Deep brain stimulation (DBS) is a surgical procedure involving implantation of electrodes into deep nuclei of the brain. A surgically implanted, battery-operated device delivers electrical stimulation to targeted areas in the brain that control movement, blocking abnormal nerve signals that cause essential tremor and Parkinson’s disease symptoms, according to the American Academy of Neurology (AAN). The procedure is also used to treat dystonia and other conditions.

There are three target sites for DBS treatment of Parkinson’s disease and other movement disorders: the ventralis intermedius nucleus of the thalamus, the internal segment of the globus pallidus, and the subthalamic nucleus. During a DBS procedure, electrodes are connected to a device that delivers electrical stimuli to brain tissue to modulate or disrupt patterns of neural signaling within a targeted region, according to an October 18, 2012, article published in the *New England Journal of Medicine* by Michael S. Okun, MD. The subthalamic nucleus and the internal segment of the globus pallidus are the most commonly targeted sites for the procedure when treating Parkinson’s disease, Okun wrote.

DBS is performed by neurosurgeons in a hospital. For additional information, please see the following *Clinical Privilege White Papers*:

- Practice area 145 – Neurology
- Practice area 155 – Neurological surgery
- Practice area 423 – Clinical neurophysiology

**Involved specialties**

Neurosurgeons, neurologists, neuropsychologists, neurophysiologists

**Positions of specialty boards**

**ABCN/AACN**

The American Board of Clinical Neuropsychology (ABCN) is a specialty board of the American Board of Professional Psychology and certifies competence in clinical neuropsychology. Once a candidate passes the ABCN examination and becomes board-certified in clinical neuropsychology, he or she is invited to join the American Academy of Clinical Neuropsychology (AACN), which is the membership organization of ABCN specialists.
ABCN has endorsed the Houston Conference Guidelines for specialty training in clinical neuropsychology for individuals who completed their neuropsychological training on or after January 1, 2005. The length of the residency must be the equivalent of two full years of education and training in clinical neuropsychology and neuropsychology-related disciplines, completed on at least a half-time basis.

For doctoral training or respecialization completed from January 1, 1990, to December 31, 2004, candidates must have:
- Successful completion of systematic didactic and experiential training in neuropsychology at a regionally accredited university
- Two years of appropriate supervised training applying neuropsychological services in a clinical setting. One of these years may be predoctoral. For both years of training:
  - Supervision must be provided on-site and for all clinical cases
  - The training program should include a combination of didactic and experiential training

For doctoral training or respecialization completed from January 1, 1981, to December 31, 1989, candidates must have:
- 1,600 hours of clinical neuropsychological experience supervised by a clinical neuropsychologist at the predoctoral or postdoctoral level

For doctoral training or respecialization completed prior to 1981, candidates must have:
- 4,800 hours of postdoctoral experience in a neuropsychological setting, involving a minimum of 2,400 hours of direct clinical service

**ABPN**

The American Board of Psychiatry and Neurology (ABPN) offers certification in neurology, which requires candidates to complete either four years of training in an Accreditation Council for Graduate Medical Education (ACGME)-accredited neurology residency or a year of ACGME-accredited training in internal medicine and three years of postgraduate specialized residency training in a neurology program.

According to the ABPN’s *Clinical Skills Evaluation of Residents in Neurology and Child Neurology*, residents are required to evaluate a minimum of five different patients during residency training in the following areas:
- Critical care
- Neuromuscular
- Ambulatory
- Neurodegenerative (Parkinson’s is a neurodegenerative disorder)
- Child patient
Each resident must be evaluated by a minimum of three ABPN-certified neurologists/child neurologists who are faculty members. The clinical skills evaluation must take place in order for residents to apply for certification.

The ABPN offers a three-year neurology residency program, which includes a year of ACGME-accredited training in internal medicine or a year in an ACGME-accredited program in which a minimum of six months of training must be in internal medicine.

At least two of the additional six months must be spent in internal medicine, pediatrics, and/or emergency medicine. For candidates entering neurology residency training on or after July 1, 2001, at least two of the additional six months must be spent in internal medicine, pediatrics, family medicine, and/or emergency medicine. No more than two of the remaining four months may be spent in neurology.

The ABPN also offers a residency program that includes four years of training in a neurology residency program accredited by the ACGME. For residents entering residency training in neurology as of July 1, 2002, six months of neurology credit may be granted for neurosurgery training, provided the training has not been accepted by another board for certification.

The ABPN offers a certification in the subspecialty of clinical neurophysiology and requires one year of specialized training in clinical neurophysiology. However, the ABPN does not list specific requirements for DBS.

**ABNS**

The American Board of Neurological Surgery (ABNS) offers certification to physicians who fulfill its approved educational training and evaluation process.

For candidates seeking certification before July 1, 2009, the ABNS required at least 36 months of core clinical neurosurgery with progressive responsibilities culminating in 12 months at the most senior level. The entire 36 months must be completed in programs accredited by the Residency Review Committees (RRC) of the ACGME. At least 24 months must be obtained in one program.

At least three months must be devoted to clinical neurology as a full-time assigned resident in an RRC-accredited neurology program (the ABNS recommended six months). Up to three months of this training may be acquired during the 12 months of training in fundamental clinical skills.

For candidates seeking certification after July 1, 2009, ABNS requires at least 72 months of training. At least 42 months must be completed in RRC-accredited programs and must be devoted to core clinical neurosurgery with progressive
responsibilities culminating in 12 months at the most senior level. At least 21 months of this training must be obtained in one program. Candidates must submit a list of cases containing a minimum of 100 operative procedures as part of the application process.

ABNS does not list specific requirements for DBS.

**AOBNP**

The American Osteopathic Board of Neurology & Psychiatry (AOBNP) offers certification in neurology. Requirements include:

- Graduation from an American Osteopathic Association (AOA)-accredited college of osteopathic medicine
- License to practice in the state or territory where the candidate’s practice is conducted
- Three years of AOA-approved training in neurology following the required one-year internship

The AOBNP does not list specific requirements for DBS.

**AOBS**

The American Osteopathic Board of Surgery (AOBS) certifies physicians in neurological surgery. Candidates who began training prior to 2008 must complete one year of training in general surgery followed by four years of training in neurological surgery, or five years of training in neurological surgery.

Candidates who began residency training with the required internship starting in the academic year 2008 must complete six years of neurological surgery.

The AOBS does not publish specific requirements for DBS.

**Positions of societies, academies, colleges, and associations**

**ACGME**

The ACGME publishes *ACGME Program Requirements for Graduate Medical Education in Neurology*. The requirements include at least 36 months of neurology residency. Approved residencies in neurology must provide at least 36 months of this education. The program meeting these requirements may be of two types:

- Programs that provide four years of residency education including a broad clinical experience in general internal medicine
- Programs that provide three years of residency education where all the residents will have had an initial first year of graduate education accredited by the ACGME
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The ACGME also publishes *Program Requirements for Graduate Medical Education in Neurological Surgery*, in which it requires at least 72 months for a neurological surgery residency; the first 36 months must include a minimum of three months of structured education in an ACGME-accredited neurology program. Residents should have a maximum of six months of neurological surgery.

The program must also include:

- Forty-two months of clinical neurological surgery
- Minimum of 21 months of neurological surgery education
- A 12-month period as chief resident on the neurological surgery clinical service

**AACN**

The American Academy of Clinical Neuropsychology (AACN) supports continued maintenance of standards in clinical neuropsychology through the established board-certification process of ABCN. AACN supports the continued development of the ABCN examination process, and advocates for the standards represented by board certification.

It does not specifically include requirements for DBS.

**AOA/ACONP**

The AOA and American College of Osteopathic Neurologists and Psychiatrists published together a report, *Basic Standards for Residency Training in General Neurology*, which includes the following requirements:

- A four-yearlong residency training program in neurology
- Two months neurology, one month emergency medicine, one month surgery selective (vascular, neurosurgery, orthopedics, etc.), one month elective (as agreed upon with the residency training director), seven months internal medicine—to include mandatory one month cardiology, minimum one month intensive care unit, three months general internal medicine, two months elective internal medicine specialties
- Two years of exposure to diagnostic procedures in inpatient as well as outpatient settings
- Twelve months of subspecialty rotations, including electromyography, electroencephalography (EEG), neuropathology, neuro-pediatrics, neuroradiology and exposure to movement disorders, and neuro-ophthalmology.

In 2011, the AOA published *Basic Standards for Residency Training in Surgery and the Surgical Subspecialties*. The AOA standards require a minimum of 500 major neurological surgery procedures per year.

According to the guidelines, the required length of a neurosurgery residency program is 72 months, which includes an AOA-approved common surgical
Osteopathic Graduate Medical Education residency (OGME 1-R) program. During the first 36 months of education, residents must have a minimum of three months of structured education in a neurology program.

Residents must complete a 12-month interval performing the duties as chief resident on the neurological surgery clinical service in the sponsoring institution under supervision, demonstrating advanced-level responsibilities.

Each resident must document by program completion, participation, under supervision, of a minimum of 400 major neurosurgical procedures, 200 of which must be cranial and must represent a well-balanced spectrum of neurological surgery in both adults and children.

**SCN**

The Society for Clinical Neuropsychology (SCN) is a division of the American Psychological Association and a scientific and professional organization of psychologists interested in the study of brain-behavior relationships, and the clinical application of that knowledge to human problems. It provides information on standards of training at the graduate, internship, and postdoctoral levels, and lists additional resources including:

- Houston Policy Statement
- Association for Doctoral Education in Clinical Neuropsychology
- Association for Internship Training in Clinical Neuropsychology
- Association of Postdoctoral Programs in Clinical Neuropsychology

The SCN does not include requirements for DBS.

**Positions of subject matter experts**

**Michael S. Okun, MD**

*University of Florida in Gainesville, Fla.*

**Michael S. Okun, MD,** professor of neurology at the University of Florida in Gainesville, national medical director at the National Parkinson Foundation, and author of the book, *Parkinson’s Treatment: 10 Secrets to a Happier Life,* says DBS involves an interdisciplinary team.

“Traditionally DBS has been best performed when patients are evaluated by an interdisciplinary team involving neurologists, psychiatrists, neurosurgeons, neuropsychologists, PTs, OTs, and speech therapists,” he says.

As for qualifications in terms of education, training, and experience in order to perform DBS, Okun says, “there are no standard criteria or qualifications required.”

“However,” he adds, “the best centers usually have teams that have done specialty
training and also have a ton of experience.”

Okun adds, “I was blessed in training at a program where more than one DBS procedure occurred each week. Our current training program that I direct performs three to four procedures a week, and the fellows are intimately involved.”

As far as how many cases or procedures Okun thinks are necessary to maintain competence on an annual basis combined with outcomes, he says, “How many cases are necessary to maintain competence in DBS is a hard question. We know the more you do, the better you will become. DBS centers who perform less than a procedure a week will likely have overall worse outcomes than high volume centers with interdisciplinary teams.”

**Gregory G. Heuer, MD, PhD**  
*Children’s Hospital of Philadelphia*

**Gregory G. Heuer, MD, PhD**, assistant professor of neurosurgery at Children’s Hospital of Philadelphia, says DBS is performed by neurosurgeons.

“During this process, most centers use some form of neuromonitoring for localization,” he adds. “This can be performed by a neurophysiologist (PhD) or sometimes a neurologist (MD). The postoperative programming is almost always done by a neurologist or a nurse practitioner under a neurologist.”

For education, training, and experience in order to perform DBS, some neurosurgery programs have enough case volume to allow a neurosurgery resident to learn this procedure. “Rarely, individuals that don’t have this exposure can do it as part of a fellowship after residency,” Heuer says.

Asked if DBS has been incorporated into the ACGME curriculum for the identified specialty areas, Heuer says it is part of the normal training for neurosurgery residents.

During training, Heuer says he performed 30-50 primary implants with many more revisions or battery changes, adding that he believes four to 10 or more cases or procedures are necessary to maintain competence on an annual basis combined with outcomes.

Stereotaxic biopsies or stereotaxic radiation treatments are procedures that utilize like skills and techniques that should be considered when developing criteria for this privilege, Heuer says.

**Positions of accreditation bodies**

**CMS**

CMS has no formal position concerning the delineation of privileges for DBS.

However, the CMS *Conditions of Participation* (*CoP*) define a requirement for a criteria-based privileging process in §482.22(c)(6) stating, “The bylaws must include criteria for determining the privileges to be granted to individual practitioners and a procedure for applying the criteria to individuals requesting privileges.”

- §482.12(a)(6) states, “The governing body must assure that the medical staff bylaws describe the privileging process. The process articulated in the bylaws, rules or regulations must include criteria for determining the privileges that may be granted to individual practitioners and a procedure for applying the criteria to individual practitioners that considers:
  - Individual character
  - Individual competence
  - Individual training
  - Individual experience
  - Individual judgment

The governing body must ensure that the hospital’s bylaws governing medical staff membership or the granting of privileges apply equally to all practitioners in each professional category of practitioners.”

Specific privileges must reflect activities that the majority of practitioners in that category can perform competently and that the hospital can support. Privileges are not granted for tasks, procedures, or activities that are not conducted within the hospital, regardless of the practitioner’s ability to perform them.

Each practitioner must be individually evaluated for requested privileges. It cannot be assumed that every practitioner can perform every task, activity, or privilege specific to a specialty, nor can it be assumed that the practitioner should be automatically granted the full range of privileges. The individual practitioner’s ability to perform each task, activity, or privilege must be individually assessed.

CMS also requires that the organization have a process to ensure that practitioners granted privileges are working within the scope of those privileges.

CMS’ *CoPs* include the need for a periodic appraisal of practitioners appointed to the medical staff/granted medical staff privileges (§482.22[a][1]). In the absence of a state law that establishes a time frame for the periodic appraisal, CMS recommends that an appraisal be conducted at least every 24 months. The purpose of the periodic appraisal is to determine whether clinical privileges or membership should be continued, discontinued, revised, or otherwise changed.

*The Joint Commission*

The Joint Commission has no formal position concerning the delineation of
privileges for DBS. However, in its *Comprehensive Accreditation Manual for Hospitals*, The Joint Commission states, “The hospital collects information regarding each practitioner’s current license status, training, experience, competence, and ability to perform the requested privilege” (MS.06.01.03).

In the introduction for MS.06.01.03, The Joint Commission states that there must be a reliable and consistent system in place to process applications and verify credentials. The organized medical staff must then review and evaluate the data collected. The resultant privilege recommendations to the governing body are based on the assessment of the data.

The Joint Commission introduces MS.06.01.05 by stating, “The organized medical staff is responsible for planning and implementing a privileging process.” It goes on to state that this process typically includes:

- Developing and approving a procedures list
- Processing the application
- Evaluating applicant-specific information
- Submitting recommendations to the governing body for applicant-specific delineated privileges
- Notifying the applicant, relevant personnel, and, as required by law, external entities of the privileging decision
- Monitoring the use of privileges and quality-of-care issues

MS.06.01.05 further states, “The decision to grant or deny a privilege(s) and/or to renew an existing privilege(s) is an objective, evidence-based process.”

- The EPs for standard MS.06.01.05 include several requirements as follows:
  - The need for all licensed independent practitioners who provide care, treatment, and services to have a current license, certification, or registration, as required by law and regulation
  - Established criteria as recommended by the organized medical staff and approved by the governing body with specific evaluation of current licensure and/or certification, specific relevant training, evidence of physical ability, professional practice review data from the applicant’s current organization, peer and/or faculty recommendation, and a review of the practitioner’s performance within the hospital (for renewal of privileges)
  - Consistent application of criteria
  - A clearly defined (documented) procedure for processing clinical privilege requests that is approved by the organized medical staff
  - Documentation and confirmation of the applicant’s statement that no health problems exist that would affect his or her ability to perform privileges requested
  - A query of the NPDB for initial privileges, renewal of privileges, and when a new privilege is requested
  - Written peer recommendations that address the practitioner’s current medical/clinical knowledge, technical and clinical skills, clinical judgment, inter-
personal skills, communication skills, and professionalism

- A list of specific challenges or concerns that the organized medical staff must evaluate prior to recommending privileges (MS.06.01.05, EP 9)
- A process to determine whether there is sufficient clinical performance information to make a decision related to privileges
- A decision (action) on the completed application for privileges that occurs within the time period specified in the organization’s medical staff bylaws
- Information regarding any changes to practitioners’ clinical privileges, updated as they occur

The Joint Commission further states, “The organized medical staff reviews and analyzes information regarding each requesting practitioner’s current licensure status, training, experience, current competence, and ability to perform the requested privilege” (MS.06.01.07).

In the EPs for standard MS.06.01.07, The Joint Commission states that the information review and analysis process is clearly defined and that the decision process must be timely. The organization, based on recommendations by the organized medical staff and approval by the governing body, develops criteria that will be considered in the decision to grant, limit, or deny a request for privileges. The criteria must be consistently applied and directly relate to the quality of care, treatment, and services. Ultimately, the governing body or delegated governing body has the final authority for granting, renewing, or denying clinical privileges. Privileges may not be granted for a period beyond two years.

Criteria that determine a practitioner’s ability to provide patient care, treatment, and services within the scope of the privilege(s) requested are consistently evaluated.

The Joint Commission further states, “Ongoing professional practice evaluation information is factored into the decision to maintain existing privilege(s), to revise existing privileges, or to revoke an existing privilege prior to or at the time of renewal” (MS.08.01.03).

In the EPs for MS.08.01.03, The Joint Commission says there is a clearly defined process facilitating the evaluation of each practitioner’s professional practice, in which the type of information collected is determined by individual departments and approved by the organized medical staff. Information resulting from the ongoing professional practice evaluation is used to determine whether to continue, limit, or revoke any existing privilege.

**HFAP**

The Healthcare Facilities Accreditation Program (HFAP) has no formal position concerning the delineation of privileges for DBS. The bylaws must include the cri-
criteria for determining the privileges to be granted to the individual practitioners and the procedure for applying the criteria to individuals requesting privileges (03.01.09). Privileges are granted based on the medical staff’s review of an individual practitioner’s qualifications and its recommendation regarding that individual practitioner to the governing body.

It is also required that the organization have a process to ensure that practitioners granted privileges are working within the scope of those privileges.

Privileges must be granted within the capabilities of the facility. For example, if an organization is not capable of performing open-heart surgery, no physician should be granted that privilege.

In the explanation for standard 03.01.13 related to membership selection criteria, HFAP states, “Basic criteria listed in the bylaws, or the credentials manual, include the items listed in this standard. (Emphasis is placed on training and competence in the requested privileges.)”

The bylaws also define the mechanisms by which the clinical departments, if applicable, or the medical staff as a whole establish criteria for specific privilege delineation.

Periodic appraisals of the suitability for membership and clinical privileges is required to determine whether the individual practitioner’s clinical privileges should be approved, continued, discontinued, revised, or otherwise changed (03.00.04). The appraisals are to be conducted at least every 24 months.

The medical staff is accountable to the governing body for the quality of medical care provided, and quality assessment and performance improvement (03.02.01) information must be used in the process of evaluating and acting on re-privileging and reappointment requests from members and other credentialed staff.

**DNV**

DNV has no formal position concerning the delineation of privileges for DBS. MS.12 Standard Requirement (SR) #1 states, “The medical staff bylaws shall include criteria for determining the privileges to be granted to individual practitioners and a procedure for applying the criteria to those individuals that request privileges.”

The governing body shall ensure that under no circumstances is medical staff membership or professional privileges in the organization dependent solely upon certification, fellowship, or membership in a specialty body or society.

Regarding the Medical Staff Standards related to Clinical Privileges (MS.12),
DNV requires specific provisions within the medical staff bylaws for:
- The consideration of automatic suspension of clinical privileges in the following circumstances: revocation/restriction of licensure; revocation, suspension, or probation of a DEA license; failure to maintain professional liability insurance as specified; and noncompliance with written medical record delinquency/deficiency requirements
- Immediate and automatic suspension of clinical privileges due to the termination or revocation of the practitioner’s Medicare/Medicaid status
- Fair hearing and appeal

The Interpretive Guidelines also state that core privileges for general surgery and surgical subspecialties are acceptable as long as the core is properly defined.

DNV also requires a mechanism (outlined in the bylaws) to ensure that all individuals provide services only within the scope of privileges granted (MS.12, SR.4).

Clinical privileges (and appointments or reappointments) are for a period as defined by state law or, if permitted by state law, not to exceed three years (MS.12, SR.2).

Individual practitioner performance data must be measured, utilized, and evaluated as a part of the decision-making for appointment and reappointment. Although not specifically stated, this would apply to the individual practitioner’s respective delineation of privilege requests.

**CRC draft criteria**

The following draft criteria are intended to serve solely as a starting point for the development of an institution’s policy regarding DBS.

**Minimum threshold criteria for requesting privileges in DBS**

**Basic education:** MD or DO

**Initial privileges:** Successful completion of an ACGME- or AOA-accredited training program in neurological surgery that included training in DBS or completion of a hands-on CME that included at least [n] proctored cases with a surgeon experienced in DBS.

**Required current experience:** Demonstrated current competence and evidence of the performance of at least 12 DBS procedures in the past 12 months or completion of training in the past 12 months.

**Renewal of privileges:** Demonstrated current competence and evidence of the performance of at least [n] DBS procedures in the past 24 months based on ongoing professional practice evaluation and outcomes.
References

If the applicant is recently trained, a letter of reference should come from the director of the applicant’s training program. Alternatively, a letter of reference may come from the applicable department chair and/or clinical service chief at the facility where the applicant most recently practiced.

Reappointment

Reappointment should be based on unbiased, objective results of care according to a hospital’s quality assurance mechanism, as well as demonstrated current competence and evidence of the performance of at least [n] DBS procedures in the past 24 months based on results of OPPE and outcomes.

In addition, continuing education related to DBS should be required.

For more information

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American Academy of Neurology
201 Chicago Avenue South
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Centers for Medicare & Medicaid Services
7500 Security Boulevard
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Children’s Hospital of Philadelphia
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DNV Healthcare, Inc.
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