

### (A) INTRODUCTION

#### Background

Paediatric Surgery (PS) encompasses a broad range of congenital and acquired surgical diseases in babies, children and adolescents. PS diseases include operative and non-operative paediatric and neonatal conditions in general surgery, non-cardiac thoracic surgery, urology and gynaecology.

#### Training outcomes

The objective of the programme is to train a Paediatric surgeon who is:

1. Technically competent in paediatric and neonatal operations
2. Sound in clinical judgment
3. Able to critically appraise published literature and apply to patient care appropriately, to provide evidenced-based medical care
4. An active participant in clinical research /teaching

### (B) PROGRAMME OVERVIEW

The duration of the PS Surgery-in-General (SIG) training programme is 6 years. Training duration maybe extended when the trainee does not meet stipulated learning requirements or assessments.

A candidate who is currently midway in another accredited training programme (local or overseas) that leads to Paediatric Surgery qualification may apply to enter the programme. His/her prior training experience reviewed by the Joint Committee for Specialist Training (JCST) on a case-by-case basis and he/she may be advanced to begin training at a more senior level if appropriate.

#### (1) PS SIG

The programme comprises 2 year SIG training followed by 4 years of PS training.

During the SIG R1 to R2 years, trainees rotate through postings in General Surgery, Urology, Thoracic Surgery and relevant Paediatric Surgery-specific electives. The training in the third year (PS R3) continues with General Surgery rotations to develop the broad basic general surgical competence required for Paediatric Surgery.

The aim of this component (SIG R1-R2 and PS R3) is for trainees to develop a good foundation in general surgical knowledge, critical reasoning and operative skills. In addition, the PS-electives aim to expose trainees to fine tissue-handling surgical skills and essentials of paediatric medicine.

The final years PS R4 to R6 involve core training in Paediatric Surgery where trainees are exposed to the full spectrum of Paediatric Surgery. The trainees are also required to actively participate in research and teaching at this level of seniority.

## **(2) MID-STREAM ENTRY**

Trainees who are currently midway in another training programme (local or overseas) that leads to Paediatric Surgery qualification may apply to enter the programme. The applicant's prior training experience will be reviewed by the Specialist Training Committee on a case-by-case basis, to decide if the applicant may start at a more senior level of training.

Generally, applicants who have successfully completed General Surgery Residency or have equivalent General Surgery specialist qualification recognised by the Singapore Specialist Accreditation Board (SAB) can start training at PS R4 level. They then proceed to complete 3-year PS Advanced Specialist Training (i.e. PS R4 to R6).

Other applicants who have completed a few years of basic surgical training in other recognised residency / training programmes will need to submit proof of prior training records with letter of recommendation from their previous training director. Accredited prior training may be recognised and discounted from the rotation requirements such that the candidate maybe advanced to start at R2, R3 or R4 as appropriate.

## **(C) ADMISSION REQUIREMENTS**

Entry criteria to PS SIG programme are listed below. The criteria 1 (iii/iv) are unique to PS as candidates require good foundation of surgical experience and adequate understanding of PS as career choice before embarking on training.

### **(1) PS SIG**

Applicants must fulfill all of the following entry criteria / pre-requisites as stated below:

- i. Qualification as a medical practitioner from a university recognised by the Singapore Medical Council
- ii. Registration with the Singapore Medical Council (Full / Conditional)
- iii. have completed at least 2 years' postgraduate working experience
- iv. 12 months of surgical subspecialty experience, of which at least 3 months must be in Paediatric surgery

### **(2) MID-STREAM ENTRY**

Applicants must have passed MRCS and fulfil either of the following entry criteria / pre-requisites as stated below:

- i. Successful completion of Accreditation Council for Graduate Medical Education (ACGME) accredited General Surgery programme
- ii. Doctors who are registered with the Singapore Medical Council (SMC) and have obtained specialist accreditation in GS by the Specialists Accreditation Board (SAB) upon commencement of the training program;

Doctors who are currently midway in a training programme (local or overseas) that leads to Paediatric Surgery qualification may apply to the JCST to have their prior training recognized on a case-by-case basis for consideration for eligibility. Overseas training must be in a recognized Paediatric Surgery training program in the UK, Australian, New Zealand, Ireland, Canada and US programmes.

## (D) TRAINING SYLLABUS

### (i) Clinical exposure

Training Year	Rotations	Rotation Duration
SIG R1 & R2	General Surgery	12 months
	PS-specific electives	3 months in Children's Emergency 3 months in Paediatric Anaesthesia
	Urology / Thoracic	6 months in either posting
PS R3	Urology / Thoracic / General Surgery	6 months in 2 of the 3 postings not done during SIG years
<i>General surgery – includes general surgical sub-specialties currently recognized by SAB as general surgery (i.e. Breast, HepatoPancreatoBiliary, Upper GI, Vascular, Colorectal, Trauma, Head &amp; Neck surgery)</i>		
PS R4	Elective and Emergency Ward, Clinic and Operating theatre experience necessary for core training in Paediatric Surgery	
PS R5		
PS R6		

### (ii) Syllabus R1-R3

1. Basic science knowledge relevant to surgical practice
  - 1.1. Anatomy, physiology, pharmacology, pathology, microbiology
2. Common Surgical conditions
  - 2.1. To get relevant history, do proper physical examination and order appropriate investigations in assessment of common surgical conditions in adults
  - 2.2. To propose appropriate differential diagnoses and management plan, offering surgical intervention as appropriate and/or referral to relevant specialists
  - 2.3. Preoperative preparation of the surgical patient, including management to reduce operative and anaesthetic risks
  - 2.4. Taking informed consent for straight forward cases
3. Basic surgical skills
  - 3.1. Familiarity with basic operative technical skills (instrument handling, tissue handling, haemostasis, diathermy use, suturing and knot-tying)
  - 3.2. Principles of endoscopy, thoracoscopy and laparoscopy
4. Peri-operative care of the surgical patient
  - 4.1. Operating theatre practices (anti-sepsis and safety)
  - 4.2. Principles of anaesthesia (general, regional and local) and pain control
  - 4.3. Principles of management of bleeding and use of blood products
  - 4.4. Post-operative care of the surgical patient, including fluid/nutrition management and complications
5. Assessment and management of the patient with trauma
  - 5.1. Principles of assessment and resuscitation in multi-trauma
6. Death and dying patient
  - 6.1. Management of the dying patient in consultation with the palliative care team
  - 6.2. Principles of organ and tissue transplantation
  - 6.3. Principles of brain stem death and its relevance to organ donation, including the relevant legislation in the Singapore context
7. Professional behaviour
  - 7.1. Ethical and legal concepts in patient care

- 7.2. Inter-professional behaviours including good communication and teamwork
- 8. Practice based learning and improvement
  - 8.1. Basic Knowledge of evidence-based medicine
  - 8.2. Participation in teaching of medical students / nurses / peers
- 9. Systems based practice
  - 9.1. Knowledge of the healthcare systems in Singapore
  - 9.2. Familiarity with patient safety practices
- 10. Special characteristics of management of children's health and illness
  - 10.1. Obtaining history and doing physical examination in babies and children
  - 10.2. Communication with the family/care giver
  - 10.3. Differences in the basic sciences - e.g. Anatomy, physiology. pharmacology and relevance to clinical management
  - 10.4. Ethical issues in paediatrics and adolescence

**Syllabus R4-R6**

PS R4	<ol style="list-style-type: none"> <li>1. Theoretical knowledge of general paediatric surgery</li> <li>2. In-depth knowledge of paediatric resuscitation</li> <li>3. Evaluation and management of emergency admissions and general assessment of outpatient general paediatric surgery patients.</li> </ol>
PS R5	<ol style="list-style-type: none"> <li>1. In-depth knowledge           <ol style="list-style-type: none"> <li>a. Paediatric Intensive Care</li> <li>b. Neonatal Care</li> </ol> </li> <li>2. Surgical management of all routine paediatric surgical procedures. Thorough familiarity with theory and surgical management of common index conditions such as:           <ol style="list-style-type: none"> <li>a. Pyloric Stenosis</li> <li>b. Intussusception</li> <li>c. Neonatal hernia</li> <li>d. Undescended Testis</li> </ol> </li> </ol>
PS R6	<ol style="list-style-type: none"> <li>1. In-depth theoretical knowledge of index neonatal surgical conditions such as:           <ol style="list-style-type: none"> <li>a. Oesophageal atresia with/without Tracheo-Oesophageal Fistula</li> <li>b. Intestinal atresia</li> <li>c. Hirschsprung's disease</li> <li>d. Anorectal Malformations</li> <li>e. Abdominal Wall defects</li> <li>f. Congenital diaphragmatic hernia</li> <li>g. Biliary atresia</li> </ol> </li> <li>2. Knowledge and management of other areas of paediatric surgery such as paediatric urology, paediatric surgical oncology, paediatric trauma etc.</li> </ol> <p>(The above list is by no means comprehensive)</p>

**iii) Courses**

Essential

1. Basic Cardiac Life Support

2. Advanced Cardiac Life Support
3. Advanced Paediatric life support APLS / PALS
4. Basic Laparoscopy
5. Advanced laparoscopy (R4-R6)

Recommended

1. Advanced Trauma Life Support ATLS
2. Fundamental Critical Care Support

**(iv) Specific Requirements of PS Advanced Specialist Training\* (PS R4 - R6)**

1. Participate in a research project as the principal researcher. The trainee is expected to present research findings at local /regional conference and work towards a publication in a peer reviewed journal.
2. Participate actively in all departmental activities. These would include performing administrative duties required of a registrar, presenting at surgical audits, attending regular teaching conferences, supervision of junior trainees and teaching of juniors (e.g. medical officers/ residents, nurses and medical student).

\*Note that Index paediatric surgery cases logged during R1-R3 may be included in the total logbook requirement for index cases. Relevant research activities and courses attended in the R1-R3 are also included towards the total required.

**(v) Operative case log**

At the end of Advanced Specialist Training in Paediatric Surgery (i.e. at the end of R6), the trainee should have scrubbed in for the following types of cases:

<b>Overall Categories (Main)</b>	<b>Recommended</b>	<b>Minimum</b>
<b>Neonatal Surgery</b> (not including hernias)	40	30
<b>Abdominal Surgery</b> (not including hernia/ hydrocoeles and appendicectomy)	90	60
<b>Head and Neck Surgery</b>	30	10
<b>Thoracic surgery</b>	25	10
<b>Oncosurgery</b> (not including CVAD)	20	10
<b>Paediatric Urology</b> (not including cystoscopy, orchidopexy and testicular torsion surgery)	60	40

<b>Categories defined: Neonatal Surgery</b>	<b>Recommended</b>	<b>Minimum</b>
Malrotation – Ladd’s procedure	5	2
NEC laparotomy	5	2
Neonatal stoma	5	2
Abdominal wall defects repair	5	2
Diaphragmatic hernia repair	5	2
Duodenal Atresia/ stenosis/ web anastomosis	3	1
Intestinal Atresia/ stenosis/ web anastomosis	3	1
Oesophageal atresia +/- TOF repair	2	1

Sacrococcygeal teratoma excision	1	nad
Neonatal herniotomy (no. of patients)	30	20

<b>Categories defined: Abdominal Surgery</b>	Recommended	Minimum
Fundoplication +/- Gastrostomy	10	5
Intestinal obstruction	10	5
ARM definitive surgery	10	5
Pyloric stenosis (Pyloromyotomy)	10	3
Hirschsprung's definitive surgery	5	3
Biliary atresia / Choledochal cyst definitive surgery	5	3
Splenectomy	5	3
Hernia/ hydrocele	200	100
Appendectomy (laparoscopic / open)	100	50

<b>Categories defined: Head and Neck Surgery</b>	Recommended	Minimum
Lymph node excision	5	3
Thyroglossal cyst- Sistrunk's operation	5	2
Others (e.g. Thyroid or salivary gland surgery, excision of branchial remnant, lymphatic malformation etc)	10	3

<b>Categories defined: Thoracic Surgery</b>	Recommended	Minimum
Decortication/ Debridement (thoracoscopic / open)	5	3
Lung resection (thoracoscopic / open)	5	2

<b>Categories defined: Oncosurgery</b>	Recommended	Minimum
Wilms/ neuroblastoma radical excision	5	2
Ovarian / Testicular tumour excision	5	2
Hepatoblastoma excision	2	nad
Rhabdomyosarcoma / sarcomas excision	1	nad
Central venous access device (CVAD) Insertion / removal	20	10

<b>Categories defined: Paediatric Urology</b>	Recommended	Minimum
Hypospadias repair	30	10
Pyeloplasty/ Ureter Reimplantation	15	10
Nephrectomy / Nephroureterectomy (Non-oncology; urology indications only)	5	2
Cystoscopy +/- intervention	20	10
Orchidopexy	50	25
Exploration for testicular torsion	10	5

#### **(vi) Assessment and supervision**

For each rotation during R1 to R3, the trainee is assigned a rotation supervisor who liaises with the PS SIG Program director regarding the educational requirements and progress of the trainee. For R4-R6, the trainee

stays within an accredited department of Paediatric Surgery and maybe assigned one or more supervisors during this period.

The educational experience offered at each rotation should include both structured lectures and clinical teaching (e.g. Grand Ward Rounds, Journal Club, M&M Sessions, X-Ray Meetings, Topic Presentations, etc.). Trainees are granted protected time to attend teaching and are expected to attend at least 80% of all training activities. The programme should document recommended textbooks for the resident's reference, with the caveat that sole reliance on textbook review is inadequate.

Duties of the supervisor include regular meetings with the trainee, assigning rotation assessments and providing mentorship. Trainees are expected to maintain an updated logbook on the training experience. Supervisors should review the accuracy of the content of the logbook and provide guidance to the trainees on areas of deficiency. The supervisor will submit end-of rotation trainee evaluations to the PS SIG Program Director who retains overall responsibility for the programme and the trainees.

## **(E) EXAMINATION**

### **(1) INTERMEDIATE EXAMINATION**

At the end of PS SIG R2, a trainee must pass the MRCS Intermediate Examination before he/she can progress to R3.

At the end of R3, the trainee should demonstrate competency in general surgical skills and decision-making before promotion to senior resident R4. Trainees would have to achieve a minimum grade of 'satisfactory' at the end-of-year assessment by the HOD/Programme Director and faculty of the training sites (NUH / KKH).

### **(2) EXIT EXAMINATION**

The trainee will sit for the exit examination at the end of R6 where he/she is Assessed on the following criteria:

- 1) Track record of clinical competence
- 2) Knowledge and experience in Paediatric surgery
- 3) Performance in research activities
- 4) Attendance at regular teaching conferences/ courses

The Paediatric Surgery Residency Advisory Committee convenes the exit exam with at least 3 examiners. Candidates need to fulfil course attendance and case-log requirements to proceed to the exam. The exit examination follows the format of

- Viva: 1 Long Case and 3 Short Cases
- Objective Structured Clinical Examination (OSCE): 10 Questions

(Note: Candidates have to pass Viva in order to proceed to OSCE)

Although it is not mandatory, the trainee should aim to have at least one scientific paper, either published or accepted for publication by R6. The minimum requirement is for the trainee to have presented at least once, either in the form of oral presentation or poster, in a local scientific meeting.

## **(F) CERTIFICATION FOR COMPLETION OF TRAINEESHIP (EXIT)**

At the end of the traineeship period, trainees are required to submit of the following documents to the RAC for review to determine completion of advanced training:

1. Logbook
2. 6-monthly performance reports from supervisor for all the completed postings.

3. Leave records for the entire period
4. Attendance of Medical Ethics, Professionalism and Health Law Course
5. Research publication if any
6. Membership Examination of the Royal College of Surgeons (MRCS) certification or its equivalent

## **(G) GENERAL GUIDELINES**

Please refer to Annex 1 for general guidelines on the following:

- 1) Leave Guidelines**
- 2) Training Deliverables**
- 3) Changes to Training Period**
- 4) Part-Time Training**
- 5) Overseas Training**
- 6) Maximum Candidature**
- 7) Withdrawal of Traineeship**
- 8) Exit Certification**