

Specialty Training Requirements (STR)

Name of Specialty:	Neurosurgery
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Note: In addition to the training requirements stated in this STR, residents must comply with any other regulatory requirements or practice-based requirements mandated by the healthcare institutions or place of practice.

Scope of Neurosurgery

Neurosurgery is a specialty of surgery that encompasses operative and non-operative management (i.e. prevention, diagnosis, evaluation, interpretation of imaging, treatment, critical care, and rehabilitation) of disorders of the central, peripheral, and autonomic nervous systems. This includes their supporting structures and vascular supply; the evaluation and treatment of pathological processes that modify the function or activity of the nervous system, including the hypophysis; and the operative and non-operative management of pain.

Purpose of the Residency Programme

The Neurosurgery residency programme aims to produce a graduate with the appropriate knowledge, clinical skills and attitude to function independently and ethically as a general neurosurgeon in Singapore. The clinical competencies expected include sound clinical judgement, operative technical competence, good communication and ability to engage with current evidence to provide up-to-date patient-centred care in collaboration with rest of healthcare team.

Admission Requirements

At the point of application for this residency programme,

- a) Applicants must be employed by employers endorsed by Ministry of Health (MOH); and
- b) Residents who wish to switch to this residency programme must have waited at least one year between resignation from his / her previous residency programme and application for this residency programme.

At the point of entry to this residency programme, residents must have fulfilled the following requirements:

- a) Hold a local medical degree or a primary medical qualification registrable under the Medical Registration Act (Second Schedule);
- b) Have completed Post-Graduate Year 1 (PGY1);
- c) Have a valid Conditional or Full Registration with Singapore Medical Council (SMC); and
- d) Completed Surgery-In-General residency programme.

Selection Procedures

Applicants must apply for the programme through the annual residency intake matching exercise conducted by MOH Holdings (MOHH).

Continuity plan: Selection should be conducted via a virtual platform in the event of a protracted outbreak whereby face-to-face on-site meeting is disallowed and cross institution movement is restricted.

Less Than Full Time Training

Less than full time training is not allowed. Exceptions may be granted by Specialist Accreditation Board (SAB) on a case-by-case basis.

Non-traditional Training Route

The programme must not accept application for mid-stream entry to the residency programme by International Medical Graduates (IMG).

Separation

The PD must verify residency training for all residents within 30 days from the point of notification for residents' separation / exit, including residents who did not complete the programme.

Duration of Specialty Training

The training duration must be 48 months.

Maximum candidature: All residents must complete the training requirements, requisite examinations and obtain their exit certification from JCST not more than 36 months beyond the usual length of their training programme. The total candidature for Neurosurgery is 24 months SIG residency + 48 months Neurosurgery residency + 36 months candidature.

Nomenclature: Because residents continue with Neurosurgery residency after the 2-year SIG residency, residents in first year of Neurosurgery residency are denoted as R3, residents in 2nd year of Neurosurgery residency as R4, etc.

“Make-up” Training

“Make-up” training must be arranged when residents:

- Exceed days of allowable leave of absence / duration away from training; or
- Fail to make satisfactory progress in training.

The duration of make-up training should be decided by the Joint Coordinating Committee (JCC)¹ and should depend on the duration away from training and / or the time deemed necessary for remediation in areas of deficiency. The JCC should review residents' progress at the end of the “make-up” training period and decide if further training is needed.

¹ The JCC is established for Integrated Programmes (IPs) to oversee resident selection, training curriculum, and faculty and resident evaluations.

Any shortfall in core training requirements must be made up by the stipulated training year and / or before completion of residency training.

Learning Outcomes: Entrustable Professional Activities (EPAs)

Residents must achieve level 4 of the following EPAs by the end of residency training:

	Title
EPA 1	Managing General Neurosurgical Outpatient Clinics
EPA 2	Managing Neurosurgical Inpatients
EPA 3	Performing On-call Duties
EPA 4	Performing Neurosurgical Procedures
EPA 4.1	Craniotomy and resection of Convexity Meningioma
EPA 4.2	Craniotomy for intra-axial brain tumours
EPA 4.3	Decompressive Craniectomy
EPA 4.4	Aneurysm Approach / Craniotomy and Splitting of the Sylvian Fissure
EPA 4.9	Adult VP Shunt Insertion/Revision and Ventriculostomy

Residents must achieve level 3 of the following EPAs by the end of residency training:

	Title
EPA 4.5	Anterior Cervical Exposure, Discectomy and Fusion
EPA 4.6	Posterior Spinal Exposure and Decompression without instrumentation

Residents must achieve level 2 of the following EPAs by the end of residency training:

	Title
EPA 4.7	Paediatric VP Shunt Insertion and Ventriculostomy
EPA 4.8	Paediatric Craniotomy

Learning Outcomes: Core Competencies, Sub-competencies and Milestones

The programme must integrate the following competencies into the curriculum, and structure the curriculum to support resident attainment of these competencies in the local context.

Residents must demonstrate the following core competencies:

1) Patient Care and Procedural Skills

Residents must demonstrate the ability to:

- Gather essential and accurate information about the patient
- Counsel patients and family members
- Make informed diagnostic and therapeutic decisions
- Prescribe and perform essential medical procedures
- Provide effective, compassionate and appropriate health management, maintenance, and prevention guidance

Residents must demonstrate competence in performing General (Adult & Paediatric, non-procedure specific) procedures, to include:

- Managing General Neurosurgical Outpatient Clinics
- Managing Neurosurgical Inpatients
- Performing On-call Duties
- Paediatric VP Shunt Insertion and Ventriculostomy
- Paediatric Craniotomy

Residents must demonstrate competence in performing neurosurgical operative procedures, including adult cranial procedures, to include:

- Craniotomy and resection of Convexity Meningioma
- Craniotomy for Intra-Axial Brain Tumours, including Posterior Fossa Lesions
- Decompressive Craniectomy
- Aneurysm Approach / Craniotomy and Splitting of the Sylvian Fissure

Residents must demonstrate competence in performing neurosurgical operative procedures, including adult spinal procedures, to include:

- Posterior Spinal Exposure and Decompression without Instrumentation

Residents must demonstrate competence in performing neurosurgical operative procedures, including adult CSF / ventricular procedures, to include:

- Adult VP Shunt Insertion/Revision and Ventriculostomy

2) Medical Knowledge

Residents must demonstrate knowledge of established and evolving biomedical, clinical, epidemiological and social-behavioural sciences, as well as the application of this knowledge to patient care.

Residents must demonstrate knowledge of basic science relevant to neurosurgical practice: anatomy, physiology, pharmacology, pathology, microbiology.

Residents must demonstrate knowledge of neurosurgical emergencies.

Residents must demonstrate knowledge of treatment of neurosurgical conditions, to include:

- Cerebrovascular disorders
- Functional neurosurgery
- Neurocritical care
- Neuro-oncology
- Pain

- Paediatric neurological surgery
- Peripheral nerve disorders
- Spinal disorders
- Trauma

Residents must demonstrate knowledge of different medical practice models and delivery systems and how to best utilize them to care for an individual neurosurgical patient.

3) System-based Practice

Residents must demonstrate the ability to:

- Work effectively in various health care delivery settings and systems relevant to their clinical specialty
- Coordinate patient care within the health care system relevant to their clinical specialty
- Incorporate considerations of cost awareness and risk/benefit analysis in patient care
- Advocate for quality patient care and optimal patient care systems
- Work in inter-professional teams to enhance patient safety and improve patient care quality. This includes effective transitions of patient care and structured patient hand-off processes.
- Participate in identifying systems errors and in implementing potential systems solutions

4) Practice-based Learning and Improvement

Residents must demonstrate a commitment to lifelong learning.

Resident must demonstrate the ability to:

- Investigate and evaluate patient care practices
- Appraise and assimilate scientific evidence
- Improve the practice of medicine
- Identify and perform appropriate learning activities based on learning needs

5) Professionalism

Residents must demonstrate a commitment to professionalism and adherence to ethical principles including the Singapore Medical Council's Ethical Code and Ethical Guidelines (ECEG).

Residents must:

- Demonstrate professional conduct and accountability
- Demonstrate humanism and cultural proficiency
- Maintain emotional, physical and mental health, and pursue continual personal and professional growth
- Demonstrate an understanding of medical ethics and law

6) Interpersonal and Communication skills

Residents must demonstrate ability to:

- Effectively exchange information with patients, their families and professional associates.
- Create and sustain a therapeutic relationship with patients and families
- Work effectively as a member or leader of a health care team
- Maintain accurate medical records

Other Competency: Teaching and Supervisory Skills

Residents must demonstrate ability to:

- Teach others
- Supervise others

Residents must demonstrate participation in teaching of medical students / nurses / peers.

Learning Outcomes: Others

Residents must attend Medical Ethics, Professionalism and Health Law course conducted by Singapore Medical Association (SMA) and Geriatric Medicine Modular Course by Academy of Medicine Singapore (AMS).

Residents must attend the following course:

- a) Quality Improvement Course

Residents must obtain and maintain valid certification in the following:

- a) Basic Cardiac Life Support
- b) Advanced Cardiac Life Support
- c) Advanced Trauma Life Support

Curriculum

The curriculum and detailed syllabus relevant for local practice must be made available in the Residency Programme Handbook and given to the residents at the start of residency.

The PD must provide clear goals and objectives for each component of clinical experience.

Learning Methods and Approaches: Scheduled Didactic and Classroom Sessions

The programme must organise a series of didactic educational sessions that cover the core knowledge of Neurosurgery.

The programme must schedule the following teaching activities at least once a month:

- a) Resident tutorials
- b) Departmental conferences (e.g., X-ray meeting, morbidity and mortality meeting, journal club, surgical pathology meeting)
- c) Multidisciplinary conferences (e.g., tumour board, vascular meetings)

Residents should fulfil any prevailing MOH protected training time requirement.

Learning Methods and Approaches: Clinical Experiences

Between R3 and R6, all residents are required to fulfil the below mentioned mandatory duration at each site:

- Tan Tock Seng Hospital (TTSH, a principal training site) – 12 months
- Singapore General Hospital (SGH, a principal training site) – 12 months
- National University Hospital (NUH, a principal training site) – 12 months
- Ng Teng Fong General Hospital (NTFGH) – 3 months
- KK Women's and Children's Hospital (KKH) – 3 months
- Final 6 months will be spent in either of the principal training sites (TTSH, SGH or NUH).

Each year of training must be anchored in either TTSH, SGH or NUH as the principal training site with a maximum 3-month attachment with a participating site (NTFGH or KKH) during R4 and R5.

R3

- R3 residents must complete:
 - One (1) year of clinical neurosurgery rotation at either TTSH, SGH or NUH
 - Clinical exposure of R3 residents during these postings must include:
 - Neurotrauma
 - Neuro-oncology
 - Spine surgery
 - Neurovascular surgery
 - Skull base and pituitary surgery

R4 and R5

- R4 and R5 residents must complete:
 - Eighteen (18) months of clinical neurosurgery rotations at either TTSH, SGH or NUH during these two years
 - Three (3) months of clinical neurosurgery rotations at NTFGH during R4
 - Clinical exposure of R4 and R5 residents during these postings must include:
 - Full spectrum of adult neurosurgical illness (operative and non-operative)
 - Advanced consultation-based neurosurgery practice
- R5 residents must also complete:
 - Three (3) months of paediatric neurosurgery rotation at KKH
 - Clinical exposure for R5 residents during this posting must include:

- Paediatric trauma care (Level 1 trauma centre exposure)
- Management of congenital and acquired paediatric hydrocephalus
- Craniofacial surgery
- Epilepsy surgery
- Spinal dysraphism
- Paediatric neuro-oncology

R6

- R6 residents must complete:
 - Two (2) six-month rotations at either TTSH, SGH, or NUH
 - Clinical exposure of R6 residents must include:
 - Full spectrum of neurosurgical cases (operative and non-operative)
 - Advanced subspecialty exposure based on resident's area of interest (post-examination)

In the event of a protracted outbreak, whereby cross-institution movement is restricted, residents should continue their rotation in their own sponsoring institution.

Learning Methods and Approaches: Scholarly/Teaching Activities

Residents must complete the following scholarly / teaching activities:

	Name of activity	Brief description: nature of activity, minimum number to be achieved, when it is attempted
1.	Quality Improvement (QI) project	One during residency

Elective Scholarly Activity that is encouraged

	Name of activity	Brief description: nature of activity, when it is attempted
1.	Clinical research project	Research project of residents' interest any time during training; it can be a single long project or a series of small projects.
2.	Publication in peer-review	It can be a case report of interest or clinical significance, prospective studies of relevance to neurology, retrospective analyses or clinical observation reports.
3.	Conference abstract presentation	to present one conference abstract at a local, regional or international conference.
4.	Evidence based Medicine course	to attend an Evidence-based-medicine course & be able to critically review / appraise published literature

		for clinical practice and present during journal watch / club.
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Learning Methods and Approaches: Documentation of Learning

Starting from the R3 residents in AY2026, all residents must achieve and log a minimum of 150 surgical procedures annually of which at least 100 procedures must be core procedures.

Core Operative Neurosurgical Procedures:

Cranial

- Trauma
- Cerebrovascular
- Intrinsic and Extrinsic Tumours
- Meninges
- Pituitary
- CSF circulation

Spinal

- Trauma
- Degenerative C-spine
- Degenerative T-spine
- Degenerative L-spine

Elective Procedures (Optional)

Cranial

- Craniofacial
- Pineal
- Cranial Nerves
- Functional / Pain
- Epilepsy
- Infection

Spinal

- Vascular
- Tumour
- Spinal dysraphism
- Infection
- Functional/Pain

Peripheral Nerve

- Decompression

Other

- Suture of Wounds
- Diagnostic Biopsy Procedures

Summative Assessments

	Summative assessments	
	Clinical, patient-facing, psychomotor skills etc.	Cognitive, written etc.
R6	Joint Specialty Fellowship (JSF) Examination 1. Oral Viva – 3 stations (30 mins each) 2. Clinical Examination – 4 short cases (10 mins each)	MCQ written examination – 150 single best answer (approx. 3 hours)
R5	Nil	Nil
R4	Nil	Nil
R3	Nil	Nil

S/N	<u>Learning outcomes</u>	<u>Summative assessment components</u>		
		Component a: MCQ	Component b: Oral Viva	Component c: Clinical Viva
1	EPA 1: Managing General Neurosurgical Outpatient Clinics	✓		
2	EPA 2: Managing Neurosurgical Inpatients	✓	✓	✓
3	EPA 3: Performing On-call Duties			✓
4	EPA 4: Performing Neurosurgical Procedures	✓	✓	✓
5	EPA 4.1: Craniotomy and resection of Convexity Meningioma	✓	✓	✓

6	EPA 4.2: Craniotomy for intra-axial brain tumours	✓	✓	✓
7	EPA 4.3: Decompressive Craniectomy	✓	✓	✓
8	EPA 4.4: Aneurysm Approach / Craniotomy and Splitting of the Sylvian Fissure	✓	✓	✓
9	EPA 4.5: Anterior Cervical Exposure, Discectomy and Fusion	✓	✓	✓
10	EPA 4.6: Posterior Spinal Exposure and Decompression without instrumentation	✓	✓	✓
11	EPA 4.7: Paediatric VP shunt and ventriculostomy	✓	✓	✓
12	EPA 4.8: Paediatric Craniotomy	✓	✓	✓
13	EPA 4.9: Adult VP shunt and ventriculostomy	✓	✓	✓