Post-Doctorate Super-Specialty Course: Organ transplant Anaesthesia - Curriculum

GUIDELINES FOR COMPETENCY BASED POSTDOCTORAL ADVANCED FELLOWSHIP IN ORGAN TRANSPLANT ANAESTHESIA

Program outcome

End-stage liver and renal diseases are one of the important causes of morbidity and mortality. Often, these patients have complex clinical problems, which require multidisciplinary approach for management Transplantation of affected organ is a gold standard in their management which dramatically improves the medical and social wellbeing of these patients. The surgeries are complex and require great expertise on the part of the anesthesiologist to maneuver the already compromised patient through the perioperative period. The PDAF organ Transplant Program aims to train an anesthesiologist in the intricacies of perioperative management of end stage organ disease patients with multiple systems compromised.

1. The trainee shall acquire skills in various aspects of theoretical, clinical and practical realms of management of end organ dysfunction patients.
2. The course will enable the students to offer skill-based diagnostic and therapeutic care of the highest professional standards.
3. The knowledge and attitudes imparted during the program shall enable the students to work as an independent clinician, teacher and researcher who is well versed with diagnostic and therapeutic acumen and research methodologies pertaining to the subject.
4. The extensive training given shall enable them to cater to the health care needs of organ dysfunction patients at the local, regional, and national levels and help deliver quality care of international standards to our population.

A post-doctoral fellowship student pursuing PDAF Organ Transplant Anesthesia will acquire adequate knowledge related to

(a) Basic Sciences as applied to end organ dysfunction so that the student is at par international counterparts to help acquire focused and knowledge-based understanding of multi system failure.

(b) Clinical, experimental, investigative and management issues applied to surgical aspects of transplantation. To gain comprehensive proficiency related to anatomy and physiology of organs, etio-pathogenesis, and the diverse clinical spectrum of end organ failure. The familiarity with local prevalent anesthesia and post-op management practices shall help the trainees serve their region, state, and country in a need-based and cost-effective manner.

(c) Awareness about recent advances in the field with up-to-date skill and knowledge to benefit the region, state, and country.

(d) Contribute to the field by imparting training to colleagues, teaching future students, and getting involved in research.

Eligibility Requirements

Students who have completed MD (Anaesthesiology) from a MCI recognized college or institute/ DNB (Anaesthesiology) from National Board.

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SUBJECT SPECIFIC LEARNING OBJECTIVES

At the end of the course the candidate who completes the course will acquire the following:

a. Clinical, diagnostic, analytical, self-directed learning with procedural and therapeutic skills required in perioperative care of patients with the full spectrum of liver or renal diseases, who have come for transplant or non-transplant surgical or medical interventions, which are prevalent in the region, state, and country.

b. Have comprehensive knowledge and skills in the areas of basic, clinical and translational medicine to understand the disease burden, epidemiology, patho-physiology, other organs affected, and complications seen in patients of end organ dysfunctions.

c. Will be able to independently perform;

i. Preoperative anaesthesia assessment regarding fitness for organ donation.

ii. Preoperative anaesthesia assessment of the organ recipients

iii. Organ preservation techniques in deceased donor.

iv. Conduct of anaesthesia for organ retrieval.

v. Conduct of anaesthesia for organ transplantation

d. Postoperative care of the organ recipients in the ICU.

e. Develop mentorship, leadership, and networking skills to help teach, train and impart clinical and research skills to future transplant anesthesiologists in the state and country.

f. Acquire skills to establish an effective communication network with the patients, patients' relatives, health administration, policy makers, common public, community leaders, peers of medical fraternity and academicians in the field of anesthesiology and allied fields.

g. **Demonstrate a detailed and comprehensive** understanding about the patho-physiology, cellular and molecular pathology, diagnostic, management, and preventive aspects of various postoperative complications occurring in both children and adults.

h. **Along with clinical aspects, skills in** formulating research questions, planning, initiating and conducting translational, clinical and epidemiologic research that **prioritizes thrust areas of Solid organ Transplantation** at institutional, state, national and international levels

i. Network to set up collaborative workforces at various levels to enhance the re… **the country with special focus on** easing access to therapy, lowering the c… modalities, novel indigenous modes of treatment and prevention o… complications.

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j. Demonstrate compassion for patients and their families and have an ethical and holistic approach to them to help deliver evidence-based, respectful ethical care to the patients.

The student is expected to gain knowledge in the following FOUR key areas:

a. Theoretical Knowledge:

i. The student will acquire knowledge in all aspects pertaining to the practice of Transplantation anesthesiology with focus on the burden of disease, duration and complications arising during the time spent on waitlist for surgery, **in the region, state and country.** This shall involve teaching and training to enable the student to provide specialist care to the citizens of the country. In addition to clinical **training,** research **skills shall also be prioritized so that the trainee gets the skills to** set up collaborative networking at institutional, state, national and global levels to **add to the research milieu of the country.**

ii. The PDAF shall be well versed with different aspects of THE TRANSPLANTATION OF HUMAN ORGANS ACT, 1994 and its amendments from time to time.

iii. The PDAF trainee shall acquire up-to-date knowledge, skills, and attitudes in clinical aspects of epidemiology, patho-physiology, and key determinants of post organ failure complications in the **region, state and country.**

iv. Trainee shall be able to make patient-centric decisions based on the latest scientific advances in the field after rationally examining available data and apply these ethically in a **cost-effective manner tailored to the needs of the patients of the region, state, and country.**

v. He/ she shall be well versed with **diagnostic and therapeutic modalities related to pharmacological and non-pharmacological management, interventions, cutting edge research and their application to** diverse aspects of pre and post-transplant complications.

B. Teaching skill

i. The student will be able to teach diverse aspects of perioperative management of organ transplant donors and recipients to other resident doctors, junior colleagues, nursing and para-medical staff to enhance **the skills of the work force at local level.**

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ii. Shall develop mentorship and leadership qualities to help teach, train and impart clinical and research skills to future transplant anesthesiologists in the **state and country**

C. **Research methodology**

i. Shall have the skills to recognize knowledge gaps **and unmet areas of need relevant to perioperative management of Organ transplant donor and recipients of the local community.**

ii. To seek solutions to such areas of unmet clinical need, should be conversant with principles of research as applied to contemporary problem spectrum **prevailing in the local community, state or country.**

iii. Shall be trained to formulate, write and conduct research proposal using appropriate methodologies related to the subject in accordance with ethical guidelines.

iv. Shall have the skills to promote inter-institutional research and help train and guide those who wish to undertake pursue research.

D. **Group approach**

i. During the academic training, student will be part of multi-disciplinary meetings with nephrologists, hepatologists, liver and kidney transplant surgeons, radiologist, microbiologists and allied disciplines.

ii. This will help them to understand the concept of Organ -Transplant team approach that seeks a multi-disciplinary patient care. Inputs and insights gained during such interactions shall help in knowledge and skill building and is likely to improve patient outcomes of the **region, state and country.**

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SUBJECT SPECIFIC COMPETENCIES

At the end of the course, the PDAF student will acquire the following competencies under the following three domains:

(A) Cognitive domain (Knowledge domain)

The postgraduate students will 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 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 equipment's used in anesthesia 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-anesthesia assessment clinic, operation theatres, radiological and diagnostic labs, and intensive care unit.

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10. 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 decannulation.

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.

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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 (Attitudes including Communication and Professionalism)

The post graduate student will 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.

4. Demonstrate kindness, empathy and compassion towards all patients and their families.

5. Have the skills to participate in seminars, Continued Medical Education programs, panel discussions, lectures to discuss and review recent scientific data to further the cause of Transplant anaesthesiology in the country and increase visibility on national and global platforms.

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6. Should have the ability to pass on such information and knowledge gained to other students and colleagues, especially those working in resource-limited settings **to improve perioperative care in the region, state, and country**.

7. Develop a habit of maintaining honest, detailed, and comprehensive medical records.

8. Be aware of ethical principles of clinical research as guided by institutional ethical committees.

9. Should demonstrate principles of equality when dealing with individuals of special groups.

10. Should be able to accept feedback and criticisms with an open mind.

11. As a skilled professional, be aware of the value of maintaining punctuality in clinical work.

(C) Psychomotor domain

At the end of the course, the students will 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 troubleshooting

5. Blood conservation strategies, management of massive blood loss and complications

6. Use of specialized equipment – ultrasound, echocardiography, transcranial doppler, point-of-care coagulation, cell saver, rapid infusers, depth of anesthesia monitors

Procedures in the ICU

1. Routine ICU procedures and management

2. Monitoring and troubleshooting

3. Blood conservation strategies, management of massive blood loss and complications

4. Use of specialized equipment – ultrasound, echocardiography, transcranial doppler, point-of-care coagulation, cell saver, rapid infusers, depth of anesthesia 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, extracorporeal membrane oxygenation, molecular adsorbent recirculation system.

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Syllabus

Course contents:

I. Cognitive domain

A. Basic Sciences

1. Anesthetic care

- History of anesthetic practice
- Scope of modern anesthetic practice

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

- o Inhaled anesthetics
- o Intravenous anesthetics
- o Local anesthetics

c. Transfusion medicine

d. Complications of anesthesia

3. Immunology, rejection & immunosuppression

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

4. Liver transplantation- curriculum and training objectives

a. Anatomy of various organs

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b. Physiology and Pathophysiology of various organs and systems

c. Biochemical basis of ischemic-anoxic injury

d. Reperfusion injury

e. Apoptosis

f. Antioxidant biochemistry.

g. Promising treatment modalities for reperfusion injury.

h. Pharmacology of various drugs in patients with end stage liver disease

5. Kidney transplantation- curriculum and training objectives

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

B. **Clinical**

1.Liver transplantation: 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. Anesthesia for pancreas transplantation
e. Anesthesia 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)

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2. Kidney transplantation- Patient-centric training

a. Management of acute kidney injury

b. Preoperative Management of a patient with ESRD (End-stage kidney or renal disease)

c. Anesthesia for patients with ESRD

d. Rejection of transplanted organs – Types, recognition, and management

e. Renal Replacement Therapy – modalities, indications, and complications

3. 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)

4.Preservation and transportation of retrieved organs

5. 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, immunosuppression.

f. Transfusion medicine and coagulation management

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g. Safe transport of critically ill patients

C. **Recent Advances**

a. Review of recent literature and guidelines
b. Recent immunosuppression
c. Interaction of immunosuppresants with Anaesthetic agents.
d. Translational Molecular Imaging and applications in end organ disease
e. Advances in Anesthesiology
f. Artificial Intelligence utility in anaesthesiology
g. Recent advances in Clinical, Experimental, Investigative, Translational perioperative management of Organ recipients
h. Recent advances in postoperative ICU management of Organ recipients.

II. Affective domain (Communication and Professionalism)

Ethical issues, like;

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

III. Psychomotor domain

1. **Clinical care of the following aspects of organ donors and recipients including but not limited to:**

a. Pre-operative evaluation and management of donors and recipients of organ transplantation.

b. Detection, evaluation, and management of postoperative complications of organ transplant recipients.

c. Evaluation and management of critically ill hospitalized post-transplant patients.

d. Perioperative Management of paediatric organ transplant recipients.

e. Clinical Trials in Transplant Anesthesiology, Statistical and Ethical Considerations, in Trials, Approaches to Clinical Trial Design and Methodologies.

Besides the above, students should be involved in didactic and self-learning schedules assigned to them.

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TEACHING AND LEARNING METHODS

General principles

The basic aim of postdoctoral medical training and education is to produce specialists who understand the needs of community health of the state and country and enhance the quality of health care as well as provide an impetus to research, education, and training of the medical community. The doctor after completion of the skill based competency training programme should be able to successfully address the medical requirements of the community. Learning during the programme is not only goal-oriented and didactic but also essentially self-directed and emanates from clinical and academic work. The designated academic sessions are meant to supplement the student's core efforts.

Teaching Methodology

The post doctoral student shall be given the responsibility of preoperative assessment, intraoperative and postoperative holistic management of Organ transplant donors and recipients in a gradual and phased manner under supervision, after the student demonstrates skill and efficiency at each step. Skill development in terms of long line placements, epidural and intrathecal injections, tracheostomy and other techniques required for patient management in ICU will be encouraged. Teaching sessions shall be an overall judicious amalgamation of case presentations, journal clubs, seminars, group discussion related to the subject. Focused brief topic presentations as allotted from time to time, practical case-based learning, integrated and interdepartmental meetings including any other collaborative activity with allied departments, as deemed necessary. Suggested modalities of teaching-learning methods are summarized below but shall not be limited to these. The frequency of the mentioned teaching and learning methods may vary based on perceived requirements, candidates' competencies, work load and overall working schedule. Self-directed motivational learning forms a key part of the training for which although the hours are not specifically ear-marked, but it shall be integrated into day to day learning.

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Formal teaching sessions

This will comprise of the following:

1. **Journal Club:** The post graduate student will present a journal article relevant to organ transplant anesthesia, either an original article or a short study along with a review article. She/he will be 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 will be conducted once 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 anesthesia 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 will be held regularly to review all deaths and complications.

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

8. **Additional teaching/training**

All the post graduate students will be expected to attend regular CMEs, Conferences group teaching organized by local/national/international institutes and required to b current knowledge and recent advances in the field of organ transplant anesthesia and critical care.

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Proposed teaching program and time-table

Clinical Case Review	:Daily (8-9 am)
Journal Club (Wednesday)	:1 per week (8am-9am)
Seminar (Thursday)	:1 per week (8am-9am)
Clinical Case Discussion (Saturday)	:1 per week (3pm-4pm)
Joint Transplant Board Meeting (Wednesday)	1 per week(8am-9am)
Mortality Meeting	As required
Research Review	1 per 3 months

9. Logbook

In addition, students will be required to maintain a Logbook. The Logbooks would be checked and assessed periodically by the faculty members imparting the training and will include:

a. Observing / working under supervision for at least 20 renal transplant recipients.

c. Observing / working under supervision for at least 10 liver transplant recipients.

d. Observing / working under supervision for organ harvesting in 15 cases.

e. Would have managed independently or under supervision 10 deceased organ donors in the ICU.

f. Would have worked under supervision in a dialysis unit for two months.

g. Observed / worked under supervision in at least 20 pediatric and 50 adult cardiac surgeries.

h. Would be 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.

The **Department shall encourage e-learning activities.**

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Clinical postings: Recommended schedule for two years training

Operation Theatres	:16 months
Transplant ICU	: 2 months
Surgical ICU	: 1month
Endoscopy/Interventional Radiology	: 2months
Observership/external rotation for Liver Transplantation	: 2 months
OPD posting for workup and follow-up of Transplant Patients	:1 month

During the training program, patient safety is of paramount importance; therefore, skills are to be learnt and performed initially under supervision followed by performing independently in a phased and guided manner. For this purpose, documentation of proficiency of skills is mandatory.

First Academic Year

- Pre-anaesthesia check-up under supervision
- Supervised preoperative, postoperative and intensive care of admitted patients
- Assist in all anaesthetic procedures and perform few procedures under supervision.
- Perform first on call duties.
- Academic work - Journal Club and Seminar presentation.
- Protocol submission for research projects

Second Academic Year

- Independent care of patients admitted in ICU and performs PAC.
- Perform emergency and elective procedures as specified below.
- Academic presentation – Seminar and clinical case presentation.
- Completion of research projects.
- Clinical responsibilities mainly in a supervisory role.
- Expected to provide anaesthesia for major surgical procedures.
- Academic work as before with emphasis on clinical case presentations.

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- Analysis and submission of research projects.

Research

Each post graduate student will be required to undertake research under the guidance and mentorship of a faculty member. The student will be required to submit a research protocol after due advice and approval from the faculty guide within 6 months after joining the course. Acceptance or submission of research papers to indexed journals would be mandatory before appearance in examination.

Assessment

Periodic evaluation of training, and internal assessment will be done.

Assessment of clinical skills, professionalism

The assessment of clinical skills will be conducted at the workplace. The availability at short notice when on call, adherence to timelines, punctuality in academic sessions and at workplace, attitude, and aptitude for learning and behaviour with colleagues will be continuously assessed.

Assessment of knowledge

The knowledge will be informally tested on day-to-day basis in the operation theatres, during post-operative rounds, in ICU and during procedures outside the operation theatres.

Internal Assessment

The department of anaesthesiology will assess the knowledge through in house assessment after each semester. Each candidate would be assessed every semester and after each special posting/rotation. The candidates are required to maintain a logbook detailing procedure performed and academic activities. The overall internal assessment process is based on performance in patient care, performance in academic programme, logbook maintenance and achievement of research objectives.

Final Assessment

Eligibility

As per Institute's norms the duration of the course is 2 years including the exit exams.

Theory paper (Total Marks: 300)

Paper I: Basic Sciences related to Organ Transplant Anaesthesia 100 marks

Paper II: Clinical Science related to Organ transplant Anaesthesia 100 marks

Paper III: Recent Advances in Organ Transplant Anaesthesia. 100 marks

Practical Examination (Total Marks: 100)

Components of Practical Examination

Component	Marks
Clinical cases (long case one)	60
Clinical cases (two short cases)	30 marks each
Equipments	40
General viva	40

Total weightage for results

Theory 75% of total evaluation

Practical 25% of total evaluation

To be successful a candidate will be required to obtain at least 50% marks separately in theory and practical.

Examiners

The final assessment will be done by two external and two internal examiners having and liver transplant anaesthesia. The examiners should hold the post of professor in teaching institute running postgraduate program in anaesthesia. Qualification and experience of the examiners shall follow the same rules as applicable to other examiners of the D.M. or DNB courses in the country at other institutions.

List of Examiners:

1. **Prof. C.K. Pandey,** Ex-Professor ,Anaesthesiology, Dr. Ram Manohar Lohia Institute ofMedical Sciences, Lucknow and Current HOD,Anaesthesiology, Medanta Lucknow, UP
   Mob: 954094946851
2. **Dr Manish Tandon,**
   Senior Consultant and Head ,
   Department of Anaesthesia
   Dharamshila Narayana Superspecilaitity Hospital
   Delhi 110096 and
   Ex-Additional Professor Anaesthesia
   Institute of Liver and Biliary Sciences
   New Delhi
   Mob no. 954094860
3. **Prof Vimi Riwari,**
   Professor, Department of Anaesthesiology
   AIIMS, New Dehli
   Mob: 9818304880
4. **Prof Sameer Sethi**
   Professor, Department of Anaesthesiology
   PGIMER, Chandigarh
   Mob no. 9317851002
5. **Dr. Manisha Modi**
   Professor & HOD, Dept pf Organ transplant Anaesthesia and Critical Care
   Institute of Kidney Diseases and Research Center,
   Institute of Transplantation Sciences,
   Civil Hospital Campus,Asarwa,
   Ahmedabad 380016,Gujarat India,
   Mob:9714601106
6. **Dr Gaurav Sindwani,**
   Additional Professor
   Dept of Organ transplant Anaesthesia and Critical Care
   Institute of Liver BS, Vasant Kunj
   New Dehli
   Mob: 8728089898
7. **Dr Lakshi Kumar**
   Head of Department | Professor, Department of Anaesthesiology, Am
   Medicine, Kochi, Kerela
   Mob:9496211333

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RecommendedReading:

Textbooks (latest editions)

1. Oxford Textbook of Transplant Anesthesia 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. Anesthesia and Perioperative Care for Organ Transplantation. Ed: Subramaniam K,Sakai T

5. Anesthesia and Intensive Care A-Z. ed: SM Yentis et al

6. Liver Anesthesia and Critical Care Medicine. ed: G Wagener

7.. Transplantation of the Liver. Ronald W. Busuttil, Goran B. Klintmalm (Ed.). Saunders.

8. Anesthesia and Intensive Care for Patients with Liver Disease. Gilbert R. Park, YoogooKang (Ed.). Butterworth-Heinemann Medical.

9. Schiff's Diseases of the Liver. Eugene R. Schiff, Michael F. Sorrell, Willis C. Maddrey

(Ed.). Lippincott Williams & Wilkin.

10. Handbook of Kidney Transplantation (Lippincott Williams & Wilkins Handbook Series)

Gabriel M. Danovitch (Editor)

11. Brenner and Rector's The Kidney: 2-Volume Set, 11e (Kidney (Brenner) Maarten W.

Taal MD FCP(SA) FRCP (Author)

12. Physiology and Pharmacology in Anaesthetic Practice. Stoelting

12. Critical Care Medicine-Civeta

Journals:

- Anesthesia
- British Journal of Anesthesia
- Anesthesia and Intensive Care
- Anesthesia and Analgesia
- Anesthesiology
- Anesthesiology Clinics of North America

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- Current Opinion in Anaesthesiology
- European Journal of Anaesthesiology
- International anesthesiology clinics
- Transplant Proceedings
- American Journal of Transplantation
- Transplantation
- Transplantation International
- Liver transplantation
- Critical Care Medicine
- Intensive Care Medicine
- Critical Care Clinics
- Current Opinion in Critical Care
- European Journal of Intensive Care Medicine
- Journal of Intensive Care Medicine
- Pediatric Critical Care Medicine
- Current Opinion in Organ Transplantation
- Journal of Critical Care Medicine
- Seminars in Liver Disease
- Liver Clinics of North America
- New England Journal of Medicine

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