NEUROSURGERY TRAINING PROGRAM

SURGERY TRAINING PROGRAM
NEUROSURGERY TRAINING PROGRAM
GOALS AND CURRICULUM

Introduction

The Neurosurgery Training Program covers a period of six years following the PGY-I year. One year of experience in general surgery (PGY-I) is required before an applicant can enter our program. We admit either one or two residents in alternate years so as to finish eight Chief Residents every five years. Although we reserve a PGY-I position in the Surgery Program at Stanford Health Services (SUMC) for each resident accepted, the one year of general surgery training can be acquired at another program approved by the Program Director.

Three hospitals support the Neurosurgery Training Program: Stanford Health Services (SUMC), Lucille Salter Packard Children's Hospital and the Palo Alto Veterans Administration Hospital (PAVAH). The training goals of the Neurosurgery Residency Program at Stanford include acquisition of clinical skills in Neurosurgery and inculcation of a deep commitment to academic and research pursuits. Clinical skills to be developed include accurate and concise diagnosis, proficient surgical technique, excellent patient management, personal maturity, a humanistic approach to patients, and possession of adequate funds of medical and neurosurgical knowledge. Academic skills to be acquired include the ability to perform and evaluate clinical and basic research, facility in writing and public speaking, and an inclination toward creativity and innovation.

Of the six neurosurgical years, PGY II-VII, four are spent in clinical neurosurgery, one is divided among neurology/neuropathology/neuroradiology, and one is devoted to research, basic or clinical. Full-time faculty direct the training programs at each hospital. Over 2,000 neurosurgical operations covering the full spectrum of neurosurgical problems are performed yearly at SUMC alone.

Expectations

Residents progressively assume surgical and patient management responsibility commensurate with their level of experience with the expectation that, by the end of the training program, the resident will be well-versed in the theoretical aspects of neurosurgery, be fully trained in the bedside care of neurosurgical patients, be a proficient technical neurosurgeon, and be able to evaluate critically clinical and basic neurosurgical research.

Chronological rotation assignments of residents

- PGY-I: Intern in General Surgery at Stanford and affiliated hospitals (SUMC, LSPCH, PAVAH, and Santa Clara Valley Medical Center).
- PGY-II: Junior Resident at SUMC and LSPCH
- PGY-III: Junior Resident at PAVAH, SUMC, and LSPCH
- PGY-IV: Neurology/Neuroradiology/Neuropathology at SUMC and LSPCH
- PGY-V: Clinical and/or basic research
PGY-VI: Senior Resident at SUMC and LSPCH, and some coverage at PAVAH.

PGY-VII: Chief Resident at SUMC, LSPCH, and PAVAH

Thirty-six months of clinical neurological surgery are required at SUMC, LSPCH, and PAVAH. Most residents complete 48 months of clinical neurosurgery.

Goals, Objectives and Responsibilities of the residents in each year

PGY-I: Internship in General Surgery

During this year the resident is expected to acquire expertise in the diagnosis and treatment of general medical and general surgical diseases and conditions. The resident is expected to learn to efficiently manage a busy clinical service. This includes learning to obtain a complete medical history, perform a physical exam, order appropriate tests, follow-up test results, perform daily care, write accurate and concise daily notes, carry out discharge planning, and dictate discharge summaries. The resident should build a fund of knowledge in general medicine and surgery.

PGY-II: Junior Resident at SUMC and LSPCH

The resident is expected to become familiar with the diagnosis and both preoperative and postoperative management of neurosurgical disease. This includes the ICU care of critically ill patients, emergency management of neurosurgical patients, and performance of neurosurgical consultation. The resident should learn to manage an outpatient clinic by acquiring skills in neurologic and neurosurgical diagnosis, communication with patients, selection of patients for surgery, and postoperative care. Emphasis is placed on medical ethics and improving communication skills for relating to patients and their families. The resident learns to supervise interns and teach medical students. Clinic rotations include vascular, tumor, spine and peripheral nerve, pediatric, functional (epilepsy, pain, movement disorders) and general neurosurgery. During this year, the resident is expected to learn basic principles of operative neurosurgical technique, including patient positioning, surgical exposure and surgical closure. The resident also acquires technical proficiency in minor procedures (lumbar puncture, ventriculostomy, muscle/nerve biopsy, halo, and tracheostomy), in craniotomy for trauma, tumor, hematoma, or abscess; in basic cervical, thoracic, and lumbar spinal surgery; in peripheral nerve surgery; and in basic stereotactic biopsy. The resident is expected to broaden a basic and clinical neuroscience fund of knowledge and take Part I of the Neurosurgical Board Exam for self-assessment.

PGY-III: Junior Resident at PAVAH, SUMC, and LSPCH

During this year the resident acquires increased independence in managing a neurosurgical clinical service by acting as the patient’s primary neurosurgeon for inpatient and outpatient care and consultation. The resident is expected to acquire diagnostic and patient management skills in stereotactic radiosurgery and pediatric neurosurgery. The resident is expected to improve the operative skills acquired in Year II and acquire additional proficiency in operative techniques for complex spine surgery, stereotactic radiosurgery, and pediatric neurosurgery. The resident begins to develop the microsurgical skills used in repairing cerebral aneurysms, carotid endarterectomy, resecting tumors and vascular malformations, and in transsphenoidal surgery. The resident is also expected to supervise and teach Neurology residents and medical students rotating on the service. During this year the resident should develop clinical research interests, submit abstracts regarding this research to regional and national meetings, and present clinical data at local, regional, and national conferences. The resident is expected to broaden further a basic and clinical neuroscience fund of knowledge and again take Part I of the Neurosurgical Board Exam for self-assessment.
PGY-IV: Neurology/Neuroradiology/Neuropathology

During this year the resident is expected to acquire in-depth knowledge and clinical skills in the diagnosis and management of non-neurosurgical neurologic diseases, neuroradiology and neuropathology. The resident should also participate in clinical and basic research projects, involving written scholarship, analysis of research data, submission of abstracts, and presentation at regional and national meetings. During this year the resident plans their subsequent research year and applies for grants. The resident is expected to broaden further their basic and clinical neuroscience fund of knowledge and again take Part I of the Neurosurgical Board Exam for self-assessment.

PGY-V: Clinical and/or Basic Research

During this year the resident is expected to learn to conduct clinical and basic research. The resident should develop academic skills, including critical evaluation of data, synthesis of experimental results with existing literature, creative and rigorous design of novel experiments or clinical studies, written scholarship, and presentation at regional and national meetings. The resident is also expected to broaden further a fund of basic and clinical neuroscience knowledge and take Part I of the Neurosurgical Board Exam for credit or self-assessment. Each resident is required to pass Part I before beginning the PGY-VII, Chief Resident year and to achieve a score of 50th percentile or greater to complete the Program.

PGY-VI: Senior Resident at SUMC, LSPCH, and PAVAH

During this year the resident is expected to become proficient in the outpatient and inpatient diagnosis and management of neurosurgical diseases, including those in the subspecialty areas of vascular, tumor, spine/peripheral nerve, pediatric, functional and general neurosurgery. The resident should demonstrate proficiency in supervision of junior residents, interns and medical students and in communication with patients, families, colleagues, and staff. The resident should learn to balance the analytical and scientific aspects of medicine and surgery with humanitarian concern. The resident is expected to develop microsurgical operative skills, including those for aneurysms, vascular malformations, epilepsy, microvascular decompression, brain tumors, transsphenoidal procedures, spinal tumors, spinal dysraphism, carotid endarterectomy, sympathectomy, functional neurosurgery, craniofacial reconstruction, craniosynostosis repair, and complex spine surgery. The resident should continue to improve a fund of basic and clinical neuroscience knowledge and take Part I of the Neurosurgical Board Exam for credit if it has not already been passed for credit at the 50th percentile.

PGY-VII: Chief resident at SUMC, LSPCH, and PAVAH

During this year the resident is expected to become proficient in independently managing an inpatient and outpatient neurosurgical service, including supervision of the neurosurgical housestaff and medical students. It is expected the resident will hone all neurosurgical operative skills, including microscopic surgery for difficult aneurysms, vascular malformation, tumors, epilepsy, transsphenoidal lesions, carotid endarterectomies, vascular reconstructive procedures including EC-IC bypass, complex spinal reconstruction, and functional neurosurgical procedures. The resident should be able to supervise and teach junior residents and interns, both in the operating room and on the wards. The resident should continue pursuing basic or clinical research interests and refining academic skills including written scholarship and oral presentations at regional and national meetings. At the conclusion of the PGY-VII year, the neurosurgical resident should be fully qualified as a member of an academic neurosurgical faculty or a busy clinical practice.
Scheduled Teaching Rounds

There are daily attending rounds with the house staff and students, including weekends, at all three hospitals of the Stanford Neurosurgical Resident Training Program. The faculty of the Department of Neurosurgery are committed to making each of these attending rounds a teaching experience for the house staff and medical students. On weekends a single faculty member rounds with the house staff and medical students at all three hospitals (SUMC, LSPCH, and PAVAH). The faculty use weekend rounds to enhance the teaching experience for residents by discussing in depth several patients currently on the service.

Outpatient and Inpatient Facilities

Daily neurosurgery outpatient clinics are held in the recently renovated Clinical Neuroscience Clinic at SUMC. Pediatric Neurosurgery Clinics are held three times a week in the new Pediatric Neuroscience Clinic at LSPCH. Each resident attends faculty outpatient clinics three half days a week. There is also a resident outpatient clinic at the PAVAH one-half day a week, staffed by faculty. During clinic time, residents evaluate patients preoperatively and care for them postoperatively with supervision and teaching from the faculty.

Research Facilities

Excellent research facilities exist within the Department of Neurosurgery and in affiliated departments at Stanford University Medical Center. The neurosurgical laboratories include 10,600 square feet of laboratory space, including rodent and rabbit microsurgery suites, histology laboratory, darkroom, data analysis area, tissue culture labs, molecular biology facilities, and conference room. In addition, we share research space with MR facilities and animal research surgical suites. Laboratory facilities for tissue culture and rodent surgery are also available at the PAVAH. In the Neurosurgery Department at both SUMC and PAVAH, animal microsurgical areas allow residents to perfect their microsurgical skills. Neurosurgical residents also have a Microsurgical Skull Base, Spine and Peripheral Nerve Cadaver Dissection Laboratory.

Research Programs

The Stanford Neurosurgery Department is involved with a number of basic research and clinical research projects. Neurosurgery residents have participated in many of these studies: Drs. Steinberg and Yenari's laboratories are investigating the pathophysiology and treatment of cerebral ischemia using rodent and rabbit stroke models. Various neuro-protective and neuro-restorative strategies are being examined, including novel inhibitors of apoptosis and neurosis, anti-inflammatory drugs, mild brain hypothermia, gene transfer therapy enhanced neurogenesis and neurotransplantation. Dr. Chan is studying cellular and molecular mechanisms of neuronal cell death via apoptosis and necrosis after acute CNS injuries (stroke, trauma) and neurodegenerative diseases with focus on the role of oxidative stress in cell death mechanisms using transgenic and knockout mutant animals. Dr. Adler's research broadly focuses on the development, implementation and clinical testing of minimally invasive surgical tools to be used for the treatment of brain and spinal tumors. These technologies encompass both stereotactic radiosurgery and image-guided intraoperative surgical navigation. Dr. Harsh's basic research focuses on the molecular biology of brain tumor development and innovative treatments of brain tumors including skull base surgery, stereotactic radiosurgery, and brachytherapy. Dr. Shahidi and Dr. Maurer’s primary research interests lie in preoperative surgical planning and intraoperative volumetric image navigation techniques and apparatuses. Their current research projects focus on "image enhanced endoscopy", "brain shift compensation" and "3-D stereotactic microscopes". Dr. Palmer’s research investigates neuronal stem cell biology, mechanisms of neurogenesis and angiogenesis, as well as neurotransplantation using various in vivo and in vitro experimental models. Dr. Shuer's research focuses on the surgical treatment of patients with intractable epilepsy, and of children with congenital malformations of the skull. Dr. Huhn is studying the multi-modality treatment of pediatric brain tumors and the embryogenesis and pathogenesis of spinal dysraphism. Dr. Heit uses current source density analysis to study epileptiform activity and cognitive evoked potentials and the cognitive
neurophysiology of the cingulate cortex. Dr. Kim's research focuses on detailed analyses of craniocervical and spinal anatomical relationships and developing novel instrumentation for stabilization. Dr. Chang is investigating innovative applications of frameless radiosurgery for brain and spine diseases. Dr. Silverberg is studying the effects of CSF drainage on toxic substances in the CSF of Alzheimer’s disease patients. Dr. Heilbrun’s research focuses on developing new techniques of intraoperative surgical navigation, functional brain imaging, and stereotactic radiosurgery. Dr. Tse's research interests include gene therapy and anti-angiogenesis strategies for brain tumors. Dr. Skirboll is studying the biology of stem cells in brain tumors.

There are a number of clinical research studies being carried out by members of the Department. These include: 1) new radiosurgical techniques to treat patients with brain metastases, skull base meningiomas and acoustic neuromas, with the intention of preserving hearing; 2) new techniques of intratumoral irradiation; 3) clinical trials using hypothermia as a neuroprotective agent in aneurysm patients; 4) clinical studies of multi-modality therapy utilizing embolization, microsurgery and stereotactic radiosurgery for complex intracranial vascular malformations; 5) evaluation of surgical and non-surgical treatment for infants with craniosynostosis; 6) epilepsy project directed at investigating improved methods to evaluate and treat patients with medically intractable epilepsy; 7) molecular genetic multi-institutional study isolating the genetic locus associated with familial central nervous system vascular malformations and aneurysms, 8) clinical outcome analysis evaluating the use of instrumentation for cervical fusion; 9) multi-center study of patients with unruptured intracranial aneurysms; 10) neurotransplantation for stroke using neuronal progenitor cells.

In addition, Stanford University School of Medicine has outstanding Departments or Divisions of Neurobiology, Neuroradiology, Neurology, and Neuropathology, as well as other Basic Sciences. All support active research programs and provide opportunities for neurosurgical resident’s research.

Operating Rooms and Scheduled Surgery Days

At SUMC, the University Neurosurgical Service and the Community Neurosurgical Service utilize 2-4 full operating room days, Monday through Friday. At PAVAH, the Neurosurgical Service has one full room on Monday and one full room on Wednesday alternating with Thursday every other week. Usually residents work in the operation room with a single attending physician at each institution. Occasionally, a junior resident will assist a chief resident under faculty supervision.

Outpatient Experience of the Residents

Each resident attends three half days of clinic at SUMC or LSPCH under the supervision of a faculty member. The resident performs a complete evaluation and discusses each case with the attending physician. Six month outpatient clinic rotations include cerebrovascular, tumor, spine/peripheral nerve, pediatric, functional (epilepsy, pain, movement disorders), stereotactic radiosurgery and general neurosurgery. The resident then participates in the surgery and postoperative care of these patients and follows the patient in postoperative clinic under faculty supervision. Some clinic patients at SUMC and LSPCH are managed by the resident as primary physician. The weekly PAVAH clinic is also designed to allow the resident to act as the primary physician. The resident conducts the preoperative evaluation, operates on these patients, manages their in-hospital care, and then sees the patients in follow-up clinic.

Critical Care Experience of the Residents

Neurosurgery residents at Stanford have an outstanding critical care experience over the course of their training. Critical care neurosurgical patients are managed primarily by the neurosurgical resident staff under the supervision of the attending neurosurgeon, with consultation from the ICU team of residents, fellows, and faculty. The Clinical Director of the ICU is an attending physician in the Department of Anesthesia.
Training in Other Neurosciences

**Neurology.** Each resident devotes six months during PGY-IV to Neurology training, usually at SUMC and LSPCH. During these six months, the resident rotates through General Neurology, Epilepsy, Stroke, Movement Disorders, and Pediatric Neurology Services. The Neurosurgical resident has the same responsibilities as a Neurology resident on each of these services. The Neurosurgical resident also attends Neurology conferences throughout the training program.

**Neuropathology.** Each resident spends at least three months rotating through the Neuropathology Service at Stanford University Medical Center. The resident performs frozen section examinations of specimens removed during neurosurgical cases. The resident also works up all of the surgical specimens and autopsy cases from brain cutting, including gross examination, microscopic examination, and diagnosis of the case. The Neurosurgical resident on Neuropathology prepares and presents the surgical cases of the prior month at Neurosurgical Service conferences each month. Additionally neuropathology is incorporated into the weekly didactic sessions for neurosurgical residents.

**Neuroanatomy.** Residents in the Stanford Neurosurgery Program are trained in neuroanatomy throughout their residency. Many of the didactic weekly teaching sessions are devoted to neuroanatomy. This includes study of prosections of autopsy material, skull specimens, spine specimens, and selected microscopic material. There are three months of two-hour weekly skull base lab anatomy sessions devoted to cadaveric neuroanatomy dissection. The faculty also emphasize neuroanatomy during surgical cases and teaching rounds. Residents are encouraged to audit the Neurobiology course taught at Stanford Medical School during their non-clinical years.

**Neurophysiology.** Training in Neurophysiology for the Neurosurgical residents occurs in the didactic teaching sessions and in laboratory research meetings. Faculty also make a point of teaching the neurophysiology correlates of clinical conditions encountered on the service. Evoked potential monitoring (SEPs, BAEPs), routinely performed during many craniotomies and intraspinal cases, provides relevant teaching for neurosurgical residents.

**Neuroradiology.** The Neurosurgery residents receive extensive training in Neuroradiology during all of their clinical neurosurgical rotations. Daily neurosurgical rounds start in the Neuroradiology Reading Room, where all of the previous day’s radiologic studies are reviewed. Residents spend three months on the Neuroradiology service at SUMC during PGY-IV year. During this time, they participate in all of the activities of the Neuroradiology service, including daily read out and thrice weekly conferences, and work closely with the Neuroradiology faculty and fellows.

**Electroencephalography.** The Neurosurgery residents gain practice reading EEG’s during their Neurology rotations. Residents on the Neurosurgical Service also attend bi-monthly Epilepsy Case Conference, during which patients’ EEG’s are routinely reviewed and important clinical principles taught.

**Conferences**

All Neurosurgery residents are required to attend the one hour weekly Neurosurgery Grand Rounds, the one hour weekly combined Neurology-Neurosurgery-Neuroradiology-Neuropathology Clinical Case Conference, the two hour monthly Difficult Neurosurgical Case Conference and the one hour monthly Neurosurgical Morbidity and Mortality Conference. All residents (except the Chief Resident) are required to attend the 2 ½ hour weekly Resident Didactic Tutorial Sessions. Other conferences are attended by residents as appropriate for their clinical rotations.
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Support Services

Stanford University Medical Center has excellent support services for patient care, minimizing the need for residents to engage in patient care activities of limited educational value. Both hospitals have blood drawing teams, blood gas technicians, patient transport services, etc., to perform the tasks which do not require the skills of a physician. Nurses routinely start IV’s. Residents dictate all notes except routine progress notes, making it unnecessary to write extensive notes long-hand. These services are also available at the Palo Alto Veterans Hospital. The support of eight full-time nurse practitioners and nurse coordinators affiliated with the Neurosurgery Service at SUMC and LSPCH also considerably reduces the residents’ workload.

Each of the hospitals has cafeteria and canteen services for residents on call. If residents are required to stay in-house, Stanford Hospital supplies a meal allowance. Palo Alto Veterans Hospital also provides meals for residents required to spend the night in-house.

Evaluation of Residents

Residents are formally evaluated semi-annually by each faculty member, utilizing a uniform set of criteria. There is daily oral feedback to residents from faculty teaching in the operating room and on the wards. Monthly meetings are held between the nursing staff and residents for feedback to the resident staff. The Program Director meets monthly with the residents as a group to discuss common issues, listen to concerns, and offer advice. The Program Director also meets with the residents individually semi-annually to review the faculty evaluations of the resident, discuss the resident’s progress, listen to resident concerns, and provide advice. If problems arise or the resident is not performing up to the expectations, this is discussed at the semi-annual meeting or at a specially scheduled conference. Written summaries of these semi-annual meetings are signed by the Program Director and the resident. Resident promotion is based on a resident’s meeting criteria for progression (see description of Expectations and Evaluation Form). Each resident has access to his/her file. Each resident is also assigned a Faculty Mentor with whom to meet regularly for discussion and advice.

Each resident is required to take the written examination of the American Board of Neurological Surgery each year for self-assessment. The exam is taken for credit during the PGY-V or PGY-VI year. The resident must pass to begin the PGY-VII Chief Resident year. A percentile score of at least 50% is required for the resident to successfully complete the Training Program. The resident should demonstrate an improvement in scores each year of the Training Program. The Board scores are also used by the faculty as part of the evaluation process.

Evaluation of Faculty

Residents provide anonymous written evaluation of each faculty member twice a year. Residents discuss their concerns regarding the Program and individual rotations twice yearly with the Program Director, at the monthly resident-Program Director meeting, or more frequently, if necessary. Resident evaluation of faculty is also achieved in a fashion that protects resident confidentiality by allowing residents to communicate with the faculty anonymously through the Chief Resident.

Evaluation of the Program

Residents and faculty provide continual evaluation of the conferences and residency rotations at the monthly Resident-Program Director meetings, the monthly faculty business meetings, during the semi-annual individual Resident-Program Director meetings, and often on a weekly basis immediately following department conferences. Additionally the residents provide evaluations of the conferences, rotations of the residency, and the overall Residency Program through anonymous written evaluations twice each year.
Education Requirements

California State law specifies certain educational requirements for licensure in the State. In most circumstances, graduates of U.S. and Canadian medical schools will have little, if any, difficulty in meeting the educational requirements for licensure in California. Graduates of accredited U.S. and Canadian medical schools are "deemed" educationally qualified for licensure in this state provided that the Division of Licensing has not found their particular program to be significantly different from the detailed requirements found in Sections 2089 and 2089.5 of the Business and Professions Code. In determining whether or not an applicant is in substantial compliance with the code, the Division has allowed for substantial latitude in the evaluation process. The review consists of asking and answering the following questions:

1. Has the applicant graduated from and been awarded the M.D. degree by an LCME/CCME medical school?

2. Has the applicant completed at least 32 months of training as a matriculant of such school and was all work upon which the M.D. degree was based completed while such a matriculant?

3. Has the applicant completed at least 72 weeks of clinical training?

4. Has the applicant completed at least one period of clinical training in each of the five core areas of surgery, pediatrics, medicine, obstetrics and gynecology, and psychiatry? (It is important to note that graduates of LCME/CCME medical schools are not required to meet the specific number of weeks of training by core subject specified in Section 2089.5 of the Business and Professions Code, but they must have had a course in each core subject which the university declares "satisfactory" by its completion of the Certificate of Medical Education form (Form L2) required of each applicant.)

If the answers to the above four questions are "yes", the medical education requirements are deemed to have been met and no further inquiry with respect to basic medical education is made. Past experience would indicate that in excess of 90% of all U.S. and 50% of all Canadian medical school graduates will fall into this group.

All residents must pass the written Board Examination of the American Board of Neurosurgery before starting their Chief Residency year, and achieve a percentile score of at least 60% in order to successfully complete their training program. No resident will be recommended without passing this exam.

All residents are required to write clinical research or basic science manuscripts and present their work at local, regional and national meetings.
Introduction

Stanford University Medical Center is located on the campus of Stanford University in Palo Alto, California, 30 miles south of San Francisco. The Center is composed of Stanford University Hospital, Stanford University School of Medicine, Stanford University Clinics, the Clinical Sciences Research Building, and Hoover Pavilion. The center is located in a growing suburban community with many social, cultural and educational opportunities.

Stanford University Medical Center

Stanford University Hospital was designed and built in the late 1950's. In 1989, University Stanford University Hospital opened a new wing, the first major modernization Medical project since it was built in 1959. The new wing offers more private rooms, better. Center facilities for diagnosis and treatment, 65 patient rooms specifically designed for intensive care, a new 20 room surgical suite, and quiet, private areas for family/physician consultations. Currently, there are 663 licensed beds in the consolidated Stanford University Medical Center which includes Stanford University Hospital and nearby Hoover Pavilion, both of which are owned and operated by Stanford University. Approximately 25,000 patients are admitted annually, of which 12,000 are surgical patients.

Lucile Salter Packard Children’s Hospital at Stanford

Lucile Salter Packard Children's Hospital at Stanford is a 156-bed regional, tertiary care facility providing all pediatric medical and surgical services associated with Stanford University Medical Center. It opened in April of 1991. The Ambulatory Care Center augments inpatient care, offering a comprehensive primary care clinic, as well as more than 40 specialty and subspecialty clinics.

Lucile Packard Children's Hospital is dedicated to: 1) advancing the health and well-being of infants, children, and youth by providing the highest quality of patient care in an atmosphere of love and concern and in an environment designed to meet the developmental needs of children and families; 2) providing an environment suitable for the training of future physicians, research scientists, and other health professionals and for the ongoing education of those engaged in the care of children; 3) promoting the acquisition of new knowledge through basic and clinical research, for the benefit of humankind, and to provide an environment suitable for the development, assessment, and application on the latest advances in biomedical science and technology.

To broaden the scope of experience in surgery, two additional hospitals are incorporated into the Stanford Surgery Training Program. They are the Palo Alto Veterans Administration Hospital (PAVAH) and the Santa Clara Valley Medical Center. Each adds a unique element to the total surgical experience for the Stanford trainee, and each program is supervised by full-time Stanford surgical faculty members and administered by the Department of Surgery, Stanford University School of Medicine.

Palo Alto Veterans Administration Hospital

The 1,276 bed Palo Alto Veterans Administration Hospital, constructed in 1960, is on Stanford land close to the Stanford University Hospital Medical Center. A major renovation is nearing completion. The V.A. Surgery Department includes the following disciplines of surgery: general, thoracic, cardiac, plastic and reconstructive, neurosurgery, ophthalmology, orthopedic, otorhinolaryngology, and urology. All faculty and staff appointments in the V.A. Surgery Department are made by the Stanford Department of Surgery. Over
2,500 surgical procedures are performed in this hospital annually. In addition, most of the surgical sections have active surgical research laboratories.

Santa Clara Valley Medical Center

Established in 1956 and rebuilt in 1960 as a 641 bed hospital, the Santa Clara Valley Medical Center is located in San Jose, a 30 minute drive from Palo Alto. A new hospital facility is currently under construction. This center serves the wide spread population of Santa Clara County, estimated at one million persons, and provides the major emergency room facility for the lower San Francisco Bay region. In 1980, there were 43,000 emergency room visits, 3,400 patients admitted to the surgical service, and approximately 2,900 operative procedures performed. The Stanford Department of Surgery makes all teaching appointments at this center and is responsible for the special disciplines of surgery, including cardiac surgery, neurosurgery, ophthalmology, orthopaedics, otorhinolaryngology, plastic and reconstructive surgery, and urology. The Department of Surgery is also responsible for the conduct of research activities at this site.

Lane Library

Lane Library, centrally located in the Stanford University Medical Center complex, is a nationally known, open-stack library which houses approximately 305,000 volumes available for use by house staff. The library also receives 3,248 journals annually. The historical collection of Lane Library is considered one of the best in the country. In addition to Lane Library, there is a surgical library located in the Department.

Stanford Residency Program

Residency training programs are available in General Surgery, Orthopaedics, Ophthalmology, Otolaryngology, Neurosurgery, Urology, Plastic and Reconstructive Surgery, and Cardiothoracic Surgery.

Nineteen postgraduate-year-one residents (interns) are appointed annually from graduates of approved medical schools. Selections are made through the National Resident Matching Program. The first year of training consists of rotations through General Surgery and specialty services, including Cardiac Surgery, Otolaryngology, Neurosurgery, Orthopaedics, Pediatric Surgery, Plastic and Reconstructive Surgery, Thoracic Surgery, Urology, Trauma, Transplantation, and Emergency Room care. This year is spent mainly at the Stanford University Hospital.

Positions matched through Phase 1 of the National Residency Matching Program include the following:

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Course</th>
<th>Positions Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Surgery</td>
<td>1820 19</td>
<td>6</td>
</tr>
<tr>
<td>Plastic Surgery</td>
<td>1820 49</td>
<td>4</td>
</tr>
<tr>
<td>Orthopaedic Surgery</td>
<td>1820 38</td>
<td>3</td>
</tr>
<tr>
<td>Neurosurgery</td>
<td>1820 34</td>
<td>1</td>
</tr>
<tr>
<td>Urology</td>
<td>1820 44</td>
<td>2</td>
</tr>
<tr>
<td>Otolaryngology</td>
<td>1820 39</td>
<td>3</td>
</tr>
<tr>
<td>Preliminary Tract</td>
<td>--------</td>
<td>1</td>
</tr>
</tbody>
</table>

Rotations are arranged to provide residents with early exposure to the special area of surgery that he/she feels may be his/her career goal. Most first-year residents continue training here at Stanford, either in General Surgery or in one of the specialties.
The first year resident functions on a team composed of two or three faculty attending surgeons, a senior resident, and one or two medical students. Primary responsibility for directing the pre- and postoperative management of the patients is that of the first-year resident under the direct supervision of the senior resident and attending surgeon.

This introductory year is designed to ensure that the house officer becomes skilled in the responsibility of patient care. He/she is responsible for the written history and physical examination of all patients and assists in operations. The responsibility for pre- and postoperative care is that of the first-year resident. In this role, he/she has the opportunity to learn about the practice of surgery. Although this broad exposure to surgery is time-consuming, time is reserved on each rotation to assure the resident time for study. The resident also plays an important role in the teaching of medical students assigned to his/her service. Further, he/she has the opportunity to follow his/her patients in the outpatient clinic after dismissal from the hospital and for initial investigation prior to admission to the hospital. It is expected that the resident make rounds with members of the surgical team on which he/she is participating. Attendance at all formal conferences is also required.

Under the jurisdiction of the full-time surgical faculty, approximately 7,400 operations are performed per year by the Stanford surgical house staff and more than 48,000 outpatient visits are scheduled in the University Surgical Outpatient Clinics. The two community general surgical teams with clinical faculty surgeons generate approximately 6,800 additional operations. Currently, about half of these patients are operated upon by residents under supervision.

Residents are allowed a three week vacation during the year. On call rooms in the hospital are assigned for those residents on duty which, as a rule, are alternate nights. Although there is very limited housing on campus, there is a large range of housing available in the vicinity of the University.

All nineteen year-one residents are offered a second year of training if their performance has been satisfactory, with the exception of those entering the Orthopaedic, Otolaryngology or Neurosurgery programs. These residency programs require only one year of residency training in general surgery.