

**REGULATIONS AND SYLLABUS
FOR
ADVANCED DIPLOMA IN DIALYSIS CENTRE MANAGEMENT**

Offered by

**BHARATHIAR UNIVERSITY, COIMBATORE
FROM 2007-2008**

Under The

**UNIVERSITY INDUSTRY INTERACTION AND
CONSULTANCY SERVICE CENTER (UIICSC)
COLLABORATIVE PROGRAMME**

ADVANCED DIPLOMA IN DIALYSIS CENTRE MANAGEMENT

1. Course title

Advanced Diploma in Dialysis Centre Management

2. Course Description

The course is designed to impart basic medical knowledge, patient care, learning about dialysis machines, dialysis process and all forms of extracorporeal blood purification therapies. On completion of the course the candidate will be completely knowledgeable about dialysis and will be skillful in management of the patient, trouble shooting of machines and in effective organizing and running of the dialysis unit.

The program will be conducted at a hospital recognized by Bharathiar University under the UIICSC collaboration program. Candidate shall abide by the stipulated timings, discipline, rules and regulations of the hospital to which they will be assigned for the entire course.

3. Regulations

a. Admission criteria

- Any candidate who has passed +2 or an equivalent course (graduates can also apply)
- Both male and female candidates aged 17 years and above are eligible to apply.
- Physical fitness certificate to be obtained from a Registered Medical Practitioner.

b. Course duration

- Course : 18 months
- Internship : 6 months

c. Medium of instruction

- English

4. Course and scheme of examination

First Year Paper:

Paper. No.	Subject	Credits	Marks	
			Int.	Ext.
1.	Basics of Dialysis	4	40	60
2.	Communication Skills and Sick Patients	4	40	60
3.	Renal Diseases and its Complications	4	40	60
4.	Haemodialysis I	4	40	60
5.	Peritoneal Dialysis I	4	40	60
6.	Haemodialysis I- Practical	4	40	60
7.	Peritoneal Dialysis I – Practical	4	40	60
8.	Care of Sick Patients - Practical	4	40	60

Second Year Paper:

Paper. No.	Subject	Credits	Marks	
			Int.	Ext.
1.	Haemodialysis II	4	40	60
2.	Extra corporeal treatments	4	40	60
3.	Dialysis centre management and administration	4	40	60
4.	Haemodialysis II Practical	4	40	60
5.	Machine Maintenance Practical	4	40	60
6.	Project work / Internship- Viva- Voice	8	80	120

5. Practical training

Being practical oriented program, the focus will be more for practical training. The candidate shall undergo practical training in haemodialysis, peritoneal dialysis, patient care, handling of dialysis machines and running the dialysis unit.

6. Requirement to appear for examination

Candidate should put in a minimum of 90 % attendance to appear for the examinations.

7. Passing minimum

To pass

- A candidate shall secure a minimum of 50 % in the practical and theory to pass the examination. A candidate failing in any one of the component will have to reappear for that particular component only in the supplementary examinations.
- A candidate shall secure 50 % marks in the internals.

8. Classification of successful candidate

- A candidate securing 75 % and above, aggregate in theory and practical examinations, in the first attempt shall be deemed to have passed the examination with distinction.
- A candidate securing 60 % to 74 % of the aggregate in theory and practical examinations, in the first attempt shall be deemed to have passed the examination in the first class.
- All other candidates who have secured the minimum marks in all the papers shall be deemed to have passed the examination in the second class.

9. Conferment of degree

A candidate who has passed all the examinations as prescribed shall be eligible to receive the “Advanced Diploma in Dialysis Centre Management” from the Bharathiar University.

10. Ranking

Candidates who have passed all the examinations in the very first attempt and securing the first position in aggregate marks for every 10 candidates appearing in the examinations, ranking (with the maximum of 10 positions) will be awarded university ranks.

11. Revision of regulation and syllabus.

The syllabus and regulations of the course are subject to modification by the concerned board where ever necessary.

12. Question paper pattern.

Theory examination will be for 100 marks with the following components which will be converted into 60 marks

- Multiple choice / one word answers : $20 \times 1 = 20$ marks
- Short notes (100 words/ one paragraph) : $6 \times 5 = 30$ marks (with choice 6/8)
- Elaborate (300 words or 1½ paper) : $5 \times 10 = 50$ marks (with choice 5/7)

I YEAR: PAPER 1
BASICS OF DIALYSIS

Unit I – Basics of substances, solutions

Atom, Molecule, Ion, Charge
Solute, solvent
Concentration of a solution, concentration gradient
Solution, substances move in a solution

Unit II – Solutions, Membranes

Diffusion, osmosis, filtration, convection, conduction, mass transfer, convective mass transfer
Pressure of fluids, hydrodynamic pressure.
How to measure concentration of substances in a solution, pressure in a solution.
Membrane, permeability of a membrane, semi permeable, membranes, biological membranes
Solution, PH
Conductivity
Electronic measurement of parameters like pressure, concentration of fluids, transducers.
Measurements of electrical charge etc. of a solute.

Unit III – Human Body

Health – What is health – how to achieve this - Human body - Overall structure and function
– Basic structure and function

Unit IV – Individual systems of Human Body

Individual system structure and function

Unit V – Human growth and development

Infection and its control – Nutrition - Growth and development of man - Death – Conception and birth.

I YEAR: PAPER 2
COMMUNICATION SKILLS AND SICK PATIENTS

Unit I – Introduction to communication

Why should we communicate?

What are the various methods of communication?

Verbal and non verbal (Body Language) communication

Unit II – Communication Skills

What is important for communication?

Language for communication

Desire to communicate

Language – any language – English universal communication language – how to improve communication skills.

Unit III – Assessment of Sick patient

Definition of sick patient – Consciousness – Pulse – breathing – Blood pressure – Neurological function

Unit IV – Management of Sick patient

Sick patient treatment – team work – How to organize a team and be a member of a team

Circulation – Blood Pressure – pulse – Respiration – respiration rate – consciousness – assessment – How to monitor sick patients.

Oxygen – respiration – defibrillator – pulseoximeter.

Unit V – Intervention of Sick patient

CPR

I YEAR: PAPER 3
RENAL DISEASES AND ITS COMPLICATIONS

Unit I – Kidney Disease and Kidney Failure

Development of kidneys and urinary tract – Anatomy of kidney and urinary tract – Physiology of kidney and urinary tract

Unit II – Diseases of Kidneys and Urinary Tract – Laboratory Tests

Urinary tract infection – Cystitis and Urethritis – Pyelonephritis – Glomerulonephritis – Nephrotic Syndrome – Diabetes – Hypertension – Polycystic Kidneys – Drug induced kidney disease ESRD – Examination of the Urine – Specific gravity – Osmolarity – pH – Protein – Glucose – Acetone – Blood – Bile – Biochemical tests – Nuclear medicine test – Newer tests – Abdomen Scan – Ultrasound Renal biopsy.

Unit III – Kidney failure – Acute Renal Failure – Chronic Renal failure

Acute renal failure – Reversible – Sudden Chronic Renal failure – slow irreversible – causes natural history sign symptoms

Unit IV – Treatment – Medical – Dialysis – Transplantation

Conservative – Diet – Drugs - Hemodialysis – Peritoneal dialysis – Renal replacement therapies Renal Transplantation

Unit V – Prevention – Early Diagnosis – Rehabilitation

How to prevent kidney and urinary tract diseases – Screening – Tests for early diagnosis – Dietary and drug treatments to slow down progress – Rehabilitation of patient suffering from renal disease, renal failure, post transplantation.

I YEAR: PAPER 4
HAEMODIALYSIS – I

Unit I – Principle of Haemodialysis

What is done in Haemodialysis – achieved in haemodialysis – How it is achieved.

Basic principle of Haemodialysis

How it is organized in the individual patient – requirements for Haemodialysis.

Unit II – COMPONENTS OF A HAEMODIALYSIS SYSTEM – HAEMODIALYSIS MACHINEL

Dialysate delivery systems design – Monitoring systems – components – Dialyser – heparin administration system – other components.

Unit III – Dialyser – dialysis fluids – Concentrate – Water for dialysis – heparin

Acetate – lactate and bicarbonate buffered concentrate – other electrolytes currently used – Dilution – water contaminants – particle / depth filtration - softener – deionization – reverse osmosis – urination – ultrafilters.

Unit IV – HEPARIN AND ANTICOAGULATIONS:-

Definition- Heparin – type – Heparin- Free dialysis – protoamine sulphate – other technique of anticoagulations – Interpretation of coagulation times – PT – PTT – INH - ACT

Unit V – COMPLICATIONS DURING HEMODIALYSIS:

Problems that can happen – How they are prevented – Monitoring – Complications due to Operator, equipment error; complications associated with the administration of medications. Problems regarding heparinization – access complications

I YEAR: PAPER 5
PERITONEAL DIALYSIS

Unit I – Introduction to Peritoneal Dialysis

What is peritoneum?

How it serves as semipermeable membrane

Surface area of the peritoneal dialysis

How is it organized

Unit II – Kinetics of Peritoneal Dialysis:

How Peritoneal dialysis works – Dialysate to plasma equilibration – Ultrafiltration patterns – absorption of calcium, dextrose. Obligatory losses of protein – water soluble vitamins, hormones. Factors that influence ultrafiltration – Factors that influence solute transport drug transport – $K+V$ measurement.

Unit III – Peritoneal Dialysis Different Formats

Continuous Ambulatory Peritoneal dialysis – Automated peritoneal dialysis – continuous cycling peritoneal dialysis – Nocturnal Intermittent peritoneal dialysis.

Unit IV – CAPD

Procedure for initiation of dialysis – exchange procedure – daily patient assessment – Documentation – diagnosis and management of patient problems and complications – Technical problems – procedure to discontinue or interrupt dialysis.

Unit V – Advantages, Disadvantages of Peritoneal Dialysis and other procedures

Advantages – disadvantages – warming dialysis solutions – adding medications for IP Administration – catheter fluoroscopy – CT scan for diagnosis of internal leaks – splicing damaged catheter – changing catheter adapter – transfer set change.

I YEAR: PAPER 6
PRACTICAL - HAEMODIALYSIS I

Unit I – Haemodialysis Machine

Identifying the parts – Functions of the part – Basic requirements in any machine – classifications of dialysis machines – Care and Maintenance of dialysis Machines.

Unit II - Water Treatment System and Supply System

Supply system – disinfection and cleaning – Water quality monitoring – chemical – physical – microbiological – pH – conductivity – resistivity – total hardness, free and total chlorine. % rejection and % recovery, silt density index, empty bed contact time, pressures, bacterial and endotoxic testing.

Unit III – Reuse Technique

Rinsing and reverse ultrafiltration – cleaning – Bleach – H2O2 – Formaline – Disinfection and Sterilisation – Reprocessing procedure for hollow fiber dialysers – advantages and disadvantages of dialyser reuse.

Unit IV - Actual Haemodialysis

Session length – Blood flow rate – Dialyser – Dialysis Solution composition (variable) – Dialysis solution flow rate – dialysis solution temperature – Fluid removal orders – Dialysis frequency – Choosing a dialyser – Post dialysis evaluation – Post dialysis blood values.

Unit V – Terminating of Haemodialysis and preparing for next Haemodialysis

Apply pressure to cannulation sites after the removal of cannulated needle – Apply dressing to cannulation sites – saline return – air return. Rinse the Machine – prepare for HCO₃ and Acid concentrates – Meet the conductivity – prime the tube and dialyser of the patient.

I YEAR: PAPER 7
PRACTICAL - PERITONEAL DIALYSIS I

Unit I – Peritoneal Dialysis

1. Peritoneal dialysis catheters IPD
Peritoneal dialysis catheters CAPD
2. Peritoneal delivery sets
3. Peritoneal dialysis fluid, PD fluid bags.
4. Other accessories for CAPD

Unit II – CAPD

Measurement of peritoneal membrane characteristics (PET) – Frequency of dialysis – Exchange volume – Number of exchanges – types of solution – system of equipment to be used time (total exchange, fill time & dwell time, drain time) - additives

Unit III – Actual IPD Running

Predialysis patient assessment – Machine set up – initiation of dialysis – technical problem solving – trouble shooting – diagnosis and management of patient problem and complications –discontinuing dialysis – post dialysis assessment – documentation.

Unit IV – CCPD

Initial precautions – getting ready with the materials – aseptic procedures – getting ready for the procedure – exchange – complications – determining the strength of the solution – Daily routine – colour of the fluid – dressing of the catheter site of the catheter

Unit V – NIPD

Nocturnal intermittent peritoneal dialysis – cyclers – dialysis solution – NIPD connections – Transfer sets – Catheter to transfer set connection – Transfer set to container connections.
Tidal Peritoneal Dialysis – Night exchange device.

I YEAR: PAPER 8
PRACTICAL - CARE OF THE SICK PATIENTS

Unit I

Identify the parameters important in normal person - consciousness- Respiration rate – Temperature – Pulse – Blood pressure – Auscultative for heart lung – Bladder – Paralysis – pupils

Unit II

Instruments useful to monitor – BP apply – thermometer – Pulse oximeter – ECG monitor respirator monitor - IBP, NBP-monitor

Unit III - How to use the above

Unit IV – CPR (Cardiopulmonary Resuscitation)

Airway – Breathing – Circulation – Defibrillation – Evaluating

Unit V

Use of this above in a – Maintaining records – Inform to doctors – Following the orders

II YEAR: PAPER 1
HAEMODIALYSIS II

Unit I – Haemodialysis History

Invention artificial kidney machine – Invention of artificial kidney – Development – First dialysis on artificial kidney machine – Advantage – Failures - Today's development

Unit II - Dialysate Delivery Systems

The delivery systems function – Provide online proportioning of water and dialysate concentrate – To monitor dialysate for temperature – Composition – To regulate dialysate flow rate through the dialyser.

Unit III – Electricity, Water for Haemodialysis

Power requirement – AC, DC, 120 V,5V,12V and 24V devices – Location – Perforate / Water for Haemodialysis – Filtration – Deion sate – filtrate – Reverse osmosis treatment.

Unit IV – Haemodialysis Concentrate / Infection Control

Acetate – Lactate – Bicarbonate Buffered concentrates – Acid concentrates – Other electrolytes – Dry concentrates and mixing ratio infection – Resistant – Source of infection – Host – Nature of micro organism – Bacteria – Classification of bacteria – Spread of infection – Prevention – Environmental control.

Unit V – New Developments in Haemodialysis.

Continuous blood volume monitoring – Including automated UF control – Access flow and recirculation measurements – Blood temperature and thermal balance monitoring and controlling – Ionic dialysance – Urea concentration and dialysis dose monitoring – Total pool dialysate collection – Aliquot method

II YEAR: PAPER 2
EXTRACORPOREAL TREATMENTS

Unit I – CRRT

General principles – Clinical indications – Difference among CHD – CHDF and CH in clearance of small and large molecular weights solutes – Vascular access – Hemo filters and dialysers – Dialysis and replacement solutions – Advantage of slow continuous therapies.

Unit II – Diseases / Conditions Benefited by Extracorporeal Therapies

Chronic Liver failure – Liver failure – Hyperlipidemia – Poisoning – Plasma pheresis – Good pastures syndrome (antibody GBM diseases) cryoglobulinemia – Guillain – Barre syndrome – Management of poisoning with selected agents - Acetaminophen, aspirin – Barbiturates – Digoxin – Toxic alcohol – Lithium carbonate – Mushroom poisoning – Paraquat – Diquat.

Unit III – Hemofiltration / Hemodiafiltration

CH – No dialysis solution – Replacement fluid – Pre dilution or post dilution – Urea clearance with Hemofiltration – solute removal – vascular access – temperature of dialysis solution – Replacement fluid in hemodiafiltration – Empiric dosing – Kinetic dosing based on urea.

Unit IV – Liver Failure Therapy

Molecular adsorbent recirculating system namely (MARS)- High flux dialyser – Low flux dialyser – Activated charcoal – Anionic exchange – Toxic material removal – (20%) Human albumin as a diluent

Unit V – Plasmapheresis and Haemoperfusion

Indication for plasmapheresis - Contraindication for plasmapheresis – Causes – Procedures – Plasma Filter – Advantages – Disadvantages – Indication for hemoperfusion – Contraindication. For hemoperfusion –Procedures – Cartridge – Advantages – Disadvantages.

II YEAR: PAPER 3

DIALYSIS CENTRE ORGANISATION / MANAGEMENT & ADMINISTRATION

Unit I – Dialysis unit organization

Organization – space – electricity, water – drainage - Equipments – manpower – equipments – types of machines – adequate water supply – drainage pipe line – Staff requirement

Unit II – Finances – Investment, returns

Initial capital needed – cost of different equipments – life span of equipments – calculation of cost of treatment

Unit III – Staff Management

Staff requirement – staff welfare – staff supervision – staff health – New staff posting and training – Continuous training

Unit IV – Machine Maintenance

Machine – Maintenance – Maintenance contracts – Advantages – Disadvantages – Comprehensive contract

Unit V

Dialysis centers in India, abroad, new developments.

II YEAR: PAPER 4
PRACTICAL – HAEMODIALYSIS II

Unit I – Haemodialysis Machine Parts

Blood pump – Touch screen – Arterial pressure monitor – Venous pressure monitor – Safety air bubble detector – Safety air bubble detector clamp – Dialyser holder – Heparin infusion pump – By pass switch – Concentrates connectors – Dialysate connectors

Unit II – Trouble Shooting

Air in blood – Blood leak – No dialysate flow – UF system error 2 – Low conductivity – High conductivity – Bicarbonate or Acid high and low – Temperature high and low etc.....

Unit III – Dialysis Unit: Water, Gas, Suction, Electricity Maintenance

Cleaning of dialysis unit – Disinfecting dialysis unit – Proper water supply – Gas such as oxygen and vacuum for suction – Electricity – Ground fault interruption – Line isolation – Power distribution – AC, DC – 120V, 24V, 12V, 5V devices – Location and rationale for each type of device in dialysis system.

Unit IV – Trouble Shooting Day Disciplines

Water tap – Electricity – Acid and Bicarbonate concentrates – Bleach – H₂O₂ – Formalin – Acetic acid – Number of machine in use – Number of staff available – Schedule of patients available – Haemodialysis material – Packs – AVF needles - Syringes – Heparin vials – Betadine – Spirit.

Unit V – Machine Disinfection

Water rinse – Bleach – Water rinse again – Acidic acid – Water rinse – Oxalic acid – Dwelling time – Water rinse – Hot rinse – Nitric acid – Dwelling – Rinse – Formalin.

II YEAR: PAPER 5
PRACTICAL - MACHINE MAINTENANCE

Unit I Description of Parts - Functions of the Machine.

UF control system – Dialysate delivery system – Design – Motors – Pumps – Valves – Regulators – Deaeration devices and relief valves – Probes – Sensors – Flow equalizers – Heaters – Heat exchangers – Shock sensors – Back siphon production – Bypass function – UF measurements.

Unit II – Maintenance of Parts

Cleaning blood spills immediately – Periodically calibration of conductivity – Blood pump occlusion – Dialysate ports conductivity connectors – loose, leak – Salt precipitation – Electrical and water inlet and outlet.

Unit III – Machine Spares

When to replace – what are the parts to be replaced – life time of the parts - Conductivity prefilters – Transducers productors – Blood leak sensors – Heparin pump – Deaeration pump – Acid pump – Bicarbonate pump – Chemical pump – Balancing chambers – Bypass valve etc

Unit IV – Preventive Machine Maintenance

Periodically preventive maintenance. – What are the preventive maintenance- Calibration of blood pump – Conductivity – Machine temperature – UF rate – Blood leak sensor – Safety air bubble detector etc

Unit V – Routine Machine Maintenance

Routine maintenance – periodical routine maintenance – what are the periodical routine maintenance – Every day cleaning – Rinsing with RO water – Chemical disinfection – By bleach – Acetic acid – Oxalic acid or Citric acid – Nitric acid – Formalin – Checking all the machine parts and its condition

II YEAR: PAPER 6
Internship / Project Work

Small project discussions

Viva- Voice

Project in 4 months tour.

Topic to the given by the guide