

Overall Program Goals and Objectives

PREAMBLE

At the completion of training, the resident is expected to be a competent specialist in the practice of Neurosurgery and to assume a consultant's role.

The resident is expected to acquire a thorough working knowledge of the theoretical basis of Neurosurgery, including its foundations in basic medical sciences and research. The resident must be well-grounded in the general principles of Neurosurgery and surgery in general. The fully-trained resident must demonstrate proficiency and expertise in the care of neurosurgical conditions as well as clinical evaluation, pre- and post- surgical care, in addition to knowledge, clinical, and surgical skills related to surgical diseases of the nervous system and related disciplines.

Residents are expected to demonstrate a detailed knowledge of the normal structure and function of the nervous system and its supporting structures, and the pathological processes affecting them.

They are expected to develop learning strategies to enhance their knowledge, and expertise; necessary for maintaining and enhancing the quality of neurosurgical care. The resident is expected to acquire knowledge of research methodology and the ability to correctly analyze, interpret, and apply ongoing knowledge from literature and scientific presentations.

Specific Objectives:

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 transition into independent neurosurgical practice.
10. To develop sufficient clinical expertise, research and teaching ability to join the consultant staff of an academic medical 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.

Junior adult neurosurgery

Medical Expert

- 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 nuclide 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.

Training Level	Independently	Under Supervision
PGY1	<ul style="list-style-type: none"> - sterile technique - professional behavior as part of OR team - patient transfer - urinary catheter insertion - surgical checklist 	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - 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 	<ul style="list-style-type: none"> - 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	<ul style="list-style-type: none"> - all PGY 2 supervised activities - positioning/draping for transphenoidal surgery - application of stereotactic frame - accurately estimate duration and expected blood loss for surgical procedures 	<ul style="list-style-type: none"> - 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 specialities. 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.

Leader

- 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

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

- 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.

Training Level	Independently	Under Supervision
PGY4	<ul style="list-style-type: none"> - 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 d decompression - aneurysm surgery dissection of basal cisterns - stereotactic calculation of target coordinates/biopsy/cyst drainage - carpal tunnel, ulnar nerve procedures - primary nerve anastomosis 	<ul style="list-style-type: none"> - aneurysm dissection and clipping anterior/posterior circulation - AVM dissection/removal - supra/infratentorial craniotomy for complex tumors <ul style="list-style-type: none"> craniopharyngioma colloid cyst hypothalamic tumors acoustic neuroma brainstem lesions - thermal/glycerol rhizolysis - carotid arteriotomy, plaque removal, arterial closure, insertion of shunt - complex craniofacial repair
PGY5/6	<ul style="list-style-type: none"> - all procedures previously supervised at end of PGY4 - carpal tunnel, unar nerve procedures - pediatric <ul style="list-style-type: none"> repair of myelomeningocele other spinal dysraphic states cranial dysraphic states craniosynostosis repair 	<ul style="list-style-type: none"> -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.

Leader

- 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

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

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.

Communicator

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.

Leader

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.

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

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.

Communicator

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.

Leader

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 problems, 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.

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

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

Leader:

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

Anaesthesia

PREAMBLE

These objectives are expected to serve as a guideline for the training of a Neurosurgical Resident rotating through the Anaesthesia Service. Generally, it should be understood that the over-riding objective for such a rotation is to train the resident in the technical skills required to establish and maintain an airway, to educate him in the general pathophysiological concerns faced by the anaesthetist shepherding any patient through a surgical procedure, to educate the resident in the specific needs of the anaesthetist with respect to knowledge of the surgical issues during a neurosurgical procedure (so that, as a neurosurgeon, he can communicate these issues in a timely manner), and to acquaint the resident with the general and specific pharmacological knowledge relevant to surgical procedures.

In this light, the following objectives have been formulated to conform to the CanMEDS 2015 Principals, and the objectives of training in Neurosurgery as recommended by the Royal College of Physicians and Surgeons of Canada.

Medical Expert:

General Objectives:

Knowledge: Basic Science and Anatomy.

The resident is expected to have a good comprehension of the basic and normal anatomy and physiology of the respiratory and circulatory systems.

Knowledge: General Clinical.

The resident is expected to learn how to do a preoperative assessment with respect to specific anaesthetic and surgical risk factors from both a historical and physical viewpoint. He/she should be able to predict the types of problems specific patients might be likely to encounter with surgical procedures, and understand the relevant investigations which should be done preoperatively to assist the anaesthetist in minimizing these risks.

Knowledge: Specific Clinical Problems.

These should include an understanding of the Principals of Allergy and Immunology relative to the surgical process (e.g. allergic reactions, blood transfusions); the resident should understand the pathophysiology of circulatory diseases relevant to cardiac function in the patient undergoing anaesthesia; specifically with respect to neurosurgical procedures the resident should have an understanding of the effect of positioning, pharmacological agents, and ventilatory management on intracranial pressure and tissue perfusion.

Knowledge: Technical.

By the end of the rotation the resident is expected to be able to arrive at an acceptable anaesthetic management plan, and effect that plan through the anaesthetic experience for an individual patient, with a view to prevention of complications. He should be able to recommend and plan for the safest anaesthetic route, which should include not only an understanding and knowledge of general anaesthetic principles, but also knowledge of the appropriate use of spinal, epidural, regional, and local anaesthetic techniques.

Knowledge: Specific Pathology.

The list of potential anaesthetic concerns covers the gamut of medicine, and will not be covered in its entirety in this list, but should include cardiac crises, including arrhythmias, arrest, ischaemia, hypertension, pulmonary oedema; Circulatory Failure, including hypovolaemic shock; Respiratory Failure; Septicaemia; Metabolic, fluid, electrolyte, and acid base disorders; Endocrine dysfunction, including diabetes, parathyroid disease, pituitary axis, and the abnormalities of both anterior and posterior pituitary dysfunction; Coagulopathies and their management; Pharmacology of commonly used drugs for the critically ill patient; Management of hyperthermia; Use of mechanical ventilators; Use of anaesthetic agents.

Communicator:

The neurosurgical resident rotating in Anaesthesia will need to demonstrate communication skills in dealing with the patient and the patient's family, and, just as importantly, with the entire operating room team, including nurses, technicians, surgeons, and other physicians involved with the patient's care. He/she should learn the details of maintaining a complete anaesthetic record.

Collaborator:

The resident will demonstrate an ability to use his/her communication skills to be able to collaborate in a professional manner with other health professionals and with the patients and their families.

Leader:

This role in this rotation is likely to be limited to demonstrating the logistics of co-coordinating the health professional team to achieve an expeditious, gentle and safe induction, an appropriate "awakening", and a safe transfer from the operating room to the post-operative care area. The resident should, in this regard, have a full knowledge and understanding of the appropriate monitoring equipment to be able to establish effective monitoring throughout and following the anaesthetic.

Health Advocate:

During the pre-anaesthetic interview, the resident should use the opportunity to inform and educate the patient in specific preventative strategies that he may wish to undertake in concert with the family physician, respecting of course the potential stress the patient may be experiencing in relationship to the impending procedure.

Scholar:

The anaesthetic rotation affords the resident an opportunity to search the literature and thus educate himself/herself about many different disease conditions which he may encounter and consider the opportunities for designing investigations as well as literature searches to answer the many questions he/she will encounter with respect to management strategies.

Professional:

The resident shall demonstrate during his rotation the ability to function as an honest, reliable and respectful individual interacting in a professional manner with patients and colleagues. This will include an ability to work in a collaborative manner with other health care professionals, and understanding and respect for the rights of the patients to privacy, a sensitivity and understanding of the specific psychological demands of a patient undergoing the stress of surgery, which will include an understanding and allowance for specific ethnic and cultural considerations.

ROTATION SPECIFIC EDUCATIONAL OBJECTIVES FOR NEUROSURGICAL RESIDENTS ON ROTATIONS WITH HEALTH SCIENCES NORTH IN SUDBURY

GENERAL OBJECTIVES

Overall goal is to provide exposure to community experience in Neurosurgery over a one to 3 month rotation in Sudbury.

SPECIFIC OBJECTIVES

Medical Expert

Acquire a thorough knowledge of Neurosurgical conditions commonly encountered in the community

Communicator

To communicate and interact with physicians, patients and other health care workers in the community

Collaborator

Establish effective relationships with team members and be helpful and supportive to others in the community

Leader

To gain exposure to, develop, and be involved in effective practice management in the community

Health Advocate

Promotion of Neurosurgery best practices in the community

Scholar

Contribute to the creation, dissemination and application of new knowledge and practices in the community

Professional

Demonstrate appropriate responsibility, ethical behavior, honesty and integrity, commitment and seek to advance skills

Critical Care

Medical Expert

Preamble

These objectives are expected to serve as a guideline for the training of a Neurosurgical Resident rotating through the Critical Care Department. It is expected that this training will provide the resident with the capability to respond appropriately to the spectrum of urgent and emergent medical and surgical issues, which patients and their families bring to critical care setting. Further, this rotation should provide the resident with an understanding of both the capabilities and limitations of critical care departments within a modern hospital in the Canadian Health Care System.

The resident's function in the ICU will require that she/he gain a working knowledge of both normal physiology and pathophysiology to enable the expeditious identification and management of the patient who is unstable and at risk from the full range of disease processes.

Under supervision, the resident shall initiate appropriate investigations and avoid inappropriate interventions, as well as facilitate ongoing care.

Medical Expert:

Knowledge: Basic Science and Anatomy.

The resident is expected to have a good comprehension of basic anatomy, physiology, and metabolism to be able to understand the deviations there from with which patients in the ICU may present.

Knowledge: General Clinical:

The resident will be expected to learn the algorithmic expeditious assessment of an ICU, as well as the rapid formulation and institution of a management plan. She/he will be expected to demonstrate an understanding of the pathophysiology of common medical and surgical diseases presenting to the Emergency Department.

Knowledge: Specific Clinic Problems.

1. These include myocardial ischaemia and infarction, pulmonary oedema, respiratory failure, the acute abdomen, musculoskeletal emergencies, infectious processes including septicaemia, urosepsis, meningoencephalitis, wound infections, bronchitis, conjunctivitis, pharyngitis, pneumonia, and cellulites.
2. The resident should demonstrate an ability to manage both minor and major soft tissue injuries.
3. The resident will demonstrate a working understanding of ischaemia as it applies to all organs, including the brain, the heart, the kidneys, the intestinal tract, and the extremities. This knowledge shall include an understanding of strategies to limit the effect of ischaemia.

Knowledge: Technical Skills.

1. The resident is expected to be able to establish, use, and maintain the following lines and tubes:
 - a. Endotracheal and tracheostomy tubes
 - b. Intravenous lines including central lines via jugular or subclavian punctures
 - c. Arterial lines
 - d. Feeding tubes
 - e. Chest tubes
2. The resident will learn to interpret information from bedside monitors and from laboratory and imaging results in order to help provide best management of critical illnesses

Communicator:

The resident shall demonstrate an ability to communicate with patients and with their families, and to amplify and verify histories in charts of admitted patients.

He/she will establish communications with the referring physicians and associated residents, family physicians, and other involved health professionals in both a written and oral manner to enable the facilitation of care.

Collaborator:

The resident will recognize the competencies and respect the professionalism of other health professionals, utilizing their expertise in an appropriate manner to facilitate the patient's care.

Leader:

The resident shall demonstrate an ability to manage medical, surgical, and psychiatric problems in the ICU in an algorithmic fashion, providing timely management decisions with an eye to the efficient and expeditious care of the patient.

Health Advocate:

The resident should recognize where patient's presentations present the opportunity for counseling with respect to the management of lifestyle issues, to minimize risk and modify disease processes.

Scholar:

The clinical material seen in the ICU shall be used by the resident as an opportunity to stimulate reading and literature reviews around specific surgical and medical issues. Particular attention shall be paid to neurological disease presentations, with a view to the consideration of evidence-based management and care.

Professional:

The resident must behave in a manner demonstrating his/her reliability, integrity, honesty, and ethical approach to the care of his/her patients, respecting the cultural and ethnic issues appropriate to them.

Emergency Medicine

Preamble

These objectives are expected to serve as a guideline for the training of a Core Neurosurgical Resident rotating through the Emergency Department. It is expected that this training will provide the resident with the capability to respond appropriately to the spectrum of urgent and emergent medical and surgical issues, which patients and their families bring to an Emergency Department. Further, this rotation should provide the resident with an understanding of both the capabilities and limitations of Emergency Department care within a modern hospital in the Canadian Health Care System.

The resident's function in the Emergency Ward will require that she/he gain a working knowledge of both normal physiology and pathophysiology to enable the expeditious identification, triage, and management of the patient who is unstable and at risk from the full range of disease processes. The resident shall initiate appropriate investigations and avoid inappropriate interventions, as well as facilitate ongoing care.

Medical Expert:

Knowledge: Basic Science and Anatomy.

The resident is expected to have a good comprehension of basic anatomy, physiology, and metabolism to be able to understand the deviations thereof with which patients in the Emergency Department may present.

Knowledge: General Clinical

The resident will be expected to learn the algorithmic expeditious assessment of an Emergency Department patient, as well as the rapid formulation and institution of a management plan. She/he will be expected to demonstrate an understanding of the pathophysiology of common medical and surgical diseases presenting to the Emergency Department.

Knowledge: Specific Clinical Problems.

These include myocardial ischaemia and infarction, pulmonary oedema, respiratory failure, the acute abdomen, musculoskeletal emergencies, infectious processes including septicaemia, otitis, bronchitis, conjunctivitis, pharyngitis, pneumonia, and cellulites. The resident should demonstrate an ability to manage both minor and major soft tissue injuries. The resident will

demonstrate a working understanding of ischaemia as it applies to all organs, including the brain, the heart, the kidneys, the

intestinal tract, and the extremities. This knowledge shall include an understanding of strategies to limit the effect of ischaemia.

Knowledge: Technical.

The resident is expected to be able to take care of simple lacerations, and to recognize and institute a management plan for complex soft tissue injuries, including vascular, ligamentous, tendinous, and neural extremity injuries.

Communicator:

The resident shall demonstrate an ability to communicate with patients and with their families, and to recognize when histories need to be corroborated. She/he will establish communications with the referring physicians, family physicians, and consultants in both a written and oral manner to enable the facilitation of future care.

Collaborator:

The resident will recognize the competencies and respect the professionalism of other health professionals, utilizing their expertise in an appropriate manner to facilitate the patient's care.

Leader:

The resident shall demonstrate an ability to manage medical, surgical, and psychiatric problems in the Emergency Department in an algorithmic fashion, providing timely management decisions with an eye to the efficient and expeditious care of the patient.

Health Advocate:

The resident should recognize where patient's presentations present the opportunity for counseling with respect to the management of lifestyle issues, to minimize risk and modify disease processes.

Scholar:

The clinical material seen in the Emergency Department shall be used by the resident as an opportunity to stimulate reading and literature reviews around specific surgical and medical issues. Particular attention shall be paid to neurological disease presentations, with a view to the consideration of evidence-based management and care.

Professional:

The resident must behave in a manner demonstrating his/her reliability, integrity, honesty, and ethical approach to the care of his/her patients, respecting the cultural and ethnic issues appropriate to them.

ROTATION SPECIFIC EDUCATIONAL OBJECTIVES FOR NEUROSURGICAL RESIDENTS ON EPILEPSY AND FUNCTIONAL NEUROSURGERY AT WESTERN UNIVERSITY

Medical Expert:

1. To be able to perform a clinical evaluation, investigate, and outline a management plan for patients with movement disorders, functional neurological conditions in general and epilepsy.
2. To be familiar with, assist and be able to describe the operative procedures for managing patients with movement disorders, functional neurological conditions in general, epilepsy and the complications.
3. To participate in and be familiar with the post-operative care of patients with functional neurological conditions and epilepsy.
4. To be familiar with the clinical epidemiology of patients with functional neurological conditions and epilepsy.
5. Procedures to be familiar with include but are not limited to, deep brain stimulation, and spinal cord stimulation.

Communicator

- a. Establish therapeutic relationships with patients/families.
- b. Obtain relevant history from patients/families/communities.
- c. Listen effectively.
- d. Discuss appropriate information effectively with patients/families and the health care team.

Collaborator

- a. Consult effectively with other physicians and health care professionals.
- b. Contribute effectively to other interdisciplinary team activities.

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Leader

- a. Allocate finite health care resources wisely.
- b. Work effectively and efficiently in the care of patients and the community.

Health Advocate

- a. Identify the important determinants of health affecting patients and the community.
- b. Contribute effectively to improved health of patients and communities.
- c. Identify opportunities for advocacy, health promotion and disease prevention.

Scholar

- a. Maintain and enhance professional activities through ongoing learning.
- b. Critically evaluate medical information and its sources, and apply this appropriately to practice decisions.
- c. Be involved in medical education and contribute to the development, dissemination and translation of new knowledge.

Professional

- a. Maintain ethical practice, adhere to regulations, and high personal standards.

ROTATION SPECIFIC EDUCATIONAL OBJECTIVES FOR NEUROSURGICAL RESIDENTS ON A GENERAL SURGERY SERVICE

GENERAL AIMS

- 1 To provide knowledge and practice of management of the patient with acute trauma.
- 2 To improve knowledge, technical skills and decision-making capacity with respect to the trauma patient and general surgical patient.
- 3 To gain knowledge and management skills in the principles of trauma and surgery.

Medical Expert:

1 CLINICAL SKILLS

Given a patient with general surgical disease, the resident will be able to do the following to the satisfaction of his/her supervisor(s):

- 1 To perform the management of the critically ill or traumatized patient according to ATLS guidelines.
- 2 Take a relevant history and perform a physical exam concentrating on the appropriate areas.
- 3 Arrive at an appropriate differential diagnosis
- 4 Order appropriate laboratory, radiologic and other diagnostic procedures demonstrating knowledge in the interpretation of these investigations.
- 5 Arrive at an acceptable plan of management, demonstrating knowledge in operative and nonoperative management of the disease process.
- 6 To formulate an initial hypothesis in light of conflicting data or events.
- 7 Manage patients in the ambulatory setting, demonstrating a knowledge of common office techniques and procedures.
- 8 Manage the patient throughout the entire in-hospital course, demonstrating knowledge of and being able to treat potential complications of the disease processes and operative procedures.
- 9 Provide a plan for patient follow-up.
- 10 To identify conditions that require urgent treatment.

Given a patient with one of the disease entities listed in Section 2, the neurosurgical resident is expected to be able to perform the clinical skills listed in this section.

2 KNOWLEDGE BASE

Given a patient with a general surgical disease, the neurosurgical resident is expected to be able to perform the clinical skills listed in section 1, and be able to demonstrate to the satisfaction of his/her supervisor(s) a fundamental knowledge and understanding of:

A Principles of Surgery and Post-operative Problems

1	Fluid and electrolyte disorders	12	Delerium
2	Acid base disturbances	13	Organ failure
3	Cardiogenic shock	14	Stress ulceration
4	Hypovolemic shock	15	Malnutrition
5	Septic shock	16	Obesity
6	Neurogenic shock	17	Specific nutritional deficiencies
7	Wound infection, dehiscence, and evisceration	18	Specific coagulation disorders
8	Thromboembolic disorders	19	General coagulopathies
9	Atelectasis and pneumonia	20	Transfusion reactions
10	Pressure palsy and pressure ulceration	21	Graft rejection
11	Bladder retention	22	Organ failure treatable by transplantation

B Trauma

1	Airway obstruction	11	Aortic rupture
2	Pneumothorax	12	Tracheobronchial tree injury
3	Cardiac tamponade	13	Diaphragmatic rupture
4	Fractured cervical spine	14	Esophageal rupture
5	Major vascular injury	15	Blunt or penetrating abdominal trauma
6	Head injury	16	Fractures, joint injuries, open wounds, compartment syndrome & fracture accompanied by neurovascular compromise
7	Spinal, paraspinal and cord injuries	17	Urologic injuries
8	Face and neck which are life threatening	18	Burns
9	Myocardial contusion		
10	Pulmonary contusion		

3 TECHNICAL SKILLS

Residents at all levels must master:

ASSISTING (both first and second) in the operating room, developing a facility for anticipation of surgical maneuvers, gentle retraction of tissues, an ability to take direction well, to make reasonable suggestions and enquiry, and to contribute to a positive operating room atmosphere.

Preamble

Given a patient requiring one of the surgical procedures listed below, the neurosurgical resident will participate in the patient's care as a member of the operating team. It is expected that the resident will initiate the process of technical skill development by assisting in both simple and complex operations, and by performing, under supervision, simple procedures. It is expected that the resident will be familiar with surgical instruments and suture materials. It is expected that the resident will be able to position and drape patients for surgical operations. It is expected that the neurosurgical resident will be able to open and close surgical wounds, control bleeding, and demonstrate a knowledge of fundamental principles of tissue handling.

Given a patient with a general surgical illness, the neurosurgical resident will be able to demonstrate:

Professional:

- 1 Respect for patients' rights to privacy.
- 2 Sensitivity to the sexual, moral, ethical, religious and ethnic characteristics of the patient and family, understanding of the special psychological needs of the patient with general surgical disease, and the capacity for supportive and compassionate care in the course of terminal disease.
- 3 A knowledge of the ethical and legal aspects of general surgery.
- 4 Honesty, reliability, and respectfulness in working with patients and colleagues alike.

Communicator:

- 1 The ability to communicate with healthcare professionals, patients and their families explaining to them their disease process and the benefits, risks, and complications, and alternatives of management recommendations in terms each individual can comprehend.
- 2 The ability to keep succinct, pertinent, and up-to-date medical records.

Scholar:

- 1 The discipline of continued self-education and the appropriate application of this current knowledge to the clinical setting; the ability to supervise and educate undergraduate and postgraduate students in general surgery; the skills to educate colleagues, patients, families, and other health care professionals; the capacity to undertake research, and be aware of the importance of peer review protocols, ethical considerations, and the limitations of such endeavors.

Collaborator:

- 1 The ability and willingness to work in a cooperative manner with other health care personnel, being sensitive to their roles and abilities, and to be able to give and receive advice in a manner that is consistent with the harmonious operation of a health care team.

ROTATION SPECIFIC OBJECTIVES FOR NEUROSURGERY RESIDENTS DURING THEIR INTERNAL MEDICINE ROTATION

GENERAL AIMS

To investigate and manage patients with acute and chronic 'medical' illnesses which are extremely common in the neurosurgical patient.

Medical Expert:

1 CLINICAL SKILLS

Given a patient on a medical ward, the resident will be able to do the following to the satisfaction of his/her supervisor(s):

- 1 Take a relevant history.
- 2 Perform an acceptable physical exam concentrating on the relevant areas.
- 3 Arrive at an appropriate differential diagnosis.
- 4 Order appropriate laboratory, radio logic and other diagnostic procedures demonstrating knowledge in the interpretation of these investigations.
- 5 Arrive at an acceptable plan of management.
- 6 Manage the patient throughout the hospital stay including potential complications.

2 KNOWLEDGE BASE

To have a basic knowledge of internal medicine pathologies with emphasis on endocrinology and multi-system organ dysfunction.

3 TECHNICAL SKILLS

At the end of a rotation in internal medicine, the resident must be able to show technical competence in the following procedures to the satisfaction of his/her supervisor(s).

- 1 Techniques used in advanced cardiac life support, including EKG interpretation.
- 2 Techniques of arterial and venous access, including arterial lines, CVP lines and venous cut-downs.
- 3 Thoracentesis, Paracentesis.
- 4 Lumbar puncture.
- 5 Physiologic monitoring techniques including O₂ saturation and cardiac output measurement.
- 6 Interpretation of relevant imaging techniques, including x-rays and nuclear scans.
- 7 Other - eg. insertion of Foley catheters nasogastric tubes and temperature probes.

At the end of the rotation, the resident must have demonstrated to the satisfaction of his/her supervisor(s):

Professional:

- 1 Respect for patients' rights to privacy.
- 2 Sensitivity to the sexual, moral, ethical, religious and ethnic characteristics of the patient and family, understanding of the special psychological needs of the patient with disease, and the capacity for supportive and compassionate care in the course of terminal disease.
- 3 A knowledge of the ethical and legal aspects of internal medicine.
- 4 Honesty, reliability, and respectfulness in working with patients and colleagues alike.

Communicator:

- 1 The ability to communicate with healthcare professionals, patients and their families explaining to them their disease process and the benefits, risks, and complications, and alternatives of management recommendations in terms each individual can comprehend.
- 2 The ability to keep succinct, pertinent, and up-to-date medical records.

Scholar:

- 1 The discipline of continued self-education and the appropriate application of this current knowledge to the clinical setting; the ability to supervise and educate undergraduate and postgraduate students in general surgery; the skills to educate colleagues, patients, families, and other health care professionals; the capacity to undertake research, and be aware of the importance of peer review protocols, ethical considerations, and the limitations of such endeavors.

Collaborator:

- 1 The ability and willingness to work in a cooperative manner with other health care personnel, being sensitive to their roles and abilities, and to be able to give and receive advice in a manner that is consistent with the harmonious operation of a health care team.

ROTATION SPECIFIC EDUCATIONAL OBJECTIVES FOR NEUROSURGICAL RESIDENTS ON INTERVENTIONAL NEURORADIOLOGY

GENERAL OBJECTIVES

1. Overall goal is to gain an understanding of the field of interventional neuroradiology
2. Become proficient with diagnosis and management of common cerebrovascular disorders
3. Become proficient with indications and interpretation of cerebrovascular imaging modalities
4. Observe/participate in interventional procedures and attend Neurointerventional clinics.

SPECIFIC OBJECTIVES

Medical Expert

- a. Basic Knowledge:
 - Arterial and venous angiographic anatomy (cranial and spinal)
 - Cerebral blood flow
 - Autoregulation
 - Collateral circulation
 - Anastomosis
 - Pharmacology/biology of coagulation cascade (anticoagulation, thrombolytics)
- b. Clinical Knowledge (diagnosis, management, interventional procedures)
 - Acute stroke
 - Aneurysms
 - AVM
 - Carotid cavernous sinus fistula

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- Dural AVF
 - Vasospasm
- c. Diagnostic modalities (physics/mechanisms, indications, interpretation)
- Pharmacology/biology of contrast agents
 - CT/A/V
 - MRI/A/V
 - Digital subtraction angiography
- d. Interventional procedures (indications, risks, outcomes, trials)
- Intra-arterial thrombolysis/mechanical thrombectomy (Clot-retrieval)
 - Aneurysm coiling
 - Embolization
 - Extracranial/intracranial stenting
 - Flow diverting stents for the treatment of giant aneurysms

Communicator

- a. Communicate effectively with referring physicians and other members of the health care team.
- b. Communicate indications and urgency of diagnostic procedures appropriately with nurses and radiologists.
- c. Become proficient at communicating indications and risks of cerebrovascular diagnostic modalities to patients and family members.

Collaborator

- a. Work effectively with nurses, nurse practitioner, radiologists, neurosurgeons in a collaborative model of patient assessment and management.

Leader

- a. Balance the proper use of investigations and therapies with the social obligation to control health care costs, with an understanding of how investigations and therapies can change management and/or outcomes.

Health Advocate

- a. Recognize a patient that may require urgent neurointerventional treatment.
- b. Consider alternative treatments, including non-invasive options and open-surgical treatments.
- c. Awareness of a patient's ability to access various services in the health care

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system and be able to act as an advocate in that circumstance.

Scholar

- a. Be able to effectively teach patients, families, students, residents, and other health care professionals about issues related to cerebrovascular disease.
- b. Be aware of the foundational evidence behind current standards of care for cerebrovascular diseases.
- c. Become familiar with seminal and recent trials: (IMS-III, Synthesis, MR rescue, SAMMPRIS, COSS, CREST, NASCET, ISAT, ISUIA, ARUBA, MR CLEAN, ESCAPE, SWIFT PRIME etc.)

Professional

- a. Understand the legislation related to informed consent and decision-making capacity, including the roles of physicians and substitute decision-makers.
- b. Analyze and attempt to resolve ethical issues surrounding patient care such as truth-telling, consent, confidentiality, end-of-life care, conflict of interest, disclosure of procedural complications, and resource allocation.

ROTATION SPECIFIC GOALS AND OBJECTIVES FOR NEUROSURGERY RESIDENTS IN NEUROLOGY BLOCK

PREAMBLE

These objectives are expected to serve as a guideline for the training of the neurosurgical resident rotating through the neurology service. It is anticipated that the training will lead to the production of fully trained neurosurgeons, gaining an understanding of neurological disorders with the potential for careers in academic or community based Neurosurgery. These objectives have been formulated to conform to the CanMEDS 2015 principles and the objectives of training in Neurosurgery as recommended by the Royal College of Physicians and Surgeons of Canada. The objectives will be described under the headings of the various CanMEDS 2015 roles-those of Medical Expert, Communicator, Collaborator, Leader, Health Advocate, Scholar and the Professional.

Medical Expert:

General Objectives:

1. To obtain a fundamental knowledge of basic neurological disorders.
2. To obtain a practical working knowledge of neurological disorders.
3. To develop a thorough and in-depth knowledge of clinical neurology.
4. To develop excellence in clinical judgement.
5. To develop excellence in the techniques of neurology.
6. To develop an interest in, and understanding of the techniques of clinical and basic science research as they relate to the clinical neurology.
7. To develop an ability and interest in teaching.
8. To be adequately prepared to pass the Principles of Surgery examination and Specialty Examination in Neurosurgery of the Royal College of Physicians and Surgeons of Canada.
9. To be an expert in obtaining a detailed and accurate relevant history.
10. To be able to formulate a differential diagnosis based on a critical evaluation of the symptoms and signs.
11. To be able to order appropriate investigations and properly utilize laboratory tests to document and substantiate the clinical diagnosis.

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12. 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.

Specific Objectives:

The development of competence in clinical neurology requires the trainee:

1. To have an understanding of the fundamental of neurological conditions which are treated without surgery but may present to a neurosurgeon, e.g., motor neuron disease and multiple sclerosis.
2. To become familiar with the basic science of neurology and to outline the etiology, pathophysiology, clinical presentation, natural history, prognosis, appropriate investigations, and treatment of disease presenting with the following symptoms complexes.
3. Bilateral weakness including:
 - a. spinal cord disorders e.g. motor neuron disease
 - b. peripheral neuropathies, e.g. Guillian-Barre syndrome
 - c. neuromuscular disorders, e.g. myasthenia gravis
 - d. muscle disorders, e.g. inflammatory, endocrine, dystrophic
4. Unilateral or focal weakness including:
 - a. focal cerebral lesion, e.g. primary and secondary brain tumors, infections, hematoma, infarcts
 - b. Incomplete spinal cord lesions, e.g. Brown-Sequard syndrome
 - c. mononeuropathies
5. Bilateral numbness including:
 - a. brainstem lesions, e.g. central medullary syndrome
 - b. spinal cord lesions, e.g. syringomyelia, ependymoma
 - c. peripheral neuropathies, e.g. alcoholic neuropathy
6. Focal or unilateral numbness including:
 - a. transient ischemic attacks
 - b. partial seizures
 - c. migraine aura
 - d. mononeuropathy
7. Anosmia including
 - a. vitamin deficiency
 - b. endocrine deficiency
 - c. drug side effects
8. Visual loss including:
 - a. transient ischemic attacks

- b. cortical blindness
- c. optic neuritis
- d. optic nerve compression

9. Diplopia including:

- a. central lesions
- b. peripheral lesions

10. Altered hearing, dizziness and vertigo including:

- a. meniere's disease
- b. benign positional vertigo
- c. brainstem lesions

11. Cardiac arrhythmias, postural hypotension

12. Ataxia and gait disturbance including:

- a. differentiating cerebellar disease, posterior column disease, and other sensory neuropathies
- b. recognizing classical gait patterns such as those in Parkinson's disease, hemiparesis, limb girdle weakness and normal aging

13. Speech disturbances including differentiating between major aphasic syndromes

14. Dementia and delirium including:

- a. reversible causes of dementia, e.g. hypothyroidism, B12 deficiency
- b. common causes of dementia, e.g. Alzheimer's, multi-infarct dementia
- c. acute confusional states, e.g. Wernicke's encephalopathy

15. Coma including:

- a. mass lesions, e.g. tumor, infarct, abscess
- b. metabolic causes, e.g. hypercalcemia, ketoacidosis

16. Infections, e.g. meningitis

17. Subarachnoid hemorrhage

18. Involuntary movements including:

- a. Parkinson's syndrome and disease
- b. benign essential tremor
- c. dystonias
- d. drug-induced movement disorders

19. Syncope including:

- a. cardiac causes, e.g. Stokes-Adams attacks
- b. seizure disorders
- c. vertebro-basilar insufficiency

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d. autonomic failure

20. Epilepsy including medical management of status epilepticus

21. Headache including:

- a. tension
- b. analgesic rebound
- c. migraine
- d. medical management of trigeminal neuralgia

22. Regional pain including:

- a. myofascial pain syndromes
- b. neuropathic pain
- c. postherpetic neuralgia
- d. reflex sympathetic dystrophy

23. Urinary incontinence and impotence including:

- a. cerebral causes
- b. spinal cord lesions, e.g. multiple sclerosis
- c. cauda equina lesions and peripheral neuropathies
- d. drug-related, e.g. anticholinergics

24. To obtain a thorough understanding of the techniques and interpretation of the ancillary aids to the diagnosis of neurology disorders including: vestibular testing, cerebral blood flow electroencephalography, electromyography and nerve conduction studies, evoked potentials and neuropsychological tests.

25. Neuroradiology: Plain Radiography, Computed Tomography, Magnetic Resonance Imaging, Arteriography and Radioactive nucleotide imaging.

26. To develop the necessary technical skills to perform neurology procedures:

- a. Lumbar puncture
- b. Cisternal puncture
- c. Instruction of exercises for BPV
- d. Hallpike-Dix maneuver

27. Interpretation of EEG

28. Interpretation of EMG and nerve conduction studies

Communicator:

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

- 1. Patients and their relatives

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- a. To be able to explain the neurological disease process
 - b. To be able to obtain an informed consent related to Neurology procedures
2. Other physicians
 - a. Family Physicians
 - b. Other resident staff
 - c. Neurology staff
 - d. Consultants in other specialties
 - e. Radiologists
 - f. Medical students and clinical clerks
3. Health care professional other than physicians
 - a. Nursing staff
 - b. Physiotherapists
 - c. Occupational therapists
 - d. Social workers
 - e. Pharmacists
 - f. Clerical and other allied staff such as speech pathologists, nutritionists, psychologists, and others
4. The resident is also expected to become very comfortable with presentation of clinical investigative information at teaching rounds and scientific conferences using contemporary electronic teaching aids.

Collaborator:

1. The resident is expected to be able to participate in interdisciplinary team meetings.
2. The resident is expected to be able to consider and respect the opinions of other members of the health care team.
3. The resident is expected to be able to comprehend the depth of expertise of others and contribute to decision making as expected of a Neurosurgery resident.
4. The resident is also expected to be aware of his/her limitations and those of other health care team members.
5. The resident is, in essence expected to be able to collaborate with other non-medical health care personnel to achieve the very best possible outcome for the patients.

Leader:

- a. The resident needs to understand how to function within the confines of the structure, finances and the general operation of the Canadian health care system.

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- b. The resident needs to be cognizant of the functioning of the organizations within the hospital such as
 - a. committees at various levels
 - b. local organizations
 - c. national and international organizations pertinent to the specialty of Plastic surgery
 - d. research accounts
- c. The resident is expected to comprehend principles of care and decisions based on best available evidence.

Health Advocate:

1. 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 the patient.
2. For various patient groups at risk, the resident is expected to be aware of preventative measures that have been shown to be efficacious.

Scholar:

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

1. Generate a clinical question
2. Identify his/her own strengths and limitations
3. Develop a plan for doing the appropriate research
4. Assimilate and analyze the material available
5. Consult other physicians and allied health care personnel as needed
6. Propose a solution to the clinical question posed
7. Implement the solution
8. Evaluate the efficacy of the solution
9. Generate new relevant clinical questions

Professional:

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

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

NEURO-ONCOLOGY ROTATION SPECIFIC OBJECTIVES FOR MCMASTER UNIVERSITY NEUROSURGERY RESIDENTS

The goals and objectives of the neuro-oncology rotation is to advance the knowledge and practice of the resident in the principles of medical neuro-oncology. The resident is expected to attend all tumor board meetings, neuro-oncology clinics, rounds and gain a working knowledge of chemotherapy and radiotherapy, including radiosurgery as applied to tumors of the nervous system and related pathology.

Medical Expert:

1. The resident is expected to acquire in depth knowledge of the clinical presentation, diagnostic evaluation treatment, prognosis and follow up of tumors of the nervous system and related structures.
2. The resident is required to be knowledgeable in the pathology, classification, genetics and prevention strategies of tumors of the nervous system and related structures.
3. The resident is expected acquire in depth knowledge of adverse effects and complications of treatment of tumors of the nervous system and related structures.

Collaborator:

1. The resident is expected to demonstrate effective consultation with related disciplines in the overall management of patients with tumors of the nervous system.
2. Ability to develop collaborative research with the neuro-oncology team.

Patient Advocate:

1. The resident is expected to engage in preventive strategies for nervous system tumours and advocate for the best treatment for patients.

Scholar:

1. The resident is expected to engage in teaching and participate in ongoing research effectively during the rotation.

Professional:

1. The resident is expected to exhibit appropriate professional behaviors, including honesty, integrity, dedication, compassion, respect and altruism, demonstrate punctuality, demonstrate a commitment to delivering the highest quality care and recognize the principles and limits of patient confidentiality.

Communicator:

1. Recognize that being a good communicator is a core clinical skill for Neurosurgeons, and that effective physician-patient communication can foster patient satisfaction, physician satisfaction, and improved clinical outcomes.
2. Establish positive therapeutic relationships with patients and their families that are characterized by understanding, trust, respect, honesty and empathy.
3. Respect patient confidentiality, privacy and autonomy, listen effectively, recognize and respond to nonverbal cues, facilitate a structured clinical encounter effectively, use appropriate language and terminology to facilitate understanding and decision making accurately elicit and synthesize relevant information and perspectives of patients and families, colleagues, and other professionals, gather information about a disease and about a patient's beliefs, concerns, expectations and illness experience.
4. Convey relevant information and explanations accurately to patients and families, colleagues and other professionals, deliver information to a patient and family, colleagues and other professionals in a humane manner and in such a way that it is understandable, encourages discussion and facilitates participation in decision-making, address challenging communication issues effectively, such as obtaining informed consent, delivering bad news, and addressing anger, confusion and misunderstanding.
5. Maintain clear, accurate, and appropriate records of clinical encounters and plans and present oral reports of clinical encounters and plans.

NEUROPATHOLOGY ROTATION SPECIFIC OBJECTIVES FOR MCMMASTER UNIVERSITY NEUROSURGERY RESIDENTS

Residents in the neurosurgery training program at McMaster University undertake a 3 month rotation on the neuropathology service at Hamilton Health Sciences. Residents are expected to participate in all the activities of the service including brain cutting, autopsies, preparation and assessment of surgical specimens, preparation of pathology and cytology reports, tumor board meetings, rounds and teaching sessions.

OVERALL GOAL AND OBJECTIVE:

To consolidate the resident's knowledge about the anatomy and pathology of the normal and diseased nervous system.

MEDICAL EXPERT:

1. Gain an understanding of the basic pathological processes (general pathology).
2. Gain an understanding of the basic processes peculiar to the pathology of the nervous system, such as Wallerian degeneration and regeneration, demyelination, tumors.
3. Learn the anatomy and functions of the regions, tracts and nuclei of the CNS utilizing the specimens available in the pathology lab or museum.
4. Learn and correlate clinical and pathological findings related to the nervous system
5. Gain an appreciation for the diagnostic contribution made by the neuropathologist, and for the factors which may limit this contribution in some situations, for instance, the problems of small specimens or sampling error in the assessment of tumors.
6. Appropriately prepare gross and microscopic specimens of the nervous system for examination, including frozen sections
7. Display appropriate use of the light microscope.

COMMUNICATOR:

1. Understand the need for cooperation between the neurosurgeon and neuropathologist in the examination and diagnosis of neuropathological specimens.
2. Communicate effectively with neuropathologists and members of the pathology team.
3. Contribute toward the preparation of neuropathological reports with attention to clinical-pathological correlation.
4. Communicate examination results effectively to referring physicians and the health care team.

COLLABORATOR:

1. Contribute effectively to interdisciplinary team activities.
2. Be an active participant in the neuropathological examination of specimens. Show an interest in learning the role and duties of a neuropathologist.

LEADER:

1. Work effectively with the attending Neuropathologists and laboratory staff.
2. Recognize the necessary safety precautions entailed in the examination of tissue specimens removed at surgery and postmortem.
3. Show the appropriate respect to neuropathological specimens and results of the neuropathological examination.
4. Effectively use time to coordinate participation with diagnostic activities in the laboratory and reading.

HEALTH ADVOCATE:

1. Be aware of important determinants of health related to neuropathological diagnoses.
2. Awareness of the genetic basis for certain disorders and inheritance pattern including appropriate counselling
3. Awareness of infectious disorders that may require preventive action (e.g. HIV, AIDS-related illnesses, Creutzfeldt-Jakob disease).

SCHOLAR:

1. Develop, implement and monitor a personal continuing education strategy.
2. Critically appraise sources of medical information.
3. Facilitate learning of students and other health professionals.
4. Read widely during the Neuropathology rotation especially around cases seen while on clinical neurosurgery services where neuropathology is involved.
5. Be able to critically assess the neurosurgical literature as it relates to neuropathological diagnoses.
6. Participate in academic activities.
7. Participate in any ongoing research activities.

PROFESSIONAL:

1. Exhibit appropriate personal and interpersonal professional behaviors.
2. Practice medicine ethically consistent with obligations of a physician.
3. Be punctual and available for all the activities of the neuropathology division and be a reliable member of the team.

ROTATION SPECIFIC EDUCATIONAL OBJECTIVES FOR NEUROSURGERY RESIDENTS ON A NEURORADIOLOGY ROTATION

GENERAL AIMS

- 1 To acquire a systematic approach to the interpretation of imaging studies.
- 2 To understand the advantages, disadvantages and limitations of available imaging techniques for the study of lesions affecting the nervous system.

Medical Expert:

1 CLINICAL SKILLS

Given a patient with a neurological or neurosurgical condition undergoing radiologic assessment, the neurosurgery resident will be able to do the following to the satisfaction of his/her supervisor(s):

- 1 Summarize the clinical history from the chart, and identify the specific question(s) to be answered by the imaging study.
- 2 Provide a plan for the appropriate neuroradiologic investigation of common neurosurgical and neurological conditions.
- 3 Discuss the techniques and limitations of the various common neuroimaging modalities including: plain x-rays, computerized axial tomography, myelography and magnetic resonance imaging.
- 4 Discuss the indications, techniques, risks and interpretation of cerebral and spinal angiography.
- 5 Identify and interpret changes in the plain x-ray, magnetic resonance image and computerized axial tomogram of the neuraxis and propose the most probable and differential diagnosis of the common neurological conditions that produce such changes.
- 6 With the assistance of a neuroradiologist, write a brief, succinct report of the results of a neuroradiologic procedure.
- 7 Manage the patient throughout the entire neuroradiologic investigation, demonstrating knowledge of and being able to treat potential complications of the investigation including reactions to radiographic contrast material.
- 8 Discuss the role of neurointerventional procedures in the treatment of cerebral aneurysms, vasospasm, arteriovenous malformations and carotid artery disease.
- 9 Understanding of the administrative and communicative aspects of neuroradiologic procedure arrangements, particularly the importance of succinct clinical summaries for appropriate neuroimaging protocol planning and interpretation.
- 10 Knowledge of the general and detailed anatomy of the brain, skull and spine as seen on plain x-ray, computerized axial tomogram and magnetic resonance images.

- 11 Knowledge of the detailed anatomy of the extracranial and intracranial arterial and venous systems as seen on angiography.
- 12 Knowledge of the arterial and venous anatomy as seen on spinal angiography.
- 13 Understanding of the principles of magnetic resonance imaging - the significance of T1 and T2 weighted images, the role of specific imaging protocols to demonstrate particular pathology.
- 14 Differential diagnosis of problems of the nervous system based on the changes seen on MR and CT imaging studies.
- 15 Neurointerventional procedures as applied to the treatment of cerebral aneurysms, vasospasm, arteriovenous malformations and carotid artery disease.

Professional:

- 1 Respect for patients' rights to privacy.
- 2 A knowledge of the ethical and legal aspects of neuroradiology.
- 3 Honesty, reliability, and respectfulness in working with patients and colleagues alike.

Communicator:

- 1 The ability to keep succinct, pertinent, and up-to-date medical records.

Scholar:

- 1 The discipline of continued self-education and the appropriate application of this current knowledge to the clinical setting; the ability to supervise and educate undergraduate and postgraduate students in general surgery; the skills to educate colleagues, patients, families, and other health care professionals; the capacity to undertake research, and be aware of the importance of peer review protocols, ethical considerations, and the limitations of such endeavors.

Collaborator:

- 1 The ability and willingness to work in a cooperative manner with other health care personnel, being sensitive to their roles and abilities, and to be able to give and receive advice in a manner that is consistent with the harmonious operation of a health care team.

ROTATION SPECIFIC GOALS AND OBJECTIVES FOR NEUROSURGERY RESIDENTS IN ORTHOPEDICS BLOCK

PREAMBLE

These objectives are expected to serve as a guideline for the training of the neurosurgical resident rotating through the orthopedic service. These objectives have been formulated to conform to the CanMEDS 2015 principles and the objectives of training in Neurosurgery as recommended by the Royal College of Physicians and Surgeons of Canada. The objectives will be described under the headings of the various CanMEDS 2015 roles-those of Medical Expert, Communicator, Collaborator, Leader, Health Advocate, Scholar and Professional.

MEDICAL EXPERT

GENERAL OBJECTIVES

1. To gain a knowledge in the practice of initial trauma care, musculoskeletal physiology and pathophysiology pertinent to the practice of orthopedic surgery, especially spine surgery.
2. To gain a working knowledge of current orthopedic practice, especially spine surgery.

EDUCATIONAL OBJECTIVES

1. CLINICAL SKILLS

The resident is expected to participate and be able to perform initial trauma resuscitation, evaluation and care.

Given a patient with a musculoskeletal problem, the neurosurgery resident is expected to be able to do the following to the satisfaction of his/her supervisor(s):

1. Take a relevant history.
2. Perform an acceptable physical exam concentrating on the relevant areas.
3. Arrive at an appropriate differential diagnosis.
4. Order appropriate laboratory, radiologic and other diagnostic procedures demonstrating knowledge in the interpretation of these investigations, especially radiographs of long bones.
5. Arrive at an acceptable plan of management, demonstrating knowledge in operative and non-operative management of the disease process.
6. Formulate an initial hypothesis in light of conflicting data or events.
7. Manage patients in the ambulatory setting, demonstrating knowledge of common office techniques and procedures.

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8. Manage the patient throughout the entire in-hospital course, demonstrating knowledge of and being able to treat potential complications of the disease processes and operative procedures.
9. Provide a plan for patient follow-up.
10. Identify conditions that require urgent treatment (e.g., progressive neurological deterioration in a spinal cord injury patient, open long bone fracture, compartment syndrome).
11. Interpretation of radiographic long bone, pelvic, & spine images: MRI, CT, x-rays
12. Work-up for metastatic disease (Bloodwork, Radiological Imaging).

2) KNOWLEDGE BASE

Given a patient with a musculoskeletal problem, the neurosurgical resident rotating through orthopedics must be able to perform the clinical skills listed in section 1, and be able to demonstrate to the satisfaction of his/her supervisors(s) a fundamental knowledge and understanding of the general areas in 2a and a practical working knowledge of the specific disease processes listed in 2b. These lists are not intended to be exhaustive or exclusive.

a. General Areas

1. Anatomy and physiology of the musculoskeletal/locomotor system
 - a. muscles, tendons, ligaments, long bones, spine, pelvic
 - b. spinal & peripheral nerves
 - c. arterial & venous systems in extremities
2. Pharmacology as related to diseases of the bone and joints
 - a. Osteoporosis drugs
 - b. Calcium
 - c. Phosphate
 - d. Vitamin D
3. Resuscitation and care of the multiple injured patient in the trauma setting.
4. Principles of treatment of fractures, including open fractures.
5. Principles of treatment of soft tissue injuries.
6. Principles of treatment of spinal fractures.
7. Principles of treatment of spinal cord injuries.

b. Specific Disease Entities/Clinical Syndromes

1. Upper and lower extremity fractures (classification, treatment, complications & results)
2. Spinal fractures (diagnosis, treatment, complications and prognosis)
3. Ligamentous and tendinous injuries, especially pertaining to the spine

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4. Vascular and neurologic complications of limb injuries eg: Compartment syndrome
5. Principles of reconstruction of arthritic joints
6. Principles of treatment of degenerative spinal disease
 - a. spondylosis, spondylolisthesis
 - b. degenerative disc disease
7. Principles of spinal cord decompression & fusion (cervical, thoracic, lumbar, sacral)
8. Osteoporosis & Osteoarthritis
9. Bone Cancers
 - a. Primary Tumors (osteosarcoma, multiple myeloma, etc.)
 - b. Secondary Tumors (mets)

3) TECHNICAL SKILLS

At the end of a rotation on an orthopedic service, the neurosurgical resident must be able to show technical competence in the following procedures to the satisfaction of his/her supervisor(s).

1. Assisting (both first and second) in the operating room, developing a facility for anticipation of surgical maneuvers, gentle retraction on tissues, an ability to take direction well, to make reasonable suggestions and enquiry, and to contribute to a positive operating room atmosphere.
2. Surgical approaches to upper and lower extremities, and spine (decompression, fusion).
3. Closed reduction of fractures and cast application techniques in the ER setting.
4. Open reduction of fractures and application of internal fixation devices including plate and IM nails.
5. Surgical repair of tendon injuries.
6. Measurement of compartment pressures.
7. Traction of long bones for temporary reduction of fractures.
8. Cervical spine reduction with gardner wells (tongs) traction.
9. Use of halo vests, rigid C-spine collars (Aspen, Vista, Miami-J, SOMI), Jewitt brace, TLSO brace.

COMMUNICATOR

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

1. Patients and their relatives
 - a. To be able to explain the Orthopedic disease process
 - b. To be able to obtain an informed consent related to surgical procedures
2. Other physicians
 - a. Family Physicians

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- b. Other resident staff
 - c. Neurosurgical staff
 - d. Consultants in Internal Medicine, Respiriology, Endocrinology and others
 - e. Radiologists
 - f. Medical students and clinical clerks
 - g. Other surgical specialities
3. Health care professionals other than physicians
- a. Nursing staff
 - b. Physiotherapists
 - c. Occupational therapists
 - d. Social workers
 - e. Pharmacists
 - f. Clerical and other allied staff such as speech pathologists, Nutritionists, Psychologists, and others.

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

COLLABORATOR

1. The resident is expected to be able to participate in interdisciplinary team meetings.
2. The resident is expected to be able to consider and respect the opinions of other members of the health care team.
3. The resident is expected to be able to comprehend the depth of expertise of others, and contribute to decision making as an Orthopedic resident.
4. The resident is also expected to be aware of his/her limitations and those of other health care team members.
5. The resident is, in essence expected to be able to collaborate with other non-medical health care personnel to achieve the very best possible outcome for the patients.
6. The resident is expected to learn how to interact with specialists from other specialities. For combined cases, the collective and individual responsibilities to the patients need to be clearly understood. The boundaries between specialities have to be recognized and respected. Most importantly, the residents need to make sure that in a collaborative surgical effort, issues do not get missed.

LEADER

1. The resident needs to understand how to function within the confines of the structure, finances, and the general operation of the Canadian health care system.
2. The resident needs to be cognizant of the functioning of the organizations within the hospital such as:
 - a. committees at various levels,
 - b. Local organizations
 - c. national and international organizations pertinent to the speciality of orthopedics
 - d. research accounts

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3. 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.
4. The resident is expected to comprehend principles of care and decisions based on best available evidence.
5. The resident is expected to learn some practical matters such as arranging meetings and running meetings smoothly.

HEALTH ADVOCATE

1. 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.
2. 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 as spinal injury patients.
3. 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:

1. Generate a clinical question
2. Identify his/her own strengths and limitations
3. Develop a plan for doing the appropriate research
4. Assimilate and analyze the material available
5. Consult other physicians and allied health care personnel as needed
6. Propose a solution to the clinical question posed
7. Implement the solution
8. Evaluate the efficacy of the solution
9. Generate new clinical question as relevant

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Research issues: The resident is expected to (if time permits):

1. Generate a research question
2. Review relevant literature
3. Assimilate the literature
4. Identify and collaborate with appropriate personnel
5. Write a research proposal
6. Conduct the research
7. Disseminate the results of the results by:
 - a. Presenting at conferences
 - b. Writing a paper for publication
8. Identify future research possibilities

Educational issues:

1. The resident is expected to understand the principles of self-directed learning.
2. The resident is expected to teach the junior residents, clinical clerks, undergraduate students the various clinical and surgical aspects of Orthopedics.
3. The resident is expected to over the course of the program learn to impart appropriate clinical information to the allied health care personnel.
4. The resident is expected to review text-books, papers and other publications prior to surgery
5. and be comfortable with the surgical approach prior to coming to the operating room.
6. The resident is expected to be able to prepare for Orthopedics rounds and seminars at relatively short notice.
7. The resident is expected to be able to study and use all sources (electronic and written) to
8. Gather information relating to management of consultations seen in the emergency room and the Orthopedic wards.

PROFESSIONAL

At the end of the rotation, the resident must have demonstrated to the satisfaction of his/her supervisor(s):

1. The ability and willingness to work in a cooperative manner with other health care personnel, being sensitive to their roles and abilities, and to be able to give and receive advice in a manner that is consistent with the harmonious operation of a health care team.

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2. The ability to communicate with patients and their families explaining to them their disease process and the benefits, risks, and complications, and alternatives of management recommendations in terms each individual can comprehend.
3. Respect for patients' rights to privacy.
4. Sensitivity to the sexual, moral, ethical, religious and ethnic characteristics of the patient and family, understanding of the special psychological needs of the patient with musculoskeletal problems, and the capacity for supportive and compassionate care in the course of terminal disease.
5. A knowledge of the ethical and legal aspects of orthopedic surgery.
6. Honesty, reliability, and respectfulness in working with patients and colleagues alike.
7. The discipline of continued self-education and the appropriate application of this current knowledge to the clinical setting; the ability to supervise and educate undergraduate and postgraduate students; the skills to educate colleagues, patients, families, and other health care professionals; the capacity to undertake research, and be aware of the importance of peer review protocols, ethical considerations, and the limitations of such endeavors.
8. The ability to keep succinct, pertinent, and up-to-date medical records.

ROTATION SPECIFIC GOALS AND OBJECTIVES FOR NEUROSURGERY RESIDENTS IN PLASTIC SURGERY ELECTIVE BLOCK

PREAMBLE

These objectives are expected to serve as a guideline for the training of the neurosurgical resident rotating through a plastic surgical service. It is anticipated that the training will lead to the production of fully trained neurosurgeons with an understanding of benign and malignant lesions of the skin, wound creation and closure as well as the technical experience in optimal incision planning, suturing techniques and handling of wounds. In addition the resident should become comfortable dealing with the surgical treatment of common peripheral nerve disorders. He/She should also gain an understanding of plastic surgical practice as it relates to independent neurosurgical practice, be it in private practice or academic neurosurgery. These objectives have been formulated to conform to the CanMEDS 2015 principles and the objectives of training in Neurosurgery as recommended by the Royal College of Physicians and Surgeons of Canada and will be described under the CanMEDS 2015 roles- Medical Expert, Communicator, Collaborator, Leader, Health Advocate, Scholar and Professional.

Medical Expert:

General Objectives:

1. To obtain a fundamental knowledge of basic plastic surgery.
2. To obtain a practical working knowledge of plastic surgery.
3. To develop a thorough and in-depth knowledge of clinical plastic surgery as it relates to neurosurgical practice.
4. To develop excellence in clinical judgement.
5. To develop excellence in the basic techniques of plastic surgery.
6. To develop an interest and understanding of the techniques of clinical and basic science research as they relate to the clinical plastic surgery.
7. To develop an ability and interest in teaching.
8. To be adequately prepared to pass the Principles of Surgery examination and specialty examination in neurosurgery of the royal College of Physicians and Surgeons of Canada.
9. To master the principles of surgery as they relate to plastic surgery.
10. To obtain a detailed and accurate relevant history.

11. To carry out a thorough and accurate relevant clinical examination, especially the peripheral nervous system and brachial plexus.

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

Specific Objectives:

The development of competence in clinical plastic surgery requires the trainee:

1. To have an understanding of the fundamental of anesthetic options.

2. To become familiar with the basic science of plastic surgery including the pathophysiology of trauma, both general and specific to the plastic surgery service; pathophysiology of burns; wound healing in aseptic and septic conditions; options for wound closure; reconstructive surgery options for head, neck, hand, and trunk.

3. Trauma

- a. Polytraumatized patient
- b. Head and neck trauma
- c. Facial fractures
- d. Facial soft tissue injury
- e. Hand trauma including: Skin loss
 - i. Tendon injury
 - ii. Open and closed hand fractures

f. Burn patient

g. Frostbite

h. Hypothermia

4. Wound healing problems:

a. Diabetes

b. Immunosuppressed patients

c. Paraplegic patients

5. Hand lesions

a. Malformations

b. Deficiencies

6. Neoplastic skin lesions

a. Benign tumors

b. Malignant tumors

7. Soft tissue infections

a. Spontaneous

b. Post-traumatic

c. Post-operative

8. Techniques of skin surgery

9. Decompression of compressive peripheral neuropathy

10. Approaches to brachial plexus lesions

Communicator:

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

1. The resident is also expected to become very comfortable with presentation of clinical investigative information at teaching rounds and scientific conferences using contemporary electronic teaching aids. Specifically he/she needs to learn to put together a concise presentation that conveys relevant information without being exhaustive and be able to hold the attention of the audience, whatever the forum may be.
2. The ability to communicate with healthcare professionals, patients and their families explaining to them their disease process and the benefits, risks, and complications, and alternatives of management recommendations in terms each individual can comprehend.
3. The ability to keep succinct, pertinent, and up-to-date medical records.

Collaborator:

1. The ability and willingness to work in a cooperative manner with other health care personnel, being sensitive to their roles and abilities, and to be able to give and receive advice in a manner that is consistent with the harmonious operation of a health care team.

Leader:

- a. The resident needs to understand how to function within the confines of the structure, finances and the general operation of the Canadian health care system.
- b. The resident needs to appreciate the functioning of:
 1. Hospital committees at various levels
 2. Local organizations
 3. National and international organizations pertinent to the specialty of Plastic surgery
 4. Research accounts
- c. The resident is expected to comprehend principles of care and decisions based on best available evidence.

Health Advocate:

1. 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 the patient. This would obviously involve empathy and understanding of the patient's condition- not just medical but social.
2. For various patient groups at risk, the resident is expected to be aware of preventative measures that have been shown to be efficacious.

Scholar:

1. The discipline of continued self-education and the appropriate application of this current knowledge to the clinical setting; the ability to supervise and educate undergraduate and postgraduate students; the skills to educate colleagues, patients, families, and other health care professionals; the capacity to undertake research, and be aware of the importance of peer review protocols, ethical considerations, and the limitations of such endeavors.

Professional:

At the end of the rotation, the resident must have demonstrated to the satisfaction of his/her supervisor(s):

1. Respect for patients' rights to privacy.
2. Sensitivity to the sexual, moral, ethical, religious and ethnic characteristics of the patient and family, understanding of the special psychological needs of trauma patients and their families, and the ability to understand and respond to families of trauma patients as they go through the grieving process.
3. Knowledge of the ethical and legal aspects of plastic surgery.
4. Honesty, reliability, and respectfulness in working with patients and colleagues alike.

ROTATION SPECIFIC OBJECTIVES FOR NEUROSURGERY RESIDENTS DURING THEIR THORACIC SURGERY ROTATION

GENERAL AIMS

- 1 To gain an understanding of cardiopulmonary physiology and pathophysiology pertinent to the practice of surgery.
- 2 To gain a working knowledge of the current practice of thoracic surgery.

Medical Expert:

1 CLINICAL SKILLS

Given a patient with a thoracic condition, the resident will be able to do the following to the satisfaction of his/her supervisor(s):

- 1 Take a relevant history.
- 2 Perform an acceptable physical exam concentrating on the relevant areas.
- 3 Arrive at an appropriate differential diagnosis.
- 4 Order appropriate laboratory, radiologic and other diagnostic procedures demonstrating knowledge in the interpretation of these investigations, especially the chest xray and the CT scan.
- 5 Arrive at an acceptable plan of management, demonstrating knowledge in operative and non-operative management of the disease process.
- 6 Formulate an initial hypothesis in light of conflicting data or events.
- 7 Manage patients in the ambulatory setting, demonstrating a knowledge of common office techniques and procedures.
- 8 Manage the patient throughout the entire in-hospital course, demonstrating knowledge of and being able to treat potential complications of the disease processes and operative procedures.
- 9 Provide a plan for patient follow-up.
- 10 Identify conditions that require urgent treatment.

2 TECHNICAL SKILLS

At the end of a rotation on a thoracic surgery service, the resident must be able to show technical competence in the following procedures to the satisfaction of his/her supervisor(s):

- 1 Assisting (both first and second) in the operating room, developing a facility for anticipation of surgical maneuvers, gentle retraction on tissues, an ability to take direction well, to make reasonable suggestions and enquiry, and to contribute to a positive operating room atmosphere.
- 2 Insertion and removal of chest tubes with minimal physical and emotional discomfort for the patient.
- 3 Emergency treatment of tension pneumothorax.
- 4 Opening and closing of a thoracotomy incision.
- 5 Intercostal nerve block.
- 6 Arterial blood stab.
- 8 Bronchoscopy and esophagogastroscopy.
- 9 Thoracoscopy.
- 10 Minor chest wall injuries.

Professional:

- 1 Respect for patients' rights to privacy.
- 2 Sensitivity to the sexual, moral, ethical, religious and ethnic characteristics of the patient and family, understanding of the special psychological needs of the patient with thoracic disease, and the capacity for supportive and compassionate care in the course of terminal disease.
- 3 A knowledge of the ethical and legal aspects of thoracic surgery.
- 4 Honesty, reliability, and respectfulness in working with patients and colleagues alike.

Communicator:

- 1 The ability to communicate with healthcare professionals, patients and their families explaining to them their disease process and the benefits, risks, and complications, and alternatives of management recommendations in terms each individual can comprehend.
- 2 The ability to keep succinct, pertinent, and up-to-date medical records.

Scholar:

- 1 The discipline of continued self-education and the appropriate application of this current knowledge to the clinical setting; the ability to supervise and educate undergraduate and postgraduate students in general surgery; the skills to educate colleagues, patients, families, and other health care professionals; the capacity to undertake research, and be aware of the importance of peer review protocols, ethical considerations, and the limitations of such endeavors.

Collaborator:

- 1 The ability and willingness to work in a cooperative manner with other health care personnel, being sensitive to their roles and abilities, and to be able to give and receive advice in a manner that is consistent with the harmonious operation of a health care team.

Trauma

Medical Expert

GENERAL OBJECTIVES

- 1 To gain a knowledge of the physiology of the traumatized patient.
- 2 To gain a knowledge of the multidisciplinary nature of trauma management and the roles of the various sub-specialties.
- 3 To understand the functions of the trauma team, trauma team leader and members within the team.
- 4 To understand the role of the neurosurgeon in the management of head injuries associated with multi-system trauma.
- 5 To gain technical expertise helpful to the developing surgeon

EDUCATIONAL OBJECTIVES

CLINICAL SKILLS

Given a trauma patient, the neurosurgery resident will be able to do the following to the satisfaction of his/her supervisor(s):

- 1 Assess the trauma patient rapidly and accurately and demonstrate concepts and principles of primary and secondary patient assessment.
- 2 Resuscitate and stabilize the patient on a priority basis and establish management priorities in a trauma situation.
- 3 Initiate primary and secondary management necessary within the first hour of emergency care for acute life threatening emergencies
- 4 Manage the trauma patient subsequent to the resuscitation in the emergency department.
- 5 Diagnose and manage commonly encountered orthopedic injuries, abdominal injuries, thoracic injuries and head injuries.
- 6 Understand the use of ancillary and consultative services to aid in the comprehensive management of the trauma patient.
- 7 Understand the psychosocial aspects of the trauma patient including the dynamics of the trauma family, the interaction with the medical/legal profession as well as other community agencies such as Community Care Access Centre and the police department.

- 8 Understand the importance of trauma prevention.

KNOWLEDGE BASE

Given a trauma patient, the core surgical resident must be able to perform the clinical skills listed in section 1, and be able to demonstrate to the satisfaction of his/her supervisors(s) a fundamental knowledge and understanding of the specific areas in 2; This list is intended to be a guide, and is neither exhaustive nor exclusive.

Specific Areas

- 1 Initial triage and stabilization of the trauma patient at a peripheral centre.
- 2 Pre-hospital care to ensure the safe transfer of an acutely injured patient.
- 3 Establishment of emergency treatment priorities and immediate management of the following life threatening conditions:
 - a airway obstruction
 - b shock and overt hemorrhage
 - c pneumothorax
 - d hemothorax
 - e cardiac tamponade
 - f fractured cervical spine
- 4 Appropriate diagnostic procedures for conditions identified during a detailed physical examination.
- 5 Diagnostic procedures and management principles for conscious and unconscious patients with traumatic head injury.
 - a assessment - Glasgow Coma Scale
 - b investigations - skull x-rays, CT scan
 - c initial management - appropriate use of mannitol
- 6 Elicit and interpret the clinical features of spinal, paraspinal and cord injuries.
 - a clinical signs
 - b categorization
 - c C-spine protocol and C-spine clearance
 - d investigations - x-ray, CT scan, MRI
 - e initial management measures
7. Facial and cervical injuries:
 - a assessment of extent of injury
 - b investigation
 - c initial management
8. Diagnose and perform the initial management of:
 - a tension pneumothorax
 - b open sucking chest wound
 - c massive hemorrhage
 - d flail chest
 - e cardiac tamponade

9. Diagnose and understand the initial management of:
 - a pulmonary contusion
 - b aortic rupture
 - c tracheobronchial tree injuries
 - d diaphragmatic rupture
 - e esophageal rupture

10. Airway management:
 - a orotracheal airway insertion
 - b nasopharyngeal airway intubation
 - c ventilation without intubation
 - d adult oral tracheal intubation
 - e adult nasotracheal intubation
 - f infant endotracheal intubation
 - g needle cricothyroidotomy
 - h surgical cricothyroidotomy
 - i translaryngeal tracheostomy
 - j open tracheostomy

11. Resuscitation techniques in the hypothermic patient.

12. Shock:
 - a define and classify
 - b initial fluid management and evaluation of fluid resuscitation and organ perfusion in the trauma patient:
 - i estimate fluid and blood losses
 - ii fluid replacement with respect to crystalloid, blood products
 - c use of pneumatic anti-shock garments

13. Nutritional problems in the trauma patient:
 - a identify trauma patients at risk of nutritional disturbance and describe factors responsible for the disorder.
 - b prepare a nutritional plan for the trauma patient
 - c fluid and electrolyte disorders in the trauma patient
 - d describe the maintenance requirements of intravenous fluids and electrolytes
 - e. diagnosis of fluid and electrolyte and acid-base disturbances
 - f. appropriate clinical or laboratory investigations
 - g management of water and electrolyte or acid-base disorders
 - h enteral and total parenteral nutrition
 - i percutaneous gastric tube insertion for enteral feeding
 - j open feeding jejunostomy tube insertion

14. Pharmacological basis of trauma management:
 - a understand the pharmacological properties of the common medications used in the management of the trauma patient with respect to medical problems
 - b understand the pharmacological properties and the common use of the common inotropic agents in the ICU

15. Rehabilitation medicine:
 - a outline the basis of spinal cord rehabilitation

- b outline the basic rehabilitation plan for closed head injured patients
- c outline the basic rehabilitation plan for the multiple injured patient
- d be aware of the different ancillary services available to the trauma patient in southwestern Ontario including rehabilitation medicine, occupational medicine, convalescence
- e have knowledge of insurance-related injuries and claims
- f have an understanding of Bill 59 and knowledge of what services can be accessed

16 Trauma prevention and injury prevention

- a. describe the different programs that are available for trauma prevention including the IMPACT Program and the Outreach Program

3 TECHNICAL SKILLS

At the end of a trauma rotation, the neurosurgical resident must be able to show technical competence in the following procedures to the satisfaction of his/her supervisor(s).

- 1 Primary and secondary assessment of the patient with multiple injuries.
- 2 Establish a patent airway and initiate one and two man ventilation.
- 3 Orotracheal and nasotracheal intubation.
- 4 Cricothyroidotomy.
- 5 Initiation of percutaneous and venous access, central intravenous access with central venous pressure monitoring, intraosseous infusion, postop symmetry monitoring.
- 6 Venous cutdown.
- 7 Pleural decompression by needle thoracentesis and chest tube insertion.
- 8 Pericardiocentesis.
- 9 Roentgenographic identification of thoracic injuries.
- 10 Roentgenographic identification of spine injuries.
- 11 Immobilization and stabilization of extremity injuries.
- 12 Immobilization and stabilization of spine injuries.

Communicator:

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

1. The ability to communicate with healthcare professionals, patients and their families, explaining to them their disease process and the benefits, risks, and complications, and alternatives of management recommendations in terms each individual can comprehend.
2. The resident is also expected to become very comfortable with presentation of clinical and investigative information at teaching rounds and scientific conferences using computerized

teaching aids.

3. The ability to keep succinct, pertinent, and up-to-date medical records.

Collaborator:

1. The ability and willingness to work in a cooperative manner with other health care personnel, being sensitive to their roles and abilities, and to be able to give and receive advice in a manner that is consistent with the harmonious operation of a health care team.

Leader:

1. The resident needs to understand how to function within the confines of the structure, finances and the general operation of the Canadian health care system.
2. The resident needs to be cognizant of the functioning of the organizations within the hospital such as:
 1. committees at various levels
 2. local organizations
 3. national and international organizations pertinent to the specialty of trauma
 4. research account
3. The resident is expected to comprehend principles of care and decisions based on best available evidence.

Health Advocate:

1. 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 the patient.
2. For various patient groups at risk, the resident is expected to be aware of preventative measures that have been shown to be efficacious.
3. 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:

1. The discipline of continued self-education and the appropriate application of this current knowledge to the clinical setting; the ability to supervise and educate undergraduate and postgraduate students; the skills to educate colleagues, patients, families, and other health care professionals; the capacity to undertake research, and be aware of the importance of peer review protocols, ethical considerations, and the limitations of such endeavors.

Professional:

At the end of the rotation, the resident must have demonstrated to the satisfaction of his/her supervisor(s):

1. Respect for patients' rights to privacy.

2. Sensitivity to the sexual, moral, ethical, religious and ethnic characteristics of the patient and family, understanding of the special psychological needs of trauma patients and their families, and the ability to understand and respond to families of trauma patients as they go through the grieving process.
3. Knowledge of the ethical and legal aspects of trauma management.
4. Honesty, reliability, and respectfulness in working with patients and colleagues alike.

ROTATION SPECIFIC OBJECTIVES FOR NEUROSURGERY RESIDENTS ON A UROLOGY SERVICE

GENERAL AIMS

- 1 To gain an understanding of lesions of genitourinary physiology and pathophysiology pertinent to the practice of surgery.
- 2 To gain a working knowledge of urologic surgery as currently practiced.

Medical Expert:

1 CLINICAL SKILLS

Given a patient with a urologic condition, the resident will be able to do the following to the satisfaction of his/her supervisor(s):

- 1 Take a relevant history.
- 2 Perform an acceptable physical exam concentrating on the relevant areas.
- 3 Arrive at an appropriate differential diagnosis.
- 4 Order appropriate laboratory, radiologic and other diagnostic procedures demonstrating knowledge in the interpretation of these investigations.
- 5 Arrive at an acceptable plan of management, demonstrating knowledge in operative and non-operative management of the disease process.
- 6 Formulate an initial hypothesis in light of conflicting data or events.
- 7 Manage patients in the ambulatory setting, demonstrating a knowledge of common office techniques and procedures.
- 8 Manage the patient throughout the entire in-hospital course, demonstrating knowledge of and being able to treat potential complications of the disease processes and operative procedures.
- 9 Provide a plan for patient follow-up.
- 10 Identify conditions that require urgent treatment.

At the end of the rotation, the resident must have demonstrated to the satisfaction of his/her supervisor(s):

Professional:

- 1 Respect for patients' rights to privacy.
- 2 Sensitivity to the sexual, moral, ethical, religious and ethnic characteristics of the patient and family, understanding of the special psychological needs of the patient with urologic disease, and the capacity for supportive and compassionate care in the course of terminal disease.
- 3 A knowledge of the ethical and legal aspects of urologic surgery.
- 4 Honesty, reliability, and respectfulness in working with patients and colleagues alike.

Communicator:

- 1 The ability to communicate with healthcare professionals, patients and their families explaining to them their disease process and the benefits, risks, and complications, and alternatives of management recommendations in terms each individual can comprehend.
- 2 The ability to keep succinct, pertinent, and up-to-date medical records.

Scholar:

- 1 The discipline of continued self-education and the appropriate application of this current knowledge to the clinical setting; the ability to supervise and educate undergraduate and postgraduate students in general surgery; the skills to educate colleagues, patients, families, and other health care professionals; the capacity to undertake research, and be aware of the importance of peer review protocols, ethical considerations, and the limitations of such endeavors.

Collaborator:

- 1 The ability and willingness to work in a cooperative manner with other health care personnel, being sensitive to their roles and abilities, and to be able to give and receive advice in a manner that is consistent with the harmonious operation of a health care team.

ROTATION SPECIFIC OBJECTIVES FOR NEUROSURGERY RESIDENTS ON A VASCULAR SURGERY SERVICE

Preamble:

These objectives have been formulated to conform to the CanMEDS format and are expected to guide the Neurosurgical residents and the supervisors in vascular surgery. They are described under the headings of the CanMEDS roles-those of Medical Expert, Communicator, Collaborator, Leader, Health Advocate, Scholar and Professional.

Medical Expert:

The general aims of this rotation are:

- a. To gain an understanding of radiologic and non-invasive assessment of arterial, venous and lymphatic diseases
- b. To develop an ability to localize the level of obstruction in exercise-induced leg ischemia by history and clinical examination.
- c. To gain technical expertise with arteries and veins pertinent to the practice of Neurosurgery.

Given a patient with a vascular disorder, the neurosurgery resident is expected to be able to perform the following to the satisfaction of his/her supervisor(s):

- 1 Take a relevant history.
- 2 Perform an acceptable physical exam concentrating on the relevant areas.
- 3 Arrive at an appropriate differential diagnosis.
- 4 Order appropriate laboratory, radiologic and other diagnostic procedures demonstrating knowledge in the interpretation of these investigations.
- 5 Arrive at an acceptable plan of management, demonstrating knowledge in operative and non-operative management of the disease process.
- 6 Formulate an initial hypothesis in light of conflicting data or events.
- 7 Manage patients in the ambulatory setting, demonstrating a knowledge of common office techniques and procedures.
- 8 Manage the patient throughout the entire in-hospital course, demonstrating knowledge of and being able to treat potential complications of the disease processes and operative procedures.
- 9 Provide a plan for patient follow-up.
- 10 Identify conditions that require urgent treatment.

Given a patient with vascular disease, the Neurosurgical resident must be able to perform the clinical skills listed above, and be able to demonstrate to the satisfaction of his/her supervisor(s) a fundamental knowledge and understanding of the general and specific areas listed below. The resident is also expected to be able to acquire the technical skills listed below during the vascular rotation.

General Areas

- 1 Anatomy and physiology of the arterial, venous and lymphatic systems, with emphasis on the arteries to the leg, the arterial and venous relationships at the inguinal region, the carotid bifurcation, the subclavian artery and vein, and the abdominal aorta and vena cava.

Specific Areas

- 1 Extracranial vascular disease (carotid).

Technical Skills

At the end of a rotation on a vascular surgical service, the resident must be able to show technical competence in the following procedures to the satisfaction of his/her supervisor(s). This list is intended to be a guide, and is neither exhaustive nor exclusive

- 1 Assisting (both first and second) in the operating room, developing a facility for anticipation of surgical maneuvers, gentle retraction on tissues, an ability to take direction well, to make reasonable suggestions and enquiry, and to contribute to a positive operating room atmosphere.
- 2 Control of hemorrhage in emergency situations.
- 3 Exposure of the extracranial carotid artery without injury to artery or surrounding structures.
- 4 Repair of traumatized artery.
- 5 Patch of a diseased artery.
- 6 Vascular anastomosis of a large vessel.

Professional:

- 1 Respect for patients' rights to privacy.
- 2 Sensitivity to the sexual, moral, ethical, religious and ethnic characteristics of the patient and family, understanding of the special psychological needs of the patient with vascular disease, and the capacity for supportive and compassionate care in the course of terminal disease.
- 3 A knowledge of the ethical and legal aspects of vascular surgery.
- 4 Honesty, reliability, and respectfulness in working with patients and colleagues alike.

Communicator:

- 1 The ability to communicate with healthcare professionals, patients and their families explaining to them their disease process and the benefits, risks, and complications, and alternatives of management recommendations in terms each individual can comprehend.
- 2 The ability to keep succinct, pertinent, and up-to-date medical records.

Scholar:

- 1 The discipline of continued self-education and the appropriate application of this current knowledge to the clinical setting; the ability to supervise and educate undergraduate and postgraduate students in general surgery; the skills to educate colleagues, patients,

families, and other health care professionals; the capacity to undertake research, and be aware of the importance of peer review protocols, ethical considerations, and the limitations of such endeavors.

Collaborator:

- 1 The ability and willingness to work in a cooperative manner with other health care personnel, being sensitive to their roles and abilities, and to be able to give and receive advice in a manner that is consistent with the harmonious operation of a health care team.