

AANS

SUMMER 2008

NEUROSURGEON

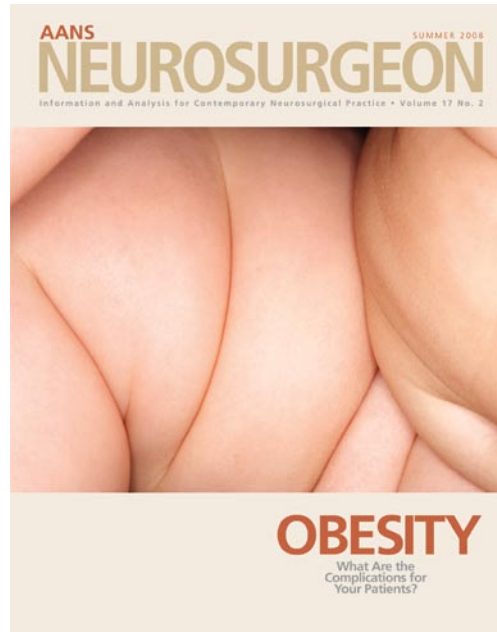
Information and Analysis for Contemporary Neurosurgical Practice • Volume 17 No. 2



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What Are the
Complications for
Your Patients?

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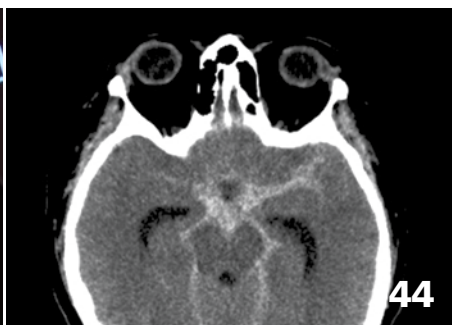
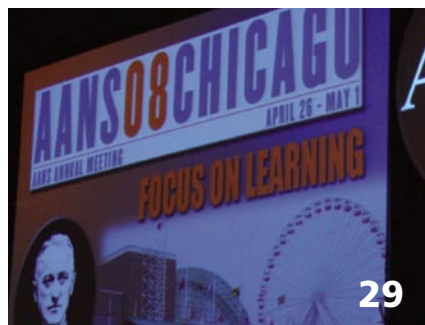
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AANS MISSION

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. 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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FRONTLINES

NEWS TRENDS LEGISLATION



IN THE LOUPE

Hunt Batjer, MD, makes a connection for the Northwestern team at the 5th Annual Neurosurgery Charity Softball Tournament, www.columbiakidsneuro.org/cst/index.html. The June 7 event, hosted by Columbia University, was held in New York's Central Park. Harvard defeated Emory 4-2 to claim the championship and the J. Lawrence Pool Memorial Trophy. Since its inception the event has raised \$150,000 for pediatric brain tumor research. (Contributed by Ricardo J. Komotar, MD, New York, N.Y. Disclosure: Dr. Komotar, a resident at Columbia University, is founder of the Columbia University Pediatric Brain Tumor Research Fund.).

Legislation to Halt Medicare Physician Payment Cut Fails Before July 1 Deadline

AANS and CNS Did Not Support Legislation Proposed in June

At press time, members of Congress were unable to reach a compromise and pass a bill that would halt the 10.6 percent cut in Medicare physician reimbursement scheduled to take effect July 1. Congress was expected to reconvene on July 7 and pass legislation to address the payment cut retroactively. In the meantime, Medicare was to hold new claims for 10 days; Health and Human Services Secretary Michael O. Leavitt said in the New York Times that the freeze was intended to “minimize the impact” of the fee reduction.

Just before the Fourth of July recess, the House of Representatives passed H.R. 6331 by a veto-proof margin. On June 26, the House bill was brought to the Senate floor for a vote, which failed just short of the 60 votes needed to proceed. Legislation was of-

fered that would have extended the current payment rates for 30 days and allowed more time for negotiation, but the matter was closed for the time being.

While the AANS and CNS found that the legislation had several positive aspects—it would have:

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 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.

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extended the current 0.5 percent update through the end of 2008; given physicians a 1.1 percent payment increase in 2009; extended the Medicare Physician Quality Reporting Initiative program through 2010, allowing physicians who qualify to earn 2 percent bonus payments on all Medicare-allowed charges; and extended rural physician payment increases through Dec. 31—the AANS and CNS did not support the legislation because the bills contained a number of provisions deemed potentially detrimental to neurosurgeons, among them:

- The payment cut for 2010 would have been 21 percent rather than 5 percent because of the way in which the temporary fee increase is financed.
- Medicare would have been required to publicly report the names of physicians who satisfactorily submit data on quality measures on the CMS Web site; to establish the “Physician Feedback Program” to improve efficiency and control costs; to develop a plan for transitioning to a value-based purchasing program for physicians; and to create a demonstration project on diagnostic imaging appropriateness criteria.
- Mandatory e-prescribing would have started in 2012, and physicians not e-prescribing would have had their payments cut by 1 percent in 2012, by 1.5 percent in 2013, and by 2 percent in 2014 and in each subsequent year.

The 2008 AANS/CNS legislative agenda is summarized on page 39. Additional information on legislative matters is available from the AANS/CNS Washington office.

Report Calls for Drastic Change in CE Delivery

A new monograph on the November 2007 Continuing Education in the Health Professions conference details recommendations for change in the way continuing education, CE, is financed and delivered. The committee, led by Suzanne W. Fletcher, MD, of Harvard Medical School, found that “traditional lecture-based CE has proven to be largely ineffective in changing health professional performance and in improving patient care,” and the report recommends moving toward practice-based learning, interactive scenarios and simulations, among other things. The committee also found the conflicts of interest between health-care professionals and industry to be irreconcilable: “No amount of strengthening the ‘firewall’ between commercial entities and processes of CE can eliminate the potential for bias,” the report states. The committee proceeds to call for organizations that provide CE to decline “any commercial support from pharmaceutical or medical device companies” whether such support is direct or indirect.
www.josiahmacyfoundation.org

Medicare No-Pay List: Final Rule Expected by Aug. 1

By Aug. 1 the Centers for Medicare and Medicaid Services is expected to release the final rule on the expanded list of conditions that the CMS says are “reasonably preventable through proper care and for which Medicare will no longer pay at a higher rate if the patient acquires them during a hospital stay.” The rule would apply to patients discharged from the hospital in fiscal 2009, which begins Oct. 1. The expanded list includes clostridium difficile-associated disease, diabetic ketoacidosis, some types of coma, delirium, legionnaires’ disease, deep vein thrombosis or pulmonary embolism, iatrogenic pneumothorax, surgical site infections after specific procedures, staphylococcus aureus septicemia, and ventilator-associated pneumonia. As of Oct. 1, Medicare will not reimburse for the eight conditions on the original “no-pay” list: air embolism, blood incompatibility, catheter-associated urinary tract infections, mediastinitis after coronary artery bypass surgery, object left behind in a surgical patient, pressure ulcers, some types of falls and trauma, and vascular catheter-associated infection.

www.cms.gov; www.ama-assn.org/amednews/2008/07/14/prsa0714.htm

Expanded Low Back Pain Guideline Announced

The American Pain Society announced in May an expanded evidence-based, clinical practice guideline on diagnosis and treatment of chronic low back pain that includes recommendations on surgery and other interventional treatments. “In general, noninvasive therapies supported by evidence showing benefits should be tried before considering interventional therapies or surgery,” stated Roger Chou, MD, director of the American Pain Society’s Clinical Practice Guideline Program. The expanded guideline will address the unproven status of invasive diagnostics for diagnosing various spinal conditions, epidural stenosis injections as an option for short-term pain relief for persistent radiculopathy, other interventional therapies that are not supported by convincing and consistent evidence of benefits from randomized trials, the effectiveness of surgery to treat radiculopathy and spinal stenosis, and the uncertain effectiveness of surgery for nonradicular low back pain. The guideline builds on the first APS Clinical Practice Guideline on Low Back Pain, intended for primary care physicians, which was published in the *Annals of Internal Medicine* in 2007.

www.ampainsoc.org/press/2008/downloads/LBP_Guidelines_2008.pdf **NS**



OBESEITY

What Are the Complications For Your Patients?

DEBORAH L. BENZIL, MD

Neurosurgery has evolved in response to such forces as technological advances (both inside and outside of the specialty), innovation, changing patterns of disease, and shifting patient populations. For example, many neurosurgeons can readily recall the advent of first CT and then MRI scans and their impact on practice. Similarly, degenerative spine disorders have come to be treated by neurosurgeons primarily in developed countries, while in other countries neurosurgical practice frequently is devoted to intracranial manifestations of infectious diseases such as tuberculosis.

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Developments such as these accentuate the need to anticipate changes that may impact neurosurgery in the future. A trend with significant potential to impact medicine in general and neurosurgery specifically is the increase in obesity, not only in the U.S. but also worldwide. The increase in obesity is probably the foremost demographic change and epidemiological health challenge of the 21st century. Recent headlines highlight that obesity is now more costly to the U.S. economy than either smoking or alcoholism. Obesity carries a 10 percent to 50 percent increased risk of death, primarily because of the increased risk of medical comorbidities such as heart disease, diabetes, hypertension and sleep apnea. It is obvious that the primary care field is significantly impacted by the legions of patients who are overweight and obese. For neurosurgery, it is expected that the incidence and prevalence of many neurosurgical diseases will change, the risk-benefit analysis of surgical interventions will be altered and intriguing opportunities for functional intervention as a means of treating or curing refractory obesity will come to light.

Economically, obesity is associated with a 36 percent increase in healthcare spending and accounts for nearly 10 percent of all direct medical expenditures, a price tag topping \$100 billion a year. The loss of productivity alone costs nearly \$4 billion a year. Obesity is now so common that in most countries it outstrips both malnutrition and infectious disease as the number one contributor to ill health.

In the U.S., as recently as 1990 not a single state had an obesity prevalence greater than 15 percent, while in 2006 only four states could boast prevalence rates below 20 percent. Today nearly two-thirds of all Americans (140 million) are obese or overweight, a figure that has doubled since 1970 and continues to increase. More than 60 million adults over age 20 are obese. Contributing to this epidemic is the inactive lifestyle of most Americans. In 2006, only 26 percent of Americans engaged in vigorous physical activity at least three times per week while nearly 60 percent engaged in no substantial fitness at all.

Overweight children are also a serious health concern. In all age groups, rates have tripled in the last two decades. Even among 2- to 5-year-olds an astounding 14 percent are already seriously overweight. Studies clearly demonstrate that weight problems in children typically translate into obesity in adult life.

Impact of Obesity on Surgical Outcome

Perhaps of greatest importance to neurosurgeons is the potential impact of obesity on surgical outcome.

Nearly every aspect of surgery and postoperative care is complicated by excess weight. Consider a relatively straightforward case of a five-foot-10, 300-pound male with a drop foot resulting from an L4–L5 herniated disc that is unresponsive to the usual medical interventions. In contrast to a rapid, minimally invasive, highly successful outpatient procedure, this surgery for obese patients can present significant challenges for anesthesia and positioning, a potentially prolonged surgical approach with commensurate related postoperative issues—hypoventilation syndrome, medical and wound healing complications, and likely at least an overnight hospitalization. While the absolute risks may be difficult to quantify given all variables involved, the appreciation of surgical complications in obese patients has led some spine surgeons to refuse surgical intervention for any patient with a body mass index, or BMI, greater than 30.

What are the known additional risks of surgery in patients who are overweight? The first consideration is the associated medical problems including diabetes, end-stage renal disease, osteoarthritis, systemic and pulmonary hypertension, ischemic heart disease, arrhythmias, heart failure, restrictive ventilatory dysfunction and hypoxemia, obesity-hypoventilation syndrome, liver disease, and increased risk of aspiration related to delayed gastric emptying. Positioning also can be problematic and even hazardous in these patients. While most operating tables have a weight capacity of 200 kg (441 pounds), the prone positions used for many spinal procedures can be treacherous, particularly for patients with protuberant truncal obesity. Even supine positioning can have problems related to aortic and inferior vena caval compression and ventilatory impairment. In one study, obese patients had a greater than 30 percent incidence of surgically induced ulnar neuropathy compared with only 1.0 percent in controls. Other compression injuries and even rhabdomyolysis have been reported in prolonged neurosurgical procedures. Rehabilitation after spinal procedures also may be negatively affected by the poor muscle conditioning so prevalent in this underactive group of patients.

While the impact of patient obesity on spine surgery may be obvious, studies also have demonstrated dramatic and statistically significant impact on craniotomies, surgery in children, and patients sustaining blunt trauma. In a series of elective thoracic and lumbar spinal fusions, complication rates increased directly with BMI (complication rates increased 14 percent for a BMI of 25, 20 percent for a BMI of

30, and 36 percent for a BMI of 40). Looking at morbidity following craniotomy for meningioma, readmission rates for complications were more than two-and-a-half times higher in the obese than in the nonobese population. A large study that evaluated all surgery on children saw higher rates of postoperative hypertension, diabetes mellitus and asthma in overweight patients. Also seen in the obese group were increased incidence of upper airway obstruction, difficult airways, prolonged stay in the postanesthesia care unit, and increased use of antiemetics. Obese patients admitted for blunt trauma also suffer more problems: While they seem to sustain somewhat fewer head injuries, they experience greater chest and extremity trauma, have higher complication rates (42 percent compared with 32 percent), and have higher mortality rates, as well as longer hospitalizations, stays in the ICU and days of mechanical ventilation.

The explosion in the number of obese people also will impact disease incidence and prevalence, affecting the spectrum of disorders exhibited by patients encountered in the neurosurgical office. Obesity is a known risk factor for pseudotumor cerebri (once a rare disorder); after treatment, shunt failures are extremely common, particularly in patients with classic android-type obesity (abdominal-truncal distribution of weight). Being overweight also increases the risk for many cancers. There is increased incidence of nearly all of the most common cancers, including colon and breast, in this population.

Not surprisingly, obesity is a major risk factor for development of osteoarthritis. A mere 10 additional pounds increases the force on a knee by 30–60 pounds with each step. One can imagine the additional stress on the spine and on spinal instrumentation in obese patients. Overall, osteoarthritis is four-to-five times more likely in obese patients while 66 percent of all patients diagnosed with osteoarthritis are either obese or overweight. Clearly obesity will increasingly influence the number of patients presenting to neurosurgeons with degenerative spine disorders.

Opportunity in Adversity

Adversity proverbially is the mother of invention, and with respect to the obesity epidemic the invention, or opportunity, is the potential use of functional neurosurgical intervention for the treatment of refractory obesity. If just 1.0 percent of the 70 million obese Americans were new neurosurgical patients, this would represent more than 200 new cases for every practicing neurosurgeon.

It is already established that the brain and nervous system exert significant control over eating behavior. Studies using functional imaging have detected important differences between obese and normal-weight volunteers in brain activity related to eating. Classic neurophysiological doctrine describes a dual hypothalamic control mechanism for important endocrinological and functional control over eating and hunger involving the ventromedial nucleus and the lateral hypothalamic area. But these areas may represent just the final step in a complex neural pathway that may involve additional brain regions and a variety of neuropeptides. The pivotal concepts relate to the pathophysiology of satiety, a complex, interrelated network that involves the stomach and hypothalamus but may be coordinated or driven by another brain region. Clearly, satiety is not a physical phenomenon but rather the perceptual interpretation of some mechanical alteration such as stomach distention, and perception is almost certainly a cerebral (supratentorial) function. Indirect evidence for this principle comes from studies of gastric bypass patients who experience not only the expected rapid satiety from the reduced stomach volume but also reduced hunger and voluntary reduction in intake of calorie-dense foods. Functional imaging studies also indicate that the response of obese patients to eating is a more diffuse cerebral activation than the strong, prefrontal-focused activation catalogued in normal-weight volunteers. Fortunately, several neurosurgical centers are actively undertaking studies in this area, paving the way to a better understanding of the physiological mechanisms underpinning obesity and providing potential treatment for those in whom multiple other interventions have failed.

As the 21st century advances, neurosurgeons will be faced with different challenges than those which confronted the neurosurgeons who paved our way. Certainly, patient obesity will impact the diseases neurosurgeons treat as well as the outcomes expected for these patients, and we must strive to address this reality in the everyday practice of neurosurgery. **NS**

Deborah L. Benzil, MD, is associate professor at New York Medical College and a neurosurgeon at Westchester Spine and Brain Surgery PLLC, Hartsdale, N.Y. The author reported no conflicts for disclosure.

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The Measure of Obesity

A Look at the Data

ALLEN K. SILLS, MD

The dramatic increase in the incidence of obesity in the past 20 years has landed the U.S. in the midst of what truly can be characterized as an obesity epidemic.

The terms “overweight” and “obesity” are defined using the concept of body mass index. BMI measures body weight in relation to height, specifically weight in pounds divided by height in inches squared, multiplied by 703. In the U.S., people are considered overweight if their BMI is from 25 to 29.9, obese if their BMI is from 30 to 39.9, and morbidly obese if their BMI is 40 or more. Using this method, a five-foot-nine adult ideally should weigh between 126 and 169 pounds, and would be classified as obese at a weight greater than 203 pounds and as morbidly obese at 271 pounds or more. For children, the BMI numbers are plotted on a sex-specific BMI-for-age growth chart in order to obtain a percentile ranking, which allows for the fact that the amount of body fat changes with age and is different between girls and boys. A child whose weight is equal to or greater than the 95th percentile of BMI-for-age is considered overweight.

U.S. Epidemic

In 1990, 10 states had an incidence of obesity less than 10 percent and no state had an incidence greater than 15 percent. Sixteen years later, only four states had a prevalence of adult obesity which was less than 20 percent, and in two states (Mississippi and West Virginia) more than 30 percent of the adult population was obese. Currently 66 percent of the adult U.S. population meets the definition of being either overweight or obese.

Unfortunately, this epidemic is affecting children and adolescents as well. In the decade of the 1970s, the incidence of obesity was 4 percent to 6 percent in children and adolescents ages 2 to 19. Current data suggests that 17 percent of 2- to 19-year-olds is now obese, including 14 percent of 2- to 5-year-olds.

There are also striking differences in obesity rates in the U.S. based on sex, ethnicity, and economic status. Approximately 53 percent of non-Hispanic black women and 51 percent of Mexican-American women age 40 to 59 are obese compared to 39 percent of non-Hispanic white women of the same age, according to the latest figures from the Centers

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TABLE 1

BMI for Adults in the U.S.

BMI	Weight Status	5'9" Adult
≥ 40	Morbid Obesity	> 271 lb
30.0–40.0	Obese	204–270 lb
25.0–29.9	Overweight	170–203 lb
18.5–24.9	Normal	126–169 lb
< 18.5	Underweight	< 126 lb

Data Source: Centers for Disease Control, ICD-9

BMI Formula for Adults: $\text{weight (lb)} \div (\text{height [in]})^2 \times 703$; $\text{weight (kg)} \div (\text{height [m]})^2$

for Disease Control and Prevention. Among women age 60 and older, 61 percent of non-Hispanic black women were obese compared with 37 percent of Mexican-American women and 32 percent of non-Hispanic white women. Adults age 40 to 59 had the highest obesity prevalence compared with all other age groups, with approximately 40 percent of men and 41 percent of women in this age group being considered obese.

Socioeconomic and environmental factors also influence obesity rates. Economically depressed areas may lack open spaces and sidewalks, resources that could encourage outdoor activities. Additionally, residents of these areas may feel that participation in outdoor activities is unsafe and thus are more likely to remain sedentary at home. Other data have suggested that grocery stores and supermarkets located in economically poorer areas of cities tend to offer fewer healthy choices. Cost often is prohibitive when food choices are made; high-calorie processed foods often cost less and are easier to prepare than healthier food such as fresh fruits and vegetables. However, the link between low socioeconomic status and obesity has not been established conclusively, and it should be noted that some recent research shows obesity increasing among high-income groups, as well.

"Globesity"

This problem is not restricted to the U.S. alone. The World Health Organization recently has begun employing the term "globesity" to represent the global epidemic of overweight and obesity. In developing countries, underweight and overweight individuals may often exist in the same setting, signifying complex nutrition problems and affecting global policymaking. Obesity is increasing in impoverished areas of countries around the world, especially in urban areas of more developed regions. Obesity rates in poorer countries have continued to rise while rates of underweight adults and children have decreased. For example, in a region in northeast Brazil approximately 10 percent of children remain underweight while 25 percent of adults are now overweight. In an area of northern India, 16 percent of people are thought to be malnourished, but 28 percent are obese. Similar trends have been observed in China and Russia. Nutrition research-

ers predict that this global epidemic will continue as most of the world's population growth is in urban areas where there tends to be a more sedentary lifestyle and where food supplies tend to be calorie dense and less balanced.

Economic Implications

Current economic models suggest that healthcare expenditures related to obesity now exceed \$100 billion annually in the U.S. Approximately half of these costs are paid by Medicaid and Medicare. Pooled data analyses have suggested that obese adults age 65 and younger have annual medical expenditures that are 36 percent higher than for those of normal weight. Annual medical spending attributable to obesity now rivals that attributable to cigarette smoking. This fact has prompted discussion of whether government and private insurers should be more involved in covering obesity prevention and treatment programs much as they have done for cigarette smoking. Recent data also have shown that healthcare spending on obese people accounted for 27 percent of the growth and inflation-adjusted-per-capita healthcare spending between 1987 and 2001. Assuming that the overweight and obese population in the U.S. continues to increase, this trend will have obvious implications for growth in healthcare spending. **NS**

Allen K. Sills, MD, is in practice at Semmes-Murphey Neurologic and Spine Institute, and he is associate professor of neurosurgery at the University of Tennessee Medical School in Memphis. The author reported no conflicts for disclosure.

FOR FURTHER INFORMATION

- The Economics of Obesity, www.ers.usda.gov/Publications/EFAN04004/
- National Center for Health Statistics at the Centers for Disease Control and Prevention, www.cdc.gov/nchs
- Trends: Impact of obesity on rising medical spending; National medical spending attributable to overweight and obesity—how much and who's paying? www.healthaffairs.org
- The United Nations System Standing Committee on Nutrition, www.unsystem.org/SCN
- Understanding Adult Obesity, <http://win.niddk.nih.gov/publications/understanding.htm>
- World Health Organization Global Database on Body Mass Index, www.who.int/bmi/index.jsp

Obesity in Children

Neurosurgical Considerations

FREDERICK A. BOOP, MD

The prevalence of obesity in childhood, although more of a problem in developed countries, is now recognized as a worldwide problem. It is estimated that over 250 million children worldwide currently fit this definition. Given that obesity is a chronic problem and that the consequences of obesity also are chronic, the longer one remains obese the greater the number of complications from the disease can be anticipated.

In the U.S. the prevalence of obesity, as determined by the National Health and Nutrition Examination Surveys of 1976–1980 compared to 1999–2000, increased two-fold in children ages 6 to 11 and tripled in children ages 12 to 17. It is now estimated that 15 percent of all U.S. 15-year-olds are obese. Although there may be a number of causes for obesity in childhood, by far the most common are related to lifestyle—increased fast food consumption and sedentary lifestyle. Whereas fast food intake in our country was 2 percent in the 1970s, it now accounts for 10 percent of meals. Given that most parents are responsible for buying groceries and preparing meals, children can hardly be held responsible for their dietary indiscretions. Furthermore, fresh fruits and vegetables and health club memberships are expensive; it therefore is no surprise that childhood obesity is more prevalent in lower socioeconomic groups.

Most primary care physicians and pediatric neurosurgeons screen children based upon normative graphs. The graphs used in the U.S. have been developed by the Centers for Disease Control and Prevention based upon American population norms. There are a number of ways, both simple and complex, to assess body fat in children. Infants younger than age 2 are assessed using a weight-for-length chart for boys or girls and are considered obese when they fall at or higher than the 95th percentile. Interestingly, studies suggest that breast feeding



infants may protect against obesity. For older children and teens, body mass index, BMI, is plotted on an age- and sex-specific chart. A BMI-for-age between the 84th and 95th percentiles is considered overweight, and a BMI-for-age at or above the 95th percentile is considered obese.

What Causes Childhood Obesity?

While 95 percent of childhood obesity cases are related to lifestyle, one should consider a differential diagnosis for this disorder. For example, weight gain is not uncommon following traumatic brain injury, brain tumor surgery, or whole brain radiation. It also may be secondary to medications commonly prescribed by neurosurgeons. For example, chronic treatment with glucocorticoids is a not uncommon cause of obesity in the neurosurgical population. Likewise valproic acid, cyproheptidine, amitriptyline, and antipsychotic medications all may contribute to weight gain in children. Lastly, rare metabolic, syndromic and molecular genetic causes for weight gain must be considered.

Prader Willi syndrome, characterized by intra-uterine fetal hypotonia, hypogonadotropic hypogonadism, and mental retardation, is a syndromic cause. Childhood hypothyroidism, growth hormone deficiency and hypercortisolism should be consid-

ered metabolic causes. Although rare before adolescence, Cushing's disease in the child may present with obesity. A number of identifiable molecular markers for obesity also have been identified. The melanocortin receptor, MC4R, and the leptin receptor are but two of many "obesity genes" that now have been identified.

Neurosurgical Sequelae

One of the major concerns about childhood obesity is that it predisposes to the obese adult. Many of the consequences of adult obesity, such as diabetes mellitus, hypertension, hypercholesterolemia, and metabolic syndrome, are now being recognized in increasing frequency in children. It is now recommended that obese children with at least two other risk factors be screened for diabetes mellitus starting at age 10.

In the child presenting with short stature or headache, central causes for obesity such as a craniopharyngioma or suprasellar arachnoid cyst should be ruled out.

Obstructive sleep apnea, OSA, also is prevalent in obese children. Pediatric neurosurgeons are accustomed to considering central sleep apnea in children with achondroplasia, Chiari II malformations and other hindbrain abnormalities, but the incidence of OSA is increased four- to six-fold in children who are obese; a sleep study should be

considered if there is a history of loud snoring, excessive daytime somnolence or attention problems.

Increases in the incidence of pseudotumor cerebri parallel the increase in obesity. Ophthalmologists and pediatric neurosurgeons are frequently called to evaluate children with papilledema. In the thin child with pseudotumor, a number of factors such as sinus thrombosis, cancer and chronic meningitides are to be considered. In the obese teenager, the increased weight is most commonly the cause. Interestingly, if the vision is stable these children often need to lose only 10 to 15 pounds before their papilledema resolves. Steroids and diamox or serial lumbar punctures may be temporizing measures. In a series of 24 children referred to our neurosurgical service for pseudotumor, only four required shunts, so shunting should be considered a treatment of last resort in children.

Finally, many neurosurgeons are seeing the teenager with a BMI greater than 35 who presents with back pain or radiculopathy and has a ruptured disc, multilevel degenerated discs, or accelerated facet disease. Often there is a family history of back problems, and the parents commonly have a BMI to match the child's. Surgery is reserved for neurological deficit or incapacitating pain. In most cases, weight reduction, exercise and lifestyle modification together are the best treatment.

Obesity in childhood has become a major health problem, not just in the U.S. but worldwide. The long-term consequences of obesity beginning in childhood are worrisome. It behooves neurosurgeons to consider pseudotumor cerebri in the overweight child in the clinic. The ramifications of treating degenerative spine disease in the teenager also must be considered. Lastly, in a small percentage of children, underlying neurosurgical causes for their obesity must be considered.

For the relatively asymptomatic child in the office who is clearly obese, consultation with the parents and primary care physicians regarding the child's weight is in order. The long-term consequences are not just physical; problems with self-esteem, depression, and social isolation also are rampant. **NS**

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BMI for Children and Teens in the U.S.

Percentile Range	Weight Status Category
≥ the 95th percentile	Overweight
85th < 95th percentile	At Risk of Overweight
5th percentile < 85th percentile	Healthy Weight
< the 5th percentile	Underweight

Data Source: Centers for Disease Control and Prevention

Obesity and Anesthetic Care

Implications for Neurosurgical Patients

KATHRYN E. MCGOLDRICK, MD, AND DEBORAH L. BENZIL, MD



Laparoscopic gastric bypass surgery. The peritoneal cavity has been inflated with carbon dioxide to 15 Torr. © Getty Images.

Obese patients present many significant medical and technical challenges to neuroanesthesiologists. These challenges can be characterized as coexisting medical risks, pharmacological alterations, intraoperative problems and extubation/ventilation problems. Cognizance of these issues by all members of the operative neurosurgical team is essential for optimal outcomes in these patients.

A number of medical problems are associated with obesity (see listing on page 13). Of particular importance are the hypoxia-hypoventilation syndrome and obstructive sleep apnea. The hypoxia-hypoventilation syndrome is seen in up to 10 percent of morbidly obese patients. When this syndrome is present, blood gas analysis increases in importance because pulse oximetry detects oxyhemoglobin desaturation without indentifying the potential contribution from hypercapnia. Failure to recognize hypercapnia can result in inappropriate treatment with supplemental oxygen that does not reverse, and typically exacerbates, hypoventilation. An elevated bicarbonate level is consistent with chronic hypercarbia. Reductions

in functional residual capacity, FRC, and expiratory reserve volume are the most common aberrations in pulmonary function in obese patients. Importantly, low FRC renders the obese patient vulnerable to the effects of even minimal periods of apnea; hence, rapid desaturation is typically encountered after induction of anesthesia, despite adequate preoxygenation. Furthermore, both chest wall and lung compliance are reduced owing to fat accumulation on the thorax and abdomen.

Obstructive sleep apnea, OSA, clearly plays a significant role in contributing to the troubling morbidity and mortality rates encountered in obese patients. OSA is defined as cessation of airflow for more than 10 seconds despite continuing ventilatory effort, five or more times per hour of sleep, and it usually is associated with a decrease in arterial oxygen saturation of greater than 4 percent. The severity of OSA correlates better with large neck circumference (greater than 17 inches) than with the degree of general obesity. Not surprisingly, weight loss impressively reduces the severity of OSA. Centrally acting anesthetic drugs (benzodiazepines, opioids, induction agents and inhalation agents) depress the pharyngeal dilator muscles, causing serious pharyngeal collapse in obese patients with OSA.

Differences in tissue distribution, hemodynamics, and blood flow to adipose, splanchnic, and other tissues as well as plasma composition and hepatorenal function all affect pharmacokinetics in obese patients. The influence of obesity on pharmacokinetic parameters depends on lipid solubility and diffusion through body compartments and tissues. Drug dosing, therefore, should take into consideration the volume of distribution, V_d , for the loading dosage and the clearance when calculating the maintenance dose. Both loading and maintenance dosage for a drug that is mainly distributed to lean tissues should be calculated based on ideal body weight, whereas dose for a drug that is equally distributed between lean and adipose tissues should be calculated based on total body weight. Changes in V_d correlate well with drug lipophilicity. Thus, lipophilic compounds generally are affected by obesity to a greater extent than hydrophilic compounds. Repeated injections accumulate in fat, resulting in a prolonged effect owing to subsequent release from the large fat deposit.

Intraoperatively, positioning can be extremely challenging with conflicts between optimal surgical and medical considerations. In addition, venous access may be difficult to establish in these patients, and

noninvasive blood pressure monitoring may be hampered by an improperly fitting cuff or one that takes too long to inflate. Invasive arterial pressure monitoring is prudent for morbidly obese patients with severe cardiopulmonary disease, for patients undergoing extensive surgery, and for those with poor fit of the noninvasive blood pressure cuff. Obese patients desaturate quickly after loss of consciousness owing to reduced FRC and increased oxygen consumption and require adequate preoxygenation. Mask ventilation may be extremely troublesome because of redundant soft tissue in the upper airway, and endotracheal intubation may be challenging.

Problems continue even after surgery. Tracheal extubation should be considered only when there is complete reversal of neuromuscular blockade and the effects of anesthetic agents have abated. Indeed, patients with OSA should be extubated only when fully awake and able to follow commands. Risk of life-threatening airway obstruction or respiratory depression is very real in patients with OSA. Preferably, the patient should be extubated in the semi-sitting position because of more favorable respiratory parameters. Although patients who were on a continuous positive airway pressure machine preoperatively should be placed on the CPAP postoperatively, it is best to not use the device immediately postoperatively lest it interfere with the ability to suction vomit or impair the patient's ability to communicate. Lastly, should cardiopulmonary resuscitation be required, mechanical compression devices may be necessary to achieve adequate perfusion. Although the maximum 400 joules of energy on most defibrillators usually is adequate for the morbidly obese patient, the higher transthoracic impedance characteristic of these patients may necessitate several attempts at defibrillation.

In conclusion, the roles played by effective communication, monitoring, vigilance and prudent judgment with regard to safe airway management, as well as appropriate drug selection and dosing and contingency planning, cannot be overemphasized. **NS**

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MEDICAL PROBLEMS ASSOCIATED WITH OBESITY

- Arrhythmia
- Deep Vein Thrombosis / Pulmonary Embolism
- Delayed Gastric Emptying
- Diabetes Mellitus
- Hypertension
- Hypoxia
- Hypoxia-Hypoventilation Syndrome
- Increased Aspiration Risk
- Ischemic Heart Disease
- Left Ventricular Failure
- Liver Disease
- Obstructive Sleep Apnea
- Renal Disease
- Restrictive Ventilatory Dysfunction

Lumbar Spine Disease

Considerations for Obese Patients

PATRICK W. McCORMICK, MD

Obesity, defined as a body mass index greater than 30, is associated with symptomatic low back pain, anatomical changes of the functional spinal unit, increased failure of therapeutic interventions, and increased complications related to surgical intervention.

Acute low back pain is more common than chronic, progressive low back pain that interferes with functional capacities. The latter condition is associated with risk factors that are nonmodifiable, such as age and genetic endowment, and modifiable, including tobacco use, some forms of physical activity and obesity.

Biomechanical Stress and Spinal Degeneration

The relationship between obesity and chronic, progressive low back pain is at least in part explained by the biomechanical stresses that truncal obesity places on the lower thoracic and lumbar spine. The weight-bearing load on the spinal column is a function of the mass of the torso as well as of the geometric configuration of the torso. Upright, healthy individuals carry the weight of the torso through the spine to the pelvis, and the torso's center of gravity lies anterior to the spine, creating a moment arm that multiplies the forces experienced by the spine in neutral posture. When the weight of the torso increases and the torso expands, there is a corresponding increase in the forces related to increased axial loading of the spine and progressive migration of the center of gravity farther anterior to the spine. When spinal posture is altered such that the thorax is anterior to the pelvis or lateral to the pelvis, the spine is out of its neutral position, and the forces experienced by the low back increase dramatically. Both the increased weight and the abnormal geometric distribution of the weight characteristic of truncal obesity increase the forces experienced by the spine.

In everyday life, activities such as reaching, leaning,

postural adjustments and lifting are associated with the torso moving out of its neutral posture and cycling large loads through the lower spine. It is reasonable to assume that these loads cycle through the spine up to several hundred times an hour during normal routine activities of daily living. For those with truncal obesity the effects of the greater loads placed on the spine are cumulative and influenced by lifestyle activity.

Although the gross anatomical and histological changes associated with degenerative change of the lumbar spine are well known, biomolecular and cellular-level events underpinning the process are the

subject of ongoing investigation. The connection remains unclear between observed pathological anatomy and the abnormal physiology in obese patients with chronic accentuated loads on the spine. In an interesting study comparing MRI findings of degenerative disc disease and occurrence of an arginine-to-tryptophan change in the COL9A3 gene (Trp 3 allele), Solovieva

and colleagues demonstrated that the effect of obesity on lumbar degeneration is modified by the collagen IX gene polymorphism. In this study the incidence of MRI-defined lumbar degeneration in persistently obese people was increased in those with the Trp 3 allele.

Obesity has been demonstrated to be an independent risk factor for premature multisegmental spondylosis. Radiographic changes include phenotypic MRI markers of decreased disc space height and disc bulging into the spinal canal. In a compelling study, Sambrook and colleagues evaluated these markers in 326 pairs of twins. The heritability estimate was 74 percent, with a confidence interval of 95 percent, for lumbar degenerative disease, regardless of obesity status. However, environmental factors such as activity and obesity influenced observed variation in MRI disc signal. Whatever the biomolecular and cellular events may be that underlie these premature

The efficacy of lumbar surgery in obese patients varies with the type of surgery and the indication.

anatomical changes in obese people, it appears that a positive feedback cycle is initiated whereby an anatomically abnormal spine is increasingly susceptible to excessive weight loads, thus accelerating the evolution of low-back pain syndrome.

Once established, the anatomical changes associated with obesity are not thought to be spontaneously reversible. Weight reduction often will reduce discomfort in obese patients for whom diagnostic studies demonstrate degenerative spondylosis in the lumbar region. Treatments, including physical therapy, chiropractic manipulation, epidural steroids and analgesics, have a higher failure rate in obese patients compared to nonobese patients.

Surgical Complications

Spine surgery intended to relieve low back pain has been noted to have an increased failure rate for obese patients with a BMI greater than 40. Complications include increased likelihood of postoperative wound infection, pneumonia, deep vein thrombosis and additional surgery for events such as recurrent disc herniation. Patel and colleagues found a correlation between increasing BMI and the incidence of complications in lumbar fusion surgeries. Other case series of spine surgery in obese patients have failed to demonstrate an increased risk of complications and report more favorable experiences. The efficacy of lumbar surgical intervention in patients with elevated BMI seems to vary with the type of surgery (decompression or fusion) and the indication (radiculopathy or midline low back pain). Perioperative complications of lumbar surgery for these patients most consistently include wound healing disorders.

Preliminary experience describing minimally invasive surgery, MIS, in patients with elevated BMI is promising with regard to efficacy and complications. Rosen and colleagues prospectively collected data on 108 patients undergoing minimally invasive transformational lumbar interbody fusion and showed no difference in outcome between obese and normal weight patients. Park and colleagues demonstrated no difference in complications related to BMI in a series of 77 patients undergoing minimally invasive discectomy, laminectomy and fusion.

The equalizing effect of MIS on complications in obese people seems to be related to the minimization of soft tissue disruption and the small but precisely

guided trajectories employed. The difficulty with intraoperative fluoroscopic imaging of morbidly obese patients reported in open surgical series is not apparent with the fluoroscopic-based docking used in MIS techniques, perhaps representing advances in equipment technology. The ability of MIS to neutralize efficacy disparities especially in fusions is difficult to explain, but may relate to rapid mobilization with diminished perioperative pain.

Patient Management

Regardless of surgical intervention, the management of obese patients who have progressive, debilitating low back pain should include an effort to educate them about the relationship between obesity and the etiology of disabling low back pain. Minimal weight-bearing exercise, especially aquatic-based activity, is fundamental in their treatment. Oftentimes, use of a lightweight lumbar orthosis during periods of heavy activity can help avoid repetitive cycling of loads through the low back. For some morbidly obese patients, aggressive weight loss should be undertaken, including dietary regimens, nutritional therapy consultations and consideration for bariatric surgery. Ideally, obese patients will commit to lifestyle changes, including significant weight loss, as part of an overall care plan that may include surgery. **NS**

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Metabolic Syndrome

What Neurosurgeons Should Know

JANET LEE, MD, AND WILLIAM T. COULDWELL, MD

The term metabolic syndrome, first introduced in 1988, has evolved in concept since that time. While the strict definition is subject to ongoing debate, the syndrome generally involves glucose intolerance, obesity, dyslipidemia and high blood pressure, which increase the risk of developing cardiovascular disease. The complex pathophysiology underlying this syndrome similarly has yet to be agreed upon but can be attributed largely, although not entirely, to insulin resistance and dysfunctional glucose and fat metabolism. This multifactorial syndrome highlights the complex association between noninsulin-dependent diabetes mellitus, coronary artery disease, and hypertension. An overview of factors contributing to the pathogenesis of metabolic syndrome may help neurosurgeons gain an understanding of this increasingly encountered disorder.

Insulin resistance and hyperinsulinemia are key pathophysiological components of metabolic syndrome. Glucose homeostasis requires that the feedback loop is maintained between insulin-producing pancreatic beta cells in response to a rise in serum glucose levels. In the setting of insulin resistance, the abnormally high levels of insulin produced in response to serum glucose elevations act not only to stimulate glucose uptake by muscles through a phosphatidylinositol 3-kinase pathway but also to induce mitogenic and proinflammatory effects via a MAP kinase pathway.

The phosphatidylinositol 3-kinase pathway increases nitric oxide, a potent inhibitor of vascular smooth muscle. In turn, vascular smooth muscle cell growth is stimulated by the MAP kinase pathway. In combination, glucose uptake is affected and atherogenesis may be enhanced.

Dysfunctional fat metabolism also contributes to insulin resistance and atherosclerosis. After food ingestion, the body first will store energy in triglycerides located in peripheral adipose tissue. When abnormal triglyceride levels exist and the peripheral adipocytes are saturated, free fatty acid concentrations become elevated, and triglycerides then are stored also in hepatocytes, skeletal muscle, and visceral adipose tissue, which can later lead to truncal obesity. Abnormally high triglyceride levels are associated with insulin resistance in myocytes and peripheral adipocytes. As

fatty acids are released from adipocytes and taken up by the liver, the balance of lipoproteins in the blood shifts to high triglycerides, low high-density lipoprotein cholesterol and high very-low-density lipoprotein, leading to increased risk of atherosclerosis.

Adipose tissue exhibits endocrine properties that also contribute to insulin resistance. An increase in adipose tissue mass has been associated with increased expression of hormones including adiponectin, angiotensinogen, tumor necrosis factor- α , resistin, and leptin. Adiponectin, a hormone secreted by adipocytes, modulates hepatic glucose production and fatty acid catabolism, resulting in a global increase in insulin sensitivity. There is an inverse correlation between circulating adiponectin levels and obesity, diabetes mellitus and insulin resistance. Angiotensinogen is associated with development of hypertension in obesity. Increased adipose tissue mass causes increased production of angiotensinogen and angiotensin-converting enzyme, causing vasoconstriction that can lead to hypertension. Tumor necrosis factor- α is overexpressed in obesity and has been linked to insulin resistance. The link between resistin and insulin resistance continues to be debated. Many studies have found a positive correlation between resistin levels and obesity, although contradictory studies also exist. Leptin also is produced and functions to regulate appetite and metabolism. Since there is a positive correlation between leptin and obesity in humans, this suggests a leptin resistance similar to insulin resistance. Leptin receptors are located in the hypothalamus, which controls satiety.

Individuals who are diagnosed with metabolic syndrome or even with associated diagnoses such as atherosclerosis, hypertension, obesity and diabetes are likely to have a higher risk of surgical morbidity than individuals without these disorders. There is a multitude of targeted therapeutic interventions for modifiable components of metabolic syndrome. Lifestyle modification coupled with pharmacological intervention should be employed preoperatively when possible to reduce operative risk. **NS**

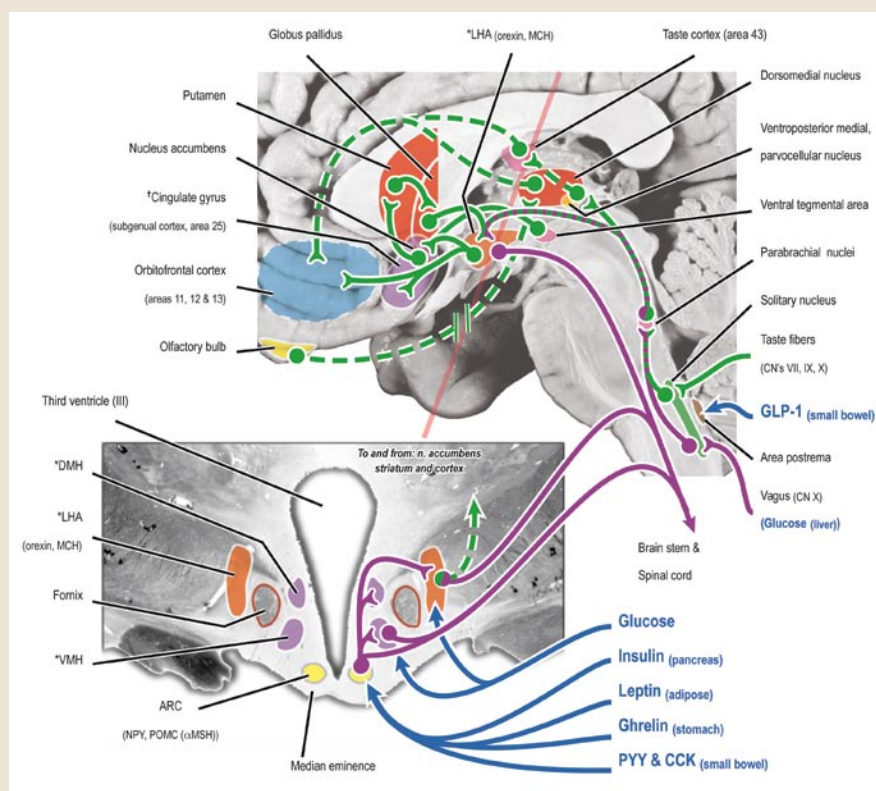
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Central Pathways: Targets for Treating Obesity and Metabolic Syndrome

Feeding behavior is controlled centrally by integration of homeostatic feedback (purple pathways) with hedonic motivations (green pathways). The obesity epidemic results from failure of homeostatic suppression of appetite in an environment of high availability of palatable calorie-dense food and decreasing requirement for physical activity. Lesions implicate medial hypothalamic structures, including the arcuate (ARC), ventromedial (VMH), and dorsomedial hypothalamic (DMH) nuclei, as the homeostatic satiety center, and the lateral hypothalamic area (LHA) as the center for homeostatic feeding drive. Indeed, experimental efforts are under way that direct deep brain electrodes to these regions (see figure labels marked with an asterisk [*]). Circulating hormones including insulin, leptin, ghrelin, peptide YY (PYY), and cholecystokinin (CCK) enter the brain via median eminence to signal energy balance and enteral feeding status to pro-opiomelanocortin (POMC) and neuropeptide Y neurons (NPY) in the ARC. NPY neurons promote hunger while POMC neurons promote satiety through actions upon LHA. POMC neurons promote metabolic rate and maintain insulin sensitivity by innervating VMH, DMH, and autonomic preganglionic neurons of the brainstem and spinal cord.

Other ascending pathways include vagal afferents (communicating gastric distension and hepatic glucose and lipid content) through brainstem relays (solitary and parabrachial nuclei) that converge upon the hypothalamus. The area postrema senses circulating intestinal glucagon-like peptide-1 (GLP-1) to mediate nausea from excessive food consumption. Furthermore, sensory information from taste afferents act via brainstem innervation of the ventral posteromedial thalamus and from the olfactory bulb via the dorsomedial nucleus of the thalamus to relay olfactory/gustatory information to the opercular cortex.

LHA integrates hypothalamic and brainstem, gustatory, mesolimbic reward, and arousal inputs. LHA produces the neuropeptides orexin and melanin concentrating hormone (MCH) that promote feeding through actions upon cognitive, limbic, motor, and autonomic systems. MCH neurons also engage the nucleus accumbens to interact with reward pathways involving dopaminergic ventral tegmental area and ventral pallidum.



Functional brain imaging of feeding-related cognitive activity and overeating reveal wide neural networks involved in hedonic motivations including hypothalamus, ventral tegmentum, dorsal and ventral striatum, opercular (primary gustatory) cortex, and orbitofrontal cortex (olfactory/gustatory cortex). Of particular interest is the subgenual anterior cingulate cortex, a region that is already a target of deep brain electrodes for relief of depression (see figure label marked with a dagger [†]).

Mechanisms of hypothalamic homeostatic dysfunctions, such as central leptin and insulin resistance, have engendered exploration of novel therapies for obesity and metabolic syndrome. Altering brain activity by targeting electrodes, gene therapy, neuropeptide microinfusions, and/or other functional neuromodulatory techniques, neurosurgeons have opportunities in the future to provide unique therapies for this significant patient population.

Jon T. Willie, MD, PhD, is a resident, and **Thomas A. Woolsey, MD**, is a professor of experimental neurological surgery in the Department of Neurological Surgery at Washington University School of Medicine in Saint Louis, Mo. The authors reported no conflicts for disclosure. The figure contains elements adapted (with permission) from *The Brain Atlas: A Visual Guide to the Human Central Nervous System*, 3rd ed., Woolsey TA, et al., John Wiley & Sons, Inc., 2008.

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DBS for Morbid Obesity

A Possible Therapy for Intractable Cases

MICHAEL SCHULDER, MD

It is clear that obesity is a serious public health problem, and medical attempts to combat it are not merely the stigmatizing of a “normal variant” condition. The increased likelihood of diabetes mellitus and heart disease, premature death, and loss of productivity are well documented. This is why seemingly drastic surgical measures such as gastric bypass have gained acceptance as a treatment for obese patients.

There is a strong rationale for the exploration of deep brain stimulation as a treatment for some morbidly obese patients. Consider the limited efficacy of available treatments for obesity. Behavioral modification, including patient education, diets and increased physical activity, yield on average a weight loss of 8 percent after six months. Many patients find these changes in behavior hard to sustain.

Weight loss medications include drugs that block serotonin and/or norepinephrine reuptake in order to decrease appetite. Other medications act in the large intestine to block the digestion of dietary fat. Weight loss with these agents has been limited in controlled trials to between 6 percent and 10 percent of weight; patients receiving placebo experienced nearly as much decrease. The nontrivial side effects of these medications include hypertension, cardiac valve disease, and fecal incontinence.

Bariatric surgery has proven to be more effective than the above treatments. Weight loss averages up to 35 percent. This surgery has evolved from open and complex rerouting of the alimentary canal to less invasive procedures that endoscopically place restrictive bands in the stomach. While the move toward minimal invasiveness has reduced the morbidity of bariatric procedures, patients still may develop dumping syndrome and dietary deficiencies. They also need to modify their behavior to maintain the benefits of the surgery.

Since the 1930s the importance of the hypothalamus in regulating human weight and metabolism has been recognized. In brief, the ventromedial hypothalamus, the VMH, is considered the “satiety center” and the lateral nucleus, the LH, the “hunger center.” Rats lesioned in the VMH eat more and become obese compared to control animals, while LH lesions produce anorexia. No one would propose

lesioning the hypothalamus of obese humans, but the option of deep brain stimulation, DBS, is intriguing.

DBS May Augment or Suppress Neuronal Activity: More Study Needed

DBS of the diencephalon and midbrain is an effective and safe treatment for patients with a variety of movement disorders and is likely to become an approved therapy for those with intractable psychiatric disorders and perhaps for epilepsy as well. Hypothalamic DBS is being investigated as a treatment for patients with cluster headaches with fair efficacy and without significant side effects. DBS of the VMH in rats has resulted in weight loss, although caloric intake was not significantly different than in controls. This indicates that neuromodulation of the hypothalamus has effects on metabolism that are much more complex than mere appetite suppression or enhancement. However, the mechanism of DBS is poorly understood. Does it augment or suppress neuronal activity, or some combination of the two? Obviously, this question has profound implications for the choice of a hypothalamic target in obese patients. Of course, DBS would need to be evaluated in carefully controlled studies before it could be considered for the treatment of intractable morbid obesity.

Neurosurgical enthusiasm for involvement in weight loss treatments may be tempered by concern that obese people are being unfairly stigmatized. Some activists contend that excess weight is not inherently pathological but rather is a normal human variation. To this group, DBS as a treatment for obesity may be considered an overly aggressive therapy.

Of course it would be better if Americans and, increasingly, people in modern societies around the world were willing and able to eat and exercise in ways that would make obesity and its attendant health problems less common. But the fact is that this problem will be with us for a long time, and DBS, if successful, may very well prove to be a more effective treatment in terms of improved health and cost savings than any other method currently available. **NS**

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Does Opioid Dependence Impact Length of Stay?

Introduction

Healthcare providers commonly consider OD patients hospitalized with acute pain to be difficult patients, a perception that may be fueled by the anxiety exhibited by these patients. This anxiety may be rooted in the patients' distrust of the medical community, concern about being stigmatized and fear that their pain will be undertreated or that their opioid therapy may be altered or discontinued (2). The anxiety can be substantial enough to complicate routine hospital care. One result has been thought to be longer hospital stays for OD patients than for non-OD patients, subsequently raising the cost of care for OD patients.

To date there are no studies that assess the relationship of OD status to hospital LOS. In the current climate of mounting budget deficits and debate regarding healthcare reform, expendi-

ture must be monitored and effectuated wisely. Considering that the average cost for a patient to stay in our neurosurgical ward is \$805 per day, the financial benefit to both the patient and to healthcare providers of reducing LOS is considerable. Perioperative conditions, including opioid use, are worth studying to determine whether they significantly impact hospitalization time.

Materials and Methods

After Institutional Review Board approval was obtained, 300 patients admitted to a rural medical center in central Georgia for spine surgery between 2006 and 2007 were screened for the use of opioids. Physician assistants interviewed the 150 patients who were found to be using an opioid medication for pain relief. The sample was a mixed-gender group that

Continues ►

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Abbreviations:

CDF, cervical decompression and fusion; DSM-IV-TR, Diagnostic and Statistical Manual of Mental Disorders, IV-Revised; LDF, lumbar spine decompression and fusion; LMD, lumbar discectomy; LOS, length of stay; OD, opioid dependent; pLOS, predicted length of stay; WHO, World Health Organization; WRPI, Walid-Robinson pain index; WRODQ, Walid-Robinson opioid dependence questionnaire

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spine, opioid dependence, length of stay

ABSTRACT

Patients dependent on opioids frequently are viewed as demanding patients who experience longer hospitalizations, consequently incurring higher healthcare costs. To determine the validity of this view, 300 patients admitted to a single institution for spine surgery (cervical decompression and fusion, lumbar spine decompression and fusion, or lumbar discectomy) were screened for opioid use. The 150 patients (50 percent) identified as using opioid painkillers were studied. These patients were interviewed using the Walid-Robinson Opioid Dependence Questionnaire. The authors performed two analyses to determine the impact of opioid dependence, OD, on hospital length of stay, LOS. In the first analysis two status types (+OD and -OD) were identified, and in the second analysis three groups (+OD, -OD and SubOD) were identified. Correlation, covariance and regression analyses were performed. The authors identified 20 percent of patients in the +OD group, 45 percent in the -OD group, and 35 percent in the SubOD group. There was no significant correlation between OD and LOS. However, there was a very significant correlation between LOS and the number of OD criteria present. After controlling for type of surgery, age, ethnicity and number of previous spine surgeries, neither analysis revealed a significant difference in LOS. Based on the number of OD criteria present and the type of surgery, age, ethnicity and number of previous spine surgeries, the authors devised an equation that predicted LOS for 64 percent of patients in the sample. The authors concluded that OD does not impact LOS after spine surgery.

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► Continued

was middle-aged, evenly distributed in relation to surgery type, and mostly Caucasian (Table 1). The tool of measurement used was the WRODQ (4), which defines “dependence” as the presence of at least three of six criteria—strong desire, binge use, withdrawal, tolerance, neglect and use despite harm—in accordance with the WHO (7) and the DSM-IV-TR guidelines.

We defined OD status as +OD with three or more criteria and as –OD with zero-to-two criteria (categorical variable). We defined OD groups as +OD for three or more criteria, SubOD for two criteria and –OD for zero-to-one criterion (categorical variable). In addition, we counted the total number (zero to six) of WRODQ questions on OD status that were answered affirmatively (numerical variable). LOS data (numerical variable) were collected after patient discharge from the hospital.

We analyzed OD status in two groups (+OD and –OD) and in three groups (+OD, –OD and SubOD) using LOS as the outcome. SubOD reflects a subclinical category of OD. We constructed the SubOD middle group, following the example set in studies of depression, anxiety and other psychiatric disorders, due to the high percentage of intermediate patients and the potential importance of this transitional state. Lastly, we created a primitive equation for the prediction of LOS in spine surgery patients.

We performed several statistical tests using SPSS software. Pearson correlation analysis was performed for LOS, the two OD status types, the three OD groups and the WRODQ. Analysis of covariance was performed on LOS where the fixed variables were OD groups of two and three categories, controlling for type of surgery, age, ethnicity and number of previous spine surgeries. Lastly, linear regression analysis was performed to create an equation for the prediction of LOS using the most significant factors as predictors. These included type of surgery (ToS), patient age (A), ethnicity (E), number of previous spine surgeries (NoPSS) and number of OD criteria present (WRODQ). The resultant equation is:

$$\text{LOS} = 1.529 \times \text{ToS} + 0.02 \times A + 0.087 \times \text{NoPSS} + 0.299 \times E + 0.11 \times \text{WRODQ} - 2.951$$

The values for the five variables are defined as follows:

ToS = 1 for LMD
2 for CDF
3 for LDF

A = age in years

NoPSS = number of previous spine surgeries

E = 1 for Caucasian patients
2 for African-American patients

WRODQ = the number (1–6) of criteria met (affirmative responses) on the WRODQ

TABLE 1

Patient Demographics

Characteristic	No. OD Patients	Total No. Patients (%)
Sex		
Male	12	71 (47%)
Female	18	79 (53%)
Race		
Caucasian	24	115 (77%)
African-American	6	35 (23%)
Type of Surgery		
LMD	7	48 (32%)
CDF	13	60 (40%)
LDF	10	42 (28%)
Age Group		
< 40	5	26 (17%)
40-49	8	57 (38%)
50-59	9	39 (26%)
60-69	5	20 (13%)
> 70	3	8 (5%)

Results

Of the 300 patients screened for opioid use before spine surgery, 150 patients were found to be using opioids. The authors identified 20 percent of these patients in the +OD group, 35 percent in the SubOD group, and 45 percent in the -OD group ([−OD status] = [SubOD group] + [−OD group]).

Pearson correlation analysis (Table 3) showed no significant correlation between OD status and LOS ($r = 0.065$, $p > 0.1$) or between LOS and OD groups ($r = 0.130$, $p > 0.1$). However, there was a very significant correlation between LOS and the number of OD criteria met ($r = 0.231$, $p < 0.01$).

Independent analyses of covariance showed no significant difference ($p > 0.716$) in the LOS between the two OD status types ($p = 0.3$) or between the three OD groups ($p = 0.439$) after controlling for type of surgery, age, ethnicity and number of previous spine surgeries. It appears that neither OD status nor OD group impacts LOS.

The model of the pLOS equation predicted LOS for 64 percent of patients studied ($R^2 = 0.64$). The interactive graph for LOS and pLOS was developed to verify the weak points of the equation (Figure 1). As shown in the graph, the model holds true for LOS of zero-to-four days, but conformance degrades thereafter.

Discussion

Healthcare providers and recipients remain keenly attuned to the cost of delivering healthcare. With the aging of the population and changes in medical technology and utilization, national health expenditures are expected to increase, and the healthcare share of gross domestic product is expected to climb to 20 percent by 2015 (3).

This study addressed the immediate impact of opioid dependence on hospital LOS in spine surgery patients in an attempt to assist healthcare providers in the decision-making process. Hospital LOS is dependent on many medical, social, psychological and institutional factors.

Zheng and colleagues studied the fac-

tors predicting hospital LOS in 112 patients undergoing revision posterior LDF with segmental instrumentation (8). The number of levels fused and age were the most significant factors predicting LOS. Opioid dependence was not evaluated in that study as a potential determinant of LOS.

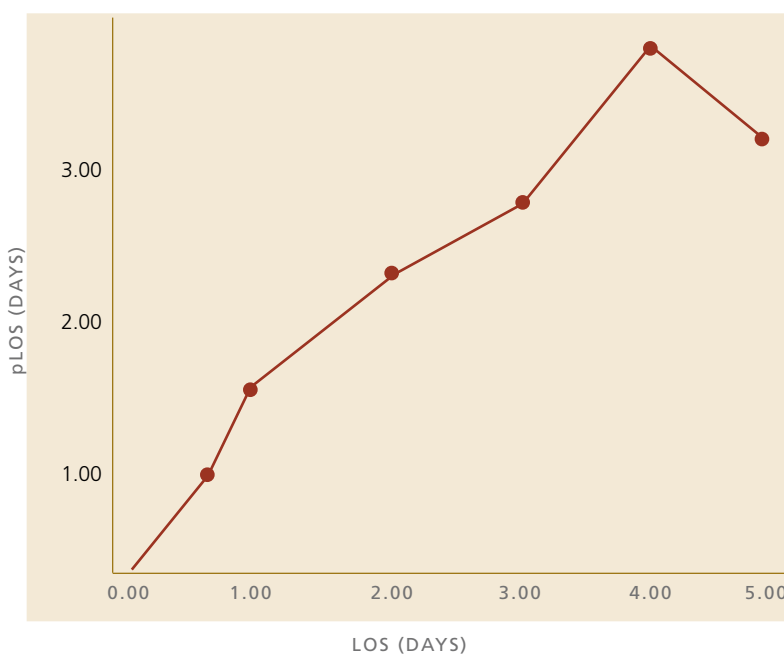
Mayer and colleagues studied the impact of opioid dependence on the socioeconomic outcomes of spine rehabilitation patients (1). A total of 1,200 patients who were using substantial amounts of opioids when they entered an intensive functional rehabilitation program were tapered off the drugs. One year after graduation from the program, however, 15 percent were OD. This doubled the risk that a patient would be out of work as well as the likelihood that a patient would engage in excessive healthcare-seeking behavior, apparently to find a

Continues ►

PEER-REVIEWED RESEARCH

FIGURE 1

Interactive Graph for LOS and Predicted LOS



PEER-REVIEWED RESEARCH

► Continued

physician willing to prescribe opioids.

Opioid dependence is “a cluster of physiological, behavioral and cognitive phenomena of variable intensity, in which the use of a psychoactive drug (or drugs) takes on a high priority” as defined by the WHO Expert Committee on Addiction-Producing Drugs (6). If opiates are given for pain, an estimated 5 percent to 15 percent of patients will become addicted (Volkow N: What do we know and what don't we know about opiate analgesic abuse? Keynote address presented at the 24th Annual Scientific Meeting of the American Pain Society, Boston, Mass., Wednesday, March 30, 2005). In our study, 50 percent of patients screened were using opioids, and 20 percent of these patients were found to be OD.

In a previous study (4), we examined the prevalence of OD status in patients

admitted for spine surgery and determined that 20 percent of surgery patients on opioids before spine surgery could be classified as OD. We found no significant correlation ($r = 0.085$, $p > 0.1$) between OD status and LOS. Regression analysis showed that type of surgery ($p = 0.0$), patient age ($p = 0.016$) and ethnicity ($p = 0.032$) were the most significant variables for LOS. In another study of OD status in patients before spine surgery (5), we determined the diagnostic and predictive values of pain parameters (pain intensity upon admission scored at eight or higher; length of pain suffering, 24 months or longer; and a WRPI score of 660 or higher). We found the WRPI score of 660 or higher to be the most accurate and efficient measure (80 percent). It had a positive predictive value twice that of the other parameters (56 percent compared with 24 percent and 28 percent, respectively), although these values were not high enough to be reliable predictors of opioid dependence in this category of patients due to a sensitivity of less than 90 percent and a prevalence rate of less than 50 percent.

Neuropathic pain patients, together with cancer and peripheral vascular disease patients, are among those patients who are highly susceptible to opioid dependence. Opioids also are prescribed widely for patients with acute and chronic back pain, including those with disc hernia and spinal stenosis.

In our current study, we addressed the impact of preoperative OD status on postoperative hospital LOS. This study showed that five variables (type of surgery, age, ethnicity, number of previous spine surgeries, and number of OD criteria) were statistically significant as determinants of LOS. Age is a key factor, largely because of comorbidities. Ethnicity is a marker for numerous other factors which, if carefully dissected, would likely produce truer operable variables. The ethnicity variable requires further investigation because there were no Hispanics or other ethnic minorities in our sample. As in our earlier study (5), the number of previous spine surgeries was found to

TABLE 2

Patient LOS

Days	No. OD Patients	Total No. Patients (%)
0	7	48 (32%)
1	6	46 (31%)
2	5	10 (7%)
3	4	19 (13%)
4	3	10 (7%)
5	4	8 (5%)
> 6	1	9 (6%)

TABLE 3

Correlation Coefficients for LOS and Opioid Dependence Variables

		OD Status	OD Groups
LOS	Pearson Correlation	0.065	0.13
	Sig. (2-tailed)	0.427	0.112
	N	150	150

be significantly correlated with LOS. The number of previous spine surgeries is an important factor that reflects the chronic nature of back problems.

Our results showed that the model works best for LOS of up to four days and then loses conformance; that is why we left the LOS variable open after six days (Figure 1). Furthermore, longer LOS usually is due to comorbidities such as diabetes and cardiovascular disease, which were not taken into consideration. Inserting other variables (such as gender and pain parameters) would not strengthen the equation because of their weak predictive power (4). We considered three frequently performed surgeries of the spine (LMD, CDF and LDF) to produce a basic model for the prediction of LOS in spine patients. It may be noted that variations of this statistical method are commonly employed by third-party payers to determine the reimbursable limits of LOS. However, these methodologies are not often found in peer-reviewed literature or discussed in the lay press.

This study has several limitations.

First, we used a sample of convenience. This may have asserted a bias on the type of patients in the study, perhaps due to the rural area. We also did not covary for other variables of influence, such as medical comorbidities. New surgeries introduced in the past few years such as X-STOP and kyphoplasty were excluded due to the very small numbers of patients in the sample during the study period. We also did not consider postsurgical factors, like the type and amount of postoperative analgesia. However, we believe that this study improves on our previous ones and adds to the extant literature.

Conclusions

Opioid dependence does not impact hospital LOS after LMD, CDF or LDF spine surgery. Hospital LOS after spine surgery can be estimated in 64 percent of patients by a formula that uses the most significant factors (type of surgery, age, ethnicity, number of previous spine surgeries and number of OD criteria met). We suggest further research on OD status and other hospital markers related to cost and functional outcomes. **NS**

PEER-REVIEWED RESEARCH

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Exploring Osteotomy, Corpectomy and Stereotactic Codes

Common Coding Mistakes

Even experienced coders can face a dilemma when trying to describe certain common procedures. Differentiating among procedures that may be bundled together and determining when a more extensive procedure code is more appropriate than a less extensive one are two common areas of confusion. A review of the following common coding errors is intended to help clarify these areas.

Osteotomy Codes When complex spinal procedures are performed in areas of prior surgery, the role of osteotomy codes (22206–22226) in spinal surgery may be considered. The purpose of an osteotomy is to reconstitute an arthrosed joint to restore mobility. The surgeon uses chisels or drills to separate vertebral segments to restore motion, often followed by a new arthrodesis across the restored joint after correction of the deformity. In 2008 a new series of posterior osteotomy codes (22206–22208) was developed to reflect the work of three-column posterior osteotomies performed for deformity correction. These codes require bone resection of posterior elements (facets and pedicle) in addition to anterior elements (vertebral body and disc space).

In contrast, the previous posterior osteotomy codes (22210–22216) described single-column osteotomy (posterior elements only). The common coding mistake involves using osteotomy codes for initial or re-exploration discectomy and arthrodesis, typically in the anterior cervical spine. For example, the surgeon describes using a chisel or drill to perform an osteotomy of bridging bone spurs to enter the disc space in order to perform a decompression in the spinal canal. Although the tools used may imply to the coder that an osteotomy has been performed, the fact that a discectomy was performed is evidence that an arthrosed joint was not present. Consequently, either an arthrodesis code alone (22554) or in combination with a decompression code (63075) for more extensive discectomy would best describe the procedure.

Corpectomy Codes Another area of frequent error involves the use of corpectomy codes. According to the AANS Coding Guide, the use of corpectomy codes (63081–63091) requires resection of more than half of the vertebral body in the cervical spine and more than one third of the vertebral body in the thoracolumbar spine. The intent of corpectomy codes is to describe at least the resection of the central portion of the vertebral body overlying the spinal canal from the superior interspace down to the inferior interspace. The common coding mistake involves using the corpectomy codes to describe partial vertebral body removal, typically with a drill, during the performance of an anterior discectomy. In order to achieve a working channel within a narrow interspace, the surgeon may choose to remove the margins of the adjacent vertebral bodies to provide sufficient room to access the spinal canal. Rather than the work reflecting “two corpectomies,” it simply facilitates the anterior discectomy for decompression. Several methods, including the operative note and examination of postoperative imaging, can provide clues regarding the extent of vertebral body removal to determine if resection thresholds have been achieved. The absence of an anterior lumbar discectomy code has led some coders to mistakenly use the anterior lumbar corpectomy code (63090) to describe an anterior lumbar discectomy in preparation of the interspace for an anterior lumbar interbody fusion (22558). Although uncommon, an anterior lumbar discectomy for decompression should be coded with an unlisted code (64999).

Stereotactic Codes Lastly, a common coding mistake occurs in the area of the stereotactic codes (61720–61795 and 61863–61868). Since there are codes for navigational procedures (61795) and for stereotactic head frame placement (20660), some coders will use these codes in addition to the primary stereotactic procedure performed. The code descriptor paren-

► Continues on page 46

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.

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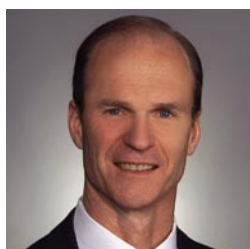
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AANS President's Perspective



Maintaining the Public Trust

James R. Bean, MD

I appreciate the opportunity to serve the AANS as president this year. This position is a high honor, and I hope I can perform with some semblance of the distinction and wisdom of those who have preceded me in this office. Each year has its own challenges, though many are recurring problems. With the advice of many proven and future leaders within this organization as well as every member's support, I am confident that AANS members and our profession will be well-served in the coming year.

Of all the advantages that neurosurgeons may enjoy, in value none exceeds public trust. Holding the public trust is the privilege of a proven profession. Neurosurgery holds dear its tradition of empathy and excellence, built by our predecessors over decades of dedication. Their examples we emulate and their achievements we strive to surpass.

Public trust is grounded in professionalism. Medical professionalism is based on three qualities, according to scholar and Pulitzer Prize-winning author Paul Starr. First, knowledge and competence are validated by a community of peers, which self-regulates through systemic required training and collegial discipline. Second, the knowledge has a rational scientific basis, and a highly technical, specialized application. And third, judgment and advice are rendered on an altruistic service basis, rather than a profit motive, with behavior constrained by a formal professional code of ethics. It is the third quality that distinguishes the medical profession from other occupations.

Every professional society bears the responsibility for defining the ethical standards of conduct for its members, ensuring not just their education and technical competence, but the correct and ethical use of their knowledge and influence. Public trust individually and collectively depends on the assurance that members will act in the interest of their individual patients and the public welfare—and not primarily in their own self-interest.

Professional conduct is not always above reproach. A controversial issue at present involves physician-industry relationships and conflicts of interest. The sheer size of health-related industries (pharmaceutical and medical device manufacturers, hospitals and other care-rendering institutions) and the drive for profitability tempts physicians with lucrative financial opportunities that expand in amount and number each year.

Twenty-six years ago, as the trend toward commercial for-profit medical ventures accelerated, Starr wrote:

The contradiction between professionalism and the rule of the market is long-standing and unavoidable. Medicine and other professions have historically distinguished themselves from business and trade by claiming to be above the market and pure commercialism. In justifying the public's trust, professionals have set higher standards of conduct for themselves than the minimal rules governing the marketplace and maintained that they can be judged under those standards only by each other, not laymen.

We must begin by explicitly defining professional behavior. We cannot expect our members to judge industry offers ethically if we have not defined the basis for judgment.

More recently some physicians have slipped the restraints of professional single-mindedness and found expanding opportunities for financial rewards from industry. High-profile inquiries into physician-industry relationships have followed, eroding the public's trust in doctors. In 2007, news of agreements between five orthopedic device manufacturers and the U.S. Department of Justice that levied \$311 million in fines were one result of the DOJ's investigations into payments to orthopedists. These investigations have spurred legislation that would require medical device and pharmaceutical industries to publish on publicly accessible Web sites all payments to doctors over \$25. The investigations also have tarnished the image of physicians and at the same time have threatened to surrender to government the right and responsibility to define and oversee professional behavior, at least in respect to physician-industry relations.

The erosion of trust is lethal to professional success. It's time to wake up, stop the hemorrhage of trust, and reassert our professional heritage.

We must begin by explicitly defining professional behavior. We cannot expect our members to judge industry offers ethically if we have not defined the basis for judgment. We cannot claim professional authority to oversee our members' actions if we are unwilling to set standards against which they can be measured.

For this reason, in April 2008 the AANS Board of Directors adopted the Guidelines on Neurosurgeon-Industry Conflict of Interest document. This document is the result of months of proposals and revisions to build a consensus among neurosurgical leaders, including all of the AANS/CNS sections and the Executive Committee of the Congress of Neurological Surgeons. The AANS and CNS have adopted identical guidelines.

The guidelines are directive but voluntary in that the AANS has no investigative enforcement structure. However, the guidelines are formulations of ethical professional behavior, as is the AANS Code of Ethics; in fact, they are derived from principles already contained in the Code of Ethics. Members

agree by virtue of their AANS membership to abide by the Code of Ethics, and the same is true of the new Conflict of Interest guidelines. Perceived violations will be handled by member complaint through the Professional Conduct Committee.

With these guidelines we intend to build public trust in neurosurgeons. This is the third document—the others are the AANS Corporate Relations guidelines and the recently revised Conflict of Interest guidelines for the *Journal of Neurosurgery*—developed to promote professional behavior in relationships between neurosurgeons and industry representatives. All are working documents that will be revised or expanded as deemed necessary.

From a strengthened base of ethical leadership, we can again lay claim to our proper social and political role: setting standards for medical and surgical care in healthcare policy. **NS**

James R. Bean, MD, is the 2008–2009 AANS president. He is president and managing director of Neurosurgical Associates PSC in Lexington, Ky. The author reported no conflicts for disclosure.

An interview with Dr. Bean appears on page 40.

MEMBERSHIP

Do You Know These AANS Members?

The AANS is seeking contact information for the following Lifetime members. If you can help, please contact Kim Bulat at kab@aans.org.

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Position Statement

The following document was signed in May 2008 by the AANS and the Congress of Neurological Surgeons.

Joint Statement on the Guidelines on Neurosurgeon-Industry Conflict of Interest

We, the undersigned speak on behalf of organized neurosurgery in the United States. The Guidelines on Neurosurgeon-Industry Conflict of Interest is a joint effort that culminated after many months of association leadership and committee input. The respective boards of directors of the AANS and the CNS approved these guidelines.

Rationale

The impetus for crafting these guidelines was in part elicited by the heightened scrutiny initiated over the last year by the federal government into the relationship between physicians and industry.

In September 2007, Sen. Charles Grassley, R-Iowa, and Sen. Herb Kohl, D-Wis., chair of the Special Committee on Aging, introduced the Physician Payments Sunshine Act, which would require drug and device makers to disclose the amount of money they give to physicians through payments, gifts, honoraria, travel and other means.

In 2006, Medtronic reached a \$40 million settlement with the federal government over accusations that the company had paid illegal kickbacks to physicians for using spinal devices. Subsequently, in late September 2007, the U.S. Department of Justice announced that settlement had been reached with five major medical device makers that accounted for nearly 95 percent of the market in hip and knee surgical implants after a multiyear investigation into violations of the federal antikickback statute.

Consequently, the number and degree of questionable financial relationships between physicians and industry has gained significant public attention through a series of articles in high-profile media outlets including The New York Times and The Wall Street Journal.

The practice of device and pharmaceutical companies paying physicians, and the lack of transparency around this can potentially obscure the most important question that exists between physician and patient: What is best for the patient?

As professional medical societies, the AANS and the CNS hold the public trust, seeking to advance the field of neurosurgery as a whole—through public and professional education, and through the development

and evaluation of new technology. It is with this goal in mind that the Guidelines on Neurosurgeon-Industry Conflict of Interest document was crafted.

Guidelines

The guidelines encompass the following purpose:

Neurosurgeons are necessary collaborators with industry for technical innovation by providing ideas and feedback, conducting research trials, serving on scientific advisory boards, and serving as faculty to teach the use of new technology related to neurosurgical practice. Neurosurgeons with innovative ideas to improve patient care rely on industry to bring their creative ideas to practical application in the healthcare market. The collaborative relationship between neurosurgeons and industry must be structured to avoid pitfalls of improper inducements or incentives.

In their daily practice, all neurosurgeons must be guided by ethical principles upon which to base their decisions for the care of their patients. The goal of medicine always should be to serve the best interest of the patient, whereas business must promote profitability for the success of its investors.

A potential conflict of interest exists whenever professional judgment concerning choices in patient care has a reasonable chance of being influenced by self-interest of the neurosurgeon.

Accurate, complete, and understandable disclosure of any potential conflict of interest is required in communications to patients, the public and colleagues.

When faced with a potential conflict of interest that cannot be resolved, a neurosurgeon should consult with the appropriate committee in an institutional or professional society to determine whether a conflict of interest exists and how to address it.

We encourage you to read the guidelines and utilize them as a tool to help provide ethical care to those who entrust you with their health and lives—your patients.

James R. Bean, MD
President
AANS

Anthony L. Asher, MD
President
CNS

FOR FURTHER INFORMATION

- Guidelines on Neurosurgeon-Industry Conflict of Interest, www.aans.org/about/membership/Neurosurgeon-Industry_Conflicts-of-Interest5-08.pdf

AANS ANNUAL MEETING

AANS Commitment to Education Evidenced at 76th Event

Plan Now for San Diego Next May

The 76th AANS Annual Meeting in Chicago April 26–May 1 was a resounding success. Attracting 3,488 medical attendees and 7,993 total attendees, not only did the meeting nearly shatter the AANS attendance record set at last year's diamond jubilee meeting, it also generated record-breaking media coverage.

More importantly, the meeting delivered top-notch neurosurgical education through 41 practical clinics, 78 breakfast seminars and 149 oral presentations. Depending on the extent of their participation, attendees could receive up to 46.75 continuing medical education credits.

The 11 scientific abstracts that the Public Relations Committee selected for release to media generated exceptional interest among national and international media outlets. Total media coverage exceeded all expectations, with a record-breaking 1.95 billion total media impressions—more than twice last year's coverage. There was pick-up not only in major U.S. print and Web publications such as The Washington Post, U.S. News and World Report, Forbes, MSN, and Yahoo, but also worldwide. Newspapers and Web outlets as far afield as Zambia, Pakistan, China, Iran, India, Russia, and the United Kingdom covered the research.

The media conducted several on-site interviews with neurosurgeons, and three interviews conducted by ORLive are viewable in the Current News area of www.aans.org. There was particular media interest in the report on deep brain stimulation for depression; regarding this topic, Ali Rezai, MD, and Donald Malone, MD, participated in several interviews, and CNN Chief Medical Correspondent Sanjay Gupta, MD, reported on their research in a May 2 broadcast.

Meeting Highlights

A Chicago-style reception at the historic Navy Pier ballroom was a fitting launch for the meeting, offering a convivial atmosphere and spectacular views of the Chicago skyline. Setting a celebratory tone were the hardest working neurosurgeons at the reception, the members of the back-by-popular-demand

A total of 236 companies offered attendees the opportunity to sample new technology in the exhibit hall.



Neurosurgical Jazz Quintet: Donald Quest, James Rose, Theodore Schwartz, Michael Scott, and Philip Weinstein.

In this year's presidential address, Jon H. Robertson, MD, discussed a particularly timely topic: the neurosurgery–industry relationship and the attendant potential conflicts of interest that must be avoided. Dr. Robertson approached the topic on two levels, that of the professional society and industry, and that of the individual neurosurgeon and industry. “By necessity, the relationship between our profession and industry must be appropriate and collaborative to benefit our patients,” he said.

An AANS member in the audience later suggested posting the address online so that all members could experience it, and Dr. Robertson's remarks in their entirety now are freely accessible via hyperlinks at www.aans.org/annual/2008_Annual_post_meeting.asp.

Delivering the Cushing oration, historian Douglas Brinkley, PhD, explored the makeup of a “sustain-

Continues ►



Jon H. Robertson, MD, tackles the neurosurgery–industry relationship in his presidential address.

able hero” primarily through three figures, Theodore Roosevelt, Ronald Reagan and Rosa Parks. Beyond individual accomplishments—establishing national parks as the true American heirlooms, facilitating the end of the cold war, and symbolizing and advancing the civil rights movement, respectively—he observed that, ironically, it is a lack of detail which allows a figure to be mythologized. He warned that in an information age run amok, heroes will be increasingly hard to sustain.

With a contemporary portrait of Arrowsmith, the hero of Sinclair Lewis’s Pulitzer Prize-winning novel of the same name, A. John Popp, MD, led off the meeting and a wealth of thought-provoking lectures with the Richard C. Schneider lecture. Contemporary Arrowsmith wound up as disillusioned as his forebear, and Dr. Popp considered whether neurosurgical education is fully preparing trainees for all aspects of a career in neurosurgery; he called for examination of what may be a stagnant model for neurosurgical education. “Discussion is a healthy business,” he observed.



Don Quest (left) and Jim Rose of the Neurosurgical Jazz Quintet take a break during the opening reception at Navy Pier.



The family’s point of view was the focus of Lee Woodruff’s Rhoton Family lecture. She recounted the extensive head injuries suffered in Iraq by her husband, journalist Bob Woodruff, from an improvised explosive device. “I wish there was a way for [doctors] to talk to families in language they can understand,” she said. “These are moments that as human beings [families] need a little coddling, and they need hope.”

In the Louise Eisenhardt lecture, Marcia Angell, MD, compellingly explored what she termed a “retreat from science” in the U.S. since the 1950s, discussing in detail why such a rejection became possible. She noted that there are enormous implications for society when

Scientific Posters Enter Digital Age

A new format for scientific posters debuted at the 2008 AANS Annual Meeting: The posters were presented in electronic format rather than displayed in the traditional gallery format. More than 400 “e-posters” could be viewed at computer stations located in the exhibit hall and in other readily accessible areas of the convention center. The digitized format allows the posters to be searched and viewed even after the meeting at <http://posters.webges.com/e-Poster.php?aans2008>. For viewing scientific posters, physicians may self-claim Category 2 Credit from the American Medical Association using an AMA PRA certificate application form. Top honors were announced at the meeting for the following posters.

- **Cerebrovascular**—1054, The Influence of the Comorbidity on the Postoperative Course of Disease in Patients With Idiopathic Normal Pressure Hydrocephalus
- **General Interest**—1412, How Much Is Enough? Virtual Reality Analysis for the Surgical Planning of Skull Base Approaches
- **History**—1438, Friedrich Nietzsche: Syphilitic Madness or a Meningioma?
- **Neurotrauma and Critical Care**—1121, Transplantation of Bone Marrow Stromal Cells Improves Cognitive Dysfunction in Rat Diffuse Brain Injury Model
- **Pain**—1096, Qualitative RI Cisternography and Brain MRI in Patients With Chronic Headache or Neck Pain
- **Pediatric**—1297, Long-Term Outcomes After Surgery Only, in Children With Low-

- Grade Brain Tumors
- **Spine and Peripheral Nerves**—1097, Adjacent Vertebral Body Osteolysis with Bone Morphogenetic Protein Use in Transforaminal Lumbar Interbody Fusion
- **Stereotactic and Functional**—1084, Autopsy Findings in a Patient Receiving Deep Brain Stimulation of the Ventral Capsule/Ventral Striatum
- **Tumor**—1145, MGMT Gene Silencing Using RNA Interference Renders Glioblastoma Cells More Sensitive to Temozolomide

AANS 08 CHICAGO	
ANNUAL MEETING APRIL 26 - MAY 1	
Poster Award Recipients	
Spine and Peripheral Nerve	
Stereotactic and Functional	
Trauma and Critical Care	
Tumor	

Outstanding Individuals Honored at 2008 Annual Meeting



CUSHING MEDAL

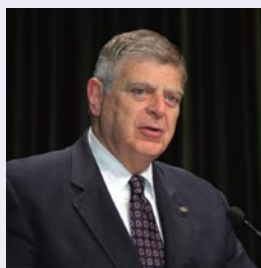
Charles B. Wilson, MD

Upon receiving the Cushing Medal, the highest honor bestowed by the AANS, Dr. Wilson spoke of neurosurgery as his "profession, passion and inspiration." He expressed his immense gratitude for the award, and credited being in the "right place, at the right time and being surrounded by people with a passion for excellence" as inspiration for his achievements.

HUMANITARIAN AWARD

Robert J. Dempsey

Presenting Dr. Dempsey with the Humanitarian Award, AANS President Jon H. Robertson, MD, noted that his work has been "a shining example of extensive humanitarian efforts," particularly in Ecuador. Dr. Dempsey acknowledged the vital role played by the Foundation for International Education in Neurological Surgery in developing countries, and said, "I am very grateful and deeply humbled" by this award.



DISTINGUISHED SERVICE AWARD

Peter Carmel, MD

Dr. Carmel was honored in part for the two decades of outstanding representation of neurosurgery to the American Medical Association. He expressed his gratitude at having been afforded the opportunity to serve, saying, "We are blessed to be able to serve first and foremost our patients ... and our

profession," and he hailed the next generation of neurosurgeons as the "most brilliant ever."

INTERNATIONAL LIFETIME AWARD

Humberto Mateos Gomez, MD

Dr. Mateos is the first recipient of the AANS International Lifetime Recognition Award. He has dedicated his life to teaching and has been a principal force in elevating the quality of neurosurgical training in Mexico. He founded the Neurosurgery Service of the Mexican Institute of Social Security in 1963 and also was a founding member and president of the Mexican Board of Neurosurgery. The award was presented at the International Reception.



people believe whatever they want at the expense of evidence. "The scientific method evolved over decades because it is the only method that worked," she said.

In "Alchemy of Ideas," Michael L.J. Apuzzo, MD, delivered the Theodore Kurze lecture "in the spirit of Ted," whom he recalled as an "engaging and eclectic person." Painting with a broad brush, Dr. Apuzzo invoked modern artists, architects and authors whose work fostered a "feeling of the inevitability of social progress." After richly illustrating the transformative power of an idea, he proclaimed that currently "the quest for modernity is beyond anything we've ever had in our field."

These and additional lectures as well as the plenary sessions in their entirety, the scientific sessions, and section sessions of the 2008 AANS Annual Meeting were recorded and can be purchased for online access or on CD-ROM. Each recorded session contains digital audio fully synchronized to the session slide presentation as submitted by the presenters. The complete series offers more than 50 hours of educa-

tional content, and 10 continuing medical education credits are available.

Plan Now to Attend the 77th AANS Annual Meeting

The 2009 AANS Annual Meeting will be held May 2-7, in San Diego, Calif. The abstract center, open now, closes Sept. 19. Registration and housing information will be available at www.aans.org in the fall.

RELATED INFORMATION

- AANS Governance, page 36
- 2008 Annual Meeting Photographs, www.lagniappstudio.com/aans2008
- AANS/CNS Position Statement: Guidelines on Neurosurgeon-Industry Conflict of Interest, page 32
- Presidential Address, www.aans.org/annual/2008_Annual_post_meeting.asp
- 2008 Annual Meeting Press Kit, www.neurosurgerytoday.org/media/press.asp
- 2008 Annual Meeting Recorded Sessions With CME, <http://marketplace.aans.org/>

AANS GOVERNANCE

2008–2009 AANS Officers 28 Members Comprise AANS Board of Directors

The AANS officers for 2008–2009 were elected at the annual business meeting on April 28 and took office at the conclusion of the 2008 AANS Annual Meeting. The president-elect took office June 1 after a special election necessitated when the nominee previously selected by the Nominating Committee withdrew his name from consideration on March 31.

Officers comprising the Executive Committee are: James R. Bean, MD, president; Troy M. Tippet, MD, president-elect; Martin B. Camins, MD, vice president; James T. Rutka, MD, secretary; Paul C. McCormick, MD, treasurer; and Jon H. Robertson, MD, past president. While brief biographical information on each of the officers follows, press releases with more extensive information are available in the Library at www.aans.org. The Board of Directors additionally includes five directors-at-large, four regional directors, a historian, nine ex-officio members, and three liaisons; the board is listed in its entirety on page 30.



James R. Bean, MD
President

James R. Bean, MD, completed a three-year term as AANS treasurer prior to serving as president-elect and now as president. An active member of the AANS since 1988, Dr. Bean was editor of the *AANS Bulletin* from 2003 to 2005. He has served as chair of the AANS/CNS Council of State Neurosurgical Societies (1997–1999), the AANS/CNS Coding and Reimbursement Committee (2000–2002), and the AANS/CNS Washington Committee (2002–2004). He is a member of the following committees: Executive, Finance, Long-Range Planning, the Neurosurgery Research and Education Foundation Executive Council, and the NeurosurgeryPAC Board of Directors. He currently is president of Neurosurgical Associates PSC in Lexington, Ky.



Troy M. Tippet, MD
President-Elect

Troy M. Tippet, MD, FACS, has served on the AANS Board of Directors since 2004, most recently completing a one-year term as vice president and a three-year term as

chair of the AANS/CNS Washington Committee. He is a member of the following committees: Bylaws, Executive, Finance, Long-Range Planning, Neurosurgery Research and Education Foundation Executive Council, and the NeurosurgeryPAC Board of Directors. Dr. Tippet received the Distinguished Service Award from the AANS in 2003. He served as president of the Florida Medical Association from 2005 to 2006 and just completed service as chair of the Florida delegation to the American Medical Association. Dr. Tippet has been in private practice and a member of the Neurosurgical Group in Pensacola, Fla., since 1976 and medical director of this practice since 1988.



Martin B. Camins, MD
Vice President

Martin B. Camins, MD, a member of the AANS since 1980, serves on the following committees: Bylaws, Executive, Finance, Long-Range Planning, the NeurosurgeryPAC Board of Directors, and Professional Conduct. He is a member of the Administrative Committee of the World Federation of Neurological Surgeons, the Neurosurgical Society of America, and the Society of Neurological Surgeons. He is the neurosurgical Regent of the American College of Surgeons. He also served on the Executive Committee of the Congress of Neurological Surgeons from 1985 to 1991 and was CNS vice president in 1988. Dr. Camins is currently clinical professor of neurosurgery at The Mount Sinai Hospital and an attending neurosurgeon at Lenox Hill Hospital.



James T. Rutka, MD
Secretary

James T. Rutka, MD, PhD, FRCS, is serving the last year of a three-year term as secretary. An active member of the AANS since 1983, he has served on the AANS Board of Directors since 2003. He was chair of the 2006 AANS Annual Meeting and chair of the Scientific Program Committee in 2005. He serves on following committees: Executive, Finance, Long-Range Planning, the Neurosurgery Research and Education Foundation Executive Council, Publications, and the

NeurosurgeryPAC Board of Directors. Dr. Rutka has been on the neurosurgical staff at the Hospital for Sick Children in Toronto since 1990. He is currently director of the Arthur and Sonia Labatt Brain Tumour Research Centre. Among his many awards are the Lister Award from the University of Toronto, a Scientist Award from the Medical Research Council of Canada; and the Grass Award from the Society of Neurological Surgeons.



Paul C. McCormick, MD
Treasurer

Paul C. McCormick, MD, is serving the second year of a three-year term as treasurer. An active member of the AANS since 1992, Dr. McCormick served on the AANS Board of Directors from 2002 to 2005. He

was chair of the AANS/CNS Section on Disorders of the Spine and Peripheral Nerves from 2000 to 2001, chair of the 2001 AANS Annual Meeting, and chair of the Scientific Program Committee in 2000. He is a member of the following committees: Development, Executive, Finance (Chair), Information Technology, Long-Range Planning, Maintenance of Certification, and the NeurosurgeryPAC Board of Directors. Dr. McCormick has been on the staff of Columbia-Presbyterian Medical Center, New York, N.Y., since 1990. In July 2006, he was appointed the Herbert and Linda Gallen Professor of Clinical Neurological Surgery at Columbia University, College of Physicians and Surgeons. In 2007, he received the John Jay award for professional achievement from Columbia University.



Jon H. Robertson, MD
Past President

Jon H. Robertson, MD, an active member of the AANS since 1983, has served on the AANS Board of Directors since 1999. He is a member of the following committees:

Executive, Finance, Long-Range Planning, Neuro-Knowledge Advisory Task Force, the NeurosurgeryPAC Board of Directors, and Nominating (Chair). He finished a three-year term as AANS secretary in 2006, served as chair of the Development Committee from 2003 to 2007, and served as chair of the Annual Meeting Committee in 1994. He is active in many professional organizations, among them the American Board of Neurological Surgery, American Academy of Neurological Surgery, and

the Society of Neurological Surgeons. Dr. Robertson was named professor and chair of the Department of Neurosurgery at the University of Tennessee Health Science Center in Memphis in 1997. He has been a practicing member of the Semmes-Murphey Neurologic and Spine Institute since 1979. **NS**

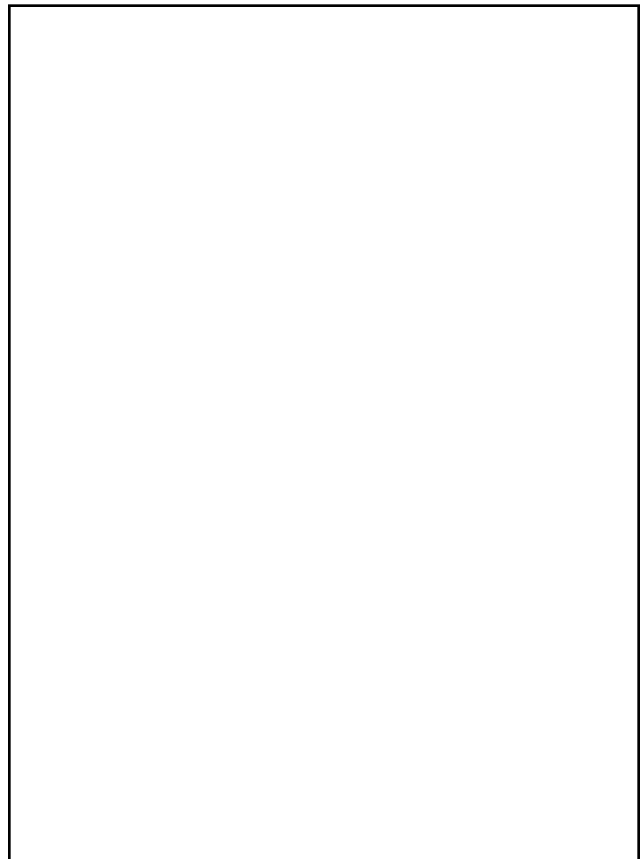
AANS Disciplinary Actions

The AANS Board of Directors heard six recommendations from the Professional Conduct Committee at its April 25 meeting in Chicago. Approved were recommendations for dismissal of the complaints in three cases and for censure in two cases. One case in which the PCC had recommended censure was dismissed.

Both of the members who were voted to be censured are appealing to the general membership of the AANS. Those appeals will be heard at the annual business meeting in San Diego, Calif., on May 4, 2009. **NS**

FOR FURTHER INFORMATION

■ AANS Bylaws, www.aans.org/about/membership/aans_bylaws072707.pdf



AANS National Neurosurgical Procedural Statistics Report

New Survey Offers Insight Into How Neurosurgeons Are Practicing Today

Betsy van Die

More than 60 percent of procedures that neurosurgeons perform are spine-related, according to the AANS National Neurosurgical Procedural Statistics 2006 Survey. "The data obtained in the recent AANS report is the most comprehensive representation of caseloads for board-certified neurosurgeons in the United States currently available," stated AANS President James R. Bean, MD.

With inclusion of the CPT codes and new procedures, it is actually more comprehensive than a similar AANS survey conducted in 2000 using 1999 data. However, many side-by-side comparisons are included to capture a glimpse of how the field has changed demographically and procedurally in the intervening seven years.

To obtain the most accurate results for the neurosurgical statistics report, a survey was distributed in April 2007 to 3,614 neurosurgeons nationwide in group, academic and solo practices. The report collected 2006 data by Current Procedural Terminology code. Nearly 750 neurosurgeons participated in the survey. The mean was calculated for the sample by each procedure audited. This procedural mean was then multiplied by 3,443, which was the number of neurosurgeons board-certified by the American Board of Neurological Surgery at the time of the survey, to allow extrapolation of the data to all U.S. neurosurgeons.

Some of the key data from the survey follow.

- The total number of procedures performed in 2006 was estimated at 2,171,195.
- Of these, 1,345,167 were spine-related, equating to nearly 62 percent of the total.
- The most common spine procedure was lumbar disc laminectomy, with 185,651 performed.
- The second highest category was cranial, with 592,443 procedures performed.
- The most common cranial procedure was supratentorial craniotomy, with 55,578 performed.

Select comparative data from 1999 to 2006 revealed:

- a 14 percent decrease in the number of neurosurgeons in private practice;

- a 13 percent decrease in the number of neurosurgeons in solo practice;
- an 11 percent increase in the number of neurosurgeons with full-time academic appointments; and
- a 6 percent increase in the number of female neurosurgeons.

Some of the recent advances in neurosurgery are reflected in the new procedures included in the 2006 report and not in the 1999 report. These include kyphoplasty, the endoscopic transnasal procedure, and several endovascular procedures including balloon angioplasty and balloon test occlusion.

AANS members can access the report at password-protected www.MyAANS.org by selecting the Procedural Statistics link under the Resources heading in the left-hand tool bar. Members of the media can receive a free copy of the AANS neurosurgical statistics report by contacting Betsy van Die, bvd@aans.org. Companies can purchase a downloadable copy by visiting the AANS Online Marketplace. **NS**

Betsy van Die is AANS director of communications. The author reported no conflicts for disclosure.

ADVANCING NEURORESEARCH

2008 Medical Student Summer Research Fellows Announced

The AANS, through the Neurosurgery Research and Education Foundation, announces the 2008 AANS Medical Student Summer Research Fellows. The fellowship is open to medical students in the U.S. or Canada who have completed one or two years of medical school and wish to spend a summer working in a neurosurgical laboratory, mentored by a neurosurgical investigator who is a member of the AANS. Applications for the 2009 awards are due by Feb. 1, 2009. The 2008 awardees are:

Lucas Harmon Bradley, University of Missouri
 Derek Chew, University of Toronto
 Anne Chin, UMDNJ – New Jersey Medical School
 Andrew Kahlen Conner, Indiana University
 Kassandra Dassoulas, University of Virginia
 Dale Ding, Duke University
 Brian Hanak, Massachusetts General-Harvard
 Obehioya Irumudomon, Case Western Reserve
 Julia Jaffe, Mount Sinai School of Medicine
 Jonathan Latzman, New York University
 Neal Mehan, University of Cincinnati
 Whitney Parker, University of Pennsylvania
 Matthew Parry, Virginia Commonwealth University
 Caroline Tougas, University of Ottawa
 Nina Zobenica, Barrow Neurological Institute

WASHINGTON WATCH

AANS/CNS 2008 Legislative Agenda Emergency Care and Medicare Reimbursement Top Ambitious List

The following summary of issues constitutes the 2008 legislative agenda of the AANS and the Congress of Neurological Surgeons. Additional information is available from Adrienne Roberts, aroberts@neurosurgery.org, in the AANS/CNS Washington office and from the Legislative Activities area of www.aans.org.

Improve trauma systems and access to neurosurgical emergency care. With only approximately 3,100 board-certified practicing neurosurgeons in the U.S., the AANS and CNS want to work with Congress to develop and implement a system for the regionalization of emergency neurosurgical care. As recommended by the Institute of Medicine, “the objective of regionalization is to improve patient outcomes by directing patients to facilities with optimal capabilities of any given type of illness or injury.” Neurosurgery also actively supports increased funding for the HRSA Trauma-EMS Program, which provides grants to states to improve critically needed statewide trauma care systems.

Champion improvements to the Medicare physician reimbursement system. Congress stopped the 10.1 percent cut that was scheduled to go into effect on Jan. 1, but physicians face a 10.6 percent cut in Medicare reimbursement on July 1 and payment cuts totaling 40 percent over the next eight years, beginning in 2009. The AANS and CNS are committed to working with Congress to pass both short- and long-term solutions to the Medicare reimbursement system crisis.

Preserve quality resident training and safe patient care. The AANS and CNS believe that further reductions in resident work hours will have a negative impact on resident training and education and will produce a generation of neurosurgeons who will not be as skilled or committed as their predecessors and will fall short of public expectations. In addition, adherence to strict work hours can lead to medical errors attributable to more frequent patient handoffs, fragmentation and loss of continuity of care. The Accreditation Council for Graduate Medical Education is effectively addressing these issues, and legislation on this matter is therefore unnecessary.

Alleviate the medical liability crisis. The AANS and

CNS support legislation to provide commonsense, proven, comprehensive medical liability reform. Federal legislation that is modeled after the laws in California or Texas and includes reasonable limits on noneconomic damages represents the “gold standard.” Other solutions also should be explored, such as applying the Federal Tort Claims Act to EMTALA-mandated services and replacing the current system with specialized health courts.

Enhance Medicare and other quality improvement programs. The AANS and CNS support a pay-for-participation system in which clinical data collection occurs in a nonpunitive environment; data is appropriately risk adjusted; physicians continually receive performance feedback; and individual data is not publicly reported.

Increase funding for healthcare and research. Institutions such as the National Institutes of Health, Centers for Disease Control and Prevention) and the Agency for Healthcare Research and Quality are leading the way to help improve our nation’s health and save lives. The AANS and CNS urge Congress to increase funding for these vital public health programs.

Safeguard patient access to specialty care in healthcare reform. Healthcare reform must ensure that every patient has access to appropriate quality care, by the appropriate doctor, at the appropriate time. The AANS and CNS believe it is imperative that all healthcare reform proposals ensure that patients are provided adequate details about health plan options and physician specialist networks, and patients have adequate access to timely, affordable specialty care, including the doctor of their choice.

Advance measures to improve the neurosurgical workforce. While neurosurgery continues to fill its residency slots across the nation, the number of slots has not kept pace with growth in the U.S. population. As baby boomer enrollment in Medicare continues to climb, the future supply of all surgical specialists will be inadequate to provide the healthcare that these seniors will require. The AANS and CNS support reevaluating the residency-funding caps that were established by the Balanced Budget Act of 1997.

Protect patient-centered healthcare. Diagnostic imaging is an integral component of neurosurgical care, and the ability of neurosurgeons to provide in-office diagnostic imaging services to their patients ensures they get the best possible and timely care available. Ambulatory surgery centers and physician-owned specialty hospitals provide cost-effective care; have low infection, complication and mortality rates; and produce a marked increase in patient satisfaction. The AANS and CNS urge Congress to protect patient access to these services. **NS**

FEATURE

Interview With the AANS President Dr. Bean Sees an Increasingly Global Perspective in Neurosurgery's Future

Manda J. Seaver

Catching up with James R. Bean at the 2008 AANS Annual Meeting was no mean feat. Even before taking office, numerous commitments crowded the 2008–2009 AANS president's schedule.

"I'll meet you in the press room," he promised, heading off to yet another engagement.

When he arrived for the interview, he was, as always, perfectly prepared. A veteran of AANS media training seminars, Dr. Bean had honed his interview skills as a spokesperson for neurosurgery's campaign for federal tort reform and for other issues as well. His experience as chair of the AANS/CNS Washington Committee, the group devising neurosurgery's advocacy agenda in the nation's capital, and as editor of the *AANS Bulletin*, the predecessor of the *AANS Neurosurgeon*, also stood him in good stead.

"I've been thinking about this," he warned, easing into a chair. He paused for a split second before laying out the areas of primary concern to the AANS in the next year.

"Clearly, our focus on education will continue," he began. He noted that the AANS is rooted in education, and therefore staying ahead of the expanding continuing medical education needs of members is an essential service to AANS members.

Dr. Bean said that AANS' educational activities as well as professional services would continue to expand internationally. A task force recently was convened to brainstorm ways the AANS can meet the needs of international members, augmenting the efforts of the AANS International Outreach Committee. Some ideas

that have been implemented include developing an international area of the Web site where selected articles from AANS scientific journals are freely available; offering free or low-cost online access to major biomedical and related social science journals for not-for-profit institutions in developing countries through the Health InterNetwork Access to Research Initiative; instituting scholarships, including the AANS International Travel Scholarship and the AANS International Visiting Sur-



Incoming AANS President James R. Bean, MD, (right) presents Jon H. Robertson, MD, with the Tennessee state flag that was displayed at the AANS Headquarters Office during his presidency.

geons Fellowship; and recognizing excellence through honors such as the AANS International Lifetime Achievement Award.

He also noted that these expanded international activities also would lay the groundwork for the 2009 World Federation of Neurosurgical Societies meeting, which the AANS will host in Boston from Aug. 30 to Sept. 4.

"The AANS is and should be a source of help to neurosurgeons around the world," said Dr. Bean. "We are an integral part of an essential and interconnected network."

This interconnectivity is reflected in the theme Dr. Bean chose for the 2009 AANS Annual Meeting in San Diego from May 2 to 7. The meeting, "Shaping Neurosurgery's Future: A Global Enterprise," will be not only an opportunity for scientific discovery and continuing medical education, but also a venue that reflects a beneficial and appropriate relationship between neurosurgery and industry.

To ensure that this is the case, the AANS estab-



lished ethical guidelines for relationships between the AANS and industry and more recently between individual neurosurgeons and industry. Dr. Bean, who was instrumental in development of the latter document, noted that such guidelines are necessary because of growing commercialism in healthcare that threatens professionalism.

“The AANS and individual neurosurgeons must make a conscious effort to keep patient interests at the center of business decisions,” he said.

Further, he maintained that this conscious focus on patient interests must extend to the political arena: “American politics has a lot to do with medical practice today and with payment regulations and practices in particular,” he said. “We have to influence politics at the national level, particularly in an election year when the nation is focusing on healthcare as a top voting issue, and never forget that the medical profession’s role in this whole business is safe and available care for patients.”

Dr. Bean said that an essential element for increasing the effectiveness of advocacy efforts in Washington is an improved public relations strategy.

“We must get the message out on what neurosurgeons do and become more visible and comprehensi-

ble as a profession to the public,” he said. “We should recognize that, while medical terminology needs to be translated into language and images that people can understand, the art of public communications doesn’t come naturally to most of us.”

He advocated media training, offered at AANS annual meetings, for neurosurgery’s leadership and for any neurosurgeon who interfaces with the public.

Dr. Bean concluded with an issue of vital importance to the health of neurosurgery in the future: attracting the best qualified candidates to the profession, particularly women.

“Neurosurgery is science that is applied by men and women,” he said. “To remain a profession on the leading edge of medicine, we must be able to attract top people to our field, and today that means, in part, becoming a profession that can accommodate a rewarding family life for the men and women in neurosurgical practice.”

“Neurosurgery has been an innovative profession in many ways,” Dr. Bean concluded. “If there’s a better way to do something, we have to do what it takes to make that happen.” **NS**

Manda J. Seaver is staff editor of the *AANS Neurosurgeon*.

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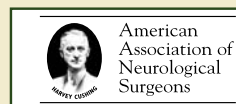
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CSNS REPORT

Neurotrauma Committee Addressing Volatile Issues in Neurotrauma

Ann R. Stroink, MD

In the U.S. each year more than a million patients are seen in emergency rooms for traumatic brain injury alone, representing only a portion of the neurotrauma cases that neurosurgeons are asked to see on a daily basis. The high volume of neurotrauma cases tests the available neurosurgical resources to meet this demand and varies from region to region throughout the country.

Neurotrauma issues affecting neurosurgeons today are addressed in the following questions. These are just a few of the many questions discussed by the Neurotrauma Committee that remain on the agenda for further debate.

1. Are we adequately preparing residents for the rigors of a typical neurosurgical practice, especially in light of recent suggestions that work hours should be further restricted from 80 to 56 hours?
2. Should daily neurotrauma coverage be performed on a volunteer basis or contracted with hospitals? Certainly, the increased risk of medical liability has swayed the vast majority of neurosurgeons to consider negotiating contracts for this service as opposed to their predecessors who did it voluntarily.
3. Do we provide all neurosurgery residents with sufficient training to offer full-scale neurotrauma services and adequate coverage? At the same time, how do we justify general surgeons performing neurosurgical procedures and argue it is in the best interest of patient care?
4. In response to an increased need for neurosurgeons to be available for neurotrauma management, should we consider the concept of modifying the training of neurosurgeons to a fast track, establishing basic skills for neurotrauma along with basic cranial and spine skills? How do we ensure our role as architects in the regionalization of neurotrauma care?
5. Lastly, how are we going to respond to the expected exodus of veteran neurosurgeons from neurotrauma coverage rosters due to increasing concerns about malpractice and liability and work hours?

In 2007, Shelly Timmons, MD, became chair of

the committee, following the fine work in that capacity of Dominic Esposito, MD. The committee takes an active role in formulating responses to resolutions brought forth by members of the CSNS in addition to tackling some of the more volatile issues of neurotrauma care affecting not only neurosurgeons, but society as a whole.

Additional information on how the Neurotrauma Committee functions and how to join this committee is available on the CSNS Web site. In an interview posted on the site, Dr. Timmons answers a number of questions about the workings of this committee and raises issues to which neurosurgeons should feel compelled to respond. **NS**

Ann R. Stroink, MD, is member of the Editorial/Publication Committee of the Council of State Neurosurgical Societies, www.csnsonline.org. The author reported no conflicts for disclosure.

International Awards 2008 AANS International Visiting Surgeon Fellowship Recipients Announced

Sudipta Mukherjee, MD, of Bagerhat, Bangladesh, and Okezie Obasi Kanu, MD, from Lagos, Nigeria, have been selected as the recipients of the 2008 International Visiting Surgeon Fellowships. This fellowship provides financial assistance to physicians in developing countries who want to participate in a visiting surgeon program in North America. The AANS funds roundtrip airfare, provides a monthly stipend to help offset expenses, and offers a stipend to attend the AANS annual meeting.

Dr. Mukherjee will be visiting the University of Washington at Harborview Medical Center where he will work with Laligam N. Shekhar, MD, observing skull base and cerebrovascular treatments. His concentration will be on microsurgical techniques of cerebrovascular surgery in respect to aneurysms, arteriovenous malformations, and stroke management.

Dr. Kanu will be visiting the Duke University School of Medicine where he will work with Allan H. Friedman, MD, FACS. Dr. Kanu's interest is in neuro-oncology, particularly the management of skull base (including pituitary) lesions.

The AANS will begin accepting applications for the 2009 International Visiting Surgeon Fellowship on July 1, 2008. Additional information is available at www.aans.org/international/surgeons_fellowships.asp. **NS**

CALENDAR/COURSES

July

- 8-11** **The 15th International Meeting on Advanced Spine Techniques**
July 8–11, 2008, Wanchai, Hong Kong
www.imastonline.com
- 9-12** **Cerebrovascular Complications Conference**
July 9–12, 2008, Teton Village, Wyo.
www.3Cmeeting.com
- 11-12** **PNS Annual Scientific Meeting: Neurosurgery in the 21st Century**
July 11–12, 2008, Hershey, Pa.
(717) 909-2693
- 27-30** **14th Annual Montana Leibrock Neurosurgery Symposium**
July 27–30, 2008, Whitefish, Mont.
www.mnif.umt.edu/symposium.htm

August

- 16-19** **Western Neurosurgical Society 54th Annual Meeting**
Aug. 16–19, 2008, Anchorage, Alaska
www.westnsurg.org
- 22-24** **17th Annual Conference of Neurotrauma Society of India**
Aug. 22–24, 2008, Bhubaneswar, India
www.neurotrauma08.org
- 25-27** **14th Annual San Antonio Trauma Symposium**
Aug. 25–27, 2008, San Antonio, Texas
www.hjf.org/events/trauma.html

September

- 3-6** **6th International Congress on Meningiomas and Cerebral Venous System**
Sept. 3–6, 2008, Boston, Mass.
www.TheMeningiomaConference2008.org
- 5-6** **9th Annual Interventional Neuroradiology Symposium**
Sept. 5–6, 2008, Toronto, Canada
www.events.cmetoronto.ca/website/index/MIM0804
- 9-12** **American Academy of Neurological Surgery Annual Meeting**
Sept. 9–12, 2008, Sedona, Ariz.
reh1@mac.com
- 12-14** **Transcranial Doppler & Imaging**
Sept. 12–14, 2008, Bothell, Wash.
www.pvicme.com/transDoppler.htm
- 24-27** **4th European Cerebral Revascularization Course: Hands-On Microsurgical and Endovascular Training**
Sept. 24–27, 2008, Bern, Switzerland
www.aesculap-akademie.ch

October

- 12-16** **International Society for Pediatric Neurosurgery 36th Annual Meeting**
Oct. 12–16, 2008, Cape Town, South Africa
www.ISPN2008.org

AANS COURSES

Goodman Oral Board Preparation: Neurosurgery Review by Case Management
Nov. 9–11, 2008
Houston, Texas

Managing Coding and Reimbursement Challenges in Neurosurgery
Aug. 22–23, 2008
Boston, Mass.

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.

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, where calendar items can be submitted.

Angiogram-Negative Subarachnoid Hemorrhage

Idiopathic or Aneurysmal Hemorrhage?

This 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 50-year-old woman with a witnessed sudden onset of severe pancranial headache, nausea and vomiting that progressed to a decreased level of consciousness. She was brought to the emergency room by ambulance within an hour of ictus. Clinical examination demonstrated a Glasgow coma score of 11 (Best Eye, 3; Verbal, 3; Motor 5), with symmetric and reactive pupils and a subtle right hemiparesis. Bloodwork, including coagulation studies, was normal. The CT showed subarachnoid blood centered in the perimesencephalic cistern, but extending into the Sylvian fissures and ambient cisterns bilaterally (see figure). Enlargement of the lateral, third, and fourth ventricles suggested an acute communicating hydrocephalus. This was treated by placement of an external ventricular drain, after which her clinical condition stabilized with a normal level of consciousness and no focal deficits. CT angiography and a subsequent catheter angiogram demonstrated no obvious vessel abnormalities.

Take the Gray Matters Survey

Please indicate how you would proceed for this patient by answering the brief multiple choice survey questions at www.aansneurosurgeon.org (select the Gray Matters Surveys link in the tool bar and take the survey); an optional comment field is provided at the survey's end.

- Web Address: www.aansneurosurgeon.org
- Take the Survey: Idiopathic or Aneurysmal Subarachnoid Hemorrhage
- A synopsis of all responses will be published in the next issue; signed responses will be considered for publication.



Nonenhanced axial CT demonstrating subarachnoid blood centered in the perimesencephalic cistern with bilateral extension into the Sylvian fissures and ambient cisterns. Enlargement of the temporal horns of the lateral ventricles indicates acute hydrocephalus.

Considerations

Despite similar early clinical and radiographic appearances, the incidence, etiology, and natural history of perimesencephalic subarachnoid hemorrhage is significantly different from that of aneurysmal rupture. Perimesencephalic hemorrhage occurs with an annual incidence of 0.5 cases per 100,000 people and is responsible for 15 percent of all spontaneous subarachnoid hemorrhages (2). Its etiology is still uncertain, but current theories include both arterial and venous causes (6). Outcome after perimesencephalic hemorrhage is clearly better than after aneurysmal hemorrhage, with long-term follow-up studies demonstrating equal life expectancy and no higher risk of rebleeding compared with the general population (2, 3).

Differentiating perimesencephalic etiology from other causes of subarachnoid hemorrhage in the acute stage, however, remains a difficult problem, and there is no consensus on the management of spontaneous subarachnoid hemorrhage with a normal initial angiogram. Repeat angiography finds roughly 18 percent of occurrences in those whose initial cerebral angiogram was negative, with the vast majority of initial false negatives occurring with a nonperimes-

Responses: Minimally Symptomatic Cervical Spondylotic Myelopathy

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THE CASE

Conservative Management or Surgery for a Patient With Minimally Symptomatic Cervical Spondylotic Myelopathy?

SURVEY RESULTS SUMMARY

The majority (85 percent) of the respondents to this online survey would manage this patient surgically rather than follow him conservatively. For those choosing to not operate, 50 percent would recommend clinical follow-up alone while the other 50 percent recommended both imaging and clinical follow-up.

Of those advocating surgery, slightly more than half would recommend a posterior approach. Specific comments related to the posterior approach included recommending laminectomy alone, laminoplasty over three levels, and laminectomy with fusion. A minority opinion was for both an anterior and posterior decompressive procedure, with one suggestion specifically of disc removal and interbody fusion augmented with plating at C4–C5 and C5–C6 as well as a C3–C6 laminectomy.

CASE COMMENTARY

Respondents to this survey were clearly in favor of surgical decompression in patients such as this, with mild and minimally symptomatic cervical spondylotic myelopathy.

This was an interesting survey result given the variable natural history of this condition and indeed the substantial clinical equipoise when it comes to managing this type of patient population.

Late stage cervical myelopathy rarely improves with treatment. Early stage treatment, such as in the patient presented here, often reverses symptoms and prevents progression. I prefer simple decompression unless a fusion is clearly indicated, but I X-ray yearly and fuse in the few cases that develop deformity with time.

Steven J. Barrer, MD, Abington, Pa.

This patient has obvious myelopathy by clinical and radiographic criteria and has suffered from “worsening” neck pain for two years. It is inappropriate to consider him minimally symptomatic. Furthermore, the term minimally myelopathic represents a contradiction in terms, as any myelopathy is significant. He should be offered surgical treatment before his myelopathy progresses, as it is likely to do within his lifetime. Furthermore, this is precisely the type of patient who is at risk for central cord injury with mild trauma. An anterior cervical decompression and fusion would serve to treat his myelopathy, protect him against future cord injury and address his two-year history of neck pain.

Peyman Pakzaban, MD, Houston, Texas

encephalic hemorrhage pattern. In patients with a typical perimesencephalic pattern, however, the false negative rate of initial angiography is less than 1.5 percent (4, 5, 8). MRI of the brain and spinal cord have revealed nonaneurysmal causes (pituitary adenoma, spinal arteriovenous malformation) in 4 percent of angiogram-negative SAH cases, but none of these occurred in cases with a typical appearance on CT of perimesencephalic hemorrhage (7).

Ruptured posterior circulation aneurysms can present with a radiographic pattern of perimesencephalic hemorrhage in more than 15 percent of cases. Conversely, there is a 5 percent to 10 percent likelihood of finding a posterior circulation aneurysm in any patient with a perimesencephalic hemorrhage pattern (1). The specific hemorrhage pattern and its differential diagnosis, therefore, should guide decision-making in these cases. **NS**

Alim P. Mitha, MD, MS, is chief resident, and **Rajiv Midha, MD, MSc**, 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 authors reported no conflicts for disclosure.

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CODING CLARITY

► Continued from page 28

thetical for 20660 (that delineates a separate procedure) is a clue that the code is typically bundled into other more extensive procedures. The stereotactic series of procedures includes the work of stereotactic frame placement, when used, as well as the work for navigation. Consequently, codes 20660 and 61795 should not be reported in addition to the primary stereotactic procedure.

These are just a few examples of the subtle intricacies of neurosurgical coding. Beyond reading the code descriptors, resources such as the AANS and American Medical Association publications and courses as well as National Correct Coding Initiative edits can enhance understanding of the proper use of neurosurgical codes. **NS**

Gregory J. Przybylski, MD, chair of the AANS/CNS Coding and Reimbursement Committee, represents the AANS on the American Medical Association's Relative Value Scale Update Committee. He instructs coding courses for the AANS and for the North American Spine Society. He is a member of the Practicing Physicians Advisory Council to the Centers for Medicare and Medicaid Services, and he is a consultant to United HealthCare and Humana Inc.



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Subconscious Attitudes Influence Personal Views on Obesity

Gut Reaction

A funny thing happened during development of this issue's cover. A plan to run the original consensus cover choice, a painting depicting an exuberant dancing couple of heroic proportions, was abandoned when the artist withheld permission—he didn't want his work associated with medical or health themes. His cautious attitude proved prudent as it foreshadowed the Pandora's box that cover image selection would become.

A search for a replacement image that would be respectful of overweight people and make for a strong cover was discouraging. A range of images from classical to clinical was considered. There were plenty of pejorative images—overweight and obese people, looking sad or anxious; one image even was branded “Too Fat” lest the viewer miss the point.

What one person might see as an image that stresses the commonplace nature of obesity—a summertime backyard photo of people grouped poolside, among them a man with protruberant truncal obesity—another might see as mocking overweight people.

Certainly, featuring noticeably overweight people on the cover contrasts sharply with covers of contemporary magazines that feature improbably fit men sporting “washboard abs” and just as improbably thin women: While a five-foot-nine woman is considered a normal weight at a minimum of 126 pounds, most models weigh well below that, with one modeling Web site listing their average weight as between 108 and 125 pounds.

No single image seemed quite appropriate for tastefully representing obesity in America on a compelling cover. Moreover, it became apparent that any image chosen was likely to be judged offensive by someone. An abstraction, a landscape of corpulence, seemed the best choice. But this image too elicited surprising gut reactions.

If your first reaction to the cover image was “gross,” or “repulsive,” both of which were among our reviewers' comments, consider that this image actually depicts the chubby infant boy pictured above; it's worth noting that infants are perhaps the only group in America today for which “fat” is considered “cute.”



The power of the cover image to evoke a gut reaction is useful for challenging one's personal and perhaps subconscious attitudes toward obesity; this becomes important given that discussion of a medical problem re-

quires interaction between two people who each bring to the discussion personal attitudes and experiences.

Several studies have shown that physicians' attitudes impact their interactions with overweight patients. One study of how physicians discuss weight with overweight female patients found that patients of physicians who used Motivational Interviewing technique, a cognitive-behavioral technique, were more likely to change behaviors and lose weight than the other patients. Another study found that obese patients particularly disliked the terms fatness, excess fat, obesity and large size, while “weight” was the most preferred term.

Keith Bachman, a primary care internist, argued recently in American Medical News that it is unethical for a physician to “make weight loss a condition for establishing a patient-physician relationship.” Dr. Bachman is an author of the “Preventing Weight Bias: Helping Without Harming in Clinical Practice” toolkit (www.yaleruddcenter.org/what/bias/toolkit), which calls for physicians to recognize, among other things, that being overweight is a product of many factors and acknowledge that many patients repeatedly have tried to lose weight.

As the cover focus articles demonstrate, excess weight compounds health-related problems for neurosurgical patients and poses serious economic challenges for society. Given the increasing prevalence of obesity, preparing for discussion of weight issues with patients—including assessing one's own attitudes toward obesity—may be useful. **NS**

Manda J. Seaver is staff editor of the *AANS Neurosurgeon*.



Neurosurgeons Are Not Immune to Obesity

Physician, Look to Thyself

Obesity was quite rare for most of human history. Food was not as plentiful as today. The attention paid to fat characters in literature over the ages points to the relative scarcity of the corpulent. The Book of Judges describes Eglon, King of Moab, as being so large that the dagger used in his assassination “disappeared beneath [his] fat.” Moving ahead 2,500 years, Shakespeare used weight to various dramatic effect. Julius Caesar states that “Yon Cassius has a lean and hungry look ... Let me have men about me that are fat,” presumably because their bulk indicated a lack of ambition. And his greatest comic creation, Falstaff, is practically defined by his obesity—“a tun of man ... that stuft cloak-bag of guts.”

Now, of course, excess weight is understood to cause a host of health problems that are life-threatening and diminish quality of life. Patients who qualify as obese should be helped to lose weight, whether by counseling and diet, medications, gastric surgery, or (perhaps to come) deep brain stimulation.

The discomforts and disabilities of great weight in fact were recognized before the advent of modern medicine. George Cheyne was an eminent British doctor of the early 18th century. Born in Scotland in 1671, he studied medicine at Edinburgh and moved to London to make his name as a physician. Cheyne built his practice in part by regular attendance at taverns, where he indulged freely in food and drink. In part this behavior may have spurred his 1724 treatise, “An Essay of Health and Long Life.” This work included the observation that “to preserve health, the quantity and nature of our food ... must be proportional to the strength of our digestion.” Cheyne is often referenced as a father of vegetarianism, advocating a meat-free diet based on milk and vegetable consumption. He himself practiced this diet with variable consistency and for most of his adult life was morbidly obese, weighing over 32 stone (that’s about 450 pounds).

In general, physicians now as in the 18th cen-



Bridgeman Art Library. © Getty Images.

“The Death of Caesar,” Vincenzo Camuccini (1773–1844), oil on canvas. Casca first, then Cassius and the other conspirators stab Caesar. (Julius Caesar, Act III, Scene 1)

ture are not immune to the perils of obesity. Looking specifically at neurosurgery, no notably obese practitioners have been chronicled in biographies of leading neurosurgeons; perhaps this reflects our restless natures and cognizance of the need to set an

example for our patients and others. But as a group we surely are not immune to the perils of too much eating and too little exercise. Seriously overweight doctors, including neurosurgeons, should be treated as would any patient, thus setting a standard for others to follow. And all who battle the bulge may take some small comfort from George Cheyne. He died in 1743, age 72, “in full possession of his faculties to the last, and without experiencing a pang.” **NS**

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