GUIDELINES FOR COMPETENCY BASED POSTGRADUATE TRAINING PROGRAMME FOR DM IN ORGAN TRANSPLANT ANAESTHESIA AND CRITICAL CARE

Preamble

The purpose of post-doctoral education is to create specialists who would provide high quality health care and advance the cause of science through research and training.

A post-doctoral specialist having undergone the required training in organ transplant anesthesia and critical care and passed the exit examination should be able to recognize the health needs of the organ transplant donors and recipients. The post graduate student should be aware of organ transplant guidelines and amendments, recent advances in the specialty and be able to handle effectively medical problems that would arise during and after organ transplantation. The post graduate student should be a highly competent anesthesiologist and intensivist with broad range of skills that will enable her/him to practice organ transplantation anesthesia effectively. Transplant anesthesiologists should have an extensive background in critical care medicine, and provide information/advice during the peri-operative period.

These guidelines are for DM programme in **ORGAN TRANSPLANT ANAESTHESIA AND CRITICAL CARE** of solid organ transplant donors and recipients.

SUBJECT SPECIFIC OBJECTIVES

At the end of the course, the student should be able to perform independently the following:

1. Preoperative anaesthesia assessment regarding fitness for organ donation.
2. Preoperative anaesthesia assessment of the organ recipients
3. Conduct of anaesthesia for organ retrieval
4. Conduct of anaesthesia for organ transplantation
5. Postoperative care of the organ recipients in the ICU

SUBJECT SPECIFIC COMPETENCIES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

A. COGNITIVE DOMAIN

The postgraduate student should acquire knowledge:

1. for diagnosis, investigations and recommend general/specific treatment of end-stage disease of the liver, heart, lung, kidney, and the gut, including the resuscitation and emergency treatment for the transplant patient with complex medical and surgical problems with necessary skills for cardiopulmonary resuscitation.

2. for diagnosis of brain death and the management of the organ donor based on principles of the assessment of the liver, heart, lung, kidney, and the gut for the purposes of organ donation including assessment of organ suitability for transplantation and multi-organ harvesting as per the THE TRANSPLANTATION OF HUMAN ORGANS ACT, 1994 and the amendments thereof.

3. for diagnosis, requisition investigations and recommend general/specific treatment of organ rejection and proper use of immuno-suppressive drugs.

4. of the pharmacokinetics and pharmacodynamics of anesthetic drugs and adjuncts.

5. on the construction and functioning of equipments used in anaesthesia and monitoring.

6. to manage acute and chronic pain

7. to teach relevant aspects of the subject to trainees, nursing and para-medical staff.

8. to identify and investigate a research problem in the subject using appropriate methodology

9. to communicate effectively with patients, colleagues and the community as well as counsel patients and relatives before, during and after transplantation by working in the pre-anaesthesia assessment clinic, operation theatres, radiological and diagnostic labs, and intensive care unit.

10. and ability to work amicably and cooperatively with caregivers such as surgeons, nurses, technicians and other paramedical staff. This will include handling of crisis situations.

11. Legal and ethical issues regarding brain death and organ donation with special reference to:

    a. Transplant of Human Organs Act notified in 2014 or subsequent amendments or new acts

b. Prerequisites for organ donation

12. Setting up of an organ donation programme and its functioning.
13. Research methodology.
14. Procedural consents, bereavement and family counselling
15. Basic and advanced principles of transplant immunology.
    a. Organ matching
    b. Immunosuppressive therapy
16. Evaluation and management of a patient with end stage organ disease.
17. Hemodynamic monitoring modalities
18. Invasive and non-invasive ventilatory management in organ donors and recipients including their withdrawal / weaning.
19. Tracheostomy- techniques, types, management and decanulation.
20. Basic principles of intravenous fluid therapy – crystalloid, colloid, blood and blood products
21. Consequences of blood loss and massive transfusion
22. Hypothermia, implications and temperature control, specific to organ transplantation
23. Acid-base equilibrium, disorders and management
24. Coagulation and organ transplantation
25. Principles of general care in critically ill patients
26. Preservation solutions and their pharmacology
27. Anaesthetic management of live and deceased organ donors and recipients.
28. Pharmacodynamics and pharmacokinetics of drugs likely to be used in patients undergoing transplantation of different organs.
29. Advanced Cardiac Life Support and Advanced Trauma Life Support
30. Use of ultrasound in the operating room and intensive care unit.
31. Management of difficult airway
32. Transesophageal and transthoracic echocardiography.
33. Renal replacement therapies
34. Donation after cardiac death
35. Transport critically ill patients to and from the operation theatre safely

B. AFFECTIVE DOMAIN:

The post graduate student should be:

1. Able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.

2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.

3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

C. PSYCHOMOTOR DOMAIN

At the end of the course, the student should acquire the following skills under supervision and be able to perform independently after the successful completion of the course the following:

Procedures in the OT

1. Setting up of intravenous lines and gaining peripheral venous access
2. Instituting non-invasive and invasive monitoring
3. Securing and management of airway
4. Intra-operative monitoring and trouble-shooting
5. Blood conservation strategies, management of massive blood loss and complications
6. Use of specialised equipment – ultrasound, echocardiography, transcranial doppler, point-of-care coagulation, cell saver, rapid infusers, depth of anaesthesia monitors

Procedures in the ICU

1. Routine ICU procedures and management
2. Monitoring and trouble-shooting
3. Blood conservation strategies, management of massive blood loss and complications
4. Use of specialised equipment – ultrasound, echocardiography, transcranial doppler, point-of-care coagulation, cell saver, rapid infusers, depth of anaesthesia monitors

5. Basic and advanced ventilation techniques
6. Surgical procedures carried out in an ICU – Front-of-neck procedures for rescue airway, tracheostomy, insertion of chest drains, suprapubic catheters, and dialysis catheters
7. Basic and advanced organ support systems and modalities – Renal replacement therapy, intra-aortic balloon pump, pacemakers, ventricular assist devices, extra-corporeal membrane oxygenation, molecular adsorbent recirculation system

Syllabus

Course contents:

1. Anesthetic care

- History of anesthetic practice
- Scope of modern anesthetic practice
- Ethical aspects of anesthetic practice
- Legal aspects of anesthetic care

2. Pharmacology

a. Basic knowledge on pharmacokinetics and pharmacodynamics of drugs, drug interactions, complications of drugs used in transplantation medicine and critical care

b. Delivery systems for anesthetics
   - Inhaled anesthetics
   - Intravenous anesthetics
   - Local anesthetics

c. Transfusion medicine

d. Complications of anesthesia

3. Immunology, rejection & immunosuppression

- Basic Immunology
- Immunologic mechanisms of rejection
- Immunosuppressive drugs: mechanism of action

4. Liver transplantation- curriculum and training objectives

a. **Anatomy of various organs**

- **Physiology and Pathophysiology**
    a. Physiology, pathophysiology of various organs and systems
    b. Rejection – types and management
- **Biochemistry**
    a. Biochemical basis of ischemic-anoxic injury
    b. Reperfusion injury
    c. Apoptosis
    d. Antioxidant biochemistry
    e. Promising treatment modalities for reperfusion injury.
- **Pharmacology**
    a. pharmacology of various drugs in patients with end stage liver disease
- **Patient centric training**
    a. Principles of organ procurement and donation- Implications for Liver
    b. Donor and recipient selection criteria for liver transplant
    c. Anesthesia for patients with hepatocellular disease
    d. Anaesthesia for pancreas transplantation
    e. Anaesthesia for intestinal and multiple organ transplantation
    f. Infectious diseases and transplantation
    g. Management of acute liver failure including parturients
    h. Intensive care management of the liver, pancreatic and GI transplant patients
    i. Molecular Adsorbents Recirculation System(MARS)

5. Cardiac transplantation- curriculum and training objectives

- **Anatomy of various organs and cardio vascular system.**
- Cardiovascular physiology and pathophysiology
- **Biochemistry**
    a. Cardiac enzymes
    b. Cardiac biomarkers
    c. Cardiac ischemic injury
- **Cardiovascular Pharmacology**

- **Patient centric training**
    a. Perform a preoperative cardiac evaluation
    b. Donor and recipient selection criteria for cardiac transplant
    c. Pathophysiology, diagnosis and management of heart failure
    d. Mechanical ventricular support
    e. Physiology and conduct of cardiac bypass and oxygenators.
    f. Principles of myocardial preservation
    g. Anesthesia for patients with compromised cardiac function.
    h. Principles of extracorporeal circulation including ECMO, circulatory assist devices and circulatory arrest
    i. Intra-operative TEE
    j. Monitor, diagnose and treat peri-operative myocardial ischemia, cardiac arrhythmias and, left and right ventricular dysfunction
    k. Monitor, diagnose and treat acute pulmonary dysfunction and pulmonary hypertension in the peri-operative period
    l. Management of right heart in a newly implanted heart
    m. Reperfusion injury
    n. Cardiac emergencies and their management
    o. Cardiopulmonary Bypass (CPB)

6. Kidney transplantation- curriculum and training objectives

- **Anatomy of the** Kidneys and Urinary Tract
- **Physiology and Pathophysiology**
    a. Renal physiology, renal failure and renal function tests
    b. End Stage Renal Disease
- **Biochemistry**
    a. Biochemical basis of ischemic-anoxic injury of kidney
    b. Reperfusion injury, apoptosis
    c. Established modalities and research into treatment for reperfusion injury
    d. Antioxidant biochemistry
- **Patient-centric training**

a. Management of acute kidney injury
b. Preoperative Management of a patient with ESRD(End-stage kidney or renal disease)
c. Anaesthesia for patients with ESRD
d. Rejection of transplanted organs – Types, recognition and management
e. Renal Replacement Therapy – modalities, indications and complications

7. Multiple organ donation

a. Preoperative evaluation and intra-operative management of organ donors.
b. Brain death, criteria for certifying brain death and tests to confirm diagnosis
c. Organ dysfunction after brain death especially cardiopulmonary complications, coagulopathy, temperature changes and diabetes insipidus, assessment of organ suitability for transplantation
d. Pathophysiology of organ preservation
e. Intra-operative management of multi-organ donors – Multi-organ brain dead donors, Donation after cardiac death (DCD)

8. Preservation and transportation of retrieved organs

9. Organ recipients

a. Preoperative evaluation and management of recipients for organ transplantation
b. Basic principles of immuno-suppression and graft rejection
c. Reperfusion injury
d. Management of hyperkalemia
e. Post- transplant complications including rejection, infection, immune-suppression
f. Transfusion medicine and coagulation management
g. Safe transport of critically ill patients

10. Ethical issues

a. Patient confidentiality and privacy legislation
b. Patient autonomy

c. Principles of informed consent and decision making
d. Next of kin designation
e. End of life decision making
f. Organ procurement for transplantation
g. Management and review of adverse events
h. Communication with families in crisis

TEACHING LEARNING METHODS

1. **Journal Club:** The post graduate student will present a journal article relevant to organ transplant anaesthesia, either an original article or a short study along with a review article. She/he is expected to present the article citing the relevance, background/context, study methods and statistical analysis, interpret results and discussion, summarize, present limitation and critically analyze the study methods and outcomes.

2. **Didactic Lectures:** Didactic lectures on organ transplantation, biostatistics, research methodology, teaching methodology, medical ethics and legal issues related to organ transplant anesthesia should be conducted once or twice a week.

3. **Subject Seminar:** The post graduate student will present a subject topic allocated after doing a comprehensive preparation, relevant literature search and present the topic in detail.

4. **Clinical Case Presentation:** The post graduate student will present a clinical case (either from anaesthesia point of view or on some critical care case) after performing thorough history and physical examination. She/he will elicit physical and non-physical aspects in history, formulate diagnosis/differential diagnosis and present a comprehensive care plan for the patient.

5. **ICU Grand Rounds:** The post graduate student will attend the ICU Grand Rounds

6. **Mortality/morbidity review** and departmental audit should be held regularly to review all deaths and complications.

7. The post graduate student should have a minimum of two publications/articles accepted for publication in indexed international /national journals during the three year course.

8. A post graduate student of a postdoctoral course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination**.**

9. The post graduate student shall be required to participate in the teaching and training programme of undergraduate students and interns.

10. Department should encourage e-learning activities.

11. **Additional teaching/training**

All the post graduate students are expected to attend regular CMEs, Conferences, Workshops; Small group teaching organized by local/national/international institutes and required to be abreast with the current knowledge and recent advances in the field of organ transplant anaesthesia and critical care.

12. **Log book**

The maintenance of log book is essential. The Log books shall be checked and assessed periodically by the faculty members imparting the training and should include:

a. Observing / working under supervision for at least 20 renal transplant recipients.
b. Observing / working under supervision for at least 1 heart transplant recipient or bioprosthetic cardiac valve replacements
c. Observing / working under supervision for at least 10 liver transplant recipients.
d. Observing / working under supervision for organ harvesting in 15 cases.
e. Should have managed independently or under supervision 10 deceased organ donors in the ICU.
f. Should have worked under supervision in a dialysis unit for two months.
g. Observed / worked under supervision in at least 20 paediatric and 50 adult cardiac surgeries.
h. Should have been actively involved in obtaining, transport and histopathological procedures associated with donor and recipient tissues of at least 5 donor and recipient organ transplant patients each.

13. Posting in Allied Departments

Each student should be exposed for one week each to modern principles of Clinical epidemiology and Biostatistics/Research methodology of the Institution. For this, he/she should attend lectures arranged by the Biostatistics and Epidemiology departments from time to time. She/he should be posted to various allied departments/units by rotation to acquire more knowledge and hands-on training as per details given below:

The following postings/rotations are recommended:

- **First year:**

  Biostatistics : 15 days

  Nephrology : 2 months

  Intensive coronary care unit/Cardiothoracic surgery intensive care unit: 1 month

  Neurosurgery intensive care unit : 1 month

- **Second year:**

  Clinical Immunology : 15 days

  Immunopathology : 15 days

  Radiology : 15 days

- **Third year:**

  Emergency medical services : 1 month

During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of surgical skills laboratories in the medical colleges is mandatory.

ASSESSMENT

Formative assessment

Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.

General Principles

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination.

Quarterly assessment during the post-doctoral training should be based on following educational activities:

1. Journal based / recent advances learning
2. Patient based /Laboratory or Skill based learning
3. Self directed learning and teaching
4. Departmental and interdepartmental learning activity
5. External and Outreach Activities / CMEs

The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I).

SUMMATIVE EXAMINATION, at the end of the course

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

The summative assessment examination shall include two heads:

A. Theory examination.

B. Practical, Clinical examination and Viva-voce.

Theory examination and Practical/Clinical, Viva-voce shall be separate heads of passing.

Theory examination shall comprise of four papers. Passing percentage shall be cumulatively 50% with minimum of 40% marks in each theory paper.

Practical /Clinical examination consisting of at least one long case, three short cases and viva-voce. Passing percentage shall be 50%.

Passing shall be separate for each head and failing shall be common, meaning thereby that clearance at theory and failure at practical / clinical shall amount to failure at Summative examination and vice versa.

The examination will be in two parts:

1. **Theory Examination**

   There shall be 04 theory papers as follows:

   Paper I: Basic sciences related to organ transplant anaesthesia

   Paper II: Clinical specialties related to organ transplant anaesthesia

   Paper III: Critical care related to organ transplantation anaesthesia

   Paper IV: Recent advances the organ transplant anaesthesia and critical care

2. **Clinical / Practical and Oral examination:**

   Clinical examination

   Post graduate students shall examine a minimum one long case and 03 short cases

3. **Oral Examination** shall be thorough and shall aim at assessing the post graduate student's knowledge and competence about the subject, investigative procedures, therapeutic techniques and other aspects of the specialty, which form a part of the examination.

Books and Journals recommended

Books (latest edition)

1. Oxford Textbook of Transplant Anaesthesia and Critical Care ed: Ernesto A Pretto
2. Oh's Intensive Care Manual
3. Textbook of Critical Care ed: Jean-Louis Vincent et al
4. Anaesthesia and Perioperative Care for Organ Transplantation. Ed: Subramaniam K, Sakai T
5. Oxford Textbook of Cardiac Anaesthesia. Ed: RP Alston et al
6. Anaesthesia and Intensive Care A-Z. ed: SM Yentis et al
7. Liver Anaesthesia and Critical Care Medicine. ed: G Wagener

Journals:

3-5 International journals and 02 national journals (indexed)

Annexure I

Postgraduate Students Appraisal Form

Name of the Department/Unit :

Name of the PG Student :

Period of Training : FROM……TO……

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
1.	Journal based / recent advances learning				
2.	Patient based /Laboratory or Skill based learning				
3.	Self directed learning and teaching				
4.	Departmental and interdepartmental learning activity				
5.	External and Outreach Activities / CMEs				
6.	Thesis / Research work				
7.	Log Book Maintenance				

Publications **Yes/ No**

Remarks*_____

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***REMARKS: Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.**

SIGNATURE OF ASSESSEE SIGNATURE OF CONSULTANT SIGNATURE OF HOD