

Several related topics—repetitive stress injuries such as awkward positioning while performing particular procedures, creating an ergonomic operating room and various policies governing the return to work following work-related injury or illness—are ripe for exploration in future issues.

While no one plans to contract hepatitis from a needlestick or to otherwise suffer from a work-related injury or illness, insurance for disability can provide a cushion when the unexpected happens. See “While You Are Able: Consider All Options in Disability Insurance,” article ID 38197, using the advanced search at [www.aansneurosurgeon.org](http://www.aansneurosurgeon.org).

# Needlestick

## A Common and Preventable OR Hazard

DONALD E. FRY, MD

**O**ccupational transmission of viral infections to surgeons from blood exposure in the operating room has been appreciated for nearly 60 years (13). While “serum hepatitis” was a known risk, it wasn’t until the recognition of the human immunodeficiency virus, HIV, as the putative agent of the acquired immunodeficiency syndrome in the 1980s (11) that surgeons became truly concerned about occupational infection from blood exposure. In 1989 hepatitis C was identified and yet another viral pathogen became a source of concern.

The intense focus of surgeons on blood-borne infection reached a crescendo during the mid-1990s. With epidemiological evidence that clearly identified occupational transmission of HIV infection as an infrequent event, and with the development of effective antiretroviral chemotherapy for the treatment of patients with known infection, the intensity of attention to this subject of viral transmission in the operating room has waned. Percutaneous injury in the conduct of invasive neurosurgical and other operative procedures continues to be a risk for infection, and vigilance in the avoidance of operating room injury needs to be a continued objective for all surgeons.

### Potential Blood-Borne Pathogens

A total of six hepatitis viruses now have been identified (Table 1) (10). Only hepatitis B, HBV, and hepatitis C, HCV, are significant blood-borne pathogens. Hepatitis A and E are fecally-orally transmitted pathogens that do not have chronic infection. Hepatitis D is an incomplete RNA virus that requires coexistent HBV infection and is not considered an occupational risk. Hepatitis G has considerable homology to HCV but is not recognized as having transmission risks in the operating room.

HBV is a DNA virus that is easily transmitted with exposure. A single hollow needlestick exposure from an infected patient has a 25 percent to 30 percent risk of transmission to a naive host. Solid needle transmissions are likely to be less frequent but are well documented to occur. With acute HBV infection, about 95 percent of cases will completely re-

solve, but 5 percent develop a chronic infection that lasts for a lifetime (19). Acute infection is clinically occult in 75 percent of cases, which means that the acutely infected individual likely will not be aware that infection exists. Among those with chronic HBV infection, many will have a chronically progressive illness that leads to end-stage liver disease or hepatocellular carcinoma. Some will have a chronic state of antigenemia where transmission can occur from them to others after exposure to blood and body fluids, but the disease may not advance significantly for the original host. Over one million people in the U.S. currently have chronic HBV infection (14).

A highly effective HBV vaccine derived from recombinant technology is available for all healthcare personnel who have potential exposures to patient blood (21). Three doses of the vaccine are given over a six-month period, and documentation of seroconversion with the anti-HBV surface antibody means that the host will be protected against future exposures. There is no reason for any neurosurgeon not to be vaccinated. As many as 5 percent of vaccinated individuals do not seroconvert and should be revaccinated (10). Some are revaccinated with double the vaccine antigen. Failure to seroconvert means that the individual must rely upon strategies to avoid blood exposure as the principal preventive strategy against HBV infection.

HCV is an RNA virus with six different serotypes. Transmission occurs in about 2 percent of needlestick exposures (5). While transmission is less frequent than for HBV exposure, chronic infection results in 60 percent to 80 percent of patients following acute infection (1). Acute HCV infection is clinically occult in 70 percent of cases. Progression to hepatocellular carcinoma or end-stage liver disease occurs for many patients, while others have a chronic antigenemia with minimal clinical disease. An interesting feature of HCV infection is that prior acute infection does not confer permanent immunity to the host against future reinfection. A vaccine against HCV infection is not available. HCV infection is the leading cause for hepatic transplantation in the U.S. About three to four million people in the U.S. have chronic HCV infection (20).

HIV is an RNA virus of the retroviral group.

Hollow needlestick injury is associated with a 0.3 percent risk of transmission (6). To date, transmission from a solid needle in the operating room environment has not been reported. Documented occupational transmissions of HIV infection in the healthcare setting have been with percutaneous and mucous membrane exposures (Table 2) (6). Epidemiological evidence from the Centers for Disease Control indicates that six surgeons likely have contracted HIV infection during surgical care, although the exact nature of the transmission events was not known. No documented case of HIV transmission of infection to surgeons in the operating room has been identified in the United States. Acute infection results in chronic infection. The evolution of highly effective, antiretroviral therapy is resulting in long-term survivors of a disease that while not cured was previously considered uniformly fatal (2). A vaccine against HIV infection continues to be elusive at this point. About 750,000 people living with HIV infection are currently estimated in the U.S. (7).

#### Prevention of Operating Room Exposure

The prevention of viral transmission in the operating room begins with the avoidance of any blood contact. Studies at the University of New Mexico demonstrated that 28 percent of operations had one or

more members of the operating room team who were contaminated with blood from the patient during the operative procedure (17). Other studies demonstrated even higher rates of blood exposure (18). Most blood exposure events occurred from breaks in the gloves and violations in the surgical gown from the level of the elbow to the cuff of the glove. Selected procedures tended to have higher exposure rates than others. For neurosurgeons, major back operations and craniotomy for intracranial bleeding following trauma likely will be high-risk circumstances. However, every procedure with surgical needles and sharp instrumentation poses a potential risk.

To avoid blood contact with the skin of the operating team members, universal precautions have been recommended by the Centers for Disease Control (8). The philosophy is simply that all patients should be considered risks for blood-borne infection, and a standard regimen of preventive strategies should be adopted. Face shields (required by the Occupational Safety and Health Administration) and double-gloving are the most common methods used to enhance personal protection against exposure. Because surgeons and other professionals in the operating room do not have completely intact skin of the hands, the objective of complete avoidance of blood contact

Continues ►

**TABLE 1**

#### Characteristics of the Six Known Hepatitis Viruses

Hepatitis Type	Nucleic Acid	Route of Transmission	Chronic Disease	Occupational Risk	Vaccine
A	RNA	Fecal-Oral	No	No	Yes
B	DNA	Blood-Borne	Yes	Yes	Yes
C	RNA	Blood-Borne	Yes	Yes	No
D	RNA	Blood-Borne	Yes	Improbable	No
E	RNA	Fecal-Oral	No	No	No
G	RNA	Blood-Borne	Yes	Uncertain	No

► Continued

with the skin is desirable. Unfortunately, universal precautions have not been universally applied and do not significantly avoid needlestick or percutaneous injury from other sharp edges encountered in the operating room.

An increased awareness for needles, scalpels, other sharp instruments, and bony spurs is very important in avoiding percutaneous injury. Reloading and repositioning of the needle in the holder must be undertaken with care. Swaged needles should be removed before tying the suture material. Needles should not be left in the operative field. Needle tips should not be palpated in difficult exposure circumstances. Passage of the loaded needle holder to the surgeon is a common source of injury to the technician or surgeon. The surgical “way station” with a Mayo stand that permits delivery and removal of the loaded needle holder becomes an effective method for avoiding injury with instrument exchange. Used needles should be discarded into an appropriate container or temporarily embedded into a Styrofoam block. Hollow needles for injection are particular sources for injury and should be removed from the operative field as soon as the infiltration or aspiration of tissues has been completed. Hollow needles should not be recapped.

Blunt needle technology can be useful in the reduction of needlestick injuries for specific types of procedures (3). Needles for passage through tissues other than skin do not require the sharpness that has traditionally been engineered into needle technology. Prospective studies have demonstrated a reduction in needlestick injuries in the operating room with the blunt surgical needle.

**Management of the Exposure Event**

While progress has been made in the reduction of needlestick and other sharp injuries in the operating room, these incidents continue to happen. The immediate response to a sharp injury is local treatment of the site. Ideally, rescrubbing of the hands including the injury site has the greatest likelihood for reduction of any viral contaminants. This is commonly not practical, and more often the site of the injury is irrigated with a viricidal agent (for example, isopropyl alcohol or povidone iodine) and the surgeon regloves and continues the procedure. Antiviral irrigation of the wounded area has not been shown to impact transmission but it is of value theoretically.

The postprocedural response of the surgeon should be indexed to knowledge of the patient’s serological status for viral pathogens (9). If the patient is known to have HBV, and the surgeon is a known responder to the HBV vaccine, then nothing more needs to be done. Remote HBV vaccination of the surgeon without current knowledge of antibody status requires that an anti-HBV surface antibody test be done, and if the test is negative the surgeon should get a booster dose of the vaccine. If the test is positive, the surgeon is protected. If the surgeon is not vaccinated, then a dose of the HBV immunoglobulin should be administered and the initial dose of the HBV vaccine should be given.

If the patient is infected with HCV at the time of the injury to the surgeon, no vaccine is available. The HCV immunoglobulin is not established as having any value to the prevention of HCV infection after an exposure event. The surgeon is followed with either a reverse transcriptase polymerase chain reaction study to identify HCV RNA, or sequential antibody tests are done to identify seroconversion. The exposed surgeon is then begun on anti-HCV, antiviral chemotherapy as soon as infection is identified. Prophylactic antiviral treatment is not recommended without evidence of seroconversion.

If the patient is known to have HIV infection, then triple-drug, antiretroviral treatment is begun immediately. A full course is administered and the

**TABLE 2**

**Healthcare Personnel Identified With Occupationally Acquired HIV (10)**

Occupation	Documented	Possible
Nurse	24	35
Nonsurgical Physician	6	12
Surgical Physician	6	6
Surgical Technician	2	2
Clinical Laboratory Workers	16	17
Emergency Medical Technicians/ Paramedics	0	12
Dental Workers (including dentists)	0	6
Others (nonclinical technicians, housekeeping, maintenance, therapists, aides and attendants, embalmers, etc.)	9	50
<b>Total</b>	<b>57</b>	<b>140</b>

surgeon is followed for seroconversion.

The more common scenario is that a percutaneous injury occurs and the status of the patient to the various viral pathogens is unknown. Correct practice would be to request a viral screen of the patient following the procedure. Commonly the request for screening of the patient is done based upon the severity of the injuring event and the surgeon's perception of the infectious risk that the patient may pose. All significant needlestick and sharp injuries should trigger updating the surgeon's status with respect to HBV vaccination and the initiation of antiretroviral chemotherapy until the patient's status is defined. Follow-up for HCV and HIV infection is essential if the infectious status of the patient remains unknown.

### New Horizons in Occupational Infection in the OR

It is unlikely that all blood-borne pathogens have been identified. Not all patients with the so-called non-A, non-B hepatitis of the 1970s and 1980s have been confirmed to have HCV, and there is considerable speculation that at least one additional hepatitis virus remains undefined. The TT virus is a new blood-borne hepatitis agent identified in Japan that is of uncertain risk as an occupational pathogen (16). The West Nile virus and other episodic viral infections pose a potential risk for occupational infection in the operating room. For neurosurgeons in particular, the recognition of transmission of new-variant Creutzfeldt-Jakob disease, vCJD, from contaminated neurosurgical instruments means that even prions pose a potential and unrecognized risk in the operating room (4). Some experimental (12) and clinical (15) reports have now suggested that vCJD can be transmitted by transfusion, and this too becomes a potential risk for blood contamination.

The spectrum of potential risks is likely to increase rather than decline. The blood of patients will potentially harbor occupational infections for neurosurgeons and all clinicians in the care of patients. These risks are not to be a source of fear but rather are to be understood. Appropriate measures for prevention, and prompt action once a needlestick or other sharp injury has occurred is strongly recommended. Blood is a toxic substance and should be treated accordingly. **NS**

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**Donald E. Fry, MD**, is emeritus professor of the Department of Surgery, University of New Mexico School of Medicine, Albuquerque, N.M., and executive vice-president of clinical outcomes management with Michael Pine and Associates, Chicago, Ill. The author reported no conflicts for disclosure.

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# Bovie Smoke

## A Perilous Plume

PATRICK W. McCORMICK, MD

**W**hen analyzed, smoke from electrosurgical units, commonly known as Bovie smoke, is shown to be quite similar to that of other potentially pathogenic smoke, behaving as a carcinogen, a mutagen and an infectious vector. In addition, particulate matter in smoke is known to have health risks related to inducing inflammatory and allergic responses in susceptible people.

The fact that electrosurgical smoke is common and has been present in operating rooms for many years has led to a complacency regarding this smoke and its potential toxicity. A comparison of laser plume and electrosurgical smoke shows little difference in terms of the health risk, and in some respects the electrosurgical smoke poses a greater risk, particularly if these risks are quantified on a time-weighted basis that takes into account accumulation over long periods of exposure. For example, a study that directly compared electrosurgical smoke with laser plume and tobacco smoke showed that electrosurgical smoke is more toxic than laser plume or tobacco smoke (5). One gram of tissue was lasered with a carbon dioxide laser, and an identical gram of tissue was vaporized with electrosurgical current. A comparison of the emitted chemical byproducts to those present in average tobacco smoke demonstrated that the laser smoke generated from a gram of tissue was equivalent to smoking three unfiltered cigarettes, while the electrosurgical smoke was equivalent to smoking six unfiltered cigarettes.

This article details some of the known risks of exposure to Bovie smoke. As importantly, it presents best practices for avoiding Bovie smoke exposure to the greatest extent possible.

Electrosurgical units transmit a current from a dissecting or cutting surgical instrument to a dispersion electrode. The resistance to the flow of this current at the tissue interface generates heat, which causes coagulation of proteins that leads to hemostasis and vaporization of tissue by superheating intracellular water content. The result is disintegration of cell integrity and aerosolization of cellular debris. The destruction of biological tissue with heat results in the generation of smoke that is

composed of volatile organic compounds, inorganic compounds, and both inert and biologically active particulate matter such as viruses. The smoke generated by an electrosurgical unit is comparable to that generated by a laser, and the mechanism is fundamentally the same (3). Aerosols of biological tissue and smoke due to heat generated by friction also are generated by high-speed air drills.

The mutagenicity of electrocautery smoke has been evaluated by collecting smoke produced during reduction mammoplasty (6). The smoke was collected at locations between two-and-a-half and three feet above the operative field, typical of the exposure experienced by the operating team. The smoke was collected in filters and extracted for analysis. The extracts were tested with strains of *Salmonella typhimurium* in a standardized Ames test, which is a well-recognized technique for evaluating the mutagenicity of a substance. The results demonstrated that all of the smoke samples contained mutagens. The finding of mutagens is an important qualitative result because there is no established safe level of mutagens, and the likelihood of establishing safe levels is quite remote. Therefore, the implication is that the amount of smoke to which operating personnel are exposed should be as minimal as possible.

### Volatile Organic Compounds

With regard to carcinogenicity, attention is typically focused on the volatile organic compounds and polycyclic aromatic compounds contained in the smoke. A health hazard evaluation report by the National Institute for Occupational Safety and Health, NIOSH, discussed the content of volatile organic compounds in surgical smoke (7). Volatile organic compounds are described as a class of molecules that have a sufficiently high vapor pressure to allow the compound to exist in a gaseous state at room temperature. Of the array of chemicals known to exist in biological tissue smoke, formaldehyde, acetaldehyde, and toluene were identified.

Formaldehyde concentrations were quite variable. They ranged as high as 0.021 parts per million, ppm, compared to a sample taken outside

the operating room door of 0.005 to 0.007 ppm. Formaldehyde is known to be an irritant at exposures of 1.0 ppm or greater in the general population, but symptoms of irritation occur earlier in persons with preexisting conditions such as allergies or respiratory disease. In addition, NIOSH identifies formaldehyde as a potential human carcinogen, and the Occupational Safety and Health Administration, OSHA, has identified a 0.75 ppm eight-hour time-weighted average as the upper limits of allowable worker exposure. The time-weighted average accounts for the elevation in the concentration of formaldehyde during exposure to surgical smoke over a period of time in a typical working day.

The report identified acetaldehyde concentrations that ranged from 0.001 ppm to 0.012 ppm, compared to a background of 0.002 ppm. Acetaldehyde is considered by the Environmental Protection Agency as a probable human carcinogen, and NIOSH recommends keeping exposure to acetaldehyde at the lowest feasible concentration. However, the OSHA guidelines for an eight-hour time-weighted exposure are much higher than those identified in this report at 200 ppm.

Toluene was identified in concentrations of 0.002 ppm to 0.015 ppm. Toluene is a known respiratory and eye irritant, and excessive inhalation exposure can lead to neurotoxicity. The symptoms of toluene exposure are not identified below 100 ppm in published studies.

#### **The Particulars of Particulate Matter**

Particulate matter is found in electro-surgical smoke, and the nonliving particulate matter is typically quantified as particles per cubic foot, ppcf. It has been noted that baseline measurements in an operating room are typically near 60,000 ppcf (4). With the use of electro-surgical tools that generate smoke, the typical rise in particulate

matter plateaus at approximately one million ppcf in five minutes. It takes approximately 20 minutes following cessation of generation of electrocautery smoke for the operating room ventilation system to return particulate concentrations to baseline level. Comparison of laser plume and electro-surgical smoke using a spectrophotometer has demonstrated that both types of smoke have a very similar particle content and size distribution.

The smaller particulate matter is thought to be the most harmful in that it typically penetrates sur-

gical masks and travels through the respiratory tree to the alveolar level. The particles typically are less than five microns in size, and more than 77 percent of particulate matter within surgical smoke is less than 1.1  $\mu\text{m}$  in size. An experimental protocol using Sprague-Dawley rats exposed to electrocautery exhaust demonstrated lung parenchyma changes, including alveolar congestion, blood vessel hypertrophy of varying degrees, focal emphysematous changes, and muscular hypertrophy of blood vessels (10). A previous study demonstrated

similar changes with carbon dioxide laser plume (2).

The particulate matter also includes living organisms, and both viable bacteria and viruses in electro-surgical smoke has been reported. Papillomavirus was identified in vapor from bovine warts treated with both laser-derived material and electro-surgical cautery (8). Of the two, more virus load was present in the laser-derived material. Despite this provocative finding, the size of these particles is such that they are easily filtered out by a surgical mask and that there appears to be a low likelihood of transmission of the papillomavirus through its presence in electro-surgical smoke. Surgical smoke has been identified to carry viable bacteria that have been cultured from surgical smoke, including *Bacillus subtilis* and *Staphylococcus aureus*. In addition, mycobacteria

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## **Bovie smoke behaves as a carcinogen, a mutagen and an infectious vector and can induce inflammatory and allergic responses in some people.**



## Evacuation of the Bovie smoke near the source has the greatest likelihood of preventing exposure and any health consequences associated with it.

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have been isolated from smoke, including *Mycobacterium tuberculosis* (9).

However, the presence of carcinogenic and mutagenic chemicals as well as inert and biologically active particulate matter represents a health hazard that varies with the susceptibility of the exposed individual. The presence of hypersensitivities, allergies, immunocompromised states, and/or a combination of surgical toxic exposures with other toxic environmental exposures such as smoking may change the risk profile on a case-by-case basis. Given the complexity of the variables involved, individual risk stratification cannot be established in a rigorous scientific fashion. The hazards of electro-surgical smoke are for the most part potential hazards without a large epidemiological database demonstrating their harmfulness to humans. In the presence of a scientifically verifiable hazard and the absence of definitive epidemiologic proof of health consequences, the most prudent course of action is to minimize exposure, which has virtually no downside risk.

### Evacuators and Masks

There is almost uniform agreement among authors in this field that evacuation of the smoke near the source has the greatest likelihood of preventing exposure and any health consequences associated with it. The NIOSH recommendations suggest a smoke evacuator system that can pull approximately 50 cubic feet per minute with a capture velocity of 100 to 150 feet per minute at the inlet nozzle (1). Filters are necessary to capture the contents of the smoke and must be replaced regularly. Used filters are considered biohazardous wastes that require proper

disposal. The regulations further suggest that a smoke evacuator nozzle be kept within two inches of the surgical site to maximize effective capturing of airborne contaminants. The use of routine suction designed for elimination of liquids from the surgical field is not adequate to evacuate electro-surgical smoke and eliminate the health hazards associated with it.

The other common practice is the use of a surgical mask. It is true that surgical masks cannot eliminate the very fine particles that are associated with respiratory inhalation, and even high-efficiency

masks will become saturated at a certain point, thus allowing the air to flow around the mask rather than through it. Nonetheless, the masks are efficient in eliminating larger particle sizes, including viruses. **NS**

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# OR Noise

## The Potential for Hearing Loss

PAUL KLIMO JR., MD, AND WILLIAM T. COULDWELL, MD

**W**ith the use of the electric or air-powered drill in cranial or spinal procedures comes the potential for hearing loss among operating team members. Exposure to loud noise can result in sensorineural hearing loss, and this loss is a function of sound pressure levels and duration of exposure.

Much research has been done regarding the impact of noise-creating devices on patient and user safety in the field of neuro-otology (1, 6). Michaelides and Kartush measured peak and impulse sound pressure levels one centimeter away from their application in the temporal bone in a variety of otologic instruments, including lasers (potassium-titanyl-phosphate, erbium, and carbon dioxide) and drills (microdrill and pneumatic) (4). Only the erbium laser and air-powered cutting drills had impulse and peak sound pressure levels of greater than 100 A-weighted decibels, dBA. Kylene and colleagues found that the noise levels were influenced primarily by the size of the burr; diamond burrs generated less noise than cutting ones and variations in rotation speed had only a slight influence on the noise levels produced (2). Prasad and Reddy recently tested a variety of bone drills and microdebriders used in otolaryngological surgery and found them all to be safe, posing no occupational hazard to the user (7).

The results of several studies have shown elevated noise above safe levels during orthopedic procedures. In one early study, the authors found that the noise generated by various air-powered and electric tools exceeded the recommended levels, and hearing loss was present in half of senior orthopedic staff at that particular facility (9). The results of more recent studies have continued to demonstrate intermittent high levels of instrument-generated noise (above the recommended limits of 110 dBA) in the orthopedic surgical suite, but it is this intermittent nature that probably protects against hearing loss, speech discrimination difficulties, and tinnitus (3, 5, 8).

To date, no studies have been undertaken to evaluate noise levels generated during spine or cranial neurosurgical operations; however, one can assume that this risk is small but probably real. Neurosurgeons tend to use instruments that make less noise



than those used in orthopedic procedures such as total joint replacement. Although neurosurgeons do use the drill for significant periods of time, drill manufacturers are now cognizant of the risk to hearing, and contemporary drills are quieter in operation. **NS**

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# Fluoroscopy

## Reducing Radiation Exposure in the OR

PATRICK W. McCORMICK, MD

In a provocative article, Finkelstein argued that the occurrence of two brain tumors in Ontario cardiologists in one year is statistically unlikely to the point of suggesting an occupational risk such as radiation exposure related to fluoroscopically guided invasive procedures (3). Although it is unlikely that a cardiologist would reach the threshold of deterministic radiation exposure illness such as radiation sickness, skin breakdown, or immunosuppression, there is another category of health risk that is related to stochastic events. Unlike deterministic events, stochastic events are not related to reaching a threshold of radiation exposure but rather to low-frequency, unpredictable events associated with low-dose radiation exposure. These stochastic events result in an incidence of neoplastic disease that is predictable in populations exposed to low-dose radiation (5,000 deaths per year in the U.S. population due to natural background radiation) (9). The incidence of cancer deaths due to low-dose radiation is 250 per million or 0.025 percent (12). The merits and nuances of these estimates are supplied by Land (6).

This article explores the basic principles of radiation physics that impact the exposure a physician experiences in the routine use of intraoperative fluoroscopy for spine cases; the levels of radiation exposure that have been identified with intraoperative procedures, including spine procedures; the biological effects of this radiation; and the best-practice techniques that will reduce a physician's radiation exposure.

Radiation is a known carcinogen and there is little argument about the existence of random neoplasm due to low-dose radiation, but the frequency

of such events is speculative. These stochastic events are thought to have a linear dose-response relationship without defined thresholds. Current models of stochastic radiation-induced neoplasm are assumed to be unaffected by dose fractionation; therefore, an individual physician's risk increases as total radiation exposure increases over the course of a career. This implies that for a physician who routinely uses

fluoroscopy in surgical cases, small per case savings in radiation exposure realized by altering technique can lead to a significant reduction in personal risk. Many physicians are misled by the claim that one would have to do thousands of fluoroscopic procedures per year in order to reach the defined occupational threshold risk for radiation exposure that is associated with disease. Because these levels of radiation are related to deterministic risk, the claim is accurate but insufficient for understanding physician risk in that it fails to account for statistically identifiable, non-deterministic (stochastic) risks.

X-rays are high-energy photons that penetrate a patient's body and are received by a contralateral image intensifier. The amount of X-rays that penetrate in a given unit of space is related to the density of the tissues that are encountered between the source beam and the image intensifier. Differential penetration creates contrast between dense substances such as bone and iodine contrast, intermediate-density substances such as soft tissues, and very low-density substances such as air. The X-rays generated by the fluoroscopy machine that do not penetrate to be intercepted by the image intensifier are either absorbed by the patient's tissues or scattered. Absorption of X-rays is related to potential adverse biological effects that will be discussed later in this article. Scattered X-rays spread throughout the



**A physician who routinely uses fluoroscopy can significantly reduce personal risk of radiation exposure by altering technique.**

operative suite and represent the majority of radiation to which physicians and their team members are exposed.

The output of a fluoroscope is described in terms of entrance skin exposure, or ESE. The units of this exposure are roentgens per minute, R/min. Individual exposure to radiation is described by the unit rem. One rem is equal to the energy imparted per unit mass of tissue when a patient is radiated. (One rad delivered to a patient results in one rem of exposure to that patient). The FDA limits fluoroscopy units to a maximum ESE of 10 rads per minute (13). Higher radiation rates, often referred to as “boost” modes, can deliver an ESE of up to 20 rads per minute for a short duration.

Modern fluoroscopy machines often have an automatic brightness control, or ABC, that is designed to automatically increase the intensity of X-rays generated per unit volume, depending on whether adequate signal is received by the image intensifier. A unit equipped with an ABC feature can increase the exposure to an operating physician during a procedure without warning. This is often encountered when the patient is large and the X-ray beam is significantly weakened by the mass of the patient.

The key to understanding operating room risk is the insight that the members of the operating team are predominantly affected by scattered radiation rather than by the primary radiation beam (2). It is an infrequent event that physicians or other members of the operating team will expose themselves to the path of a primary beam. Therefore, the largest source of X-ray exposure is from scattered radiation (Compton radiation) that results from the beam interfacing with the patient. Scattered radiation is noncoherent, multidirectional radiation that is highest near the patient’s body surface and diminishes based on the distance between the patient’s body surface and the physician (7). In a lateral exposure of the spine, personnel on the side of the beam source are exposed to the highest dose of radiation due to the large amount of radiation that is backscattered by the patient, the positioning frame, and the table (1). During pedicle screw placement, radiation exposure to the thyroid is three to four times greater on the X-ray beam source side of the table than on the image intensifier side of the table (8). The dose to a surgeon’s torso is significantly increased when the surgeon stands on the side of the X-ray source (53 millirem/min) compared to standing on the side of the image intensifier (2.2 millirem/min) (8).

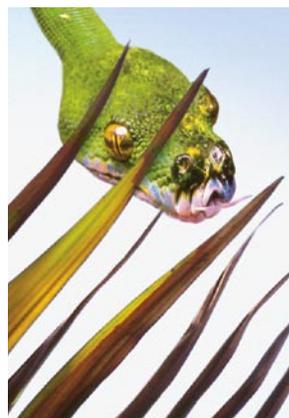
The reason for this differential is that backscattered radiation is greatest at the initial beam-patient interface and thus accrues to personnel ipsilateral to the beam source. Individuals standing on the image

intensifier side of the table are not affected by radiation that is attenuated by patient body absorption, the backscattering effect described above, and image intensifier absorption.

It is well established that the amount of radiation one is exposed to during a fluoroscopic procedure is related to the distance between the individual and the source of the radiation (10, 4). In this instance, regardless of the side of the table on which one stands, the amount of radiation exposure can be dramatically reduced by increasing the distance between the physician and the patient. Given the noncoherent, multidirectional nature of scattered radiation, the radiation per unit volume diminishes significantly with increasing distance from the source. This is referred to as the inverse square law which characterizes the reduction in radiation exposure as an exponent of distance from the source. This mathematical relationship predicts that a significant reduction in radiation exposure is achieved by adding even a fraction of a meter to the distance between a Compton radiation source and an operating physician.

The biological effects of radiation are determined by the amount of radiation exposure, the sensitivity of the specific cell line involved and the susceptibility of the individual (11, 5). The relative sensitivity of human cell lines is greatest for lymphocytes, erythrocytes, and epithelial and endothelial cells and is lowest for neurons, bone, and muscle. This correlates with the mitotic activity of the cell line, and vulnerability is driven by the proportion of cells undergoing mitotic activity per unit time; the higher the rate, the higher the sensitivity to radiation exposure. The absorption of energy from a high-energy photon often results in cell destruction but on occasion can result in an injury that produces a biologically modified cell which may initiate a neoplasm.

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#### WHAT DO YOU THINK?

What potential operating room hazards are of particular concern to you? Tell us in a letter to the editor or send us your ideas for topics to be explored in future articles. A link to instructions for all types of submissions to *AANS Neurosurgeon* is available at [www.aansneurosurgeon.org](http://www.aansneurosurgeon.org).

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The role of radiation exposure in spine surgery has been specifically evaluated and found to be 10 to 12 times greater than the radiation exposure during other fluoroscopically assisted nonspinal musculoskeletal procedures (8). This increase in exposure is related to the amount of energy required to penetrate the torso, which is thicker than limbs, and the proximity of the surgeon's hand to both the primary and backscatter sources of radiation during operative imaging.

### Best Practices

Based on the stochastic model of injury related to low-dose radiation and the physics of radiation exposure in the operating room, a series of best practices can be identified and in many instances verified for reducing the radiation exposure to the operating physician and team, as well as for reducing the likelihood of injury related to low-dose radiation.

A primary issue is the distance between personnel and the patient during an X-ray exposure. This distance should be as great as possible. Typically, the radiation exposure becomes extremely low at a distance of three meters from the patient. The opportunity to move three meters from a patient during placement of a pedicle screw, for example, is sometimes limited, but even making small increases in the distance from the patient will reduce radiation exposure. The operating physician who is most likely to be required to stay closest to the patient during an X-ray exposure should always be positioned on the side of the image intensifier. Those personnel who can move at least three meters from operative field during this portion of the case should be positioned on the source side of the fluoroscopy unit.

All personnel should use lead aprons, which markedly reduce the amount of radiation exposure. The most effective lead shielding is a wraparound two-piece garment, which gives 360-degree protection of both the upper and the lower torso. So-called lightweight lead aprons may sacrifice lead thickness for comfort, resulting in proportionately less protection.

The fluoroscopic technique should be designed to produce an adequate image with the minimal amount of penetrating beam energy for the shortest period of time. The use of short "looks" is preferable to a continuous exposure. The use of boost and magnifying modes, which increase the amount of high-energy photons generated, should be limited as much as possible.

The amount of radiation exposure also will be lessened by keeping the image intensifier as close as

possible to the patient's body surface. This significantly reduces the exposure to a physician on the side of the image intensifier and reduces the likelihood that an ABC system will compensate for a decreased signal due to the scatter between exiting body surface and the image intensifier. Dimming the room lights often can improve the contrast of the image displayed on the screen, reducing the need to boost X-ray beam energy to achieve contrast resolution.

When taking anteroposterior projections of the spine, it is best to place the image intensifier above the table and the source beam below the table. There is a significant amount of scatter from the table with the source below the table, and this relatively predictable scatter constrains much of the exposure profile to the lower torso; an adequate distance from the table and a wraparound lead apron protecting the tissues below the waist adequately compensate for this exposure. **NS**

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# Stress and Burnout

## Insidious Influences

PAUL KLIMO JR., MD, AND WILLIAM T. COULDWELL, MD

**A** career in neurosurgery may take a substantial toll on an individual's body and mind. From the "baptism by fire" experienced by a brand-new junior resident, to keeping one's head above water as the residency proceeds, to the realization shortly after graduation of being responsible for the health and welfare of one's patients, and finally to the difficulties of lifelong challenges in patient care and administration, neurosurgeons are under continual stress that varies considerably among individuals and lasts for the duration of one's career.

Job-related stressors, in the broadest definition, are any process, task or environment that is directly related to or affected by neurosurgery and has the potential to create an unpleasant, negative physiological or psychological change within the individual. Stressors within neurosurgery are innumerable. They can be due to events that take place within the clinic or operating room (long hours, complications, complex cases), academic issues (publishing, promotion, continuing medical education), economics (billing, salaries), or medicolegal concerns (lawsuits). These stressors also can affect or be affected by domains outside of neurosurgery, such as maintenance of physical health, interests or hobbies outside of neurosurgery, and relationships with spouses, children, other family members and friends.

Surgeons in other disciplines have done a good deal of research into stress and burnout in their fields. In a landmark study, Harms and colleagues conducted interviews over a 25-year period with general surgeons who graduated from a single program (6). The interviews concentrated on serious health and practice issues that occurred after residency. There was a 21 percent postresidency divorce rate, major health issues occurred in 32 percent of

all surveyed, and alcohol dependency was confirmed in 7.3 percent. In 50 percent of those age 50 or older, body mass index had increased to 26.6 kg/m from 23.9 kg/m at younger than age 40; however, only 10 percent reported a complete lack of weekly exercise activity, with 62 percent exercising at least three times per week, and 75 percent of surgeons surveyed were satisfied with their practice/career.

Job strain has clearly been associated with hypertension and cardiovascular disease, especially in men. Ohlin and colleagues found that men with baseline job strain had a significantly greater increase in both systolic and diastolic blood pressure, compared with the "relaxed" group that had low work demands and "high decision latitude" (14). High job strain also has been associated with progression of carotid atherosclerosis (3) and coronary heart disease. (1).

One of the consequences of the cumulative effect of stress is burnout. Burnout is a syndrome of lack of interest/enthusiasm for work (emotional exhaustion), a tendency to treat people as if they were impersonal objects (depersonalization), and a sense that an individual's work is not meaningful or important (low sense of personal accomplishment) (15). Burnout is associated with an increased risk of medical errors, suboptimal patient care and reduced patient satisfaction. It also can spread into personal life and impact physician relationships and activities outside the professional domain, often leading surgeons to consider early retirement (4, 9, 12, 16, 17, 18). For example, Halbesleben and Rathert found that the depersonalization dimension of physician burnout was associated with lower patient satisfaction and longer postdischarge recovery time (5).

Kuerer and colleagues found a 28 percent burnout rate among surgical oncologists (10). Campbell and

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**Burnout is associated with an increased risk of medical errors, suboptimal patient care and reduced patient satisfaction.**

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colleagues received responses from 582 actively practicing general surgeons and found a startlingly high percentage (32 percent) of physicians who admitted to having high levels of emotional exhaustion (2). Interestingly, younger surgeons were more susceptible to burnout, and burnout was not related to caseload, practice setting, or percent of patients insured by a health maintenance organization. Factors that were cited as causes of burnout included a sense that work was overwhelming; a perceived imbalance among career, family, and personal growth; perceptions that the career was unrewarding; and lack of autonomy or decision involvement.

Not surprisingly, there was a strong association between burnout elements and a desire to retire early. In a study of chairs of otolaryngology departments, high emotional exhaustion or depersonalization was correlated with low self-efficacy (belief about one's capability to produce effects), low spousal support, disputes with the dean, department budget deficits, working nights and weekends, Medicare audits, loss of key faculty, and being a malpractice defendant (7). In another survey of head and neck surgeons, 34 percent felt burned-out despite most respondents indicating that they enjoyed their work (8). Factors that were cited as contributing to burnout were the stress of extending working hours, dealing with severely ill patients and the increased need to deal with government and economic issues.

In fields in which the impact of high stress levels can have such profound effects, it is important to develop strategies to reduce stressors, or at the very least decrease the impact they have on the surgeon. Lee and colleagues found that mechanisms to cope with personal and job-related stress included eating nutritiously and exercising, spending time with family and friends, valuing relationships with patients, and participating in continuing medical education (11). Similarly, Shanafelt proposed a five-step process to promote personal job satisfaction (15):

1. Identify sources of greatest of professional motivation (goals).
2. Make critical appraisal of which practice type and setting provides the greatest opportunity to achieve these goals.
3. Become aware of and manage practice-specific stressors.
4. Achieve balance between personal and professional life.
5. Nurture personal wellness strategies.

Although no reports have dealt specifically with neurosurgeons and the effects of job-related stress,

all of the stressors cited in other fields are common to neurosurgery. As a profession that has arguably one of the highest degrees of job-related stress, neurosurgery should begin to conduct similar research to determine how prevalent the effects of stress are and then propose ways to identify, cope with and overcome them. This knowledge could then be incorporated into residency training programs with the goal of encouraging and preserving the excitement that every junior resident feels as he or she enters a career as a neurosurgeon. **NS**

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### EDITOR:

I appreciate receiving *AANS Neurosurgeon* and read with enthusiasm the contents thereof. There are a couple of items [in *AANS Neurosurgeon* 16(4), 2007–2008] which caught my attention and I believe may be worth commenting on.

The first item relates to instrumentation and neurosurgeons with respect to commentary made on page 11. There will always be a conflict of interest if a neurosurgeon is using instrumentation provided by a commercial company that attempts to market to the same neurosurgeon. One can only hope that [neurosurgeons] will not take bribes or bribe-like phenomena, thereby offering their patients not necessarily optimal but certainly “available” solutions.

The other item is in regard to Dr. Perez-Cruet’s article on minimally invasive surgery [page 14]. As an enthusiast of minimally invasive surgery, I

found it almost ridiculous that minimally invasive spine surgery is considered instrumentation using a stereotactic or other approach. To me, minimally invasive surgery is the antithesis of spine fusion surgery. I find it a bit unsettling that this instrumentation surgery is called minimally invasive.

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# Standardized Training and Evaluation of an ACGME Core Competency in a Neurosurgery Residency Program

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**Abbreviations:**

ACGME, Accreditation Council for Graduate Medical Education; CLASS Center, Clinical Learning and Simulation Skills Center; GW, George Washington University; SP, standardized patient

**Introduction**

The ACGME has mandated that resident competency in six areas be assessed before graduation. These areas are: (1) patient care; (2) medical knowledge; (3) practice-based learning and improvement; (4) interpersonal and communication skills; (5) professionalism; and (6) systems-based practice. However, the ACGME has not provided specific details on how to train or assess residents in these areas. Each U.S. residency program is to develop its own training program and assessment tools to address each competency.

The GW Department of Neurosurgery, in conjunction with the CLASS Center, created and conducted a preliminary test of a novel program to assess residents in one of these competencies, interpersonal and communication skills, in a way that would capture the nature of neurosurgical practice and disease processes. This paper will describe the program and

report the preliminary test findings.

The program that was initially developed utilized a methodology for internal review, 360-degree feedback (1). A set of questionnaires was developed to evaluate the residents by all the different groups of individuals with which they interact in the course of their clinical responsibilities, including faculty, patients, and nursing staff. In turn, the residents would have an opportunity to review the faculty, the clinical service, and their own training. These reviews proved effective in generating data for the evaluation of the residents, but there was still no standardized training for the competency other than the training received in the course of clinical practice. In its review of the residency program, the ACGME commented that the 360-degree feedback was too subjective and asked that a more objective assessment tools be developed.

A partnership between the new GW

**ABSTRACT**

The ACGME has instituted a set of six core competencies for residents and is requiring residency programs to provide evidence of effective standardized training through objective positive outcome measures for these competencies. The GW Department of Neurosurgery has implemented a pilot program to meet these requirements for interpersonal and communication skills. Ten neurosurgery residents participated. In three workshop sessions, each resident interacted with a standardized patient; there was a didactic session, and then the residents practiced new communication skills on two additional standardized patients. The standardized patients simulated clinical neurosurgical scenarios and provided feedback to the residents on their communication. In a final session, the residents interacted with standardized patients in the same clinical scenarios as before. Analysis of standardized patient feedback showed that the average feedback scores increased for all residents between the first and second exposures to the same clinical scenario (46 to 50), but this was not statistically significant ( $Z=0.53$ ,  $p > .10$ ). The present study demonstrates a pilot program which provided neurosurgery residents with standardized instruction and assessment of interpersonal and communication skills in accordance with the mandate of the ACGME. This program will require further refinement and assessment with a larger number of subjects for further development and implementation.

Hospital and the School of Medicine made available the resources of the CLASS Center, which is dedicated to educational purposes and comprises the entire sixth floor of the new hospital. The center utilizes SPs for training and assessment and has several simulated exam rooms with standard exam room equipment and video capability and monitoring stations for review of the resident's interaction with the SP.

The CLASS Center's resources had previously been utilized by the anesthesia and medicine departments, which had taken their residents through a similar program designed for those specialties. Therefore, many of the fundamental components like the didactic group presentation videos and the general format of the workshops were already established, and the neurosurgery department's program was able to utilize many of these established resources. The SP cases and the group discussions were altered to be more specific to neurosurgery.

**Methods**

Ten neurosurgery residents from program years two to seven participated in the program. The participants constituted a convenience sample. Because of scheduling conflicts, not every resident was available for every workshop. The residents attended an introduction and three communication skills workshops given one day a week.

The workshops, Informed Consent, Bad Result, and Cross-Cultural Communication, were selected from a preestablished GW program called CREATE (Cross-Residency Exercises for ACGME Training and Evaluation), which was designed to teach residents interpersonal skills (Table 1). The CREATE workshops last two hours and are divided into a DVD-guided didactic section (Appendix 1) and a practice section with SPs. The didactic DVDs present a challenging communication case for discussion, the skills to address the challenge, and an example of an experienced clinician modeling the skills

Continues ►

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**TABLE 1**

**Process of Resident Communications Workshops**

<b>DAY 1 Informed Consent</b>	<b>DAY 2 Bad Result</b>	<b>DAY 3 Cross-Cultural Communications</b>	<b>DAY 4 Assesment</b>
Residents interact one-on-one with the first standardized patient	Residents interact one-on-one with the first standardized patient	Residents interact one-on-one with the first standardized patient	Residents interact with first informed consent standardized patient scenario
DVD presentation on informed consent skills	DVD presentation on communicating a bad result	DVD presentation on cross-cultural communication	Residents interact with first bad result standardized patient scenario
Residents as a group interact with a second standardized patient	Residents as a group interact with a second standardized patient	Residents as a group interact with a second standardized patient	Residents interact with first cross-cultural communication patient scenario
Residents as a group interact with a third standardized patient	Residents as a group interact with a third standardized patient	Residents as a group interact with a third standardized patient	Residents provide feedback on entire program

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while interviewing a patient. The skills taught in each workshop are based on expert consensus from the literature. The patient cases were adapted for neurosurgery by the lead author, J.L.

After the DVD presentation, the material was openly discussed by the residents with two facilitating faculty from the CLASS Center and one junior faculty from the Department of Neurosurgery who was able to provide additional neurosurgical context. The subsequent practice section, using cases customized for neurosurgery, allowed residents to try out the skills and receive feedback from SPs and faculty.

The residents were assessed before and after the workshops by SPs who were carefully standardized and trained to evaluate the residents using checklists. Workshop-specific pretests were conducted at the beginning of each workshop and thus were given serially. Before each workshop, residents interviewed the SP who was to present

a communications challenge specific to that workshop. The posttest, consisting of three cases corresponding to each of the three workshops (and identical to the pretest cases), was given as a single event three weeks after the last workshop. The checklists for all cases assessed the same set of general communication skills specific to each of the three workshops. The SP scores from the three clinical scenarios in the posttest session were compared to the SP scores from the pretest. The data were “de-identified” prior to the analysis. Institutional review board approval for retrospective analysis was obtained prior to the analysis. The Wilcoxon signed-rank test was used to compare each resident’s average post-workshop score to his or her average pre-workshop score.

**Results**

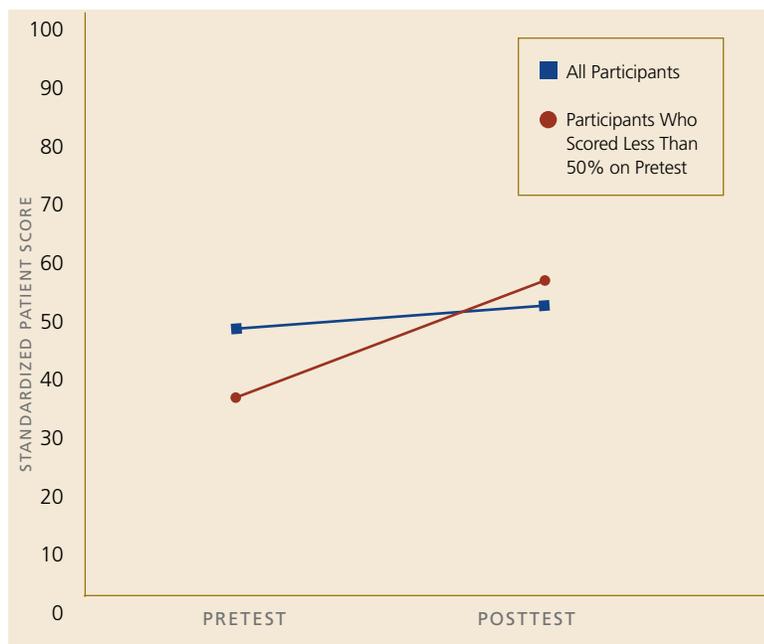
Analysis of the residents’ scores averaged across the three SP scenarios (Figure 1) demonstrated a slight improvement in average score from pretest to posttest that was not statistically significant ( $Z=0.53$ ,  $p > .10$ ). Analysis of the subset of residents that obtained less than 50 percent on their initial SP feedback revealed a statistically significant improvement from pretest to posttest ( $Z=2.02$ ,  $p < .05$ ). In the informed consent and bad result scenarios the majority of the residents received higher scores in the posttest, but in the cross-cultural workshop, such was not the case. None of these differences analyzed by specific workshop was statistically significant.

**Discussion**

These workshops, originally designed for internal medicine and surgery, were adapted to be relevant for neurosurgical residents. The workshops allow residents to reflect on the communications challenge, provide them with literature-based approaches, and demonstrate to them an experienced clinician using these approaches. Highly interactive, the workshops encourage discussion of residents’ experiences and reactions to give the topic personal relevance in accord with

FIGURE 1

Average Scores of Standardized Patient Feedback



adult learning principles. In this process, controversies arise, and residents are encouraged to explore them fully in a safe learning climate. For example, one scenario involved providing compensation to a patient who had experienced a bad outcome (2). This prospect was met with skepticism and resistance from many of the residents because of the assumed potential negative implications in our highly litigious society. In addition to promoting discussion and teaching communications approaches, the workshops provide extensive opportunities for residents to practice skills with SPs and receive feedback. This is a learning-in-action method recommended by the ACGME as one of the most effective for skills acquisition.

This communication skills program used a pre- and posttest method for evaluation. This type of trial is challenging logistically because, when performed traditionally, it requires gathering all the residents together for both the pre- and posttests. We implemented a novel approach to minimize the drain on resident time. Workshop-specific pretests, “rolling pretests,” were conducted as the initial part of each of the three workshops. Since the general communications skills are common to every workshop, we hoped that an additional advantage of this method would be sequential reinforcement of these general skills. To that end we provided residents with their checklist evaluations after every pretest.

There are obvious limitations to a small-scale pilot study such as this. The small number of residents involved in this preliminary trial precludes firm, meaningful conclusions from being drawn. Though the overall posttest scores trended toward improvement and the low scorers did demonstrate statistically significant improvement, the null hypothesis that the program was not effective cannot be ruled out. Some residents did not improve their scores, and the performance of some worsened. Also, improvement in the performance of initial low scorers may be an artifact of the statistics explained by regression to the mean. This program needs further evaluation with

large enough numbers to power meaningful conclusions. Other limitations include lack of generalizability because the trial was performed with so few residents at a single institution.

We are eager to proceed with further development and study of this program. Review of resident videos suggests that we need to achieve better SP standardization and create better checklist items, with more attention paid to evaluation of nonverbal interaction. Also, we should move toward criterion-referenced scoring, setting the bar at a minimum pass level. Instead of evaluating the residents in a comparative manner, residents must reach a threshold value before advancing, similar to the thresholds that residency programs mandate for resident scores on the board exam. Residents who demonstrate proficiency by achieving this threshold in the pretest will be excused from further training; those who do not will proceed with the workshops and the posttest. We also will explore ways to increase the numbers of residents in the program in order to better evaluate it. Possibilities include presenting the program to neurosurgery residents over a number of years and analyzing the data in aggregate, partnering with neurosurgery programs at other institutions, or combining data across specialties.

With some creative adaptations, this model could be used for teaching and evaluating other ACGME competencies. The communication workshop addresses factors within the professionalism competency, such as compassion; integrity; respect for others; responsiveness to patient needs that supersedes self-interest; respect for patient privacy and autonomy; accountability to patients; and sensitivity and responsiveness to a diverse patient population, including diversity in gender, age, culture, race, religion, disabilities, and sexual orientation. Developing a scale that recognizes these factors would address the professionalism competency. Standardized colleagues rather than SPs could be used to teach and assess the professionalism competency components

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of responsibility to the profession and society. Standardized colleagues also would make possible the instruction and assessment of the systems-based practice competency. Coordination of patient care, advocating for quality patient care, working in interprofessional teams and implementing potential systems solutions are all components of the systems-based practice competency that could be assessed through a program like this.

**Conclusions**

The GW pilot program of standardized instruction and assessment of interpersonal and communication skills, in accordance with the mandate of the ACGME, incorporates learner-centered training and evaluation methods that may be of interest to other institutions. These methods include interactive DVD-based workshops, challenging neurosurgery

communications cases, and the use of SPs for training and evaluation.

Preliminary program evaluation suggests that some residents, especially low scorers on the pretest, may improve as a result of the program. However, the difference between resident pretest and posttest scores was not statistically significant. Definite conclusions are not possible because of the small number of participants. Based on video review and resident feedback, the program will be refined and reassessed. **NS**

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**Appendix 1****DVD Example of a Clinical Case:  
Effective and Ineffective Approaches****Scenario**

Joe Porter is a 62-year-old man here to see you for follow-up regarding his appendectomy. You discharged him from the hospital seven days ago after an uneventful surgery. He called you five days after discharge complaining that his mouth was dry and that he wasn't putting out much urine. It was very hot that day, and Joe told you that his air conditioner wasn't working and he wasn't drinking much. You were very busy in the office and didn't check his chart. You told him he needed to drink more: eight glasses of liquid per day. Later, you learned from an emergency room resident's phone call that Joe wound up in the emergency room with acute urinary retention secondary to an enlarged prostate.

After the call from the emergency room resident, you went back and checked Joe's chart. It revealed that he

had a long history of benign prostatic hypertrophy. In fact, in the hospital he complained that it was giving him more trouble than usual, but that he did not want any medication.

The patient is sitting in your office and says to you, "I gotta tell you doc, I'm not happy with you. All that water you told me to drink landed me right in the emergency room at the hospital. They told me I wasn't dehydrated at all. They said my bladder was blocked because my prostate was enlarged."

**Effective Clinician Approach**

**Doctor:** I'm sorry Mr. Porter, I made a mistake. What I thought was going on was related to you being dehydrated. What did they tell you in the emergency room as it relates to your prostate?

**Joe:** Basically they told me I couldn't pee because my bladder was being blocked by my prostate being enlarged, which I thought you guys knew about. I thought it was in my records.

**Doctor:** I made a mistake, Mr. Porter. What I thought when I talked to you on the phone was your air conditioning was off, you were dehydrated, so I thought that the way to best manage that was to encourage you to drink fluids. That was my thought process. I wasn't trying to neglect you, but I wasn't thinking along those proper lines and I had forgotten that you had prostate problems. The issue is really related to your appendectomy and having your surgery. It's not unusual for the prostate and your urinary stream to get a little lazy, and what I was thinking is that it is not unusual for you to get dehydrated after an operation like this.

**Joe:** So you were making an assumption.

**Doctor:** I was, and that was a mistake. I'm sorry. I think that in the future, it would have been better if I had brought you in when you had that complaint and assessed you and evaluated you. It would have allowed us to look at your record again and we would have recognized that the prostate was a problem that you had and I could have intervened. I'm sorry that happened. I think what we are hoping to do in the future and what I would certainly tell our students and residents is that in patients after they have had an appendectomy or any gastrointestinal surgery, and certainly in men in your age bracket, we need to think about the prostate as a problem related to low urine output, and not just dehydration in this situation.

**Joe:** Can you put that in English?

**Doctor:** I can. I'm sorry. What I think we will have to do is instead of just making the assumption that you are having a problem related to dehydration and not getting enough oral intake and enough fluids, we need to think about

the prostate as a problem because it is so common in men and especially in men over the age 50 or 55. I simply neglected to think about that. I'm sorry. Certainly, we have already discussed this in our department and we would be happy to compensate you for your time and effort, and cover the cost for your emergency room visit. And again, I am very sorry for the inconvenience and the problems that were caused.

#### Ineffective Clinician Approach

**Doctor:** Mr. Porter, I don't know quite what you are getting so upset about here. We discussed your operation, your appendectomy, in detail and all the bad things that can happen after an operation.

**Joe:** You didn't say anything about the prostate getting enlarged and blocking the bladder.

**Doctor:** Well, yeah, I didn't do that because it is not a major complication. I mean the things that could have gone wrong were serious wound infections. You could have had peritonitis. We got in there, we took your appendix out, we did all the right things, and I've got to be honest...

**Joe:** I've got this tube shoved up me and I've got a bag strapped to my leg. I think that's pretty bad.

**Doctor:** Well let me tell you something, Mr. Porter. In the big scheme of things, this will get better. Now, ok, I'm sorry this happened. But let's just get over this thing because this will get better.

**Joe:** Easy for you to say. **NS**

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#### SPECIAL TO THE ONLINE EDITION

Appendix 2, a clinical case scenario for resident interaction, will be available in the online edition of *AANS Neurosurgeon* at [www.aansneurosurgeon.org](http://www.aansneurosurgeon.org).

## The Basics of Board Certification

# Time to Certify

Sometime in the last year of residency, you will receive information from the American Board of Neurological Surgery outlining the process of certification. Most residents are aware that certification—and the dreaded oral examination—will happen at some point in the future and that there is some sort of new continuing education requirement, but pressing issues that attend the end of residency can take precedence over planning for certification. With that in mind, this article will address the basics of board certification in neurosurgery, as well as briefly outline the ABNS Maintenance of Certification, or MOC, requirements.

Initial ABNS certification first requires meeting the training requirements in a program accredited by the Accreditation Council for Graduate Medical Education and passing the primary examination by the completion of residency. It then involves two steps, the application and the oral examination. An application to sit for the oral examination must be completed within five years of residency graduation. Importantly, a fellowship or other postgraduate work does not extend the five-year window.

The best known element of the application process is the practice data requirement. Practice data must be submitted for 12 consecutive months. The practice data must detail all operative cases during that period with at least three-month follow-up and include at least 100 operative cases, with no case being more than two years old when the data is reviewed. Cases performed as a fellow, even if done as a credentialed surgeon providing, for example, trauma coverage (as happens in some fellowships) cannot be used in the practice data. According to the ABNS, practice data ideally should be obtained within three years of finishing residency. The ABNS maintains the NeuroLog online database system to record practice data and requires its use. In addition to practice data, recommendations are required from at least three physicians, two of whom must be from your community. At least one of the recommendations must be from a physician who is ABNS-certified. The applicant must also hold a valid medical license in the state of prac-

tice and have unrestricted hospital privileges.

After an application review process that can take from six to 12 months (something to keep in mind in deciding when to start recording your practice data), the oral examination is scheduled. The three-hour oral exam covers the gamut of neurosurgery. It is given in a case history format which includes the symptoms, findings on exam, results of diagnostic tests, work-up, differential diagnosis, surgical and nonsurgical management including anatomy, pathology, physiology, and descriptions of surgical procedures. Those who fail the oral examination must retake it within three years. If the oral examination is not passed on the second try or if the exam is not retaken within the three-year period, the written exam must be taken again and passed, and the application process, including the submission of a new round of practice data, must be repeated.

After the oral examination is passed, a 10-year certificate is issued. To maintain certification, one must participate in the MOC program. The program consists of a series of three-year cycles that culminate in the MOC Cognitive Examination component, a multiple-choice examination which is the only requirement for the 10th year, although it may be taken in the eighth or ninth year.

In each three-year cycle, all requirements for three components must be met. (1) To show Evidence of Professional Standing, verification of an unrestricted medical license and hospital privileges must be obtained, in addition to a questionnaire completed by the chief of staff at your primary hospital. (2) To meet the requirements for Lifelong Learning and Self-Assessment, 150 hours of continuing medical education must be completed every three years in addition to participation in the Self-Assessment in Neurological Surgery, or SANS, online examinations. (3) Evidence of Performance in Practice requires the submission of the details of 10 consecutive “key cases,” of which there are currently 13, which span the intracranial, endovascular, spine, and pediatric subspecialties. Additionally, 20 of your patients will

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# INSIDE Neurosurgeon



## News of Neurosurgical Organizations

Inside Neurosurgeon focuses on the news and views of the AANS and other neurosurgical organizations. A sampling of this section's content is listed below. *AANS Neurosurgeon* invites submissions of news briefs and bylined articles to Inside Neurosurgeon. Instructions for all types of submissions to *AANS Neurosurgeon* are available at [www.aansneurosurgeon.org](http://www.aansneurosurgeon.org).

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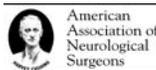
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## AANS President's Perspective



# A Commitment to Education

Jon H. Robertson, MD

Reflecting on the goal of a medical education, William Osler, considered by many to be the father of modern medicine, said: “At the outset appreciate clearly the aims and objects each one of you should have in view—a knowledge of disease and its cure, and a knowledge of yourself. The one, special education, will make you a practitioner of medicine; the other, an inner education, may make you a truly good man, four square and without a flaw.” His appeal was for a “due proportion of each” to thereby becoming a complete physician.

Education specifically in neurosurgery was experienced by the 23 surgeons chosen who attended the first meeting of the Harvey Cushing Society in 1932. Neurosurgical education was a natural commitment that would become a core mission of the organization. It would assume an even greater role as the Cushing Society transitioned to the American Association of Neurological Surgeons in the 1960s.

With the approach of the 76th AANS Annual Meeting in April and the conclusion of my AANS presidency, it is humbling to consider that the philosophy and goals of the AANS—outlined in the letters that proposed the Harvey Cushing Society—are yet intact. The authors of those letters, Temple Fay, R. Eustace Semmes, R. Glen Spurling and William P. Van Wagenen, wished to further their knowledge of neurological surgery by meeting with their colleagues to present scientific papers and discuss problems common to their clinical practices. These great leaders recognized the need for a face-to-face dialogue on the issues of their day that would make them better physicians and improve patient care. They were intent on understanding neurological diseases and developing surgical techniques that might bring about cures. Their way had been made clear by the remarkable work of Harvey Cushing, whose approval they cherished and who himself was influenced by Osler, of whom Cushing would write a much celebrated biography.

Throughout its history the AANS has strived to meet the continuing education needs of its membership. The rapid pace of scientific discovery and technological advancement has demanded an ever-increasing investment of AANS resources and a commitment of AANS leadership to careful assessment of educational offerings.

The number of directly and jointly sponsored AANS continuing education offerings has increased exponentially over the past two decades. Much of this growth has been in response to innovations in technology that call for additional hands-on training. Unlike the AANS founders, who sought to better understand neurological disease and learn of new surgical techniques, today’s practicing neurosurgeons also must become knowledgeable in the application of a wide variety of new devices that promise to improve patient care.

Our specialty has become a technology-intensive surgical practice. Neurosurgeons must interact with industry in the development of new technologies for the benefit of their patients. The high cost of educational programs and hands-

on training for these technologies must be supported through financial sponsorship from industry. Neither the practicing neurosurgeon nor the AANS can bear this expense alone.

In the past year the relationship between surgeons and the medical device industry has received a great deal of news coverage. AANS leadership has been keenly aware of the ethical and legal concerns regarding the relationship between the AANS and industry. Corporate support is desired and appropriate if it brings significant educational value and improves patient care. Governed by the AANS Guidelines for Corporate Relations, which first were released in 2005, the AANS has developed appropriate relationships with its industry partners to enhance neurosurgery's core missions of patient care, education and research.

The complexity of today's AANS education program demands forward-thinking leadership that will be ever vigilant against the threat of outside interests that might damage the integrity of our education program either directly or by association. We should openly welcome new technologies and ideas that advance the educational experience for our

members, but we also must insist that the pathway of approval for new innovations is both scientifically rigorous and strictly overseen.

Neurosurgical education belongs to organized neurosurgery. Neurosurgeons control the content and delivery of education for AANS members. Each AANS member benefits from the commitment of our organization to our core mission of neurosurgical education.

The experience of leading this wonderful organization over the past year has led me to an even greater appreciation of the foresight evidenced by visionaries such as Osler, by the founders of the Harvey Cushing Society and by my 74 predecessors at the AANS helm. I am no less appreciative of and deeply grateful for the support and hard work of everyone in our organization who has built upon the past by contributing this year to the current and future success of the AANS. For me, it has been an honor and a privilege to serve. **NS**

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**Jon H. Robertson, MD**, is the 2007–2008 AANS president and chair of the Department of Neurosurgery at the University of Tennessee Health and Science Center, Memphis, Tenn. The author reported no conflicts for disclosure.

GOING ONCE, GOING TWICE ... SOLD!

## 10th Young Neurosurgeons Silent Auction at AANS Annual Meeting

The Young Neurosurgeons Committee invites participation in the Silent Auction at the 76th AANS Annual Meeting in Chicago. Now in its 10th year, the auction boasts some of the most exciting items to date, including fine wines, books, electronics and vacation getaway packages. Items will be displayed in the AANS Resource Center, located in the exhibit hall. A new online system, cMarket, will allow bidding from any location as well as from a handheld electronic device such as a BlackBerry or iPhone, and it will automatically notify bidders of the status of their bids. The overall ease and accessibility that cMarket provides are expected to help the Neurosurgery Research and Education Foundation reach and perhaps exceed its 2008 goal of \$40,000.

Items can be viewed prior to the start of the auction by visiting [www.AANS.cmarket.com](http://www.AANS.cmarket.com). Bidding begins promptly at 9 a.m. Monday, April 28, and ends Wednesday, April 30 at 2 p.m. **NS**

INTERNATIONAL AWARDS

## 2008 Abstract Award and Travel Scholarship Recipients Announced

The AANS Scientific Program Committee selected Yves R. Lazorthes, MD, Toulouse, France, as the recipient of the 2008 AANS International Abstract Award. The award is given to the highest ranking international abstract and will be presented during the plenary session on Monday, April 28, during the AANS Annual Meeting in Chicago. Dr. Lazorthes' abstract is titled "Hypothalamic Stimulation for Chronic Cluster Headache: A Pluricentric Controlled Study."

The AANS International Travel Scholarship provides \$1,500 to support the attendance at the AANS Annual Meeting of a neurosurgeon from a developing country. The 2008 recipient is Faiz U. Ahmad, MD, New Dehli, India. His abstract is titled "Intracranial Fungal Granulomas: A Single Institutional Clinico-Pathological Study of 54 Patients and Review of Literature."

Information on the international activities of the AANS is available at [www.aans.org/international](http://www.aans.org/international). **NS**

## AANS ANNUAL MEETING

# From Planning to Unqualified Success

## 76th Year for Neurosurgery's Premier Meeting

The AANS Annual Meeting is a primary source of continuing medical education, tailored specifically to neurosurgeons, that is designed to advance neuroscience research and to promote a climate conducive to excellence in clinical practice. It is the principal mechanism for the transfer of scientific, technical, and intellectual information to the neurosurgical community. As such, it represents the culmination of a year during which numerous AANS members volunteered their time and attention. Their perseverance and commit-

The Art Institute of Chicago is one of the few structures originally built for the 1893 World's Columbian Exposition that is still in use today.



### 2008 ANNUAL MEETING OVERVIEW

**April 26–May 1**  
**McCormick Place, Chicago, Ill.**  
[www.aans.org/annual/2008](http://www.aans.org/annual/2008)

#### Friday, April 25

Early Registration 5:00 PM–7:00 PM

#### Saturday, April 26

Registration 6:30 AM–5:30 PM

Practical Clinics 8:00 AM–5:00 PM

#### Sunday, April 27

Registration 6:30 AM–5:30 PM

Practical Clinics 8:00 AM–5:00 PM

Opening Reception – Navy Pier 7:00 PM–9:00 PM

#### Monday, April 28

Registration 6:30 AM–4:00 PM

Breakfast Seminars 7:30 AM–9:30 AM

Exhibits 9:00 AM–4:00 PM

Plenary Session I 9:45 AM–1:00 PM

*Richard C. Schneider Lecture – A. John Popp, MD*

*Hunt-Wilson Lecture – Marcus E. Raichle, MD*

*Cushing Oration – Douglas Brinkley, PhD*

YNS Lunch Session 1:15–2:45 PM

Poster Viewing 2:00 PM–2:45 PM

Scientific Sessions 2:45 PM–5:30 PM

*Ronald L. Bittner Lecture – Eric C. Holland, MD*

AANS Annual Business Meeting 5:30 PM–6:30 PM

#### Tuesday, April 29

Registration 6:30 AM–4:00 PM

Breakfast Seminars 7:30 AM–9:30 AM

Exhibits 9:00 AM–4:00 PM

Plenary Session II 9:45 AM–1:00 PM

*Presidential Address – Jon H. Robertson, MD*

*Louise Eisenhardt Lecture – Marcia Angell, MD*

Poster Viewing 2:00 PM–2:45 PM

Section Sessions 2:45 PM–5:30 PM

#### Wednesday, April 30

Registration 6:30 AM–3:30 PM

Breakfast Seminars 7:30 AM–9:30 AM

Exhibits 9:00 AM–3:30 PM

Plenary Session III 9:45 AM–1:00 PM

*Rhodon Family Lecture – Lee Woodruff*

*Theodore Kurze Lecture – Michael L.J. Apuzzo, PhD*

*Van Wagenen Lecture – Rodolfo Llinas, MD, PhD*

Poster Viewing 1:00 PM–2:00 PM

Section Sessions 2:45 PM–5:30 PM

Int'l Reception–Chicago History Museum 7:00 PM–9:00 PM

#### Thursday, May 1

Registration 6:30 AM–10:00 AM

“Meet the Experts” Breakfast Seminars 7:00 AM–9:00 AM

Socioeconomic Session 9:00 AM–10:45 AM

Special Scientific Session: *Neurosurgery* 10:55 AM–12:30 PM

*With the Chicago Masters: In My Experience*



Timothy B. Mapstone

ment no doubt will render the 76th AANS Annual Meeting an unqualified success.

“It is our objective to furnish our colleagues with the finest quality learning and networking opportunities available in an easy to reach, great American city,” stated Annual Meeting Chair Timothy B. Mapstone, MD.



E. Sander Connolly Jr.

Under the leadership of E. Sander Connolly Jr., MD, the 2008 Scientific Program Committee developed a compelling program that includes 41 practical clinics, 78 breakfast seminars and 149 oral paper presentations. Courses specifically for nurses and physician extenders as well as residents, fellows and medical students are part of this program. Five of the practical clinics and six of the breakfast seminars are new this year.

The Scientific Program Committee and Poster Chair Matthew A. Howard III, MD, reviewed more



Matthew A. Howard III

than 650 abstracts for presentation at the meeting. More than 400 electronic poster presentations, a new format for this year’s meeting, will be on view in the registration area of Lakeside Center, McCormick Place. All posters will be presented at individual computer stations and organized by author or topic, dependant on viewer preference. They can be viewed throughout the convention from Friday at 5 p.m. to Thursday at 10:30 a.m.



Gail L. Rosseau

Vibrant Chicago and its many magnificent sites, such as Navy Pier, where the opening reception will be held, will welcome visitors.

“Chicago is truly a great American city,” noted Local Host Gail L. Rosseau, MD.

“From stunning architecture and world famous museums to lakefront parks and vibrant ethnic neighborhoods, we think you will find that our kind of town is your kind of town.” **NS**

## NREF Research Symposium for Donors, Grant Recipients Inaugural Event at 76th AANS Annual Meeting

The Neurosurgery Research and Education Foundation will host its first annual Research Symposium prior to its reception for donors and grant recipients at the 2008 AANS Annual Meeting in Chicago, Ill. Awardees who completed their fellowships in recent years have been invited to present the results of their research to a special audience, which will include AANS and NREF leadership, NREF contributors, academic department chairs and representatives from the corporate partners cosponsoring NREF grants. The NREF’s Scientific Advisory Committee, led by Robert G. Grossman,

MD, will lead discussion of the research and will take questions from the audience.

“This inaugural research symposium is an excellent opportunity to celebrate the accomplishments of our research fellows and young clinician investigators,” said NREF Chair Griffith R. Harsh IV, MD. “We trust that it will foster both productive scientific interaction and friendship among all those who attend.”

The goals of the NREF Research Symposium are to foster collegial ties among awardees and expose their work to academic faculty and departmental chairs. Following the symposium, new grant recipients and past awardees will join the NREF Board of Directors, NREF corporate associates and Cushing donors at a reception for donors and grant recipients. Both the symposium and the reception will afford grant recipients the opportunity to exchange ideas with each other while personally getting to know leaders in the fields of academic and clinical neurosurgery. **NS**

## Neurosurgeons Go Global To Volunteer Abroad, Start Here

Gail L. Rosseau, MD

The global nature of neurosurgery as a specialty has long been recognized. Harvey Cushing, founding father of neurosurgery, was an early and devoted advocate of international exchanges. Many of his friends, mentors and students were colleagues from abroad. He recognized the vital role such international exchanges played in the genesis and dissemination of innovations in neurosurgery. Indeed, he expected his assistants to be able to read science in any language.

Most neurosurgeons today will finish their careers with good health and financial reserves that will allow them to consider a final phase of productivity not imagined even a generation ago. Many are looking for ways of “giving back” after retirement from traditional practice. In addition, many younger neurosurgeons are aware that after 25 to 30 years in practice they may be able to have a “third career” and want to plan for it.

All of these factors drive interest in international neurosurgery. The primary opportunities are in training, service and science, and these areas often overlap. For those who might be thinking about volunteering internationally, the following overview of the primary organizations that currently offer neurosurgeons opportunities to volunteer is a place to start.

### Foundation for International Education in Neurosurgery

Founded in 1969, FIENS exists to address the critical lack of trained neurosurgeons in the developing world. The 501(c)3 organization is administered by a volunteer board of neurosurgeons and relies on the generosity of the world neurosurgical communities, as well as corporate and individual donors. Through FIENS, volunteer neurosurgeons spend weeks to months at sites in the developing world teaching techniques to local neurosurgeons and developing and supporting local residency programs. FIENS volunteers provide critical assistance in the operating room, working side-by-side with neurosurgeons in the developing world. The focus is on sharing knowledge and techniques that help these colleagues help themselves.

Volunteer travel for four weeks or more is paid by FIENS; trips of shorter duration are funded by the volunteer, and the cost is tax-deductible. Housing, supplied by the local host, is generally very modest,



This mother and her twins, one with hydrocephalus, are pictured in Mbale, Uganda, one of several locations where the Foundation for International Education in Neurosurgery has been active.

often in an extra room in the teaching hospital. Volunteers are reimbursed up to \$1,000 for educational materials provided to the site. In addition, most volunteers solicit in-kind contributions of neurosurgical instruments, implantables and other equipment,

depending on the needs at each site.

In 2007, 13 volunteers traveled to their choice of 20 FIENS sites. In 2008, 35 individuals have sought information, and 21 volunteers have planned to travel. A list of volunteer sites and a downloadable volunteer application are available from [www.fiens.org](http://www.fiens.org).

### Operation Giving Back: American College of Surgeons

Operation Giving Back is a Web site that was developed to be a “comprehensive resource designed to help surgeons find volunteer opportunities best suited to their expertise and interests.” Founded in 2003, the program grew out of an ACS study which found that many surgeons held volunteerism to be an integral part of their professional identity.

The site, [www.operationgivingback.facs.org](http://www.operationgivingback.facs.org),

allows surgeons to create individual profiles of the parameters they deem important for a desirable volunteer opportunity. It also provides a “tool kit” that enables the volunteers to begin to understand the political, medical, cultural and physical environment of the locale of each volunteer opportunity.

#### World Federation of Neurosurgical Societies

Founded in Brussels in 1955, the mission of the WFNS includes contributing to public health throughout the world by facilitating neurosurgical training, disseminating neuroscientific information, and promoting the personal association of neurosurgeons. The organization has many programs to support this mission. For example, the WFNS Foundation raises money to provide training and equipment. Fellowships to WFNS Training Centers are available at training sites located in Rabat, Morocco; Recife, Brazil; Charlottesville, Va.; and New York, NY, with several more sites under development. In addition, basic instrument sets, bipolar cautery and microscopes may be purchased as a donation to be purchased in turn at substantially reduced prices based on need by neurosurgical programs in developing countries.

The WFNS Education Committee sponsors eight

to 10 educational courses each year in the developing world, bringing contemporary neurosurgery to colleagues practicing in parts of the world where the resources to travel to major meetings for continuing education are limited. The international experts who comprise the faculty travel at their own expense to teach these courses.

Each of the areas of neurosurgical subspecialty interest is represented by a WFNS committee, with international activities varying according to the interests of the neurosurgeons on each committee. The Web site, [www.wfns.org](http://www.wfns.org), is an important resource for all information relating to international neurosurgery that includes a list of member societies with their officers and Web links.

These organizations—FIENS, the ACS and the WFNS—are points of departure for involvement in international neurosurgical volunteer activities. Volunteering in this way not only comports with the great tradition of neurosurgery but also allows the neurosurgeon to, as Gandhi so wisely advised: “Be the change you want to see in the world.” **NS**

**Gail L. Rosseau, MD**, is a member of the FIENS Board of Directors, Web manager for the WFNS, and member of ACS. The author reported no conflicts for disclosure.

## Young Neurosurgeons Committee

presents its

### 10<sup>TH</sup> ANNUAL SILENT AUCTION at the 2008 AANS ANNUAL MEETING

Benefiting the Neurosurgery Research and Education Foundation (NREF)

High-tech electronics, fine wines, vacation packages, sports memorabilia and medical items are just a few of the wide variety of items that will be auctioned at the 10<sup>TH</sup> Annual Silent Auction during the AANS Annual Meeting.

Place your bids beginning Monday, April 28<sup>TH</sup> in the AANS Resource Center.

For more information, contact Julie Quattrocchi, Development Coordinator, at (847) 378-0535 or [nref@aans.org](mailto:nref@aans.org).



and the American Association of Neurosurgeons

American  
Association of  
Neurological  
Surgeons

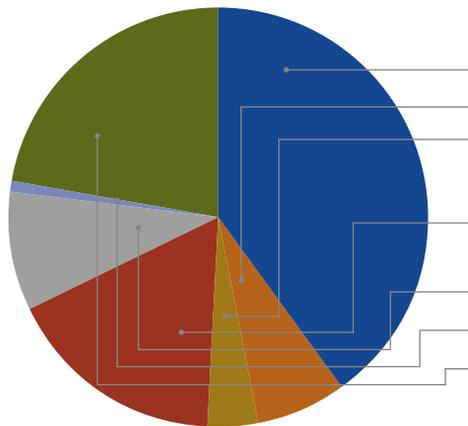
April 26–May 1, 2008 ■ Chicago, IL

## AANS MEMBERSHIP

# 684 New AANS Members in 2007

## Swell Ranks to 7,366

From four founding members in 1931 to more than 7,000 members in 2007, the AANS offers several categories of membership to neurosurgeons, residents, fellows and allied health professionals. Information detailing membership categories and benefits is available online at [www.aans.org/membership](http://www.aans.org/membership).



Category	Count	Percentage
Active	2959	40%
Active Provisional	487	7%
Associate	301	4%
Allied	4	0%
Resident/Fellow	1245	17%
Honorary	20	0%
International	649	9%
International Resident	64	1%
Lifetime	1,637	22%
<b>TOTAL MEMBERS</b>	<b>7,366</b>	<b>100%</b>

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 Michael Enrique Gomez, MD  
 Joey Grochmal, MD  
 Jonathan Grossberg, MD  
 Ashley Erin Grosvenor, MD  
 Elena Sophia Gutierrez, MD  
 Dewayne Hambrick, MD  
 Abilash Haridas, MD  
 Alia M. Hdeib, MD  
 Erik Hernandez Vasquez, MD  
 Shawn Level Hervey-Jumper, MD  
 Bradley A. Hiser, MD  
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 Sven M. Hochheimer, MD  
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 Brian Hood, MD  
 Jason Marshall Hoover, MD  
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 Tristram G. Horton, MD  
 Douglas George Hughes, MD  
 Gwyneth Leigh Hughes, MD  
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 Adam Wesley Jackson, MD  
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 Jesus Jimenez Sanchez, MD  
 Jeremiah Nicholas Johnson, MD  
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 Ryan Kitagawa, MD  
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 Sebastian Koga, MD  
 Chandan Krishna, MD  
 Vibhor Krishna, MD  
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 Mohamed Labib, MD  
 Amos Kelly Ladouceur, MD  
 Tsz Lau, MD  
 Tien Viet Le, MD  
 Bradley Charles Lega, MD  
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 Lewis Zhiyuan Leng, MD  
 Jeremy Lewis, MD  
 Yan Michael Li, MD  
 Jessica Shu-Wen Lin, MD  
 Ning Lin, MD  
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 Thomas P. Loumeau, MD  
 David Lozada, MD  
 Juan Lucino-Castillo Rueda, MD  
 Theofilos Machinis, MD  
 Girma Makonnen, MD  
 Antonio Mammis, MD  
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 Juan Jose Martin, MD  
 Christopher Maulucci, MD  
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 Jayant Menon, MD  
 Eric E. Merrill, MD  
 Jason T. Miller, MD  
 Yedathore Subba Mohan, MD  
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 Troy Andrew Munson, MD  
 Robert P. Naftel, MD  
 Edjah K. Nduom, MD  
 William Hugh Nesbit, MD  
 Shahid Mehdi Nimjee, MD, PhD  
 James A. Nobles Jr., MD  
 Neelesh Crumsan Nundkumar, MD  
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 Robert Oxford, MD  
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 Nikhil Kanti Patel, MD  
 Toral Ramanlal Patel, MD  
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 Brett David Reichwage, MD  
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 David Aaron Wilson, MD  
 Joshua Wind, MD  
 Tong Yang, MD  
 Victor Yang, MD  
 Bulent Yapicilar, MD  
 Esmiralda Yeremeyeva, MD  
 Patrick Phillip Youssef, MD  
 Ryan A. Zengou, MD  
 Don Zhang, MD

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 Ibrahim Ahmed, MD  
 Faisal Aboud Jasser Al-Otaibi, MD

Faisal Alotaibi, MD  
 Tamer Altay, MD  
 Diaa Ahmed Nabil Bahgat, MD  
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 Benedicto Cortes Baronia, MD  
 Ryan Barrett, DO  
 Shafqat Iqbal Bukhari, MD  
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 Giorgio Carraba, MD  
 Fernando Carlos Castro Prado, MD  
 Ekawut Chankaew, MD  
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 Kemel Ahmed Ghotme, MD  
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 Homoz Sheikh, MD  
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 Faisal Taleb, MD  
 Laurent Thines, MD  
 Marcus Timlin, MD  
 Tanat Vaniyapong, MD  
 Tomosato Yamazaki, MD  
 Andrew Zacest, MD

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 Ghanem Al-Sulaiti, MD  
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 Edgar Manuel Carrasco, MD  
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 Marinella Gugliotta, MD  
 Jonathan Aaron Hyam, MRCS  
 Edgar Jimenez Masis, MD  
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 Enyuan Lin, MD  
 Jiann-Her Lin, MD  
 Muhammad Raji Mahmud, MD  
 Kodeeswaran Marappan, MBBSCh, MRCS  
 Nitin Mukerji, MD, MRCSed  
 Ganesalingam Narenthiran, MD  
 Abdulla Qassim, MD  
 Michal Adam Rynkowski, MD, PhD  
 Raphael Hillel Sacho, MBChB, FRCS  
 Gnanamurthy Sivakumar, MD  
 Erkin Sonmez, MD  
 Kaoru Tamura, MD  
 Emiliano Tatti, MD  
 Beng Tiong Teo, MD  
 Raf Van Paesschen, MD  
 Kordian Wojtas, MD  
 Meng-liang Zhou, MD

**Associate Members (29)**

Margaret Katherine Boone, PA-C  
 Effie Ellen Burke, PA-C  
 Erin M. Dunbar, MD  
 Paul Jason Ford, PhD  
 Frank R. Fortier, PA-C, MPAS  
 Anthony K. Gomez, PA-C  
 Jason Goodman, PA-C  
 Roberta Anne Hart, RN  
 Jeffrey Thomas Keller, PhD  
 Brian Killen, PA-C  
 Brian Ko, RN, PA-C  
 Heidi McCoy Limbaugh, RN  
 Alyssa Liguori Macca A, RNP, MSN  
 Barbara Lynn Mancini, MBA, CN, RN  
 Katrina Maniec, PA-C  
 Cynthia Marshall McGrath, FNP  
 Jeffrey William Miller, MD  
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 Vikas Patel, MD, MS  
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 Joni L. Schroeder, PA-C  
 Thomas Scruton, PA-C  
 Mary Louise Sztatowski, PNP  
 Michelle Marie Tiano, PA-C  
 Kenneth Wayne Wagner, PA-C  
 Mike D. Williams, MD  
 Charles Yingling, PhD

**Allied Members (2)**

Theresa M. Cooper, CST, CFA  
 Michele Lei Rose, CST

## In Memoriam

### Julius M. Goodman, MD



Julius M. Goodman, MD, died Jan. 27 at the age of 72.

Dr. Goodman's main clinical interests were pituitary surgery, neuro-ophthalmology, trigeminal neuralgia, neurotrauma and critical care, and brain tumors, but his interest in medical and neurosurgical education is perhaps better known to AANS

members. An Active member of the AANS since 1972, he served on both the AANS Education and Practice Management and the Maintenance of Certification committees. He organized and directed the AANS Goodman Oral Board Review Course since its inception in 1997. The course was renamed the AANS Goodman Oral Board Review Course in 2007 to honor Dr. Goodman for his decade of dedication to the course and its more than 2,000 participants. Dr. Goodman also developed and was the director of Weekend Update, the first AANS course designed to benefit those planning to take the neurosurgery recertification exam. He also participated in the AANS Resident Mentoring Program.

Dr. Goodman was a member of many professional societies, and he served on numerous advisory boards. He was a reviewer for major journals in neuroscience, including the *AANS Journal of Neurosurgery*, and he published more than 50 journal articles and book chapters.

A native of Washington, D.C., Dr. Goodman earned his undergraduate and medical degrees at Georgetown University. After an internship at the University of California Los Angeles, he served two years in the Air Force and then went to Vanderbilt University for his general surgery residency. He trained in neurosurgery at the Indiana University School of Medicine in Indianapolis, where he subsequently became clinical professor of neurological surgery and established a career-long association with the residency program.

Dr. Goodman also was a founding member of the Indianapolis Neurosurgical Group, which held a memorial service on March 2 in his honor. Services for Dr. Goodman were held in Olney, Md., and memorial contributions can be made to the Julius Goodman Fund for Neurosciences, c/o Methodist Health Foundation, P.O. Box 7168, Indianapolis, IN 46207-7168.

### Members Deceased in 2007

Bruce J. Ammerman, MD	Lonnie J. Lamprich, MD
Richard M. Bergland, MD	Stephen E. Paul, MD
Aaron J. Berman, MD	Octavio Polanco, MD
W. Kemp Clark, MD	Bahij S. Salibi, MD, FACS
Avner I. Feldman, MD	Henry A. Shenkin, MD
Lawrence H. Fink, MD, FACS	Edir Barros Siqueira, MD, PhD
Henry D. Garretson, MD	Henry M. Suckle, MD
Stanton L. Goldstein, MD	Martin Swiecicki, MD, FACS
Julian T. Hoff, MD	Eugene H. Tennyson Jr., MD
Robert P. Iacono, MD, FACS	John Corley Van Gilder, MD
John D. Jackson, MD	W. Michael Vise, MD

### Samuel J. Hassenbusch III, MD, PhD



Samuel J. Hassenbusch III, MD, PhD, died Feb. 25 from complications of cancer. He was 54.

In May 2005 Dr. Hassenbusch was diagnosed with glioblastoma multiforme in the right frontal lobe and had surgery to remove the tumor. Articles recounting his battle with cancer appeared in local

and national media, including the *Houston Chronicle*, *Texas Monthly Magazine*, and the *CBS Evening News* with Katie Couric. He described himself in a *Newsweek* article as a "six-foot lab rat," referring to his decision to undergo experimental glioblastoma vaccine therapy. Research on the vaccine was reported at the 2006 AANS Annual Meeting by Amy Heimberger, MD, who treated Dr. Hassenbusch. *Newsweek* reported that he "became the first person in the country to receive vaccine plus chemotherapy on an alternating schedule." Earlier in their careers, Dr. Hassenbusch and Dr. Heimberger each received NREF grants for tumor research.

An Active member of the AANS since 1993, Dr. Hassenbusch participated in the AANS in several capacities over the years. He was a member of the Education and Practice Management Committee and a mentor in the Resident Mentoring Program. He served on the faculty of AANS courses in coding and reimbursement, practice management (including *Neurosurgeon as CEO* and *Beyond Residency: the Real World*), practical clinics and the oral

boards preparation course, and gave numerous presentations of clinical research at AANS annual meetings. He also chaired the AANS/CNS Section on Pain as well as the AANS/CNS Coding and Reimbursement Committee.

He was a member of many other professional societies for which he taught courses and reviewed journals, and he attended and spoke at many medical conferences around the world. His considerable involvement in research was reflected in the 31 book chapters he wrote and the 81 articles published in peer-reviewed journals.

Born in St. Joseph, Mo., he earned his medical and pharmacology degrees from Johns Hopkins University, where he also served his internship and residencies in neurosurgery and pharmacology. A professor in the Department of Neurosurgery in the Division of Surgery at the University of Texas MD Anderson Cancer Center, he concurrently served there as the medical director of the Physicians Referral Service and as associate professor in Department of Neurosurgery, at Baylor College of Medicine in Houston, Texas.

Donations in memory of Dr. Hassenbusch can be sent to the Dr. Marnie Rose Foundation 5090 Richmond Ave., PMB-291, Houston, TX 77056. Additional information is available at <http://hassenbusch.com>. **NS**

#### CSNS REPORT

## Young Physicians Committee

### Younger Neurosurgeons Gain Experience, Influence

Ann R. Stroink, MD

**T**he number of younger neurosurgeon members of the Council of State Neurosurgical Societies has increased significantly over the last 10 years, influenced partly by CSNS-sponsored programs designed to promote involvement of residents. Such programs are a clear demonstration of the CSNS' commitment to addressing issues that concern all members of the neurosurgical workforce.

The growing number of younger CSNS members gave rise to the Young Physicians Committee. The YPC offers CSNS a fresh perspective on professional development and insight into socioeconomic concerns important to the younger neurosurgeon. The YPC officially meets twice a year during the regularly

scheduled CSNS meeting. In the interim the YPC supports rapid communication via e-mail and e-blast to expedite the completion of ongoing work projects.

Topics that are discussed within the YPC include but are not limited to neurosurgical guidelines, job searches and the economics of practice initiation, board certification and maintenance of certification, work hours, and the adequacy of resident training as perceived by the neurosurgeons just starting their practices. This committee also contributes to the body of questions utilized by the SANS and MOC review courses. The YPC's meaningful work products not only are reported to the CSNS, but also are shared with all neurosurgeons through publications in neurosurgical journals, CSNS forums and presentations at the CNS and AANS meetings.

Equally important, for residents and neurosurgeons who have recently joined practices and academic departments, the YPC is a springboard to their establishment as the future leaders of organized neurosurgery. Past members and chairs of this committee have contributed to a body of thought-provoking ideas and projects that concern socioeconomic issues, fostering a milieu for academic achievement and practice management satisfaction. Program directors recognize the positive impact of well-versed neurosurgical trainees and graduates and are supportive of resident involvement as the foundation of a well-informed future neurosurgical workforce.

The energetic chair of the Young Physicians Committee is Catherine Mazzola, MD. Her dedication has resulted in an influx of new committee members whose work fortifies and completes the work previously started by other chairpersons. New ideas flourish in this committee; recent undertakings such as the Brain Death Guidelines Project and Neurosurgery Residency Evaluations are among the important and stimulating projects that the YPC is currently orchestrating. Dr. Mazzola cultivates participation as a means of advocacy for young neurosurgeons, not only for themselves but also for their contemporaries.

Dr. Mazzola participates in an in-depth discussion of past, ongoing and exciting future projects for this committee in an interview, published at [www.csnonline.org](http://www.csnonline.org), with Mick Perez-Cruet, MD, chair of the CSNS Editorial/Publication Committee.

Committee membership is not limited to CSNS delegates and appointees. Any neurosurgeon may volunteer to join this committee and should expect to become directly involved with ongoing duties. **NS**

**Ann R. Stroink, MD**, is a member of the Editorial/Publication Committee of the CSNS, [www.csnonline.org](http://www.csnonline.org). The author reported no conflicts for disclosure.

## CALENDAR/COURSES

### AANS COURSES

**Managing Coding and Reimbursement Challenges in Neurosurgery**

June 27–28, 2008  
Chicago, Ill.  
Aug. 22–23, 2008  
Boston, Mass.

**Practice Management Workshop**

June 29, 2008  
Chicago, Ill.

**Goodman Oral Board Preparation: Neurosurgery Review by Case Management**

May 25–27, 2008  
Houston, Texas  
Nov. 9–11, 2008  
Houston, Texas

**Neurosurgeon as CEO: The Business of Neurosurgery**

July 26–27, 2008  
Chicago, Ill.

For information or to register, call (888) 566-AANS or visit [www.aans.org/education](http://www.aans.org/education).

### April

26-  
May 1

**76th AANS Annual Meeting**  
April 26–May 1, 2008, Chicago, Ill.  
[www.aans.org/annual/2008](http://www.aans.org/annual/2008)

### May

18-20

**The Society of Neurological Surgeons Annual Meeting**  
May 18–20, 2008, Madison, Wis.  
[www.societyns.org](http://www.societyns.org)

27-30

**ABNS Oral Board Exam**  
May 27–30, 2008, Houston, Texas  
[www.abns.org](http://www.abns.org)

### June

1-4

**2008 ASSFN Biennial Meeting**  
June 1–4, 2008, Vancouver, Canada  
[www.assfn.org](http://www.assfn.org)

1-4

**Neurosurgical Society of America Annual Meeting**  
June 1–4, 2008, Whistler, Canada  
(507) 284–2254

3-7

**World Congress of Minimally Invasive Spine Surgery & Techniques**  
June 3–7, 2008, Honolulu, Hawaii  
[www.wcmisst.org](http://www.wcmisst.org)

10-11

**UCLA Shaped Beam Radiosurgery**  
June 10–11, 2008, Los Angeles, Calif.  
<http://neurosurgery.ucla.edu/ConferencesCourses/Current.asp>

18-21

**American Back Society 25th Anniversary Meeting**  
June 18–21, 2008, Las Vegas, Nev.  
[www.americanbacksoc.org](http://www.americanbacksoc.org)

19-21

**New England Neurosurgical Society Annual Meeting**  
June 19–21, 2008, Chatham, Mass.  
[www.ne-ns.com](http://www.ne-ns.com)

21

**2nd Annual Bay Area Symposium-Advances in Neurosciences**  
June 21, 2008, Fremont, Calif.  
[www.whhs.com](http://www.whhs.com)

25-28

**CARS 2008: 22nd International Congress & Exhibition**  
June 25–28, 2008, Barcelona, Spain  
[www.cars-int.org](http://www.cars-int.org)

29-  
July 2

**Society of University Neurosurgeons Annual Scientific Meeting**  
June 29–July 2, 2008, San Francisco, Calif.  
(305) 243-5081

Educational activities shown in red are jointly sponsored by the AANS. Additional listings are available in the comprehensive and interactive Meetings Calendar at [www.aans.org/education/meetings.aspx](http://www.aans.org/education/meetings.aspx), where calendar items can be submitted.

# Neurosurgical Workforce

## Survey Shows the State of Neurosurgery in Texas

DAVID F. JIMENEZ, MD

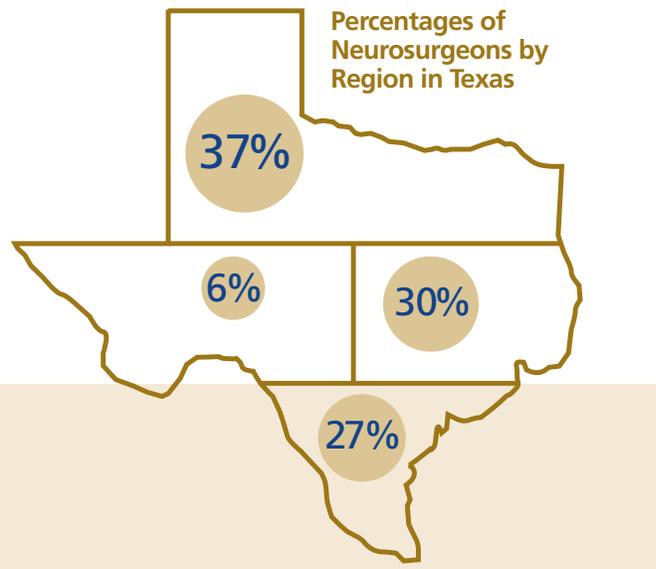
It is of vital importance that the neurosurgical needs of the nation's growing population be met with an adequate neurosurgical workforce. In Texas, the population continues to increase at an accelerated rate. Texas led the nation in population growth from 2005 to 2006. From 1996 to 2006, the total state population grew by 22.7 percent, from 19.1 million to 23.4 million. In 2006 physician workforce numbers in Texas increased almost twice as fast as the state's population, from 25,963 to 36,450 in 2006 (an increase of 40.4 percent).

To this point it has been difficult to ascertain the current status of the neurosurgical workforce in Texas. Several factors contribute to this problem: multiple and incomplete databases on neurosurgeons currently in active practice; a recent influx of surgeons relocating to the state following the passage of tort reform in 2003; and the frequency and ease with which surgeons move within and out of the state. Additionally, little information is known about the practice trends, types of practices, recruitment efforts and retirement plans of the state's actively practicing neurosurgeons.

In order to address these issues, a survey of all identified neurosurgeons practicing in Texas was conducted for the Texas Association of Neurological Surgeons in April 2007. The survey consisted of 12 questions aimed at obtaining demographic data, practice type and scope of practice, recruitment efforts, retirement plans, emergency room coverage and reimbursement, among others. The survey's response rate was 43.4 percent, far greater than the 16 percent response rate necessary for a valid and representative survey.

### Neurosurgery in Texas

**Demographics** A total of 343 surgeons were identified as currently practicing neurosurgery in Texas, including 327 males (95 percent) and 16 females (5 percent). There were 149 respondents to the survey, 144 males (97 percent) and five females (3 percent).



ARE YOU RECRUITING?	
YES	38%
FOR HOW MANY PARTNERS?	
ONE	72%
TWO	25%
THREE	0%
FOUR	3%

The average age of respondents was 52.2 and the median, 52 years, with a range between 35 and 82 years. Two-thirds of the neurosurgeons were between 40 and 60 years old. The length of practice in the state varied between six months and 42 years with an average of 18 years and a median of 16.5 years.

**Fellowship and Certification** Seventy-one percent of the respondents were board certified in neurosurgery and 25 percent had attained postresidency fellowship training. Only four percent were neither board certified nor fellowship trained. There were seven categories of fellowship training identified by the respondents, and these included: spine, pediatrics, vascular, endovascular, tumors, skull base, and research. Spine fellowships accounted for almost one-third of fellowship training (32 percent), vascular and oncology each accounted for 19 percent, pediatrics 16 percent, skull base 5 percent, with endovascular, epilepsy and research each at 3 percent.

**Practice Type** When asked what percent of their practice was devoted to any one subspecialty area, 61 percent stated more than 70 percent of their practice cases included spinal surgery (and 12 percent indicated that spine made up more than 91 percent of their practice). Pediatric neurosurgery was practiced

Continues ►

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exclusively by 10 percent of respondents whereas 84 percent said that up to 20 percent of their practice is composed of pediatric cases. The survey reported 20 full-time pediatric neurosurgeons practicing in five different areas: eight in Dallas-Ft. Worth, five in San Antonio, four in Houston, two in Austin, one in Galveston and one in Corpus Christi.

Only five percent of respondents exclusively practiced neurosurgical oncology (more than 81 percent) whereas 85 percent of respondents said that up to 20 percent of their practice involves tumor surgery. In a similar fashion, 90 percent of neurosurgeons who do cranial surgery said they still perform vascular work but that it comprises a minor part of their practice (20 percent or less). Eighty-seven percent said that they do less than 10 percent of their work in the area of skull base.

Eighty-four percent of respondents said they are in private practice and 16 percent are in full-time academic practice. Eighteen percent are in solo practice, while 5 percent are employed directly by hospitals. Of those in group practice, most are in groups of three or less (52 percent), while 21 percent are in groups of four to six surgeons, 18 percent are in groups of seven to nine surgeons, and 9 percent are in groups of 10 to 12 surgeons.

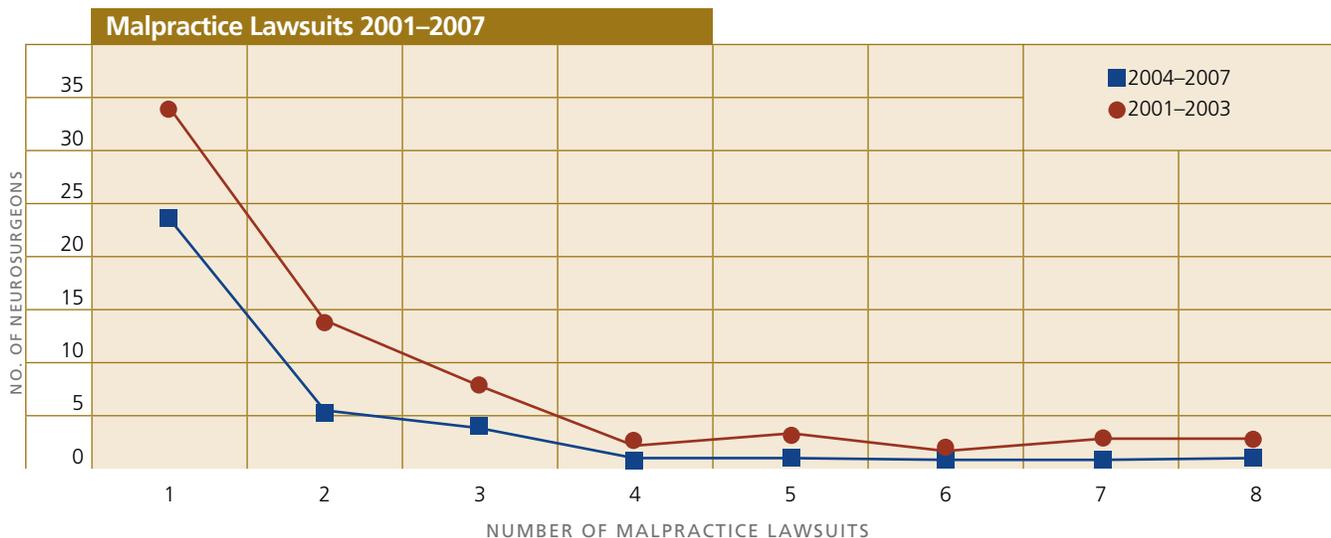
**Recruitment** Thirty-eight percent of respondents were actively recruiting new partners. Of these, 59 percent wanted to add one neurosurgeon, 21 percent wanted two and one practice wanted to add four neurosurgeons to the group. When asked whether they believed that there were enough neurosurgeons practicing in their community, 18 percent

thought that there were not enough, 54 percent believed there were enough and 28 percent thought that there were too many.

**Medicolegal** Several questions were asked to ascertain the effects of tort reform in Texas following the passage of Proposition 12 in September 2003. When asked whether or not the medicolegal climate has led to changes and/or restriction in the scope of practice, only eighty-five responded (57 percent). Of those responding, 38 percent stated that they do not restrict the scope of their practice in any way. Nineteen percent said that they do restrict their practice, and of those 48 percent restrict cranial surgery, 19 percent restrict pediatrics and only 6 percent restrict their trauma coverage.

The number of malpractice lawsuits filed has dropped significantly since the passage of Proposition 12. There was a 67.6 percent decrease in those reporting having had a single lawsuit filed against them in the three-to-six years before taking the survey (2001–2003) compared to having a single lawsuit filed within the immediately past three years (2004–2007) alone. There was a 64.3 percent decrease in those reporting two suits filed against them during the same periods and a 42.8 percent drop in those who had three lawsuits during that time. Of those who reported between four and eight lawsuits in the earlier period, none reported experiencing similar lawsuit rates in the immediately past three years.

**Emergency Coverage** Seventy-five percent of respondents said they take emergency call and 25 percent do not. Of those taking emergency call, 56 percent said they cover only one hospital, 28 percent cover



Tort reform legislation was passed in Texas in September 2003.

two hospitals, and 11 percent cover three hospitals. Three respondents said they covered four hospitals, and one respondent covered five hospitals.

Reimbursement for emergency call coverage varied across the state. A total of 54 neurosurgeons (36.2 percent) responded to the question of remuneration for call coverage. The range of payment varied between \$350 and \$4,700 per call shift. The average reimbursement was \$1,562, the median was \$1,100 and the mode, \$1,500. The highest per diem reimbursement, \$4,700, was reported in San Antonio, and the lowest, \$350, in Wichita Falls. The average reimbursement in the following six cities was: San Antonio, \$3,000; Fort Worth, \$1,333; McAllen, \$1,500; Corpus Christi, \$1,200; Houston, \$1,133; and Dallas, \$998.

**Retirement Plans** When asked about plans for retirement from neurosurgical practice, 27 percent of respondents said they plan to retire within six years, 12 percent within three years and 15 percent between three and six years. Twenty-three percent planned to retire between six and 10 years and the rest in more than 10 years. Of those planning to retire within three years, there are four in the Dallas–Fort Worth area, two in Houston, two in Beaumont and two in the Midland–Odessa area. Of those planning retirement in three to six years, there are eight in the Dallas–Fort Worth, five in Houston and three in Austin. Therefore, the Dallas–Fort Worth area stands to lose 19 percent of the currently practicing surgeons. There also will be an 11.3 percent loss of working neurosurgeons in Houston, an 18 percent loss in Austin and a 43 percent loss in Beaumont.

**Workforce Distribution and Population** There is little consensus on what the adequate and appropriate neurosurgical workforce should be in the United States at either the national or regional level. The Council of State Neurosurgical Societies' Manpower Committee conducted a survey in 1995 and calculated an overall neurosurgeon-to-population ratio of 1 to 64,000. The area with the highest concentration of neurosurgeons was found to be Washington, D.C., with a ratio of 1 to 16,000, and the lowest was Wyoming with 1 to 250,000. For comparison, Japan has a neurosurgeon-to-population ratio of 1 to 17,000 and Colombia, 1 to 350,000.

The present survey indicates that currently Texas has a neurosurgeon-to-population ratio of 1 to 68,500 which compares favorably with the current national ratio of approximately 1 to 75,000. We also found that Houston has the largest concentration of neurosurgeons (67) and a ratio of 1 to 30,098. The Houston metropolitan area has 101 surgeons and a

ratio of 1 to 26,597. Next is Dallas (39) with a ratio of 1 to 31,123, while the Dallas metropolitan area has 105 surgeons with an overall ratio of 1 to 30,300. Next in size is San Antonio with 37 neurosurgeons and a neurosurgeon-to-population ratio of 1 to 34,000. West Texas has the lowest number of practicing neurosurgeons, with the largest city, El Paso, having 11 practicing neurosurgeons and a ratio of 1 neurosurgeon to 54,500 people.

### **Implications for Neurosurgery**

The current neurosurgical workforce in Texas appears to be in line with the estimated national average. In the three largest metropolitan areas (Dallas–Ft. Worth, Houston and San Antonio) the workforce needs are at appropriate and sustainable levels. However, with an estimated retirement of 26 percent of the neurosurgical workforce within six years, a major and significant impact on neurosurgical care delivery may develop if adequate replacement does not occur. Subsequently, recruitment and retention of neurosurgeons must keep up with retirement rates. Fortunately, Proposition 12 is having a positive impact on the medicolegal climate in the state, and this has translated into an influx of 16 neurosurgeons to the state in the last three years, with two more expected this summer.

It seems that neurosurgeons in Texas are doing their part in caring for neurosurgical emergencies, with 75 percent taking trauma-emergency call. Some areas are not being properly covered such as the Rio Grande Valley and far west Texas, while the large cities with level I trauma centers do an excellent job in trauma coverage.

Furthermore, neurosurgeons are being reimbursed by hospitals for taking trauma call, although the amount paid varies significantly (\$350 to \$4,700 per diem). On average, a neurosurgeon in Texas can expect to be paid about \$1,562 per call.

Thus, this survey seems to indicate that Texas provides the practicing neurosurgeon with a favorable landscape. The medicolegal climate is among the best in the nation, the need for more neurosurgeons is present and the recruitment efforts are strong. It is imperative that we continue to have an excellent working knowledge of the neurosurgical workforce in Texas and elsewhere. The participation of all neurosurgeons in similar future surveys will be invaluable for gaining and accumulating essential knowledge about the neurosurgical workforce. **NS**

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## Minimally Symptomatic Cervical Spondylotic Myelopathy

# Conservative Management or Surgery?

The following case presentation is intended to assess current practice habits for common neurosurgical challenges when class I evidence is not available.

### The Case

The patient is a 60-year-old man who presents with a two-year history of worsening neck pain that does not radiate into his arms. The neck pain is managed well with analgesics. In the last year he has noticed slight numbness in both hands and intermittent clumsiness when performing discrete activities with his nondominant left hand. His bowel and bladder function is intact. He has normal motor bulk, tone, and power. Deep tendon reflexes are normal and not hyper-brisk. There is a positive Hoffman's sign in the left hand and an upgoing toe (positive Babinski sign) in the left foot. There is no ankle clonus, and his gait and balance are normal.

Sensory testing reveals patchy nondermatomal alteration to pinprick in the left hand. An MRI scan of the cervical spine shows multilevel cervical spondylosis with maintained lordosis. There is moderate epidural compression from spondylosis at C4–C6 and a focus of increased T2 signal within the spinal cord adjacent to the C5 vertebral body on the mid-sagittal image (see figure).

In summary, this patient presents with minimally symptomatic cervical spondylotic myelopathy, associated with an abnormal MRI scan (increased T2 signal).

### Take the Gray Matters Survey

Indicate how you would proceed for this patient by answering the four survey questions at [www.aansneurosurgeon.org](http://www.aansneurosurgeon.org) (select the Gray Matters Survey link in the tool bar and take the survey, Minimally Symptomatic Cervical Spondylotic Myelopathy). An optional open comment field is provided at the survey's end.

- Web Address: [www.aansneurosurgeon.org](http://www.aansneurosurgeon.org)
- Take the Survey: Minimally Symptomatic Cervical Spondylotic Myelopathy
- Survey results and signed comments will be published in the next issue.



This mid-sagittal image shows moderate epidural compression from spondylosis at C4–C6 and there is a focus of increased T2 signal within the spinal cord adjacent to the C5 vertebral body.

### Considerations

The management of cervical spondylotic myelopathy remains controversial. While most surgeons would recommend decompression for patients presenting with severe or progressive neurological deficits, patients with nonprogressive mild impairment or minor neurological deficits may do well with conservative treatment (5). Indeed, a recent review indicates that there is substantial clinical equipoise in several groups of patients with cervical spondylotic myelopathy (2). This is especially the case for the category of patients with minimal or no symptoms whose increased T2 signal within the cervical spinal cord was incidentally discovered when undergoing MRI (2).

In a recent study, patients exhibiting high signal intensity on T2 alone and without much circumferential spinal cord compression did not show a significant deterioration in their myelopathy after non-surgical treatment (6). Yet in surgical series the very patients with milder symptoms and findings such as a positive Babinski sign and hand dysfunction (but without spasticity or clonus) in association with hyperintensity on T2 had better surgical outcomes than those whose symptoms were more pronounced (1).

A recent Italian study demonstrated that results

Continues ►

## Responses: Asymptomatic Severe Cervical Cord Compression Case

*AANS Neurosurgeon* 16(4):40, 2007–2008

### THE CASE

Surgical Decision-Making for a Patient With Asymptomatic Severe Cervical Spinal Cord Compression

### SURVEY RESULTS SUMMARY

Most respondents to this online survey, 67 percent, would recommend surgery for prophylactic spinal cord compression. Extremely influential factors in this decision were the risk of neurological injury without treatment and comorbidities. Somewhat influential factors were patient lifestyle and age and the extent of surgery necessary. A majority of respondents also felt that the patient should be cleared for general anesthesia with intubation (67 percent) and should be advised to alter his lifestyle if he decides to avoid surgery (73 percent).

Respondents split when asked of what degree of spinal cord injury risk the patient should be apprised if he chooses management rather than surgery. Twenty-seven percent said to advise of a greater than 50 percent chance of spinal cord injury, and the same percentage said to advise of a less than 50 percent chance of such injury. Twenty-seven percent would warn of a less than 25 percent risk, while 13 percent would advise of a less than 5 percent risk and 7 percent, of a greater than 75 percent risk.

### CASE COMMENTARY

Respondents commented that major factors in advising surgery for the patient were the patient's overall good health and the high degree of active lifestyle he desires. They also stressed the importance of clear communication to the patient and the wisdom of obtaining a second opinion.

The presence of T2 signal abnormality indicates that the cord parenchyma is not tolerating compression well and, therefore, there is likely a greater risk that future minor trauma could result in an irreversible neurological deficit. If the patient is educated to this ill-defined relative risk, then an informed consent for or against surgery can be obtained.

Jeffrey Oppenheim, MD, Suffern, N.Y.

This case is a serious accident waiting to happen; therefore, it should be addressed surgically as soon as one can arrange it. It is quite obvious that the level of compression is bad at 5–6 and worse at 3–4. I believe anterior decompression of these two levels is absolutely necessary because this patient, regardless of age, is in danger of developing severe myelopathy with a minor incident, for example forceful sneezing or minor trauma to the head or neck. Therefore, this patient will need a prophylactic decompression. This is, of course, after everything is explained to the patient and he makes the final decision.

David A. Yazdan, MD, FACS, Brick, N.J.

► Continued

were best in patients with no cord signal change, intermediate in those with high T2 signal alone, and worst in patients with both high T2 signal and hypointensity shown on T1-weighted images (4).

Larger and more recent imaging studies demonstrate that a critically reduced cross-sectional transverse area of the spinal cord is the imaging feature that correlates best with poorer neurological status (3). Given the conflicting literature, it remains uncertain whether to recommend surgery or conservative treatment in patients with T2 signal change alone (with moderate compression) and mild or no clinical deficit. **NS**

**Rajiv Midha, MD, MS**, is professor and deputy head of the Department of Clinical Neurosciences and chief of the Division of Neurosurgery at the University of Calgary in Canada. The author reported no conflicts for disclosure.

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## Responses: Postoperative Anticoagulation Case

*AANS Neurosurgeon* 16(3):24, 2007

### THE CASE

Postoperative Anticoagulation for a Patient With Surgically Treated SDH and Intermittent Atrial Fibrillation

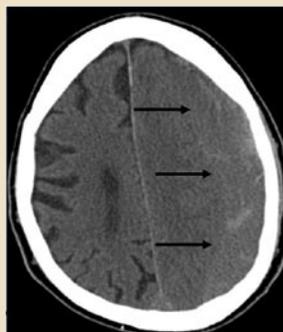
### SURVEY RESULTS SUMMARY

A majority of respondents to this online survey, 40 percent, said that they would never restart heparin given the circumstances of this case. Twenty-one percent of respondents would wait at least five days, 7 percent would wait one week, and 29 percent would restart heparin after two weeks. Two respondents commented that they would restart anticoagulation with Coumadin rather than heparin and one would consider Lovenox on the second day postsurgery. The top factors influencing decision-making in this case were the history of falls and the presence of an underlying medical condition, followed by postoperative CT, discharge disposition (home, rehabilitation, other facility), and postoperative neurological status. When asked who should make the decision about how and when to restart anticoagulation, most respondents said the neurosurgeon, followed by the cardiologist, the patient's family, and the primary care physician.

### CASE COMMENTARY

**T**easing out a consensus for restarting anticoagulation therapy in a patient with atrial fibrillation who has just had a subdural hematoma raises several issues that must be considered in formulating a treatment plan. One must first evaluate the risk stratification for a patient carrying a diagnosis of atrial fibrillation (5). It is generally accepted that the overall risk for stroke in a non-anticoagulated patient with atrial fibrillation is approximately 5 percent per year. However, this risk may temporarily increase to 20 percent for those who have recently been diagnosed with a stroke (2, 4).

Secondly, there is a theoretical basis for how neurosurgeons time the restart of anticoagulation therapy, other than anecdotal experience. Some neurosurgeons consider restarting anticoagulation within three to five days when gliosis becomes apparent through peak production of astrocytes and GFAP at the site of injury (3). Others may wish to wait one-to-two weeks based on maturation of healing (2). Consultation with the patient and the family might include the information that risk



The patient, a 76-year-old female on long-term warfarin therapy for chronic atrial fibrillation, presents with right subdural hematoma after falling. Patient coagulation status was supratherapeutic on admission and subsequently reversed prior to subdural drainage. Two days following surgery, the patient developed left middle cerebral artery ischemic infarct.

of stroke exists, extrapolated to be approximately 0.2 percent every two weeks, and that as small as this number seems, strokes do occur (see figure).

Further complicating these decisions are the general health of this population of patients, which includes variables such as elderly patients with a history of falling, cancer patients with coagulopathies, and patients with complicated anticoagulation histories associated with drug interactions (1, 5). Consensus, therefore, is more likely to be achieved in the "healthy" or an equivocal-risk subset of atrial fibrillation patients after subdural hematoma. In our experience, this group of "healthy" patients receives oral anticoagulation starting day five, reflecting the preoperative medication schedule.

Ann Stroink, MD, Seth Molloy, DO, Bloomington, Ill.

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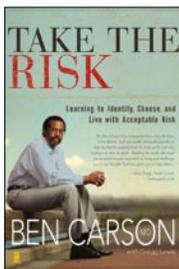
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Additional comments on this case were published in *AANS Neurosurgeon* 16(4):41, 2007.



Neurosurgeons Write

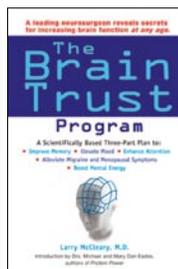
# Three Books Show Spectrum of Docs' Interests, Experiences



**Take the Risk: Learning to Identify, Choose, and Live With Acceptable Risk**, Ben Carson, MD, with Gregg Lewis, 2008, Zondervan, Grand Rapids, Mich., 237 pp.



**Inevitable Incompetence: Soaring Medical Costs, Dangerous Medical Care**, Saul William Seidman, MD, 2007, Universal Publishers, Boca Raton, Fla., 304 pp. (paperback).



**The Brain Trust Program**, Larry McCleary, MD, 2007, Perigee, New York, N.Y., 268 pp.

I enjoy reading books by neurosurgeons. It seems like more neurosurgeons are writing books on a broad spectrum of subjects, and the three books discussed in this article illustrate this breadth.

**Take the Risk: Learning to Identify, Choose, and Live With Acceptable Risk** This is Ben Carson's fourth book and, like his previous books, it no doubt will be a bestseller in the field of Christian publishers. As in *The Big Picture*, *Think Big*, and *Gifted Hands*, his new book relates his life story and gives exciting examples from his clinical practice to illustrate his thesis. Neurosurgery is fortunate to have a high profile personality informing the world about the risks that neurosurgeons face on a daily basis.

Dr. Carson uses his much publicized cases of separating conjoined twins and hemispherectomy to describe risk and the process of making decisions. He recommends an analysis that asks the following four questions: (1) What is the best thing that can happen if I do this? (2) What is the worst thing that can happen if I do this? (3) What is the best thing that can happen if I don't do this? (4) What is the worst thing

that can happen if I don't do this?

He also personalizes decision-making with illustrations from parenthood and then even expands into the realm of world politics. I particularly like the parts where he talks about his nonprofit organizations, The Carson Scholars Fund and Angels in the OR, and the risk of caring. Like his earlier books, this is a book you would love to have your children and grandchildren read.

**The Brain Trust Program** Larry McCleary is a pediatric neurosurgeon whose surgical career was cut short by health problems. He has become an expert on brain physiology and has produced a book for the lay public on brain nutrition. Dr. McCleary is convinced that a brain-building diet, brain-specific supplements, exercise, and stress reduction will improve brain function and forestall the effects of aging. This is the book to read if you have not discovered the fountain of youth, or if you are beginning to experience "senior moments." Like so many alternative medicine recommendations, Dr. McCleary's suggestions are supported by anecdotes and logical chemical theories, but no evidence-based medical studies support his prescriptions.

**Inevitable Incompetence: Soaring Medical Costs, Dangerous Medical Care** Saul Seidman is a neurosurgeon who has joined the "ain't it awful" crowd in his retirement. He is grateful that he was able to practice during the golden age of neurosurgery, but feels that healthcare has come upon hard times. This book tells of deterioration in quality assurance and passion for patient care; disregard for peer review; and the ascension of greed. Dr. Seidman wants to expose incompetence, protect patients and reduce cost. His major criticism, however, is saved for Kaiser Permanente which he portrays as the epitome of everything that can go wrong in healthcare.

So read these books, and then go write your own. **NS**

**Gary VanderArk, MD**, is clinical professor of neurosurgery at the University of Colorado Health Sciences Center in Denver. He is the 2001 recipient of the AANS Humanitarian Award. The author reported no conflicts for disclosure.

## Neurosurgeons Read Open Book

*The AANS Neurosurgeon* invites readers to contribute brief reviews of a recently read book in any genre. The two reviews in this issue indicate that neurosurgeons are reading for business and for pleasure.

**Before You Go Under: A Step by Step Guide to Ease Your Mind Before Going Under Anesthesia**, Benjamin Taimoorazy, MD, 2008, AccuPress, Bloomington, Ill., 195 pp., \$14.95.

A staggering 30 million medical and surgical procedures utilizing anesthetics are performed each year in the United States. Neurosurgeons spend a great deal of time explaining the risks and benefits of these procedures and must frequently address and allay a variety of patient concerns regarding anesthetic delivery, complicating factors, comorbidities, and urban legends. In this age of ready access to the information superhighway, many patients present unique challenges to both surgeon and anesthesiologist in preparing them for operative management and achieving the best possible outcomes.

Benjamin Taimoorazy, MD, a board-certified anesthesiologist concentrating in neurosurgical procedures, has written a step-by-step guide that explains to patients, in lay terms, the process of anesthesia. As he developed this book he wrote down and answered every question he received from patients prior to surgery. He details the different types of anesthetics commonly used in today's procedures, including general, spinal, epidural, local, regional and conscious sedation, and explains why certain anesthetics are better suited for particular procedures than others. He also emphasizes the importance of providing to both the surgeon and the anesthesiologist an accurate medical history, including height, weight, medication use and herbal supplements, and he explains how this information influences the type, dosage and concentrations of anesthetic medication re-

quired. He also addresses many common and not-so-common concerns raised by patients such as the occurrence of nightmares during and after surgery, fear of needles, headaches after anesthesia, blood transfusions, pregnancy, and pediatric and geriatric considerations. Describing knowledge as empowerment, Dr. Taimoorazy simplifies how anesthetics work, explains advances in the delivery of anesthesia and what to expect, and reminds patients of their own role in preparation and recovery. From start to finish, this is an engaging, quick read that likely will give even the most apprehensive patient peace of mind.

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**Ann R. Stroink, MD**, Bloomington, Ill. Dr. Stroink reported no conflicts for disclosure.

**Consent to Kill**, Vince Flynn, 2006, Pocket Books, New York, N.Y. 704 pp. (paperback), \$9.99.

This entertaining book is the latest in the series of international spy thrillers involving CIA special agent Mitch Rapp. He continues to wage the global war on terror after he is personally attacked in an assassination attempt. He successfully tracks down those involved by leaving the confines of CIA headquarters to serve justice. This is a quick read and a page-turner for those looking for a fictional political/espionage thriller with the inside research that makes the story come to life.

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**Christopher J. Koebbe, MD**, San Antonio, Texas. Dr. Koebbe reported no conflicts for disclosure.

### SUBMITTING REVIEWS

Reviews of no more than 300 words should relate the book's value as an interesting, entertaining, or enlightening work. A link to information on all types of submissions to the *AANS Neurosurgeon* is available at [www.aansneurosurgeon.org](http://www.aansneurosurgeon.org).

## RESIDENTS' FORUM

► Continued from page 26

be surveyed to test your physician-patient communication skills. Provided that the cognitive examination is passed in years eight, nine, or 10, and all requirements are met in each of the three-year cycles, a new 10-year certificate will be issued and the three-year MOC cycles repeat.

In summary, although there are many requirements for both obtaining and maintaining ABNS certification, knowledge of the requirements, atten-

tion to detail, and planning should help to make the process straightforward and relatively pain-free. **NS**

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**K. Michael Webb, MD**, a founding partner with NeuroTexas PLLC, Austin, Texas, currently is undergoing the certification process. The author reported no conflicts for disclosure. The author thanks M. Sean Grady, MD, secretary of the American Board of Neurological Surgery, [www.abns.org](http://www.abns.org), for his assistance with this article.

### RESIDENTS AREA OF AANS.ORG

Topics of particular interest to residents are featured at [www.aans.org/residents](http://www.aans.org/residents).



## A Risky Business?

# Neurosurgery Never Has Been Safer

HIV, hepatitis B and C, Bovie smoke—neurosurgeons routinely put their health and lives on the line during surgery. And yet, it never has been safer to be a neurosurgeon. Work conditions in a modern operating room and for doctors in general are so much better than in any previous era that the risk of a surgeon incurring a serious illness or injury at work is practically nil. But it was not ever thus. Not all that long ago, during my training, it was routine to draw blood and insert peripheral IV lines without so much as wearing gloves. The risk to doctors (and to patients!) of that practice seems obvious now.

Infectious disease as we now understand it was the most difficult and feared medical problem for humanity until about 60 years ago. It was and still is the main hazard in patient care faced by physicians and surgeons. Doctors (and nurses) have always put themselves in harm's way in the line of duty. In the late 19th century the hemorrhagic viral illness known as yellow fever, a recurrent threat in the United States, decimated the workers building the Panama Canal. The mechanism of disease transmission was proved in large part by human volunteers—physicians and nurses—who submitted themselves to mosquito bites. Public health measures that followed led to the suppression of yellow fever.

Surgeons in war today, such as our colleagues in the Middle East, are potentially in harm's way as were their predecessors, including Sir Victor Horsley. At age 58 he volunteered to join the British Army during the First World War and was sent to Mesopotamia in what is now known as Iraq. In his second year abroad Horsley died after a short illness that probably was a Salmonella infection (and most likely not heat stroke as is sometimes reported). Harvey Cushing too suffered in that war during his service in France. Following a bout with influenza, epidemic among the armies, he was stricken with debilitating numbness in his hands and feet. Diagnosed with multiple toxic neuritis, his symptoms would



“Conquerors of Yellow Fever,” a painting by Dean Cornwell, shows yellow fever experiments in which Jesse W. Lazear, MD, inoculated James Carroll, MD, with an infected mosquito at a U.S. Army hospital, in Havana, Cuba, in 1900.

continue to dog him for the rest of his life. Surgery, like life, never can be completely risk-free for patient or surgeon. Whatever chances we take in the operating room, it is the patient who almost always has more to worry about. How much risk should doctors assume? This has been a matter of ethical debate for thousands of years. Talmudic law states that one who risks his life for little benefit is a “pious fool,” yet it was also understood that physicians, more than most, had to endanger themselves to care for the sick. This was especially so during plagues, the true cause of which was unknown until the mid-19th century but the perils of which were well understood. Most doctors today will probably heed the words of this hadith: “If you hear about plague in a land, do not go there; but if you are in that land, do not run away.” **NS**

**Michael Schulder, MD**, is vice chair of the Department of Neurosurgery and director of the Harvey Cushing Brain Tumor Institute at the North Shore Long Island Jewish Health System, Manhasset, N.Y. Send topic ideas for Timeline to Dr. Schulder at [aansneurosurgeon@aans.org](mailto:aansneurosurgeon@aans.org). The author reported no conflicts for disclosure.