

KERALA PARA MEDICAL COUNCIL

**SYLLABUS
ON
DIPLOMA IN DIALYSIS TECHNOLOGY
[DDT]**

DIPLOMA IN DIALYSIS TECHNOLOGY (DDT)

I. General Introduction

At present there is shortage of qualified Dialysis Technicians. This course is started to overcome the qualified lab. Assistant (Dialysis) and dialysis Technicians in the Government and private hospitals of the state of Kerala.

II. Detailed Curriculum

A. General Information

- a) Name of the Course : Diploma in Dialysis Technology
- b) Objective of the Course : To train the students to carryout various techniques of dialysis and to perform techniques of dialysis independently.
- c) Admission requirement including authority of selection and method of selection. : Admission is based on merit by DME
- d) Eligibility for Admission : B.Sc. (MLT)
B.Sc. (Nursing)
B.Sc. (Physics, Chemistry, Zoology)
- Nativity : Indian, Kerala Origin
- Age : 20-30 Years (for SC/ST upper age limit is 36 years)
- Total No. of seats : Five
- Reservation of seats : One seat is reserved for SC/ST candidates in all years.

B. Course content

- a) Duration of the course and structure : 2 year course including one year internship
- b) Subjects taught : Theory - 2 papers
1. Fundamental of Nephrology and Dialysis Technology.
 2. Recent Advance in Nephrology and Dialysis Technology.
 3. Practical Examination including Log Book.

C. Syllabus

1. Subject wise
- a) Period of study : One Year.
- b) Instruction Period :
- | | |
|-------------------------|---------------|
| Lecturers in hours | |
| By Faculty Members | - 156 hours. |
| By Dialysis Technicians | - 312 hours. |
| Practicals in hours | - 1872 hours. |

- c) Objective of teaching this subject : To teach the students, various techniques of dialysis technology
- d) What is expected of the student at the end of the course : To do the dialysis independently
- e) Requirements for satisfying completion of the subject study
 - Attendance in theory / Practical / Clinical : 80%
 - Attendance in any others : No
 - Any records etc. to be submitted : Log book of dialysis
 - Progress evaluated in internal assessment or any other. : Every three months
- f) Prescribed text : Hand book of Dialysis. Dialysis Therapy

2. Evaluation

- a) Scheme of assessing the progress during the course of study
 - Method : Theory Exam and Practical
 - Frequency of evaluation : Every three months
 - How it is computed for final presentation : Average is taken.
- b) Final Examinations.
 - Authority to conduct the exams and award degree / diploma. : Board of Examiners including JDME, HOD of Nephrology, One internal examiner and one external examiner.
 - When : At the end of the year.
 - Scheme of examination : Theory and Practical.
 - No. of papers : Two papers.
 - Duration of written exam : 3 hours.
 - Maximum Marks : 100 each.
 - Viva Voce : 50 marks.
 - Scheme of Practical exam : Demonstration of various procedures related to dialysis technology followed by viva voce.
 - Duration of Practical exam : 2 hours.

- Maximum Marks : 100 marks (50 for practical and 50 for viva)
2. Criteria for a pass in the subject
- Minimum marks in theory : 50%
 - Minimum marks in Practical : 50%
 - Minimum marks for the subject : 50%
3. Awarding of Ist class and Rank.
- 50 - 64% - Pass
 - 65 - 79% - First Class
 - Above 80% - First Class and Distinction.
4. Supplementary Exam.
- Scheme of exam for candidates who fail : Supplementary exam will be conducted.
 - Any additional instruction period to the prescribed for failed candidates : No
 - Attendance requirement : 80%
- 3: Eligibility criteria for appearing in the final examination.
- Attendance : 80%
 - Minimum No. of works or exercises to be completed : Involved in the procedure of doing 100 Haemodialysis.
 - Records : A log book containing procedure of 100 dialysis, Hemoperfusion, CAVH, CVVH and Plasmapheresis..
 - Internal Assessment : 50%
4. Question Paper.
- Theory - No. of paper : 2 Papers
 - Duration : 3 hours.
 - Structure : Nil.
- Model Question paper in each subject
5. Examiners
- Minimum Qualification : Faculty Members (DM Nephro)
Dialysis Technician
(Diploma & PG Diploma in dialysis Technology)

No. of examiners : Course Co-ordinator, One internal and one external.

- Apprenticeship curriculum if any.

Objective

: To work as Lab Assistant (Dialysis)

Duration

: 2 years

Content

: No.

Evaluation

: No.

III. Physical requirements.

a) Institutional

1) Students amenities

- Needed

Books / Library

- Needed

Lecture Hall

- Needed

Hostel

- Needed

Students Room

- Needed

Office, Store

- Needed

Clinical / Hospital

- Needed

Facilities

- Available

2) Staff.

Minimum Staff

Teaching Staff

- Faculty members

One Professor

One Assistant Professor

Four Lecturers (DM Nephro)

Two Dialysis Technicians

(PG Diploma & Diploma in Dialysis)

One more needed

One Lab Assistant (Dialysis)

One more needed.

Non-Teaching Staff

- 5 Nurses (GNM or B.Sc. or M.Sc)

- Four Attenders

IV Formats

- Time table

- Course completion certificate to accompany the application for final examination

- Mark list

- Diploma / Degree certificate

- Any other relevant item

- During the period of internship, a stipend of Rs. 1000/- should be given per month.

SYLLABUS FOR DIPLOMA IN DIALYSIS TECHNOLOGY

Part I

1. General Orientation in Nephrology

Basic anatomy and physiology of kidney - distribution of total body water and composition of body fluids - function of the normal kidney - Acute Renal Failure - Chronic Renal Failure - function of the artificial Kidney - the technique of haemodialysis.

2. Histories and Evaluation of Dialysis

The invention of dialysis - The first artificial kidney - First Human dialysis - Kolff's Rotating drum Dialyser - parallel flow Dialysers - Twin Coil Dialyser - The scuttle Dialysis system - Introduction of a central Dialysate supply system - Home Dialysis.

3. Principles of Dialysis - Diffusion, Osmosis, Ultra filtration

Diffusion - Osmosis - Dialysis defined - concentration gradient - direction of fluid flow hydrostatic Pressure and resistance - pressure gradient - ultra filtration - dialysate.

4. Principles of sterilization and sterile precautions

Identification of common infections organisms - cannula site infections - virus infections - disinfections and sterilization.

Sterilization: Steam autoclave - ethylene oxide - Gamma Ray sterilization - Formaldehyde sterilization - clinitest - schiff's reagent.

Disinfectants: Formaldehyde sephiran chloride - phenolic disinfectants, Isopropyl alcohol - iodine antiseptic sampling procedure - contamination problems - sterile technique - isolation techniques.

5. Vascular access for dialysis

General description of the cannula system - cannula implantation cannulas - activity and immobilization of the cannulated limb - Position of the cannulated limb - cannula cleaning - cannula complications - cannula infections - cannula clothing - declotting - the subcutaneous arterial venous fistula - advances in the access to the circulation - subclavian, jugular, femoral access - shunt converted fistula - grafts - single needle dialysis.

6. Anticoagulation in Hemodialysis

Anticoagulation - anticoagulant - heparin - coumadin - Lee white clotting time - activated clotting times - intermittent infusion and continuous infusion - systemic heparinization - regional heparinization - rigid heparinization - heparin rebound - heparin modeling - saline dialysis - low molecular weight heparin.

7. **Functions of dialysis monitors and Principles of its working**

Dialysate composition - preparation - acetate bicarbonate - delivery system - batch type and proportioning type. Water pre-treatment - water pressure regulation - temperature control - temperature sensors - chemical proportioning - degassing - flow and negative pressure control - monitors conductivity cell - chemical concentration monitor - temperature compensation - temperature monitors - pressure monitors - flow rate monitors - blood leak monitors - readout devices - alarms - volumetric ultra filtration - multipatient monitors.

8. **Artificial kidneys - evolution and types**

Types of dialysis - Coil dialysis - parallel plate dialysers. Hollow fibre dialysers - comparative study of all available dialysers.

9. **Dialyser Reuse, dialyser handling, disinfections and disposal**

Storage and re-use of parallel plate dialysers - re-use of hollow fibre dialysers - Hydrogen peroxide method - fibre bundle volume checking - disinfections or sterilization - heat sterilization - formaldehyde - renalin - quality assurances.

10. **Water quality and water treatment for dialysis.**

Need for water treatment - sand filter - water softner - carbon filter - deionizer - reverse osmosis unit - in line ultraviolet rays - bacterial filters - water sampling - microbiological checking.

11. **Acute haemodialysis prescription**

1. Acute haemodialysis prescription:- (a) determining dialysis session length and blood flow (b) choosing a dialyser (c) choosing the dialysis solution (d) choosing the dialysis solution flow rates, temp, and UF
2. Haemodialysis procedure:- (a) Rinsing and priming (b) obtaining vascular access (c) initiating dialysis (d) alarms (e) Patient monitoring and complications (f) Termination of dialysis (g) Post dialysis evaluation.

12. **Complications during dialysis - short term and long term**

Blood leaks - clotting - acute bleeding - line cannula separations - hypotension - hypertension - fever - nausea - pyrogenic vomiting - headache - cardiac arrhythmias - chest pain - reactions muscle cramps - restlessness - pruritus - convulsion - congestive heart failure - secondary hyperparathyroid disease - metastatic calcification - blood requirements - peripheral neuropathy - arthritis - hepatitis - uremia pericarditis

Part II

I. Peritoneal dialysis

Theory - patient criteria - indications for PD - complications of PD patient management during PD - CAPD.

II Recent Advance in dialysis

1. H-E, H-F Therapies in clinical dialysis

High efficiency, high flux therapies in clinical dialysis - definition of H-E therapy - characteristics of H-E therapy - technical consideration - clinical application of H-E therapy - limitations and future of rapid H-E therapy.

2. Alternatives in uremia therapy

Hemofiltration - difference between HF and HD - Technical aspect of HF - isolated ultra filtration - continuous arterio venous haemofiltration - biofiltration.

3. Sorbent dialysis

Ready sorbent system - dialysis machine - sorbent cartridge - dialysate bath - acetate - bicarbonate - chloride bath - sodium balance.

4. Continuous Renal replacement therapy

CAVH, CVVH, CAVHD, CVVHD, CAVHDF, CVVHDF, SCVF - Technical and operational concerns in continuous renal replacement therapy - clotting - anticoagulation science of clotting - bleeding - therapeutic drug removal with CAVH.

5. Pediatric CAVH

Pediatric ARF, Operational principles of CAVH - characteristics of available haemofilters.

6. Haemoperfusion and dialysis in poisoning

Dialysis and haemoperfusion - a choice of therapy - priming of haemoperfusion circuit - heparinization - duration - complications - management of poisoning with selected agent.

7. Plasmapheresis

Definition Indication - mechanism of action - principle of treatment - technical consideration - anticoagulation - complication - New technique (cascade filtration, cryofiltration, thermofiltration, specific immunoglobulins adsorption) - HELP system.

8. Adequacy of dialysis

Clinical well being oedema, hypertension food intake, ability to work, rehabilitation. Investigations: PCV, Urea, creatinine, creatinine clearances, S. calcium, phosphorus, alkaline phosphates, radiology, EMG
Methods of assessing dialysis adequacy, consequences of inadequate dialysis, Pitfalls in providing adequate dialysis.

14. Infections disease and Infection control

Non-Infectious agents in Hemodialysis: patients:- Endotoxin, Exotoxin-A, Other Biological Toxins.
Bloodborne pathogens: Hepatitis B Virus, Hepatitis C virus, Human Immunodeficiency virus. Bacterial Infections: Vascular-Access Related Infections, Infections through contaminated hemodialysis equipment or dialysate, or errors in reprocessing, Vancomycin-resistant enterococci and other antimicrobial-resistant bacteria. Infection control measures for hemodialysis units: Dialysis unit precautions, control measure for hepatitis B, drug-resistant microorganisms, recommendations for screening for hepatitis C.

15. Laboratory investigations in relation to dialysis

Patient:- Urine examination, Renal function test.
Dialysate - Electrolyte, p H, temperature, contamination.

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