# Goals and Objectives for McMaster Neurosurgery Residents

## PREAMBLE

The goals and objectives described herein are intended to guide the training of each resident enrolled in the McMaster Neurosurgery Program.

The first section describes the general goals and objectives of this 6 year residency program. The second section describes rotation specific objectives.

These objectives have been formulated To conform to CanMEDS 2000 principles and to the objectives of training in Neurosurgery stipulated by the Royal College of Physicians and Surgeons of Canada.

It is anticipated that training in this program will lead to the production of fully trained neurosurgeons with the potential for successful careers in academic or community based neurosurgery.

## Part A: Overall Program Goals and Objectives

## Part B: Rotation Specific Goals and Objectives for:

1. Junior adult neurosurgery
2. Senior adult neurosurgery
3. Chief resident adult neurosurgery
4. Junior pediatric neurosurgery
5. Senior pediatric neurosurgery
6. Neurology
7. Critical Care
8. Orthopedics
9. Plastic surgery
10. Trauma
11. Anesthesia
12. Emergency medicine

Revised: Summer, 2010

Reviewed by McMaster Neurosurgery Residency Program Committee: September 2010
Part A: Overall Program Goals and Objectives for Each Resident

1. To obtain a fundamental knowledge of basic neuroscience including neuroanatomy, neurophysiology, neurochemistry and neuropharmacology.

2. To obtain a practical working knowledge of neurology, neuropathology and neuroradiology.

3. To develop a thorough and in-depth knowledge of clinical neurosurgery.

4. To interact with patients and all others in a caring, competent, reliable, honest, and fully professional manner at all times.

5. To develop excellence in clinical judgment.

6. To develop excellence in the techniques of neurosurgery.

7. To develop interest and understanding of the techniques of clinical and basic science research as they relate to the clinical neurosciences.

8. To develop an ability and interest in teaching.

9. To develop sufficient clinical expertise to join the staff of a tertiary care community hospital.

10. To develop sufficient clinical expertise, research and teaching ability to join the consultant staff of an academic health centre and to be eligible for a university academic position.

11. To be adequately prepared to pass the Principles of Surgery examination and the Specialty Examination in Neurosurgery of the Royal College of Physicians and Surgeons of Canada

12. To be prepared to make valuable contributions to the community and to the development of academic neurosurgery.
Part B: Rotation Specific Goals and Objectives

B1. Junior adult neurosurgery

Medical Expert/Clinical Decision Maker

- To be expert in obtaining a detailed and accurate medical history. This includes history taking relevant to seizures, pain, trauma, coagulopathic states, familial or genetic syndromes, sexual function, endocrine function, cardiorespiratory function, mood, disability, grief, diet, nutrition, drug/medication use, infection, neoplasia, sleep, occupation, social factors, coping capacity, competence, fitness, etc.

- To carry out a thorough and accurate general physical examination. This includes especially examination of the spine, cardiovascular system, respiratory system, musculoskeletal system, and abdomen.

- To carry out a thorough and accurate neurological examination. This includes examinations of attention, awareness, cognition, communications, behaviour, mood, memory, speech, cranial nerves, and motor and sensory function.

- To be able to determine with competence and precision, the potential anatomical sites of neurological disorders based on clinical findings and investigations.

- To be able to formulate a differential diagnosis based on a critical evaluation of the symptoms and signs.

- To formulate a medical and surgical management program to include nutritional support, cardiopulmonary support, fluid management, the appropriate use of pharmacology, and functional rehabilitation.

- To skillfully and accurately anticipate, prevent, recognize, and manage common and important peri-operative problems including infection, seizure, hemorrhage, respiratory distress, cardiac dysfunction, hypertension, endocrine dysfunction, intracranial hypertension, herniation syndromes, spinal instability, progressive neurologic deficit, hydrocephalus, vasospasm, mood disorder, family distress, risks for aspiration or falls, drug related problems, etc.

- The residents are expected to gradually improve their clinical decision making skills over the course of their training so much so that they can function independently by the time they are in the senior year.

- To have an understanding of the fundamentals of anesthesia and neuroanesthesia.

To become familiar with the basic science of the nervous system and the diseases of the nervous system to include the anatomy of the brain, spinal cord, peripheral nerve and muscles; neurophysiology; the pathology and pathophysiological mechanisms of neurological disease; neuro-endocrinology; metabolism and pharmacology of brain, spinal cord, peripheral nerve and muscle; neuropsychology.
To obtain a thorough understanding of the techniques and interpretation of the ancillary aids to the diagnosis of neurological disease to include:

- Neuroradiology: plain radiography, computed tomography, magnetic resonance imaging, arteriography and radioactive nucliotide imaging.
- Neurovestibular testing, cerebral blood flow testing, electroencephalography, electromyography and nerve conduction studies, evoked potentials and neuropsychological testing.

To develop the necessary technical skills to perform neurosurgical procedures as delineated below. It is recognized that there will be some variability in terms of learning technical skills. However, those listed below are to be used as goals that will be best achieved by a gradual increase in responsibilities.

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<tr>
<th>Training Level</th>
<th>Independently</th>
<th>Under Supervision</th>
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| PGY1           | - sterile technique  
- professional behavior as part of OR team  
- patient transfer  
- urinary catheter insertion  
- surgical checklist | - lumbar puncture  
- ventriculostomy  
- insertion/maintenance of lumbar drain  
- skin prep and drape for surgery  
- organization and operation of surgical equipment including microscope, CUSA, craniotome, image guidance system  
- craniotomy closure bone to skin |
| PGY2           | - all PGY 1 supervised activities  
- injections for awake craniotomy  
- craniotomy closure from bone to skin  
- accurately list goals and risks of surgical procedures  
- accurately name surgical instruments | - operate tools for hemostasis and assisting with surgical exposure  
- supratentorial craniotomy planning, positioning, exposure to brain  
- positioning/exposure of all major spinal procedures  
- removal of subdural/epidural hematomas  
- elevation of depressed skull fracture  
- shunts (VA, VP)  
- skeletal traction application  
- Ommaya reservoir placement  
- nerve/muscle biopsy  
- ventricular (pediatric) tap |
| PGY3           | - all PGY 2 supervised activities  
- positioning/draping for transphenoidal surgery  
- application of stereotactic frame  
- accurately estimate duration and expected blood loss for surgical procedures | - spinal tumor removal  
- exposure of carotid in neck  
- exposure for all major spinal procedures  
- closure of spinal dura  
- intracranial tumor dissection  
- syringo-subarachnoid/peritoneal/pleural shunting  
- craniectomy for posterior fossa tumors or microvascular decompression  
- aneurysm surgery dissection of basal cisterns  
- stereotactic biopsy brain lesion  
- carpal tunnel, ulnar nerve procedures  
- primary nerve anastomosis  
- peripheral nerve tumor exposure  
- pediatric: repair of myelomeningocele other spinal dysraphic states tethered cord |
Communicator

The resident is expected to demonstrate proficiency in communication skills in both verbal and written modalities with:

1. Patients, their relatives, and other entitled parties:
   - To be able to explain neurosurgical disease processes in the model of disease, impairment, disability, practical consequences and adaptation strategies
   - To support patients and families emotionally during unfamiliar, stressful, and sometimes tragic experiences
   - To gather and document information necessary for optimal care and management of neurosurgical disorders
   - To guide patients and families to sources of information useful in understanding and coping with neurosurgical conditions
   - To seek and understand feedback from patients and families and other concerned parties regarding care given by oneself and one’s team during a neurosurgical illness
   - To track outcomes of cases in which one has had significant involvement

2. Other health care professionals, as listed below, in order to maintain best care and practice while maintaining confidentiality according to legal and professional codes
   - Family Physicians
   - Resident staff
   - Neurosurgical staff
   - Consultants in other specialties
   - Radiologists
   - Pathologists
   - Medical students and clinical clerks
   - Nursing staff
   - Physiotherapists
   - Occupational therapists
   - Social workers
   - Pharmacists
   - Speech language pathologists
   - Dietitians
   - Clerical and other allied staff such as speech pathologists
   - Psychologists
   - and others.

3. Junior residents are expected to develop proficiency in dictating and charting including history and physical examination, consultation, progress notes, discharge summaries, pre-op notes, and operation notes.
4. The junior resident is expected to show sophisticated ability to evaluate self and other members of the health care team, maintaining the values of professionalism while working to bring continuous improvement in skills and knowledge to self and all members of the team.

5. The resident is expected to become very comfortable with presentation of clinical and investigative information at teaching rounds and scientific conferences using computerized teaching aids.

**Collaborator**

- The Neurosurgical resident is expected to be able to participate in interdisciplinary team meetings efficiently and with effective professional behaviours.

- The resident is expected to be able to consider and respect the opinions of other members of the health care team.

- The resident is expected to be able to comprehend the depth of expertise of others, and contribute to decision making as a Neurosurgeon.

- The resident is also expected to be aware of his/her limitations and those of other health care team members.

- The resident is expected to collaborate with other non medical health care personnel to achieve the best possible outcome for patients.

- The resident is expected to learn how to interact with physicians and surgeons from other specialties. For combined cases, the collective and individual responsibilities to the patients need to be clearly understood. The boundaries between specialties have to be recognized and respected. Most importantly, the residents need to make sure that in a collaborative surgical effort, important health and social issues are not missed.

**Manager**

- To be able to order appropriate and properly utilize laboratory aids to document and substantiate the clinical diagnosis.

- The junior resident needs to understand how to function within the confines of the structure, finances and the general operation of the Canadian health care system.
The resident needs to be cognizant of the functioning of organizations within hospitals and the wider health care community, such as:

- committees at various levels,
- community organizations which support particular groups of neuro patients
- national and international organizations pertinent to the speciality of neurosurgery
- research accounts

The resident is expected to, as he/she progresses in the training program manage his/her junior staff functions-specifically appropriate delegation of activities, call schedules and other issue with equanimity and a sense of fairness.

The resident is expected to comprehend principles of care and decisions based on best available evidence.

The resident is expected to learn practical administrative skills such as arranging meetings, delegating tasks, and running meetings smoothly.

Health Advocate

For the individual patient, the resident is expected to be familiar with the potential deleterious consequences of systematic problems such as access to health care resources for diagnosis and treatment. In the appropriate situations they are expected to learn how to be a health advocate for the individual patient to facilitate the best possible outcome for that patient.

For various patient groups at risk, the resident as expected to be aware of preventative measures that have been shown to be efficacious. For example, better education to vulnerable groups such spinal injury patients.

The resident is expected to actively get involved with such organizations such as “Thinkfirst” that is active in prevention of neurotrauma and CHAT, which is a community and hospital combined initiative against trauma.

Scholar

Clinical issues:

The resident is expected to identify clinical issues that he/she does not fully understand, and perform the following:

- Generate a clinical question
- Identify his/her own knowledge and its limitations
- Develop a plan for doing the appropriate research
- Assimilate and analyze the material available
- Consult other physicians and allied health care personnel as needed
- Propose a solution to the clinical question posed
- Implement the solution
- Evaluate the efficacy of the solution
- Generate new clinical question as relevant

Research issues:

The resident is expected to:

- generate a research question
- Review relevant literature
- Assimilate the literature
- Identify and collaborate with appropriate personnel
- Write a research proposal
- Conduct the research
- Disseminate the results of the results by:
  - Presenting at conferences
  - Writing a paper for publication
  - Identify future research possibilities.

It is understood that there may be a considerable overlap between the clinical cases and research questions, depending on the area of interest.

Educational issues:

- The resident is expected to understand the principles of self directed learning
- The resident is expected to teach clinical clerks and undergraduate students the various clinical and surgical aspects of Neurosurgery.
- The resident is expected to learn to impart appropriate clinical information to the allied health care personnel.
- The resident is expected to review text books, papers and other publications prior to surgery and be comfortable with the surgical approach prior to coming to the operating room.
- The resident is expected to be able to prepare for neuroscience rounds and the Neurosurgical seminars at relatively short notice.
- The resident is expected to be able to study and use all sources (electronic and written) to gather information relating to management of consultations seen in the emergency room, clinics, and the Neurosurgical wards.

Professional

The Neurosurgical resident is expected to be able to behave as a professional in every aspect of Neurosurgical practice. He/She is expected to:

- Interact with patients, relatives, his/her peers and other health care personnel in very professional manner
- Respect the opinions of others
- Treat all others as he/she expects to be treated
- Provide medical care in an honorable and ethical fashion
- Find a balance between professional and personal life that is fulfilling professionally
- Be able to evaluate his/her knowledge and abilities along with the limitations.
- Act according to his/her limitations - specifically ask for help from colleagues when he/she is not comfortable with a clinical situation.
- To ensure the development of a keen sense of responsibility and compassion toward their patients and their families

B2. Senior adult neurosurgery

The senior neurosurgery resident is expected to demonstrate knowledge and skills as documented for junior neurosurgery residents with the following additions and modifications:

Medical Expert/Clinical Decision Maker

- To be perceptive and reliable in putting a medical history into clinical contexts that vary according to age, ethnicity, family dynamics, economics, geographic factors, etc.
- To carry out an expert and sophisticated examination of neurological and spinal function including behavioural features.
- To be able to formulate differential diagnoses with reference to reliable medical and surgical literature and including classification, etiology, pathologic anatomy, pathophysiology, and temporal components for each diagnostic label applied.
- To formulate a medical and surgical management program with inclusion of practical measures of status and outcome.
- To identify errors and variants from expected outcomes and to relate these to appropriate medical and surgical literature sufficiently to present cases at interdisciplinary mortality and morbidity rounds.
- The residents are expected to gradually improve their clinical decision making skills over the course of their training so much so that they can function independently by the time they are in the senior year.
- To help junior residents and other health professionals understand the basic science information pertinent to particular neurosurgical cases and to suggest references and learning resources useful for efficient learning of that material.
- To discuss planning and interpretation of the ancillary aids to the diagnosis of neurological disease with health professionals specialized in their performance and reporting.

- To develop the necessary technical skills to perform neurosurgical procedures as delineated below. It is recognized that there will be some variability in terms of learning technical skills. However, those listed below are expected to be used as goals. It is expected that these goals will be best achieved by gradual increase in delegated activities.

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| PGY4           | - intra/extra-axial spinal tumor removal  
- syringosubarachnoid/peritoneal/pleural shunting  
- Chiari malformation decompression  
- extra-axial intracranial tumor dissection  
- frontal lobectomy  
- transphenoidal nasal/intrasellar dissection  
- craniectomy for posterior fossa tumors or microvascular decompression  
- aneurysm surgery dissection of basal cisterns  
- stereotactic calculation of target coordinates/biopsy/cyst drainage  
- carpal tunnel, ulnar nerve procedures  
- primary nerve anastomosis | - aneurysm dissection and clipping  
- anterior/posterior circulation  
- AVM dissection/removal  
- supra/infratentorial craniotomy for complex tumors  
- craniopharyngioma  
- colloid cyst  
- hypothalamic tumors  
- acoustic neuroma  
- brainstem lesions  
- thermal/glycerol rhizolysis  
- carotid arteriometry, plaque removal, arterial closure, insertion of shunt  
- complex craniofacial repair |
| PGY5/6         | - all procedures previously supervised at end of PGY4  
- carpal tunnel, unar nerve procedures  
- pediatric  
  - repair of myelomeningocele  
  - other spinal dysraphic states  
  - cranial dysraphic states  
  - craniosynostosis repair | -Complex craniofacial procedures  
- Neuro-endoscopy in the cranial cavity as well as thoracic spine |

**Communicator**

The senior resident is expected:

1. To be able to overcome potential limiters of patient autonomy, confidence, and comfort such as perceptual disability, cognitive impairment, aphasia, language or cultural
potential barriers with competence and precision, the potential anatomical sites of neurological disorders based on clinical findings and investigations.

2. The resident is expected to demonstrate proficiency not only in the presentation of clinical and investigative information at teaching rounds and scientific conferences but also to engage the audience in an interactive manner and to accurately evaluate the learning results of each session.

3. Senior residents are expected to demonstrate proficiency in dictating and charting including history and physical examination, consultation, progress notes, discharge summaries, pre-op notes, and operation notes.

**Collaborator**

- The senior neurosurgical resident is expected to be able to help others to participate in interdisciplinary team meetings efficiently and with effective professional behaviours.

- The resident is expected to be able to work with other health care professionals in such a way as to optimize patient care while maximizing knowledge sharing.

- The resident is also expected to be able to help others as well as himself/herself to become fully aware of each other’s strengths and weaknesses in a timely and fully professional manner.

- The resident is expected to maintain efficient and collegial concurrent and collaborative planning and care for patients who can benefit from such an arrangement.

**Manager**

- To be able to prioritize laboratory and imaging testing as well as to know the economics and potential errors involved

- The senior resident should know how to request alterations in resources or care plans if best patient care indicates a need for such changes

- The resident should demonstrate ability to guide patients and their significant others to organizations and information sources that might provide valuable knowledge or service

- The resident is expected to appropriately delegate and evaluate clinical and scholarly activities of junior residents and clerks
The resident is expected to plan care and surgical decisions based on best available evidence and guidelines, indicating those sources in written and verbal communications with other members of the health care team.

**Health Advocate**

- The senior resident is expected to assume an activist role when needed to overcome systematic problems such as access to health care resources for diagnosis and treatment.
- The resident is expected to demonstrate awareness of change theory and to use appropriate and effective means for helping patients to use measures of health maintenance effectively for themselves and their families.

**Scholar**

Clinical issues:

The resident is expected to identify clinical issues that he/she does not fully understand, and perform the following:

- Generate a clinical question
- Identify his/her own knowledge and its limitations
- Develop a plan for doing the appropriate research
- Assimilate and analyze the material available
- Consult other physicians and allied health care personnel as needed
- Propose a solution to the clinical question posed
- Implement the solution
- Evaluate the efficacy of the solution
- Generate new clinical question as relevant

Research issues:

The resident is expected to:

- Generate a research question
- Review relevant literature
- Assimilate the literature
- Identify and collaborate with appropriate personnel
- Write a research proposal
- Conduct the research
- Disseminate the results of the results by:
  - Presenting at conferences
  - Writing a paper for publication
• Identify future research possibilities.

It is understood that there may be a considerable overlap between the clinical cases and research questions, depending on the area of interest.

Educational issues:

• The senior resident is expected to exemplify the principles of self directed learning
• The resident is expected to encourage and improve learning by associated junior neurosurgery residents, peer residents, and other health professionals with particular emphasis on the basic and clinical sciences that relate directly to neurosurgery.
• The resident is expected to learn to impart appropriate clinical information to the allied health care personnel.

Professional

• The senior neurosurgical resident is expected to consistently demonstrate professional behaviours which tend to bring best care for patients and families, best health outcomes, and optimal functioning of involved health care teams
• When problems occur in team activity or relationships, the senior neurosurgical resident is expected to demonstrate knowledge and skill in the perception and analysis such situations and to address them effectively.

B3 Chief neurosurgery resident

The chief neurosurgery resident is expected to demonstrate knowledge and skills as documented for junior and senior neurosurgery residents brought to a level meeting the requirements of the Royal College of Physicians and Surgeons of Canada.

Given a patient with a health concern that might be treated by neurosurgical intervention, the chief resident will consistently demonstrate ability to:

Medical Expert/Clinical Decision Maker

1. Assess a patient’s capacity to make autonomous medical decisions
2. Assess accurately his/her own knowledge and skills as they pertain to the potential surgical procedure
3. Write a concise but accurate and comprehensive pre-op note which includes the following features: primary diagnosis, concurrent diagnoses, goals for the procedure, expected course, risks, peri-operative monitoring and management plans, special operative equipment and techniques needed
4. Establish the human and other resources needed for optimal accomplishment of neurosurgical procedures
5. Correctly choose and use surgical instruments
6. Properly position the patient for surgery
7. Provide optimal surgical exposure with minimal disruption of healthy tissues, minimal loss of blood, minimal cosmetic change, minimal risk of bacterial contamination
8. Efficiently complete an intended surgical intervention, e.g., removal of lesion, clipping of aneurysm, insertion of shunt, etc.
9. Properly close the surgical wound with minimal blood loss, minimal infection risk, optimal circumstances for best wound healing and functional recovery

Communicator

1. Communicate with patients and their associates as well as with other members of the in-patient and out-patient health care teams to maximize patient comfort, safety, information, and recovery
2. Reasonably overcome potential barriers to communication with a patient in order to maximize the patient’s autonomy for medical decision making
3. List management options and present information needed for informed consent for surgery with verification that the patient or substitute decision maker has adequate recall and understanding of that information
4. Accurately inform and advise family or other significant associates of the completion of a procedure, its expected outcomes and consequences, and plans for the early post-operative phase
5. Present best available evidence to support the information and advice he/she has given to the patient
6. Inform other significant stakeholders such as patient partners, families, and referring physicians of the information and advice he/she has given to the patient
7. Document accurately and concisely the information relevant to decisions made

Collaborator

1. Completion of tasks need for the efficient and safe transfer of the patient from the OR to the recovery room including communications with the recovery room staff
2. Carry out the surgical procedure accurately and efficiently, demonstrating the following:
   a. Organization of tasks so that the surgical team carries them out efficiently and safely
   b. Anticipation of next steps and communication with other members of the team in order to avoid unnecessary confusion, stress, and delay
   c. Proper technique and lexicon in relating to the surgical nurses

Manager

1. Organize and manage substitute decision maker involvement in medical decisions
2. Having obtained informed consent and discussed appropriately the planned surgical intervention with a patient's relevant associates, the chief resident will demonstrate ability to organize and prepare for the surgical procedure by:
   a. Proper scheduling including urgency and duration of the procedure
   b. Organization of the appropriate equipment for the procedure
   c. Assembling a sufficient and appropriate team for completion of the procedure
   d. Accurately noting potential teaching and learning opportunities associated with the procedure and planning for their implementation

3. Terminate a planned contact with the patient in a manner that allows patients and their significant associates to understand accurately any operation done, its medical outcome, its significance, and the prognosis for the condition treated

**Health advocate**

The chief resident will understand determinants of health as they apply to neurosurgical patients and seek to bring appropriate resources and opportunities for best health and autonomy to their cases.

**Scholar**

1. The chief resident will incorporate evidence based research and guidelines into treatment decisions and discussions accurately, consistently, and conspicuously, noting especially points of controversy and new progress.

2. The chief resident will support, frequently attend, and often organize educational sessions for the neurosurgical team.

3. The chief resident will support research activity by members of the teams and institutions with which he/she is affiliated.

4. The chief resident will attend professional courses and conferences sufficiently to acquire knowledge and skills to meet Royal College standards while continuing to meet clinical and administrative responsibilities by using effective planning, communication, and delegation.

**Professional**

1. Having completed and reported a neurosurgical intervention, the chief resident will demonstrate appropriate continuing care for the patient by completing and documenting post-operative visits with frequency and content appropriate to the patients needs for comfort, safety, information, and best potential health.

2. The chief resident will help guide senior and junior residents in all aspects of their learning and training.
3. Evaluation of self and fellow health professionals will be shown to be accurate, effective, and professional and carried out in a timely manner.

4. The rules for neurosurgical practice established by the Royal College will be followed rigorously by the chief resident.

5. Participate fully in the combined efforts of the Royal College, McMaster University, PAIRO, and our neurosurgical training program to provide high quality training and professionally and personally rewarding experiences for all members of our residency program.

B4. Junior pediatric neurosurgery resident

Preamble.

The Pediatric Neurosurgery rotation is expected to provide the junior neurosurgical residents the opportunity to become familiar with the common neurosurgically addressed pathologies and the particular needs of infants, children, and their families. Many of the neurological conditions of children amenable to surgical intervention present differently from their adult counterparts, and have different nuances of management and outcome, although the fundamental principals of care are the same as those that govern practice in older individuals. The emotional backdrop of an illness in a child provides a setting that allows the new physician to hone and refine his/her communications skills.

The pediatric neurosurgical service at McMaster Children’s Hospital provides a full range of neurosurgical care to infants and children, as well as prenatal consultation to families expecting delivery of infants with identified in-utero neuropathological conditions. “Elective” cases are generally seen in consultation in the pediatric neurosurgical outpatient clinics, and admitted to neurosurgery only following appropriate outpatient evaluation and preparation. Children who are in distress and potentially unstable are generally admitted to the care of the appropriate pediatric critical care specialist. Children in whom the diagnosis is unclear requiring in-patient evaluation or observation for conditions which may or may not require neurosurgical intervention are commonly admitted under the general pediatric service. In these situations, the neurosurgical service remains closely involved with their management in a consultative basis, maintaining frequent communication with the caregiving team on the ward, as well as with the patient and family. Thus the resident will have the opportunity to act in either a primary or in a consultative role. In either role, in order to maximize the educational opportunities, the resident is expected to maintain close observation of all patients, even when not responsible for hands on care.

Evaluation

It is an expectation of the program that formal evaluations take place at the halfway point of the rotation and during the final week of the rotation. The mid-rotation evaluation is expected to
identify and document any concerns of both resident and staff, and provide an opportunity to initiate any required remediation strategies. The final evaluation will document any ongoing concerns. We expect the residents to make full use of the T-Res program to provide documentation of her/his attendance at all rounds, clinics, and surgical procedures and to identify the CanMeds roles exemplified in each situation.

The resident should understand that at the time of evaluation, the neurosurgical staff may and should request input from any health professionals who have interacted with the residents, as well as considering their own observations.

**Medical Expert/Clinical Decision Maker**

*The evaluation of the many components of this role will occur on a day-to-day and case-by-case basis through direct observation and questioning by the neurosurgical staff.*

**Knowledge: Basic Science and Anatomy.**

1. The resident should have an awareness of human embryology as it relates to the nervous system to allow an understanding of the different congenital abnormalities that can arise resulting from insults at different stages of gestation.
2. The resident should know the developmental milestones of childhood and be able to assess these accurately.
3. The resident should understand the anatomy of the cranial vault and spinal column and have an understanding of the pathological processes that can affect their morphological development.
4. The resident should have a basic knowledge of cerebrospinal fluid physiology and an understanding of how various congenital, infectious, traumatic, and neoplastic processes can affect its circulation.
5. The resident should understand the concepts of spinal stability and the variations in anatomy and development that make spinal injury assessment different in children than in adults.
6. The resident should understand the pathophysiological concepts of spinal cord tethering, and recognize the congenital abnormalities that can lead to this condition in children.

**Knowledge: General Clinical Skills**

1. The resident should be able to demonstrate a facility in the communication skills necessary to obtain focused, appropriate histories from parents/guardians who may be emotionally distraught.
2. The resident should be able to perform an appropriate physical/neurological assessment in children despite potentially poor compliance and differing developmental stages.
Knowledge: Specific Clinical Issues

1. By the completion of the rotation, the neurosurgical resident should be able to:

2. obtain a relevant history and use the information in reaching a differential diagnosis

3. perform an appropriate physical examination

4. order appropriate laboratory, imaging, and other diagnostic tests as guided by the history and physical findings, demonstrating knowledge in the indications for and interpretation of these investigations

5. formulate an appropriate plan for both outpatient and inpatient management, including follow-up

6. recognize the various clinical presentations of increased intracranial pressure in different age groups and different clinical scenarios.

7. recognize heat regulation problems in infants and the need for careful environmental control in their management.

8. recognize the limited host resistance and the high risk of nosocomial infections in newborns, and the need for aseptic protocols to minimize bacteriologic hazards.

9. be able to individualize fluid administration and drug dosage on the basis of weight, and be able to quickly calculate fluid and electrolyte requirements using standard formulae.

10. recognize and allow for altered physiological states that affect drug administration (e.g., immature hepatic and renal function).

11. predict the risk of apnoea post anaesthesia and post narcotic administration in small infants.

12. apply pediatric trauma principles in the initial resuscitation and management of traumatized children.

13. appraise the indications for operative and non-operative management of the head/spine injured child.

14. understand the indications for, and demonstrate facility in various techniques of monitoring intracranial pressure.

15. understand the rationale and use of preventative measures with respect to dysraphism.

16. understand the concepts related to genetic counseling, and be able to initiate discussions and counseling with prospective parents of children with prenatally diagnosed congenital malformations.

Knowledge: Technical Skills.

By completion of the training period, the resident should:
1. be able to perform infant subdural taps via the anterior fontanelle appropriately.

2. be familiar with techniques of CSF diversion in infants and children, as well as being cognizant of approaches to diagnosing shunt malfunction.

3. become skilled at planning operative approaches for varying pediatric neurological conditions, and using the equipment needed for positioning and draping children appropriately in the O.R.

4. become familiar with the procedures for managing craniosynostosis, craniocervical issues (including procedures for Chiari decompressions), brain tumour biopsies and resections, and neurotrauma including hematoma evacuation, and repair of depressed skull fractures.

5. become skilled at setting up the operative microscope correctly for various approaches.

6. become comfortable in setting up and using the frameless stereotactic system, and knowing its limitations in small children.

7. become adept at techniques of opening and closing in order to minimize blood loss in infants and children, and in order to maximize complication-free wound healing.

Communication

The evaluation of this role will be through direct observation by the neurosurgical staff, by the staffs' solicitation of the observations of other health professionals, and by from observations of the patients and their families.

During his/her rotation, the resident will be part of the care of children in multidisciplinary clinics (neuro-oncology, head injury, spina bifida) and must demonstrate an ability to interact appropriately with other health professionals and physicians. He/she should be able to communicate at an appropriate level with both the patient and the caregivers to promote the necessary understanding and comfort with the clinical process. He/she should demonstrate the ability to produce appropriate, concise written consultations, progress notes, and discharge summaries to document the interactions and outline the proposed management and its rationale.

Collaborator

Evaluation of the collaborative role will occur both through the observation of satisfactory and appropriate planning and management having occurred and through the observations of other health care professionals.

Using his/her communication skills, the resident should demonstrate an ability to co-ordinate care involving various providers, including anaesthesia, diagnostic imaging, intensive care, physiotherapy, occupational therapy, nutritional therapy, and nursing care.
Manager

*Direct observation and questioning by the staff on a case-by-case basis will inform the evaluation of the resident in the performance of this role.*

The resident should demonstrate an ability to plan and initiate a course of therapy from initial consultation through diagnostic evaluations, surgical treatment, and follow-up care.

Scholar

*Evaluation of the resident’s achievements in this role may be informed by questioning, observation of formal presentations, and/or through the preparation of an academic paper, as well as soliciting the input of other learners on the service with respect to how well the resident functions in facilitating their learning (educator role).*

It is expected that the resident will use the clinical material to initiate appropriate literature reviews, which will highlight the knowledge available about a given problem, demonstrate the quality of the evidence supporting any proposed therapeutic intervention, and apply that new information to the child’s problem. Hopefully, this process will allow him/her to perceive the gaps in the body of knowledge available, and possibly to propose a study or research plan which would answer or fill in those gaps.

Health Advocate

*This role will be evaluated primarily by direct observation during clinical and ward encounters with children and their guardians.*

The rotation gives ample opportunity for the resident to demonstrate appropriate counseling with respect to disease prevention, particularly with respect to trauma and disease prevention, but also in such areas as preparation for parenting and prevention of dysraphic states.

Professional

*Again, this role will be evaluated by the neurosurgical staff on the basis of direct observation during clinical encounters, but also importantly through guided questioning and discussions afterwards.*

There are a number of very significant ethical issues which often present in a pediatric neurosurgical practice. The resident will be expected to gain an understanding of the ethical basis underlying physician/parent communications with respect to problems, varying from the possibility of termination of pregnancy through the decisions with respect to the degree(s) of appropriate interventions for children with neoplasia or chronic severe disability.

B5. Senior pediatric neurosurgery
Preamble.

The Pediatric Neurosurgery rotation will provide the senior neurosurgical residents the opportunity to further their knowledge and skills with respect to the management of common neurosurgically addressed pathologies and the particular needs of infants, children, and their families. Many of the neurological conditions of children amenable to surgical intervention present differently from their adult counterparts, and have different nuances of management and outcome, although the fundamental principles of care are the same as those that govern practice in older individuals. The emotional backdrop of an illness in a child provides a setting that allows the new physician to hone and refine his/her communications skills.

The pediatric neurosurgical service at McMaster Children’s Hospital provides a full range of neurosurgical care to infants and children, as well as prenatal consultation to families expecting delivery of infants with identified in-utero neuropathological conditions. “Elective” cases are generally seen in consultation in the pediatric neurosurgical outpatient clinics, and admitted to neurosurgery only following appropriate outpatient evaluation and preparation. Children who are in distress or potentially unstable are generally admitted to the care of the appropriate pediatric critical care specialist. Children in whom the diagnosis is unclear requiring in-patient evaluation or observation for conditions which may or may not require neurosurgical intervention are commonly admitted under the general pediatric service. In these situations, the neurosurgical service remains closely involved with their management in a consultative basis, maintaining frequent communication with the caregiving team on the ward, as well as with the patient and family. Thus the resident will have the opportunity to act in either a primary or in a consultative role. In either role, in order to maximize the educational opportunities, the resident is expected to maintain close observation of all patients, even when not responsible for hands on care.

Evaluation

It is an expectation of the program that formal evaluations take place at the halfway point of the rotation and during the final week of the rotation. The mid-rotation evaluation is expected to identify and document any concerns of both resident and staff, and provide an opportunity to initiate any required remediation strategies. The final evaluation will document any ongoing concerns. We expect the residents to make full use of the T-Res program to provide documentation of her/his attendance at all rounds, clinics, and surgical procedures and to identify the CanMeds roles exemplified in each situation.

The resident should understand that at the time of evaluation, the neurosurgical staff may and should request input from any health professionals who have interacted with the residents, as well as considering their own observations.

Medical Expert/Clinical Decision Maker

The evaluation of this role will occur on a day-to-day and case-by-case basis through direct observation and questioning by the neurosurgical staff.
Knowledge: Basic Science and Anatomy.

1. The resident should have knowledge of human embryology as it relates to the nervous system to allow an understanding of the different congenital abnormalities that can arise resulting from insults at different stages of gestation.
2. The resident should know the developmental milestones of childhood and be able to assess these accurately.
3. The resident should understand the anatomy of the cranial vault and spinal column and have an understanding of the pathological processes that can affect their morphological development.
4. The resident should have an advanced knowledge of cerebrospinal fluid physiology and an understanding of how various congenital, infectious, traumatic, and neoplastic processes can affect its circulation.
5. The resident should understand the concepts of spinal stability and the variations in anatomy and development that make spinal injury assessment different in children than in adults.
6. The resident should understand the pathophysiological concepts of spinal cord tethering, and recognize the congenital abnormalities that can lead to this condition in children.

Knowledge: General Clinical Skills

1. The resident should be able to demonstrate a facility in the communication skills necessary to obtain timely, focused, appropriate histories from parents/guardians who may be emotionally distraught.
2. The resident should be able to perform an appropriate physical/neurological assessment in children despite potentially poor compliance and differing developmental stages.

Knowledge: Specific Clinical Issues

By the completion of the rotation, the neurosurgical resident should be able to:

1. recognize the unique natural history of neurological diseases in children and use the information in reaching a differential diagnosis.
2. recognize the various clinical presentations of increased intracranial pressure in different age groups and different clinical scenarios.
3. recognize heat regulation problems in infants and the need for careful environmental control in their management.
4. recognize the limited host resistance and the high risk of nosocomial infections in newborns, and the need for aseptic protocols to minimize bacteriologic hazards.
5. be able to individualize fluid administration and drug dosage on the basis of weight, and be able to quickly calculate fluid and electrolyte requirements using standard formulae.
6. recognize and allow for altered physiological states that affect drug administration (e.g. immature hepatic and renal function).

7. predict the risk of apnoea post anaesthesia and post narcotic administration in small infants.

8. apply pediatric trauma principles in the initial resuscitation and management of traumatized children.

9. appraise the indications for operative and non-operative management of the head/spine injured child.

10. understand the indications for, and demonstrate facility in various techniques of monitoring intracranial pressure.

11. understand the rationale and use of preventative measures with respect to dysraphism.

12. understand the concepts related to genetic counseling, and be able to initiate discussions and counseling with prospective parents of children with prenatally diagnosed congenital malformations.

Knowledge: Technical Skills.

By completion of the training period, the resident should:

1. be able to perform infant subdural taps via the anterior fontanelle appropriately.

2. be able to perform techniques of CSF diversion in infants and children, as well as being cognizant of approaches to diagnosing shunt malfunction.

3. become skilled at planning operative approaches for varying pediatric neurological conditions, and using the equipment needed for positioning and draping children appropriately in the O.R.

4. become skilled at setting up the operative microscope correctly for various approaches.

5. become comfortable in setting up and using the frameless stereotactic system, and knowing its limitations in small children.

6. become adept at techniques of opening and closing in order to minimize blood loss in infants and children, and in order to maximize complication-free wound healing.

7. with appropriate guidance and supervision be able to perform common pediatric neurosurgical procedures such as sagittal craniosynostosis repair, operative management of trauma, ventriculoperitoneal shunting and revision procedures, Chiari decompressions, and posterior fossa approaches for tumour resection.
Communication

*The evaluation of this role will be through direct observation by the neurosurgical staff, by the staffs’ solicitation of the observations of other health professionals, as well as from observations of the patients and their families.*

During his/her rotation, the resident will be part of the care of children in multidisciplinary clinics (neuroncology, head injury, spina bifida) and must demonstrate an ability to interact appropriately with other health professionals and physicians. He/she should be able to communicate at an appropriate level with both the patient and the caregivers to promote the necessary understanding and comfort with the clinical process. He/she should demonstrate the ability to produce appropriate, concise written consultations, progress notes, and discharge summaries to document the interactions and outline the proposed management and its rationale.

Collaborator

*Evaluation of the collaborative role will occur both through the observation of satisfactory and appropriate planning and management having occurred and through the observations of other health care professionals.*

Using his/her communication skills, the resident should demonstrate an ability to co-ordinate care involving various providers, including anaesthesia, diagnostic imaging, intensive care, physiotherapy, occupational therapy, nutritional therapy, and nursing care.

Manager

*Direct observation and questioning by the staff on a case-by-case basis will inform the evaluation of the resident in the performance of this role.*

The resident should demonstrate an ability to plan and initiate a course of therapy from initial consultation through diagnostic evaluations, surgical treatment, and follow-up care.

Scholar

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