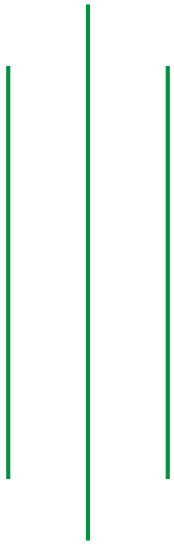
Syllabus for Licensing Examination of Diploma in Dialysis Technology 2021



Nepal Health Professional Council

Bansbari, Kathmandu

Table of Content

1. Anatomy And Physiology

Anatomy

- Introduction to Anatomical terms, organisation of the body, cell, tissues and regions.
- A brief knowledge of various organs of the following systems of the Body:
  G.I.T., Respiratory System, Excretory System, Genital System, Endocrine glands and special senses. Nervous system, Lymphatic System, Skeletal System

Physiology

Functions: Muscular System, Nervous System, Cardio-vascular System, Respiratory System, Digestive System, Excretory System, Endocrine System, Reproductive System,

2. Biochemistry, Pharmacology And Microbiology

Biochemistry

Definition of Biochemistry and its scope, Electrolytes
Digestion and absorption of carbohydrates, Maintenance of normal blood glucose level and factors regulating blood glucose level.Formation of urea and creatinine.
Tests for detection of sugar, urea, creatinine, protein in blood and urine ➢ Renal function tests, Normal range of constituents, Factors maintaining pH of blood
Serum electrolyte levels, Renal Function Tests: Normal physical characteristics of urine
Chemical composition of urine and their significance, Analysis of abnormal urine

Pharmacology

Introduction: Brief history of Materia Medica, Drug Standards and laws, Dosage of drugs, Dose – Minimal, Maximum, Toxic and lethal. Idiosyncrasy, Hyper sensitivity Sites of Drug Action: Local, Systemic, Routes of Drug Administration
Chemotherapeutics of some common Drugs: Analgesics, Antiseptics, Disinfectants, Antibiotics, Tranquillizers, Sulfonamides, Anaesthetics (local & General in detail)

Microbiology

Sterilization and disinfection, Bacteriology - classification, morphology of bacteria, method & rate of reproduction of bacteria, Immunity,
Common diseases caused by different types of organisms. Staph, Strepto, Diptheria, C. tetanus, and welchii, Anthrax, Mycobacterium tuberculosis, M. leprae. E. coli, Salmonella, Shigella, Vibrio, Pseudomonas
(Candida crypotcoccus), Virology - Hepatitis, HIV, Herpes etc. Nosocomial Infections
Universal precautions, Waste disposal

3. Theory Of Dialysis (Basics):

a. Theory of Haemodialysis

1. Monitoring of the patient in haemodialysis
2. Anatomy of Artificial kidney
3. Physiology
   Diffusion, Osmosis-Dialysis defined-concentration gradient-Direction of Fluid Flow - Hydrostatic pressure and resistance pressure gradient ultra filtration dialysis.
4. Vital signs-normal-abnormal

Pulse Rate
Blood Pressure
Respiration
Temperature

5. Dialysis efficiency-blood-distribution pattern Dialysate flow rate-blood flow rate – dialysate temperature –important characteristics of blood.

B. Medical Overview:

1. The body makeup. The distribution of water function of the body fluidscomposition of the extra cellular space function of the normal kidney acute renal failure, Chronic Renal Failure.
2. Function of the artificial kidney the technique of Haemodialysis.

C. The Dialysis Systems:

Access to the blood stream.
Dialysers - Dialysate.
Dialysate delivery systems-monitoring devices.
Anatomy of Artificial Kidney
Physiology of Artificial Kidney
Dialysis Efficiency

D. Introduction Of Patient To Haemodialysis:

Predialysis education of the patient. Initiation of Haemdialysis timing, the start of Haemodialysis timing, the start of Haemodialysis-calculation-complication during the first dialysis - conclusions due to dialysis disequilibrium syndrome-
The digitalized patient-establishment of the dialysis pattern.

F. Access To The Circulation:

General description of the cannula system-cannula implantation cannulasactivity and immobilization of the cannulated limb- position of the cannulated limb. Cannula cleaning-cannula complication- cannula infections – annual clotting Declotting the subcutaneous artificial venous fistula advances in the access to the circulation.

G. Dialysers:

Types of dialysers - coil dialysers - parallel flow dialysers capillary [Hollow fiber] dialysers comparative study of all available dialysers. Wearable artificial kidneys – disk perfusion replacing ill gaskets and housing.

H. Anticoagulation:

Anticoagulation-anticoagulant-heparin-coumadin - Leo white clotting timeintermittent Infusion and continuous infusion -systemic heparinisation-regional heparinisation-rigid heparinisation-rigid heparinisation heparin rebound.

I. Water Treatment Plant:

1. Water analysis ex: - pH, Conductivity, Hardness and Water analysis According to AAMI Standard.
2. Water softner, Deionizer, Reverse Osmosis. Various filters used in water supply to Haemodialysis room. Water supply and its maintenance.

J. Lab Investigation Commonly Done For Dialysis Patients

What/When/How

K. Washing The Accessories Of Haemodialysis:

4. Fundamentals Of Haemodialysis

Clinical well being, Oedema, Hypertension, ability to work and rehabilitation.

1. Complications During Haemodialysis And Their Management:

Line cannula separation, blood leaks, and clotting, acute bleeding, hypotension Hypertension, fever, nausea, vomiting, headache, cardiacarrythmias, chest pain, muscle cramps, restlessness, pruritis and convulsions.

2. Discontinuing Dialysis

Discontinuing uncoupling - Saline rinse.

3. Re-Use Of Dialysers:

Storage and re-use of Kill Dialysers re-use of hollow fibre dialysers Hydrogen peroxide method vacuum reserviour method- Reverse osmosis method.

4. Aseptic Filling Of Drains & Medication Port.

5. Dialysate And Dialysate Delivery Systems:

Dialysate composition, Preparation Delivery system, batch type and proportioning Type Drake willock-Century and cordis operation maintenance and troubleshooting.

6. Initiation Of Haemodialysis:

Description of the dialyser –cleaning the dialyser-kill dialyser-kill dialyser assemblydialyser testing and sterilisation-priming the dialyser – coupling the patient with cannula or fistula to the dialyser.

7. Monitoring The Dialysis Procedure

Monitoring dialysate concentration, monitoring dialsate flow, monitoring dialysate temperature, negative pressure and drip chamber pressure, monitoring blood leak detectors, air levels dectectors, monitoring heparin infusion and blood flow, monitoring patient variables.

8. Medical Problems In The Chronic Haemodialysis Patients:

Hypertension, Congestive Heart failure, Secondary hyper-parathyroid disease, Metastatic calcification, blood requirements, peripheral neuropathy, arthritis, hepatitis, Uremic pericarditis. Refractory anemia and use of Erythropoetin.

9. Ultra Filtration

10. Clinical aspects of renal dysfunction

a. Uremia/CRF
b. Acute renal failure [ARF]

11. Dialysate Supply Subsystems:

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.

12. Bacteriology of Haemodialysis:

Indentification of common infections organisms, Cannula site infection, Virus infection, Disinfection and sterilization.
Sterilization- Steam autoclave, Ethylene oxide Sterilisation, Formaldehide sterilization, Clinitent-Schiff's reagent.
Disinfection: Formaldehyde, Zophiran chloride, Phenolic disinfectants, Isopropyl alcohol, Edone antiseptics. Sampling procedures, Contamination problems, Sterile technique and Isolation technique.

13. Chemistry of Hemodialysis

Molecular weight, Equivalent weight, Milliequivalents, Milligrams percent, Hardness of water, Preparation of dialysis concentrate & dialysate. Spceial dialysate preparation, Methods for special determining dialysate composition, Total anion & chloride test reagents. Chloride determination – total anion determination – potassium determination . Dextrose

14. Re-use of dialysers:

Stroge and re-use of kill Dialysers- Re- use of hollow fibre dialysers-hydrogen peroxide method –Reverse Osmosis method.

15. Adequacy of Dialysis:

Clinical well being Oedema, Hypertension, Food intake, Ability to walk and Rehabilitation.

5. Renal Replacement Therapy

1. Dialysis for Poisoning:

Endogenous and exogenous poison.

2. Acute Dialysis:

Special precautions for carrying out the dialysis of actually ill patient. Different types of dialysis Haemo. Peritoneal Haemoperfusion, Indication for Dialysis, Rehabilitation of patient, Social, Psychological and Financial.

3. Continuous arterio venous Haemodia-filtration:

Continuous veno venous Heamodia-filtration and Heamoperfusion.

4. Intermittent peritoneal dialysis:

Anatomy of peritonium, Blood supply, peritoneal dialysis fluid and Aseptic precautions. Indications for peritoneal dialysis, Complications of peritoneal dialysis, Maintenance of patients under going peritoneal dialysis.
Continuous ambulatory peritoneal dialysis. Continuous cycle peritoneal dialysis. Tidal peritoneal dialysis.

5. Special Techniques:

CRRT, CVVHD, CAVHD Priming and setting up, Anticoagulation, Replacement Fluid, Plasmapheresis and chart maintenance of balance. AV fistula and immunization of HD Patients and PD. Monitoring the Haemodialysis in ICU.

6. **Non-surgical Renal replacement therapy other than HD and PD.**
7. **Dialysis of patient for renal transplantation before and after.**
8. **Composition of dialysis team and duties. Responsibilities of each member of the team**
9. **Psychiatric complications in chronic dialysis patients.**