Diploma in Dialysis technology

THE TAMIL NADIR DR. MG.R. MEDICAL UNIVERSITY, CHENNAI – 32.

REGULATIONS FOR DIPLOMA IN DIALYSIS TECHNOLOGY

1. ELIGIBILITY FOR ADMISSION

Candidates belonging to all categories for admission to the **Diploma In Dialysis technology** should have passed the minimum education qualification is 12th science or equivalent schooling from recognized or University with any subjects with minimum of 45% marks pass in all subjects.

2. AGE LIMIT FOR ADMISSION:

A candidate should have completed the age of 17 years at the time of admission or would complete the said age on or before 31st December of the year of admission to the **Diploma In Dialysis technology**

3. ELIGIBILITY CERTIFICATE:

The candidate who has passed 12th qualifying examinations other than HSS Examination conducted by the Government of Tamil Nadu, before seeking admission to any one of the affiliated institutions shall obtain an Eligibility Certificate from the University by remitting the prescribed fees along with application form, which shall be downloaded from the University website (www.tnmmu.ac.in)

4. REGISTRATION:

A Candidate admitted in any one of the **Diploma In Dialysis technology** in any one of the affiliated institutions of this University shall register his / her name with this university by submitting the prescribed application form for registration duly filled, along with the prescribed fee and a declaration in the format to the Academic Officer of this University through the affiliated institution within 30 days from the cut-off date prescribed for the course for admission. The applications should have date of admission of the course.

5 MIGRATION/TRANSFER OF CANDIDATE:

(a) A student studying in **Diploma In Dialysis technology** can be allowed to migrate/transfer to another institution of Allied Health Science under the same or another University.

(b) Under extraordinary circumstances, the Vice Chancellor shall have the powers to place any migration/transfer he/she deems fit before the Governing Council and get its approval for grant of permission/ratification for Migration/Transfer to the candidates undergoing the course of study in affiliated institutions of this University.

6. COMMENCEMENT OF THE COURSE:

The course shall commence from 1st August of the academic year.

7. MEDIUM OF INSTRUCTION:

English shall be the Medium of Instruction for all the Subjects of study and for examinations of the **Diploma In Dialysis technology**

8. CURRICULUM:

The Curriculum and the syllabus for the course shall be as prescribed in these regulations and are subject to modifications by the Standing Academic Board from time to time.

9. DURATION OF THE COURSE:

The duration of certified study for the **Diploma In Dialysis technology** shall be over a period of two academic years.

10. RE-ADMISSION AFTER BREAK OF STUDY:

The regulations for re-admission are as per the University Common Regulation for Re-admission after break of study for all courses.

11. WORKING DAYS IN THE ACADEMIC YEAR:

Each academic year shall consist of not less than 240 working days.

12. ATTENDANCE REQUIRED FOR ADMISSION TO EXAMINATION:

- No candidate shall be permitted to appear in any one of the parts of **Diploma In Dialysis technology** Examinations unless he/she has attended the course in the subject for the prescribed period in an affiliated institution recognized by this University and produce the necessary certificate of study, attendance and satisfactory conduct from the Head of the institution.
- A candidate is required to put in a minimum of 85% of attendance in both theory and practical separately in each subject before admission to the examinations.

13 CONDONATION OF LACK OF ATTENDANCE:

There shall be no condonation of lack of attendance.

14 VACATIONS:

Public holidays are applicable.

15. INTERNAL ASSESSMENT MARKS:

The Internal Assessment should consist of the following points for evaluation:-

i) Theory

ii) Practical / Clinical

iii) Viva

(a) A minimum of two written examinations shall be conducted in each subject during a year and the best marks of one performance shall be taken into consideration for the award of Internal Assessment marks.

(b) A minimum of one practical examination shall be conducted in each subject (wherever practical has been included in the curriculum) and grades of ongoing clinical evaluation to be considered for the award of Internal Assessment marks.

16. **CUT-OFF DATES FOR ADMISSION TO EXAMINATIONS**:

(i) 30th September of the academic year concerned

(ii) The candidates admitted up to 30th September of the academic year shall be registered to take up the 1st year examination during August of the next year.

(iii) All kinds of admission shall be completed on or before 30th September of the academic year. There shall not be any admission after 30th September even if seats are vacant.

17. DURATION:

Course Duration	- 2 years
Weeks per year	- 52 weeks
Vacation	- 2 weeks
Hours per week	- 30 hours
Hours per academic year	- 1440 hours
No. of working days per year	- 240 days

18. COMMENCEMENT OF THE EXAMINAITONS:

1st August / 1st February

If the date of commencement of examination falls on Saturdays / Sundays or declared Public Holidays, the examination shall begin on the next working day.

The University paper will be awarded for 100 marks and Internal 50 marks.

19. MARKS QUALIFYING FOR PASS:

50% of marks in the University Theory Examinations

50% of marks in the University Practical Examinations

50% of marks in the subject where internal evaluation alone is conducted

50% of marks in aggregate in Theory, Practical I.A. & Oral taken together

20. **CARRY OVER OF FAILED SUBJECTS:**

(1) A candidate has to pass in theory and practical examinations separately in each of the paper

(2) If a candidate fails in either theory or practical examinations, he/she has to reappear for both (theory and practical)

(3) The candidate has to successfully the course in double the duration of the course (i.e. 4 years from the date of joining)

21. PRACTICAL EXAMINATION

Maximum number of candidates for practical examination should not exceed 25 per day. An examiner should be a lecturer or above in any of the affiliated institutions of Allied Health Sciences.

23. **NUMBER OF EXAMINERS**

One internal and one external examiner should jointly conduct practical/ oral examination for each student

24. **REVALUATION/RETOTALLING OF ANSWER PAPERS:**

Revaluation / Retotalling of answer papers is not permitted.

THE TAMIL NADIR DR, M.G.R. MEDICAL UNIVERSITY, CHENNAI – 32

SYLLABUS - DIPLOMA IN DIALYSIS TECHNOLOGY

BRIEF SUBJECT TITLE TO BE COVERED

External subjects	**Internal subjects**
1st year	
Paper I- Human Biology And Introduction to Renal system	
Anatomy, Physiology, Biochemistry & Pharmacology	Spoken English & Communication
Introduction to Kidney diseases	Basics of Computer Science
2nd year	
Paper II- Principles and practice of Dialysis	
Introduction to Dialysis – Part I	
Introduction to Dialysis – Part II	

NOTE:

For the supportive subjects Internal Examination to be conducted by the institute conducting the course and marks should be submitted to the University

Paper I- Human Biology and Introduction to Renal system

ANATOMY & PHYSIOLOGY
Course Hours (Theory): 70 hrs
Course Hours (Practicum): 30hrs

Module 1: Introduction to anatomy

Scope of Anatomy and Physiology - Definitions and Terms in Anatomy and Physiology- Structure and function of human cell - Elementary tissues of human body- Brief account on Composition of Blood - functions of blood elements - Blood Group and coagulation of blood, Inflammation, Cellular adaptation, Cell injury & cell death.

Module 2: Cardio Vascular System

Structure and functions of various parts of the heart, arterial and venous system, brief account on common cardiovascular disorders

Module 3:Respiratory System

various parts of respiratory system and their functions, Physiology of Respiration

Module 4: Digestive System

names and various parts of digestive system-Liver, Spleen, Gall Bladder, Pancreas, Buccal Cavity, Pharynx, Oesophagus, Stomach, intestine etc.-physiology of digestion and absorption

Module 5: Urinary System

various parts of urinary system and its function-structure and function of kidneys-physiology of urine formation - pathophysiology of renal disease and edema

Module 6: Reproductive System

physiology and anatomy of Male & Female reproductive system-Prostate & Uterus & Ovaries etc

Module 7: Musculoskeletal System

Classification of bones & joints, structure of skeleton –structure of skeletal muscle –physiology of muscle contraction

Module 8: Nervous System

Various parts of nervous system- Brain and its parts –functions of nervous system - Spinal Cord & Nerves

Module 8: Ear, Nose, Throat and Eye

Elementary knowledge of structure and functions of organs of taste, smell, hearing, vision

Module 9: Endocrine System

Endocrine glands ,their hormones and functions-Thyroid, Parathyroid, Suprarenal, Pituitary, pituitary and Thymus

Module 10: Haemopoietic and Lymphatic System

Name of the blood vessels & lymph gland locations

Module 11: Surface Anatomy & Surface Markings of Human Body

Practical's

- Study of Human Skeleton parts with skeletal models..
- Study with charts and models of all organ systems mentioned above.
- Microscopic slides examination of elementary human tissues, cells.

REFERENCES

1. Solomon. E.A., (2008) Introduction to Human Anatomy and Physiology 3rd Ed, Saunders: St Louis.

2. Chaursia, B.D., & Garg, K., (2012) *Human Anatomy Regional and Applied.* CBS Publications: New Delhi

3. T.S. Ranganathan – *A text book of Human Anatomy*

4. Fattana, Human anatomy (Description and applied) *Saunder's & C P Prism Publishers*, Bangalore – 1991

BIOCHEMISTRY

Course Hours (Theory): 30 hrs
Course Hours (Practicum): 20 hrs

COURSE OBJECTIVES: On completion of this course the students will be able to:

1. Define biochemistry and explain the major complex biomolecules of the cell.
2. Enumerate the chemical structure, classification and functions of proteins, lipids and carbohydrates.
3. Comprehend the classification & function of nucleic acids and enzymes.
4. Explain the biochemical structure of vitamins, its classification and the functions of vitamins and minerals.
5. List the various hormones, its action and function.
6. Describe acids and bases, the mechanism of homeostasis and acid base balance

BIOCHEMISTRY (Theory outline)

Module 1: Carbohydrates

Glucose and Glycogen Metabolism

Module 2: Proteins:

Classification of proteins and functions

Module 3: Lipids:

Classification of lipids and functions

Module 4: Enzymes

Definition – Nomenclature – Classification – Factors affecting enzyme activity – Active site – Coenzyme – Enzyme Inhibition – Units of enzyme – Isoeznzymes – Enzyme pattern in diseases.

Module 5: Vitamins & Minerals:

Fat soluble vitamins(A,D,E,K) – Water soluble vitamins – B-complex vitamins- principal elements(Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine and sulphur)-Trace elements – Calorific value of foods – Basal metabolic rate(BMR) – respiratory quotient(RQ) Specific dynamic action(SDA) – Balanced diet – Marasmus – Kwasiorkar

Module 6 : Acids and bases:

Definition, pH, Henderson – Hasselbalch equation, Buffers, Indicators, Normality, Molarity, Molality

BIOCHEMISTRY SYLLABUS FOR PRACTICALS

1 Benedict's test

2. Heat coagulation tests

REFERENCES

1. Teitz, *Clinical Chemistry*. W.B. Saunders Company Harcourt (India) Private Limited New Delhi.
2. Vasudevan D. & Sree Kumari S., *Text Book of Bio Chemistry for Medical Students*, Jaypee Brothers, New Delhi.
3. Biochemistry, U. Satyanarayan, Books and Allied (P) Ltd. Kolkata-India
4. Das Debajyothi, *Biochemistry*, Academic Publishers Calcutta.

PHARMACOLOGY

Course Hours (Theory): 50 hrs

Practical hours: 50 hrs

COURSE OBJECTIVES: On completion of the course the students will be able to:

1. Describe the various drugs used for the treatment of kidney diseases and dialysis: which includes antibiotics, anti microbials, ionotropes, diuretics and anti – convulsants.
2. List, classify and describe in detail the various anti – hypertensives , their action, indication, side effects and adverse drug responses.
3. Describe the dialyzability of drugs.
4. Comprehend the drug adjustments to be made for varying degrees of renal dysfunction.
5. Enumerate the action, indication, dosage, routes & side effects in detail of erythropoietin and intra venous iron.
6. Comprehend and describe the action, indication, dosage, route of administration & side effects of heparin in Hemodialysis.
7. Comprehend the use of various anti septics, formalin, sodium hypochlorite and hydrogen peroxide and its uses in sterilization and disinfection of dialysers, tubings and dialyser machine.

8. Comprehend and differentiate the composition of dialysate solutions and peritoneal dialysis solutions.
9. Enumerate the use of potassium exchange resins.
10. Perform the preparation of Hemodialysate concentrates

PHARMACOLOGY (Theory)

Module 1: IV fluid therapy with special emphasis in renal diseases

Define IV fluids, differentiate the various IV fluids. Use of crystalloids and colloids in renal diseases. Mode of action, contraindication, precautions and side effects of using various IV fluids.

Module 2: Diuretics

Introduction to diuretics, definition, classification, actions, dosage, side effects & contraindications

Module 3: Anti hypertensives

Definition, classification, actions, dosage, side effects & contraindications, special reference during dialysis, vasopressors, drugs used in Hypotension

Module 4: Drugs & dialysis

Dose & duration of drugs used in dialysis. The administration of drugs and the effect of dialysis on the action of drugs

Module 5: Dialyzable drugs

List of drugs that are dialyzable, action, dosage, side effects and contraindications of phenobarbitone, lithium, methanol etc

Module 6: Erythropoietin

History of the development and use of erythropoietin. Its action, function - Primary role in RBC formation and secondary role. Mechanism of action - synthesis and regulation - Indications for use - available forms and dosages

Module 7: Heparin including low molecular weight heparin

Introduction to heparin and Low molucular weight heparin. Description of Heparin & LMWH, pharmacokinetics, mode of action, indications and use, dosage and route of administration & side effects

Module 8: Protamine sulphate

Introduction to protamine, mode of action, pharmacokinetics, indications, uses, dosage, route of administration, side effects, precautions, contraindications

Module 9: Formalin, sodium hypochlorite, hydrogen peroxide

Action, characteristics, the use of the drugs and its role as disinfectants & adverse effects of residual particles applicable too formalin

Module 10: Haemodialysis concentrates

Composition & dilution (acetate & bicarbonates)

Module 11: Peritoneal dialysis fluid in particular hypertonic solutions – composition

Fluids used in peritoneal dialysis, the composition and strength of concentration. Mode of action, uses, indications and precaution

Module 12: Potassium exchange resins with special emphasis on mode of administration

Introduction to potassium exchange resins, chemical composition. Types, mode of action, indications for use, side effects, precautions and contraindications

REFERENCES

1. Tripathi K.D. (2008) Essentials of Pharmacology 6th Ed, Jaypee Brothers medical publishers: New Delhi
2. Rang H.P., (1995) Pharmacology 3rd Ed, and Churchill Livingstone: Michigan
3. Himmelfarb, J., Savegh, M. H.,(2010) Chronic Kidney disease, Dialysis, transplantation: Companion to Brenner & Rector's Kidney 3rd Ed, Elesvier: St Louis
4. Tripathi, K.D.,(2010). Pharmacological Classification of drugs, doses and Preparations 4th Ed, Jaypee Brothers medical publishers: New Delhi
5. Ajay, P., Medhi - Bikash (2010). Pharmacology, Jaypee Brothers medical publishers: New Delhi

INTRODUCTION TO KIDNEY DISEASE

Course Hours (Theory): 200 hrs
Course Hours (Practicum): 400 hrs

COURSE OBJECTIVES: On completion of the course the students will be able to

- Describe the appropriate techniques used in the physical assessment and significant subjective and objective data related to the urinary system
- Describe the purpose, significance of results related to diagnostic studies of the urinary system.
- Comprehend the congenital abnormalities of the urinary system.
- Classify and enumerate kidney diseases, including Glomerular, tubointerstitial and vascular diseases
- Describe the pathophysiology, clinical manifestations, collaborative care and drug therapy of cystitis, urethritis, pyelonephritis, acute post streptococcal Glomerulonephritis, good pasture syndrome, chronic Glomerulonephritis & nephritic syndrome.
- Differentiate between acute renal failure and chronic renal failure.
- Differentiate among the causes of pre renal, intra renal, and post renal acute renal failure & describe the clinical course of acute kidney injury.
- Comprehend the etiology and pathogenesis of chronic renal failure/ CKD.
- Comprehend the pathology of the peritoneum in peritonitis.
- Describe the etiology, pathogenesis and management of urinary tract infections.
- Educate patients on strategies to prevent urinary tract infections
- Educate patients on peritoneal dialysis on aspects of the prevention of peritonitis

INTRODUCTION TO KIDNEY DISEASE

Module 1: Assessment and Diagnostic studies of the Urinary system

Physical assessment of a person with kidney disease, basics of assessment, list various diagnostic tests done for kidney diseases, Laboratory tests, imaging studies, normal values, interpretation of the tests including the roles and responsibilities of a technologist**.**

Module 2: Classification of renal diseases

Define renal disorders, introduction to the classification of the various types of renal disorders

Module 3: Glomerular diseases – causes, types & pathology

Definition, etiology, type's pathophysiology, medical and surgical management

Module 4: Tubulointerstitial diseases & Renal vascular disorders

Definition, etiology, type's pathophysiology, medical and surgical management

Module 5: Acute Kidney Injury

Definition, etiology, type's pathophysiology, medical and surgical management

Module 6: End stage renal diseases – causes & pathology

Definition, etiology, types pathophysiology, medical and surgical management

Module 7: Pathology of kidney in hypertension, diabetes mellitus, pregnancy

Definition, etiology, type's pathophysiology, medical and surgical management

Module 8:. Pathology of peritoneum – peritonitis – bacterial, tubercular & sclerosing Peritonitis

Definition, etiology, types pathophysiology, medical and surgical management

Module 9: Pathology of urinary tract infections

Definition of UTI"s, Common organisms involved, etiology, pathophysiology of UTI, Medical and surgical management

Module 10: Pyelonephritis & tuberculous pyelonephritis

Definition, etiology, types pathophysiology, medical and surgical management

Module 11: Dialysis in the intensive care setting

Emergency care & Intensive care of a dialysis patient, Principles of Extracorporeal Short Wave Lithotripsy, Plasmapheresis, CRRT & SLED, common Urosurgical procedures & instruments and their maintenance, Preparation of dialysis patients for various surgical procedure and post-operative Dialysis support, Basic and advanced cardiac life support.

INTRODUCTION TO KIDNEY DISEASE (Practical overview)

1. Care of Patient with CKD
2. Care of Patient with AKI(Acute Kidney Injury)
3. Health teaching on prevention of UTI
4. Health teaching on prevention of peritonitis

REFERENCES

1. Davison A.M., (2010) *Oxford textbook of Nephrology* Volume 4 Oxford University Press
2. Brenner B.M., et al. (2011*) Brenner and Rector's The Kidney* 9th Ed, Elsevier Health Sciences
3. Schrier R.W., (2006) *Diseases of the Kidney and the urinary tract* (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins
4. Claude Jacobs (1996) *Replacement of Renal Function by Dialysis* Springer
5. Nissenson, A. R., Fine R.N., (2002) *Textbook of Dialysis therapy* 3rd Ed Hanley & Belfus

Paper II- Principles and practice of Dialysis

INTRODUCTION TO DIALYSIS PART – 1

Course Hours (Theory): 200 hrs
Course Hours (Practicum): 400 hrs

COURSE OBJECTIVES: On completion of the course the students will be able to:

1. Comprehend the various modalities of renal replacement therapy with the knowledge of merits and demerits of each.
2. Comprehend the principles of hemo dialysis, the various forms of hemodialysis and when each is to be used in the clinical setting.
3. List and describe the various vascular access devices used in Hemodialysis and its complications.
4. Differentiate between peritoneal dialysis, SLED, CRRT, High efficiency dialysis & hemodialysis in terms of purpose, indications, advantages, disadvantages and the responsibilities of a technologist.
5. Practice and perform independently the water maintenance for the Hemodialysis room.
6. Independently maintain the hemodialysis machine with respect to disinfection and priming.

INTRODUCTION TO DIALYSIS PART – 1

Module 1: History, types of Dialysis

Genesis of dialysis, invention and the process involved in the evolution of dialysis. Types of dialysis and classification. Dialysis for acute kidney injury, dialysis for chronic kidney disease. Introduction to Continuous renal replacement therapy (CRRT)

Module 2: Principles of Dialysis, quantification of adequacy

Principles of diffusion, filtration, ultra filtration, convection, and osmosis. Solute transport and fluid movement during dialysis. Principles of fluid dynamics. Hemodilaysis & Peritoneal Dialysis. Measuring dialysis adequately: Urea reduction ratio - Urea Kinetic Modeling. Pre –dialysis and post dialysis - BUN Measurement. Measurement of KT/V.

Module 3: Dialysis Team-rights-responsibilities-patient doctor relationship

The overview of the dialysis team. Responsibilities of a technologist, nurse and doctor in the dialysis setting- Building effective working relationship- Its importance - dealing with difficult working relationships- Respect the rights of the patient(s)- Conflict Management

Module 4: Dialysis reuse

History of dialyzer reprocessing. Reason for dialysis reprocessing. Steps involved in dialyzer reprocessing. Hazards of dialyzer reprocessing. Documentation for dialyzer reprocessing.

Module 5: Dialyser Membranes

Introduction to dialyser membranes. Composition of the dialyser membranes, types its use and sizes of the various membranes. Principles on which the dialyser membranes work.

Module 6: Vascular Access – Temporary & Permanent

Types of vascular access – Fistulae, Grafts, Catheters. Predialysis assessments for all types of vascular access. Methods of needle insertion for AVFs and grafts. Predialysis assessment, accessing procedure, exit site care, and monitoring of catheters

Module 7: Equipment – Accessories – Function

Types of equipment used in the dialysis process. Parts of a dialysis machine, tubings and the water supply for dialysis. Overview of the various equipment ,accessories and working of a dialysis machine-The technology, functioning, calibration, and sterilization of dialysis machine according to their: Type/ brand, Frequency and duration of use, Importance of Calibration and Sterilization , Recording (Calibration, Sterilization and set up details),Planning and Organizing Scheduled Maintenance, Various indicators, alarms and sensors of the dialysis machine. corrective steps to be taken when a particular alarm goes off

Module 8: Computer applications in Dialysis

Hospital information system in the dialysis unit. Scheduling of procedures, application of computers in the monitoring and maintenance of a dialysis unit

Module 9: Dialysate delivery system

Definition of a delivery system, types of delivery systems.

Module 10: Composition of dialysate

Various dialysate compositions, its uses and indications. Method for obtaining various compositions of dialysate

Module 11: High flux / high efficiency dialysis

Definition of high flux / high efficiency dialysis, differences between high flux dialysis and Hemodialysis, used and indications for high flux dialysis, complications of high flux dialysis, precautions and contraindications. Care during a high flux dialysis.

Module 12: Continuous Renal Replacement Therapy / Slow Low Efficiency Dialysis

Definition, indications, uses, method of initiation of dialysis, contraindications of therapy. Complications of therapy and ways to prevent complications. Monitoring during SLED and CRRT. Technologist's roles and responsibilities during CRRT & SLED

Module 13: Complications in dialysis patients

List various complications seen in patients on dialysis. Prevention of complications. Education to patient on prevention of complications. Emergency management of hypotension & hemorrhage

Module 14: Water treatment-pre treatment, deionizer, Reverse Osmosis

Purpose of water treatment for dialysis. Components of a dialysis centre's water treatment system. Advantages and disadvantages of water softeners, carbon tanks, reverse osmosis, deionization, and ultraviolet irradiation in the treatment of water for dialysis. Monitoring of water treatment systems – disinfection, microbiological testsing, water sampling and chemical monitoring. Method for microbiological testing of the water treatment system. Typical water treatment monitoring schedule. Reverse osmosis process and system: definition of RO, cartridge pre – filter, reverse osmosis pump and monitor assembly, RO membranes.

Quality assessment mechanisms – JCI requirements, ISO requirements, checklists and tools used for optimal compliance

Module 15: Dialysis in Neonates, infants & children

Dialysis for infants and neonates, vascular access in this special group, dialysis settings, Monitoring for complications and management of complications

Module 16: Renal data maintenance

Records and reports maintained in the dialysis unit. Need for maintenance of records and report. The technologist's responsibility in maintenance of records and report. Medico legal aspects of maintenance of records

Module 17: Infection control and sterilization

Morphology of microorganisms, Sterilization and Disinfection, Microbiology of vascular access infection (femoral, jugular, subclavian catheters), Sampling methodologies for culture & sensitivity, Principles and Practice of Biomedical waste management

REFERENCES

1. Davison A.M., (2010) *Oxford textbook of Nephrology* Volume 4 Oxford University Press
2. Brenner B.M., et al. (2011*) Brenner and Rector's The Kidney* 9th Ed, Elsevier Health Sciences
3. Schrier R.W., (2006) *Diseases of the Kidney and the urinary tract* (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins
4. Claude Jacobs (1996) *Replacement of Renal Function by Dialysis* Springer
5. Nissenson, A. R., Fine R.N., (2002) *Textbook of Dialysis therapy* 3rd Ed Hanley & Belfus.
6. Khanna,R., Krediet R.T.,(2009) *Nolph and Gokal's Textbook of Peritoneal Dialysis*, 3rd Ed Springer
7. Feehally J., Floege, J., Johnson R.J., (2007) *Comprehensive Clinical Nephrology* 3rd Ed Mosby

INTRODUCTION TO DIALYSIS PART – 2

Course Hours (Theory): 200 hrs
Course Hours (Practicum): 400 hrs

COURSE OBJECTIVES: On completion of the course the students will be able to

- Comprehend the process of dialysis, the role of a technologist with respect to the pre, intra & post dialysis process.
- Enumerate the various drugs used during the dialysis process.
- Describe the nutrition requirement for a patient with chronic kidney disease & acute kidney injury, & prepare a health teaching plan for the same.
- Manage the anticoagulation on patients on dialysis.
- Enumerate on the various complications of Hemodialysis in terms of the technologists responsibility in prevention and worsening of the complications.
- Describe the process of peritoneal dialysis, the indications, dialysate required and the various complications.
- Start and close Hemodialysis sessions independently.

- Practice independently SLED, CRRT and high efficiency dialysis
- Successfully cannulate arterio – venous fistulae for Hemodialysis.
- Independantly operate Hemodialysis machines, CAPD cyclers & initiate CAPD therapy
- Train patients and the care givers in performing peritoneal dialysis.

INTRODUCTION TO DIALYSIS PART - 2

Module 1: Preparation and positioning of patient for dialysis

Module 2: Patient Assessment – Pre, intra & post dialysis & Machine and patient monitoring during Hemodialysis

Introduction to patient assessment, Understanding a treatment plan, Equipment preparation – Dialysate - Dialyser and Bloodlines - Decisions regarding the appropriate size and type of catheter/ IV tubing to be used –Connecting patients to the machine- Initiation of dialysis - Removing fluid - Replacing fluid - Drawing blood samples - Testing blood samples. Measuring dialysis adequately: Urea reduction ratio - Urea Kinetic Modeling. Pre –dialysis and post dialysis - BUN Measurement. Factors affecting dialysis treatment, communicating and documenting the findings prior to the dialysis process . Starting the dialysis treatment: Monitoring during dialysis - Patient Monitoring (blood pressure, temperature, rate of blood flow, proper mixture of dialysate, presence of air bubbles)- Technical Monitoring. Importance of reporting, HD Complications during dialysis: Clinical complications - Technical Complications- Procedure to disconnect the patient - procedure for removing the IV canula-Post dialysis procedures, Post dialysis patient evaluation,

Recording of the Treatment, Recording changes in Patient's condition, Preparation of status and progress reports, Equipment clean up and Maintenance, Recording the dialysis procedure on the medical report/chart of the patient,

Module 3: Lab data analysis

Tests done for a patient on Hemodialysis, interpretation of tests and normal values.

Module 4: Acute and chronic dialysis prescription

Common drugs for patients with ARF & CRF, Actions, side effects and special considerations

Module 5: Medications in dialysis patients

List the common drugs used for a patient on dialysis. Use of antibiotics during and post dialysis, considerations to be taken. erythropoietin use in patients on dialysis - dosage and administration. Antihypertensive use - considerations during dialysis. Vaccines for patients on hemodialysis - need and the schedule

Module 6: Nutrition management in dialysis patients

Introduction to nutrition and RDA's. Renal diet. Teaching for a patient on renal diet. Foods to avoid, method of cooking to be employed. Planning a renal diet for a patient with CRF

Module 7: Anticoagulation

Use of anticoagulation in the dialysis setting, various anticoagulants used in dialysis. Monitoring during use of anticoagulants. Method of administration. Calculation of anticoagulant use & complications. Heparin free dialysis - need and indication. Regional citrate anticoagulation

Module 8 Hemodialysis

The process of Hemodialysis, vascular access. Starting Hemodialysis, priming of the dialyser, alarms and the settings of a dialyser, completion of Hemodialysis, closing the Hemodialysis. Cleaning of the tubings and dialyser and the dialysis machine

Module 9: Complications of Hemodialysis– Acute & chronic

Complications of Hemodialysis, acute complications – monitoring, prevention for acute complications. Chronic complications – list, prevention strategies, monitoring for chronic complications

Module 10: Peritoneal Dialysis

Acute and Chronic Peritoneal Dialysis. History, access, physiology of Peritoneal Dialysis. PD – Transport kinetics, ultrafiltration, UF, Intermittent PD, Continuouos Ambulatory Peritoneal Dialysis, Automated Peritoneal Dialysis, Dialysis Solutions, Novel uses of PD. Adequacy of peritoneal dialysis chronic peritoneal Dialysis - KT/V Creatinine clearance. PET - Peritoneal Equilibrium test and interpretation.

Module 11: Infectious and non infectious complications of PD

Introduction to complications in peritoneal dialysis. List of Complications: Catheter Infections Peritonitis Inadequate flow or drainage of the dialysis fluid Lesions Ultra filtration failure. Management of exit site infection, Early Exit Site Care. Chronic Care of the Healed Exit Site Diagnosing Exit Site Infections Treatment of exit-site infections Technique to culture exit site infection Medical management of CAPD peritonitis Initiation of therapy based on gram stain results Antibiotic selection,

Module 12: Infection control and universal precautions

Introduction to infection control practices, need for infection control, burden of hospital acquired infection. Introduction to universal precautions - Hand washing – Personal protective equipment – contact precaution, air borne precaution, droplet precaution - - Protection from contamination - Cleaning and disinfecting – common pathogens and their route of transmission- HIV AIDS and its spread. Biomedical waste management- Employee Health Policy- Record and report infection control procedures, precautions, mode of transmission of Hepatotis B and Hepatotis C virus infections.

Module 13: Psychosocial aspects & patient education

Psychological impact of a chronic disease. The financial implications of the disease. the family and its role in the care of the patient with CRF. Patient education - Diet, prevention of complications, drug compliance.

Module 14 : Instruct patients about in-home treatment and precaution

Identification of the type of patient for whom in house treatment is possible and in line with doctor's advice, procedure of in-house treatment options, pros and cons of in-house treatment options, The relevant protocol and procedures to be followed to carry out the process

Module 15: Quality assurance in dialysis

Standards of practice, Various risks to quality and safety, JCI recommendations, NABH recommendations. Infection control policies and procedures in the dialysis unit.

Module 16 : General principle of hospital practice

Hospital structure and organization, Care of Patient , Basic Assessment Skills, First aid & Basic Life Support, Maintenance of Hygiene & Infection Control Practices, Principles of asepsis, Maintenance of Medications in the department, Specialized Investigations - Care of Patients, Medico - Legal Issues

REFERENCES

1. Davison A.M., (2010) *Oxford textbook of Nephrology* Volume 4 Oxford University Press
2. Brenner B.M., et al. (2011*) Brenner and Rector's The Kidney* 9th Ed, Elsevier Health Sciences
3. Schrier R.W., (2006) *Diseases of the Kidney and the urinary tract* (Vol I, II, & III) 8th Ed, Lippincott Williams & Wilkins
4. Claude Jacobs (1996) *Replacement of Renal Function by Dialysis* Springer
5. Nissenson, A. R., Fine R.N., (2002) *Textbook of Dialysis therapy* 3rd Ed Hanley & Belfus.
6. Khanna,R., Krediet R.T.,(2009) *Nolph and Gokal's Textbook of Peritoneal Dialysis*, 3rd Ed Springer
7. Feehally J., Floege, J., Johnson R.J., (2007) *Comprehensive Clinical Nephrology* 3rd Ed Mosby
8. Daugirdas J.T., Blake P.J., Todd S., (2000), Handbook of Dialysis, Volume 236 Lippincott Williams & Wilkins

INTRODUCTION TO DIALYSIS PART – I & II

- Setting up a dialysis machine for dialysis
- A.V. Cannulation
- A.V. Fistula / A.V. Graft Cannulation
- Initiation of dialysis through central venous catheters – Internal Jugular – Femoral – Subclavian vein
- Packing and sterilization of dialysis trays
- Closing Dialysis
- Preparation of concentrates – depending on the situation
- Reuse of dialysis apparatus
- Isolated ultrafilteration
- Performance of peritoneal dialysis exchange – manually
- Setting up of automated peritoneal dialysis equipment
- First assistant in minor procedures
- Skin suturing
- CPR Demonstrations
- Prepare Presentations based on various kinds of data collection

Internal Subjects

SPOKEN ENGLISH & COMMUNICATION

Course Hours (Theory):50 hours
Course Hours (Practicum): 25 hrs

COURSE OBJECTIVES: On completion of the course the students will be able to:

1. Improve their fluency in English.
2. Participate in class discussions and question-answer sessions with confidence
3. Improve their vocabulary and utilize English as the only medium of communication.
4. Comprehend the basics of letter writing and formatting of a letter.
5. Understand the various types of letters used for written communication.
6. Effectively write a report using grammatical sentences.

SPOKEN ENGLISH & COMMUNICATION

Module 1: Communication

Definition of communication, need for communication its classification and purpose. Various barriers of communication and major difficulties in communication. The characteristics of successful communication – The seven C's. The human needs and communication "Mind mapping". Information communication. Communication in the health care set up (Interacting with Patients suffering from acute or chronic renal failure,

People within same Hospital/Clinic/ health care unit, Renal specialists, nurses, other technicians and staff).

Module 2: Comprehension Passage

Reading purposefully **-** Understanding what is read - Drawing conclusion - Finding and analysis

Module 3: Explaining

How to explain clearly - Defining and giving reasons - Explaining differences - Explaining procedures - Giving directions

Module 4: Writing a letters

Types of letters – Business letters - How to construct correctly - Formal language – Address – Salutation – Body - Conclusion

Module 5: Report writing

Reporting an accident - Reporting what happened at a session - Reporting what happened at a meeting

Module 6 : Conversational English Exercises

Self introduction, Explanation of various procedures, Reporting of any mishap, Explaining to a patient, Conversing with the doctor on patient care status.

SPOKEN ENGLISH & COMMUNICATION (Practicum)

Module 1: Communication

Role play / skit as a practical exercise

Module 2: Comprehension Passage

Comprehension passage as an exercise

Module 3: Writing a letters

Formulate a business letter and a letter to a friend / family

Module 4: Report writing

Write a report on your recent visit to a place of interest.

REFERENCES

1. English Grammar Collins,(1993) Birmingham University, International Language Data Base, Rupa & Co.
2. Wren and Martin - *Grammar and Composition*, 1989, Chanda & Co, Delhi
3. Aman Chawla (2007) *Basic English Grammar*, Dreamland Publications.
4. Carter R., McCarthy M., (1997) *Exploring Spoken English* Cambridge University Press

5. Sarada (2000) *Spoken English* APH Publishing

BASICS OF COMPUTER SCIENCE

Course Hours (Theory): 50 hours
Course Hours (Practicum): 25 hrs

COURSE OBJECTIVES: On completion of the course the students will be able to

1. Comprehend the parts of a computer and the different operating systems.
2. Utilize the MS word for typing letters and text.
3. Effectively use features in MS word to manipulate text and insert pictures and various fonts.
4. Prepare and use effectively a PowerPoint presentation.
5. Utilize the internet for web searches and e- mail
6. Appreciate the contribution of HIS to the healthcare industry.
7. Describe the uses of the hospital information system

Basics of Computer

Module 1: Introduction to the Computer

Parts of a computer, I/O devices – memories – RAM and ROM. Networking – LAN, WAN, MAN(only basic ideas)

Module 2: Introduction to Microsoft Word

Typing text in MS word, manipulating text, formatting the text & using different font sizes, bold, italics. Using Bullets and numbering, insertion of pictures, & file insertion. Aligning of the text and justify.

Module 3: Microsoft PowerPoint

Preparing new slides using MS-PowerPoint. Inserting slides, slide transition and animation. Using templates, different text and font sizes. Inserting slides with sounds, inserting clip arts, pictures, tables and graphs. Presentation using wizards

Module 4: Introduction to the Internet

Definition about the World Wide Web & brief history. Using search engine and beginning Google search – Exploring the next using Internet Explorer and Navigator – Uploading and Download of files and images – E-mail ID creation – Sending messages – Attaching files in E-mail

Module 5: Introduction to the Hospital Information System

Definition of Hospital Information system, Architecture of a HIS, aim and uses of HIS, types of HIS Benefits of using a hospital information system.

Basics of Computer (Practicum)

Module 1: Introduction to Microsoft Word

Type a text document, save the document. Align the text with different formats using Microsoft Word. Inserting a table ensuring proper alignment of the table using MS word

Module 2: Microsoft PowerPoint

Preparing a slide show with transition, animation and sound effect using MS – PowerPoint. Customizing the slide show by inserting pictures and tables in the slides using MS – PowerPoint.

Module 3: Introduction to the Internet

Create an e – mail account. Use the internet to search for a subject of interest.

REFERENCES:

1. Murray H., (2003) Teach yourself basic computer skills, Trans Atlantic publishers.
2. Bennet A., (1996) Computers: Technology, Electronics and Internet, Holy Hail Publishers
3. Prokosh H. U., Dudeck, J., (1995) Hospital Information Systems: Design and Development Characteristics, Impact and Future Architecture, Elsevier : St Louis.

Programme structure

Subjects	Total hours		
	Theory	Practical	Clinical
1st year			
Anatomy & Physiology, Biochemistry & Pharmacology	70+30+50	30+20	50
Introduction to Kidney Diseases	200		400
Spoken English & Communication	50	25	
Basics of Computer Science	50	25	
Total: 1000 hrs			
2nd year			
Introduction to Dialysis – Part I	200		400
Introduction to Dialysis – Part II	200		400
			Total: 1200 hrs

SCHEME OF EXAMINATION

PAPER - I

Theory Subject Title	University Theory Exam		Practical Marks		VIVA		Internal assessment					
	Max		Min		Max		Min		Max		Min	
Anatomy & Physiology, Biochemistry & Pharmacology	100		50		-		-		-		-		50		25	
Introduction to Kidney Diseases	100		50		100		50		50		25		50		25	

PAPER – II

Theory Subject Title	University Theory Exam VIVA		Practical Marks		Viva		Internal assessment							
	Max		Min		Max		Min		Max		Min		Max		Min	
Introduction to Dialysis – Part I	100		50		-		-		-		-		50		25	
Introduction to Dialysis – Part II	100		50		100		50		50		25		50		25	

Internal Assessment	Marks
Theory	20
Practical	20
Log/Record work	10
Total	**50**

Internal Assessment

Question Paper Pattern

	No. of questions	Marks per question	Total Marks
Essays	3	10	30
Short Notes	10	5	50
Short Answers	10	2	20
Total			100

Six months compulsory rotatory internship:-

4 months – Maintenance hemodialysis

1 month – ICU dialysis

1 month – Continuous Ambulatory Peritoneal Dialysis