

NAGALAND UNIVERSITY

**Regulation and Syllabus for
Bachelor of Science in Dialysis Therapy Technology
(B.Sc. DTT)
(3+1) years Degree Course**

2024

2024

Regulations for the Allied Health Sciences Bachelor Programs of the Nagaland University

The Regulations & syllabus are subject to modifications by the University from time to time.

1. Eligibility for Admission:

- (i) The candidate should have passed the Higher Secondary (10+2) from CBSE or State Education Board or any Govt. recognized Board with at least 50% marks for general candidates (UR) and 45% for SC/ST/OBC/NCL candidates in Physics, Chemistry, and Biology.
- (ii) For B.Sc. (Health Information Management) course, candidates with Physics, Chemistry, and Mathematics in 10+2 may also be considered.
- (iii) The candidate should have attained the minimum age of 17 years during the admission.
- (iv) **Lateral Entry:**

Candidates who have completed a two-year diploma programme in the concerned subject from Boards recognized by Central / State Government(s) / State / Central University with at least 50% marks in aggregate for (UR) candidates and 45% marks in aggregate for SC / ST / OBC / NCL candidates shall be eligible for Lateral Entry to the second year (3rd Semester) of Bachelor Programme in Allied Health Sciences.

2. Duration of the Course:

- (i) Group A: 4 years, i.e., 3 years or 6 semesters of academic studies and one year of internship (B.Sc.HIM, B.Sc.DTT, B.Sc.AOTT, BSc RTT, BSc. MRIT).
Group B: 4 and a half years, i.e., 4 years or 8 semesters of academic studies and six months of internship (BPT, BOT courses).
Group C: 4 years, i.e., 3 and a half year or 7 Semesters of academic studies and six months of internship (BMLS) during the 8th semester.
- (ii) The maximum duration of the Bachelor Programme for Group A, B & C above shall be N+2 where N is the normal duration of the programme. No student shall be allowed to continue beyond the maximum duration.

3. Medium of Instruction:

The medium of instruction for all the Allied Health Sciences courses shall be English.

4. Working Days Per Semester:

Each Semester consists of 90 working days, with eight hours of work per day and 40 hours per week, totalling 720 hours per Semester.

5. Internship Hours:

One-year Internship programs will include 1440 hours of practical training and Six Months Internship will include 720 hours of practical training.

6. Attendance:

- (i) A candidate must secure a minimum of 80% attendance in theory classes. Students who fail to meet the requirement due to illness may be eligible for a 5% condonation, provided they submit a medical certificate from a registered medical practitioner.
- (ii) 100% in skills training (practical/internship) to qualify for the award of degree. In case of insufficient attendance, the candidate's internship period will be extended accordingly. There are no other exceptions to these rules under any circumstances.

7. Submission of Log Books:

- (i) At the time of practical examination, each candidate shall submit to the examiners his / her Log book duly certified by the Head of the Department as a bonafide record of the work done by the candidate.
- (ii) The practical record shall be evaluated by the concerned Head of the Department (Internal Evaluator) and the practical record marks shall be submitted to the University 15 days prior to the commencement of the theory Examinations.
- (iii) In respect of failed candidates, the marks awarded for record at previous examination will be carried over for the subsequent examination. The candidates shall have the option to improve his performance by submission of fresh records.

8. Revaluation / Scrutiny of Answer Papers:

- (i) There is no provision for candidate to request for revaluation of the answer papers of failed candidates in any examination. However, the failed candidates can apply for scrutiny.
- (ii) Nagaland University shall constitute a Result Moderation Committee of 3 members.

9. Pattern of Question Paper for University Examination:

Descriptive type Questions	=30%
Descriptive Short Notes	=30%
Short Answer questions	=20%
MCQ Type	=20%

10. Assessment:

- (i) Assessment for theory and practical examinations: - Students must attain at least 50% marks in each theory and practical component, both in internal assessments and in the final University examinations to pass the course. The final marks will be 75% from the University examination and 25% will be from the internal assessment.
- (ii) The distribution of marks between theory and practical shall be provided in the **Curriculum and Syllabi** of each course.
- (iii) Assessment for internship: - During the internship, students gain clinical experience and learn to document patient care effectively. Each student must maintain a logbook and a portfolio.

Activity	Marks %	Assessor
Log book	20	Supervisor
Portfolio*	20	Supervisor
Practical	40	Examiners
Viva voce	20	Examiners

*The portfolio provides one with an opportunity to demonstrate the breadth and depth of your knowledge on certain topics

The portfolio incorporates the follow documents:

- Curriculum vitae
- Progress reports
- “Summary of Competency Achievement” demonstrating the level of competency achieved in each sub-module.
- Samples of work prepared by the intern from at least 5 of the modules of internship training guide.

A presentation delivered covering key aspects of the module

The clinical supervisor will examine the portfolio at regular (at least once in three months) intervals and provide feedback to the Intern.

(iv) Mode of Evaluation: -

Evaluation for Theory papers during Odd End Semester Examination shall be internally done by the colleges and Theory papers during Even End Semester Examinations shall be externally evaluated or as notified by the University.

11. Internship Project:

As part of the internship, students are required to choose a relevant subject and prepare an in-depth project report, which should include the objective, scope of the project, and a detailed report.

12. Advancement to the Next Semester:

Advancement to the next semester is contingent upon meeting the following conditions and clearing any backlogs as described: -

A student may not fail in more than two papers in the preceding semester to be eligible to advance to the next semester.

13. Repeat examination for failed candidates:

Failed papers in odd semesters can be repeated during the exams of the subsequent odd semester. Similarly, failed papers in even semesters exams can be repeated during the subsequent even semester exams.

14. Vacation:

Maximum of 15 days including Saturdays and Sundays

15. Re-Admission after Break of Study:

Students shall be allowed to continue after break in studies provided the maximum duration as given in Clause- 2 (ii) is not exceeded.

16. Award of the Degree:

- a. Candidates who have passed all written examinations and successfully completed the compulsory internship as per the university's requirements will be awarded the degree.
- b. Final Consolidated Mark sheet shall be issued by the Nagaland University to the candidate after submission of his/her Internship Completion Certificate by the College.

17. Academic Calendar:

- (i) Odd semester shall be from July to December, and Even semester shall be from January to June.
- (ii) The odd semester and even semester university (end) examinations shall be conducted in the months of December and June respectively.

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Bachelor of Science in Dialysis Therapy Technology (BDTT)

Semester-Wise Distribution of Subjects

Total Credits= 132; Total Marks=3000

Semester	Code	Subject	Credits			Marks					Total contact hours		
			Theory	Practical	Total credits	Internal		External		Total	Theory	Practical	
						Theory	Practical	Theory	Practical				
1 st Semester Subsidiary	BDTT-101	Basic sciences part 1 (Human Anatomy & Physiology)	4	1	5	30	20	100	50	200	72	36	
	BDTT-102	Basic sciences part 2 (Biochemistry, Pathology, Pharmacology & Microbiology)	4	1	5	30	20	100	50	200	72	36	
	BDTT- 103	English Medical Terminology Ethics Computer	4	1	5	30	20	100	50	200	72	36	
	BDTT- 104	Biostatistics /Sociology	2	3	5	30	20	100	50	200	36	108	
Total credits			20			Total marks					800	Total contact hours = 468	
2 nd Semester	BDTT-201	Applied anatomy & physiology related to DTT	5	1	6	30	20	100	50	200	90	36	
	BDTT-202	Nutrition	4	3	7	30	20	100	50	200	72	108	
	BDTT-204	Principles of Nursing	4	3	7	30	20	100	50	200	72	108	
Total credits			20			Total marks					600	Total contact hours = 486	
3 rd semester	BDTT-301	Applied pathology & microbiology related to DTT	5	2	7	30	20	100	50	200	90	72	
	BDTT-302	Introduction to quality & patient safety	5	3	8	30	20	100	50	200	90	108	
	BDTT-303	Healthcare management, Professionalism & values	5	-	5	25	-	75	-	100	90	-	
Total credits			20			Total marks					500	Total contact hours = 450	
4 th Semester	BDTT-401	Pharmacology related to DTT	5	2	7	30	20	100	50	200	90	72	
	BDTT-402	Concept of Renal Disease & Dialysis Therapy Technology	5	8	13	30	20	100	50	200	90	288	
Total credits			20			Total marks					400	Total contact hours = 540	
5 th Semester	BDTT-501	Applied Dialysis Technology Part-1	5	10	15	30	20	100	50	200	90	360	
	BDTT-502	Research Methodology	5	-	5	25	-	75	-	100	90	-	
Total credits			20			Total marks					300	Total contact hours = 540	
6 th Semester	BDTT-601	Applied Dialysis Technology Part-2	5	8	13	30	20	100	50	200	90	288	
	BDTT-602	Basics of biomedical instrumentation	5	2	7	30	20	100	50	200	90	72	
Total credits			20			Total marks					400	Total contact hours = 540	
PROJECT SUBMISSION			Total credit= 12			Full marks = 100 ; Pass Mark = 40							

Internship	12 months compulsory rotational clinical posting
	Practical & Viva

INTERNSHIP – Minimum 2120 hours (calculated based on 8 hours per day, if 265 working days in a 12-month span)

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**DETAIL SYLLABUS FOR
BACHELOR OF SCIENCE IN DIALYSIS THERAPY TECHNOLOGY COURSE**

SEMESTER-1

20 CREDITS

**SUBJECT CODE: BDTT-101
HUMAN ANATOMY**

UNIT 1: INTRODUCTION
<ol style="list-style-type: none"> 1. Definition of anatomy and its divisions 2. Terms of location, positions, and planes 3. Cell and its organelles. 4. Glands 5. Basic tissues
UNIT 2: CONNECTIVE TISSUE
<ol style="list-style-type: none"> 1. Bone – Classification, names of bone cells, parts of the long bone, microscopy of compact bone, names of all bones, vertebral column, intervertebral disc. 2. Osteology: <ol style="list-style-type: none"> a. Upper limb – clavicle, scapula, humerus, radius, ulna b. Lower limb - femur, hipbone, sacrum, tibia, fibula Vertebral column 3. Histology: Types of tissue <ol style="list-style-type: none"> a. Epithelia - Squamous Glandular Transitional Cartilage b. Connective tissue – bone, fibrous tissue, muscle 4. Joints – Classification of joints with examples, synovial joint 5. Muscular system: Classification & histology
UNIT 3: CARDIOVASCULAR SYSTEM
<ol style="list-style-type: none"> 1. Surface anatomy of the heart 2. Blood supply of heart 3. Systemic & pulmonary circulation 4. Blood Vessels (Vein + artery) Anatomy, Course of Vessel. 5. Lymphatic system 6. Histology of lymphatic tissues 7. Names of regional lymphatics, axillary and inguinal lymph nodes in brief.
UNIT 4: GASTRO-INTESTINAL SYSTEM
<ol style="list-style-type: none"> 1. Parts of GIT: Oral cavity, tonsil, dentition, pharynx, salivary glands, Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas, spleen, peritoneum & reflections.

UNIT 5: RESPIRATORY SYSTEM
<ol style="list-style-type: none"> 1. Parts of RS: nose, nasal cavity, paranasal air sinuses, larynx, trachea, lungs, bronchopulmonary segments, diaphragm 2. Histology of trachea, lung, and pleura 3. Thorax – Intercostal space, pleura, bony thoracic cage, ribs sternum & thoracic vertebrae 4. Lungs – Trachea, bronchial tree
UNIT 6: URINARY SYSTEM
<ol style="list-style-type: none"> 1. Kidney, ureter, urinary bladder, the male and female urethra 2. Histology of the Kidney, the structure of nephrons, Ureter and Bladder
UNIT 7: REPRODUCTIVE SYSTEM
<ol style="list-style-type: none"> 1. Parts of the male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology) 2. Parts of the female reproductive system, uterus, fallopian tubes, ovary (gross & histology). 3. Mammary gland – gross.
UNIT 8: ENDOCRINE GLANDS
<ol style="list-style-type: none"> 1. Names of all endocrine glands in detail on the pituitary gland, thyroid gland & suprarenal gland – (gross & histology).
UNIT 9: NERVOUS SYSTEM
<ol style="list-style-type: none"> 1. Neuron & Classification of NS 2. Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology) 3. Meninges, Ventricles & cerebrospinal fluid, Names of basal nuclei. 4. Blood supply of the brain 5. Cranial nerves 6. Sympathetic trunk & names of parasympathetic ganglia
UNIT 10: SENSORY ORGANS
<ol style="list-style-type: none"> 1. Skin: Skin-histology & Appendages of skin 2. Eye: Parts of the eye & lacrimal apparatus, Extra-ocular muscles & nerve supply 3. Ear: parts of the ear- external, middle and inner ear and contents
UNIT 11: EMBRYOLOGY
<ol style="list-style-type: none"> 1. Spermatogenesis & oogenesis 2. Ovulation, fertilisation 3. Fetal circulation 4. Placenta
PRACTICAL
<ul style="list-style-type: none"> • Histology – Slides for identification and general features • Vein / ARTERY-Surface Anatomy
SUGGESTED READING:
<ol style="list-style-type: none"> a) Textbook of Anatomy Vol. 1,2,3 by Inderbir Singh b) Textbook of Anatomy Vol. 1,2,3 by B.D. Churasia

HUMAN PHYSIOLOGY

UNIT 1: GENERAL PHYSIOLOGY
<ol style="list-style-type: none"> 1. Introduction to cell physiology, transport across the cell membrane 2. Homeostasis, Body Fluid compartment & measurement

UNIT 2: BLOOD
<ol style="list-style-type: none"> 1. Composition of Blood, functions of the blood and plasma proteins. 2. Erythropoiesis, pathological and Physiological variation of the RBC. 3. Structure, function, and metabolism of Hemoglobin 4. Erythrocyte Sedimentation Rate. 5. Detailed description about WBC. 6. Platelets, coagulation of blood, anti-coagulants, bleeding disorders. 7. Blood groups and Rh factor
UNIT 3: NERVE-MUSCLE
<ol style="list-style-type: none"> 1. Neuron structure, types, neuroglia-types, nerve fibre classification, properties of nerve fibres 2. Classification of muscle, the structure of skeletal muscle 3. Mechanism of muscle contraction, types of contraction
UNIT 4: RESPIRATORY SYSTEM
<ol style="list-style-type: none"> 1. Physiological Anatomy of Respiratory tract. 2. Respiratory movements. 3. Exchange of Respiratory gases in the Alveoli. 4. Non-Respiratory functions of Lungs 5. Transport of Respiratory gases in the blood. 6. Artificial Respiration. 7. Chemical regulation of respiration 8. Neural regulation of respiration
UNIT 4: CARDIOVASCULAR SYSTEM
<ol style="list-style-type: none"> 1. Physiological Anatomy of the heart 2. Heart sounds 3. Cardiac cycle, Cardiac output. 4. Auscultatory areas. 5. Cardiac murmurs. 6. Arterial pressures, blood pressure 7. Hypertension 8. Hormonal regulations for arterial pressure and determination of arterial Blood pressure. 9. Basics of Electrocardiogram (ECG) 10. Applied physiology of coronary circulation. 11. Foetal circulation 12. Circulatory shock. 13. Coronary circulation 14. Effects of exercise on CVS and Respiratory system
UNIT 5: EXCRETORY SYSTEM
<ol style="list-style-type: none"> 1. Kidneys- functions, structure of nephron, type, non-excretory functions of kidney 2. Renal function tests 3. Mechanism of GFR, Definition, normal value, factors affecting GFR 4. Concentrating Mechanism of Tubules 5. Physiology of Bladder Function, Micturition reflex, Diuretics 6. Physiology of Electrolytes balance 7. Renal disorders. 8. Functions of Kidney and Regulation of Hypertension / EPO secretion
UNIT 6: DIGESTIVE SYSTEM
<ol style="list-style-type: none"> 1. Physiological Anatomy of the GIT. 2. Food Digestion in the mouth, stomach, and intestine 3. Stomach-functions, composition and regulation of gastric juice

<ol style="list-style-type: none"> 4. Absorption of foods 5. Role of bile in the digestion 6. Pancreas- function, composition and regulation of pancreatic juice 7. Digestion & absorption of Carbohydrates, fats and proteins
UNIT 7: ENDOCRINE SYSTEM
<ol style="list-style-type: none"> 1. Classification of Endocrine glands & their hormones & properties-chemistry and receptor, feedback mechanisms of hormone regulation. 2. Functions of the pituitary gland, thyroid glands, parathyroid glands, adrenal and pancreatic Hormones. 3. Calcium homeostasis & disorders
UNIT 8: REPRODUCTIVE SYSTEM
<ol style="list-style-type: none"> 1. Introduction to reproductive system, sex differentiation & Puberty 2. Male reproductive system, functions of testosterone & Spermatogenesis 3. Female reproductive system, functions of Estrogen, Progesterone, Oogenesis 4. Ovulation & Menstrual cycle 5. Physiological changes during pregnancy, pregnancy tests, parturition & lactation 6. Male & Female contraceptive methods
UNIT 9: CENTRAL NERVOUS SYSTEM
<ol style="list-style-type: none"> 1. Introduction to CNS, Sensory receptors classification, properties 2. Sensory pathways 3. Motor pathways 4. Classification of reflexes 5. Cerebral cortex (Sensory and motor)-functions, Medulla and Pons-functions 6. Cerebellum –functions, disorders 7. Basal ganglia-functions, disorders 8. Autonomic Nervous System - Sympathetic and parasympathetic distribution and functions 9. Hypothalamus and Limbic system-functions 10. CSF, lumbar puncture 11. EEG
UNIT 10: SPECIAL SENSES
<ol style="list-style-type: none"> 1. Vision –Functional anatomy of eye, visual pathway, lesion 2. Audition – Physiological anatomy of Ear, Mechanism of hearing, auditory pathway, deafness 3. Olfaction –modalities, receptor, function, abnormalities 4. Gustation-modalities, receptor, function, taste pathway, abnormalities
PRACTICAL
<ol style="list-style-type: none"> 1. Blood pressure Recording 2. Auscultation for Heart Sounds 3. Artificial Respiration 4. Determination of vital capacity 5. Estimation of Hemoglobin – By sahli’s method 6. Determination of ESR-By westergren’s method 7. Determination of Blood Groups. 8. Determination of packed cell volume. 9. Identification of Normal ECG (wave pattern) 10. Kidney function tests
SUGGESTED READING:
<ol style="list-style-type: none"> 1. Textbook of Medical Physiology" by Guyton and Hall, 13th edition (Publisher, Elsevier) 2. Textbook of Physiology for MBBS Students by A.K. Jain

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| <p>3. Textbook of Physiology by Chaudhuri Sujit K</p> <p>4. Ghai's textbook of practical physiology by VP Varshney & Mona Bedi</p> |
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SUBJECT CODE: BDTT 102

BASIC SCIENCES II

(Biochemistry, Pathology, Pharmacology & Microbiology)

a) BIOCHEMISTRY:

Basics of carbohydrates, Amino acids, Protein and Non-protein, Lipids, Enzymes, Minerals- Iron, Calcium & Magnesium, Normal value ranges

b) PHARMACOLOGY:

General definitions- Pharmacology, Drugs, Medical pharmacology, Toxicology, Pharmacodynamic properties, Pharmacokinetic properties

- Introduction to pharmacology, Basic pharmacology terminology and concepts
- Introduction to pharmacodynamics
- Introduction to pharmacokinetics- absorption, distribution, elimination
- Mechanism of drug action, dosage forms, routes of administration
- Common generic and trade names
- Medication errors, Legal aspects in pharmacology

c) BASIC PATHOLOGY

- Introduction of Pathology- Branches of Pathology
- Basic of inflammation, infection, degeneration and tumours (Neoplasm)
- **Basic Haematology** – Blood collection & Different anticoagulant use. Blood Composition, Functions, Normal Ranges & Disorders
- Clinical pathology- Study of body Fluids- Urine, stool & CSF and their variations in common diseases.

d) MICROBIOLOGY

Introduction and historical background of Microbiology, classification special characteristics of organisms, cultivation (Different types of Media) and identification of organisms Sterilization techniques; Basics of Immunology- Ag Ab reaction & Basics in Immune response & Hypersensitivity, Parasites and Fungi

SUGGESTED READING

1. Textbook of Biochemistry for Medical Students 6th Edition, DM Vasudevan Sreekumari S , KannanVaidyanathan.
2. Textbook of Microbiology 9th Edition, Ananthanarayan, Paniker.
3. Textbook of pathology & Genetics by Purnima S. Rao.
4. Handbook on Medical laboratory Technology Praful B Godkar

SUBJECT CODE: BDTT103

ENGLISH, MEDICAL TERMINOLOGY, ETHICS, COMPUTER

a) ENGLISH COMMUNICATION SKILLS

Course Objective

To develop the potential for language use to perform communicative functions, meeting the demands in the student's academic and professional set-ups.

The subject covers the aspects of oral communication, Grammar, Reading and Writing.

Subject description:

Phonetics/ Vocabulary& Reading:

Oral Work:/ Grammar / Reading/ Writing:

Reference: Manipal Academy of higher education; English book for Nurse by Selva Rose, 3rd Edition.

b) MEDICAL TERMINOLOGY- (Including fundamentals of clinical science)

Subject Description: Orientation to medical terminology, terms related to sympathetology, causation investigations, and treatment of conditions within medicine, surgery, Obstetrics and Gynecology, all specialties including terms related to biological disorders (skin and breast, Musculoskeletal, Neurological, and Psychiatric, Cerebro& Cardiovascular disorders, and Common diseases affecting each of the above systems).

Reference: Handbook of Medical Terminology- IR Asher

Medical diagnostic & procedural Terminology- Asher

Medical Dictionary-Oxford &IBH

c) MEDICAL ETHICS

- a. Medical ethics - Definition - Goal - Scope
- b. Code of conduct - Introduction
- c. Basic principles of medical ethics – Confidentiality
- d. Malpractice and negligence - Rational and irrational drug therapy
- e. Autonomy and informed consent - Right of patients
- f. Care of the terminally ill- Euthanasia
- g. Organ transplantation
- h. Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication – Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.

SUGGESTED READING

Principles of Bioethics: Tom Beauchamp & Childress

d) BASICS OF COMPUTERS

Course Content:

Introduction to computer – I/O devices – memories – RAM and ROM – Different kinds of ROM

Networking – LAN, WAN, MAN (only basic ideas)

MS word, MS-Excel, MS-POWERPOINT,

Explorer and Navigator – Uploading and Download of files and images – E-mail ID creation –

Sending messages – Attaching files in E-mail – Introduction to “C” language –

Practical

Creating a worksheet using MS-Excel with data and sue of functions.

Using MS-Excel prepare a worksheet with text, date time and data.

Preparing a chart and pie diagrams using MS-Excel

Using Internet for searching, uploading files, downloading files creating e-mail ID

Using C language writing programs using functions
Computer application of statistical data

SUGGESTED READING: 1. Computer Fundamentals: Pearl Software
2. Fundamentals of Computers: E. Balagurusamy

SUBJECT CODE: BDTT 104
BIOSTATISTICS, SOCIOLOGY

a) BIOSTATISTICS

General Statistics

- Definition and importance of biostatistics
- Types of data, rates, and ratio
- Methods of collection of data- primary and secondary data
- Sampling of data
- Measures of central tendency (Mean, median, mode)
- Measures of Dispersion (Mean deviation, standard deviation, Range)
- Presentation of data (Bar diagram, Pie diagram, Histogram, Frequency, Polygon, Frequency curve, Cumulative frequency curve, Line diagram)
- Correlation and Regression analysis
- Basic concept of probability

SUGGESTED READING:

Introduction to Biostatistics and Research Methods (5th Edition)– P.S.S. SundarRao& J. Richard.

b) SOCIOLOGY AND ENVIRONMENT HEALTH:

Sociology and health

- Difference between community health and clinical medicine
- Concepts in sociology that influence health and disease.
- Social structure, social behavior, social institutions, socialization, culture, custom, and acculturation. standard of living, social problems, social stress ,and social surveys
- Types of family, functions of family, family, and health, broken family.
- Demography and health.
- Influence of social factors on health.

Practical including fieldwork.

SUGGESTED READING – Textbook of preventive Medicine by Park and Park Chapters 12 and 13.

Environment health: (The influence of environment on health and preventive measures)

- Water, air, soil, housing, waste, radiation
- Water - Sources of water, quality of water, water pollution, purification of water, disinfection.
- Air –air pollutants, sources of air pollution, effects of air pollution.
- Housing – types, and influence on health
- Waste disposal - excreta disposal, hospital waste disposal impact on health
- Radiation exposure and its effect on health

SUGGESTED READING

– Textbook of Preventive Medicine by Park and Park Chapters 12 and 13.

SEMESTER II

CREDITS POINTS: 20

SUBJECT CODE: BDTT-201

APPLIED ANATOMY & PHYSIOLOGY RELATED TO DTT

UNIT 1: APPLIED ANATOMY

1. Basic Anatomy of Urinary System-Structural Anatomy of Kidney, Bladder, Ureter, Urethra, Prostate
2. Histology of Kidney
3. Blood Supply of Kidney
4. Development of Kidney in Brief
5. Anatomy of Peritoneum
6. Concept of Abdominal Hernias
7. Anatomy of the Vascular System
8. Upper Limb Vessels- Course, Distribution, Branches, Origin& Abnormalities
9. Neck Vessels- Course, Distribution, Branches, Origin& Abnormalities
10. Femoral Vessels - Course, Distribution, Branches, Origin& Abnormalities

SUGGESTED READING

1. Textbook of Anatomy Vol. 1,2,3 by Inderbir Singh
2. Textbook of Anatomy Vol. 1,2,3 by B.D. Churasia
3. William Davis (P) understanding Human Anatomy and Physiology – McGraw Hill
4. Brenner & Rector's The Kidney- Maarten W Taal, Glen M. Chertow, Philip A

UNIT 2: APPLIED PHYSIOLOGY

1. Mechanism of Urine Formation
2. Glomerular Filtration Rate (GFR)
3. Clearance Studies
4. Physiological Values - Urea, Creatinine, Electrolytes, Calcium, Phosphorous, Uric Acid, Magnesium, Glucose 24 Hours Urinary Indices - Urea, Creatinine, Electrolytes, Calcium, Magnesium
5. Physiology of Renal Circulation
6. Factors Contributing to & Modifying Renal Circulation
7. Hormones Produced by Kidney & Physiologic Alterations in Pregnancy
8. Haemostasis - Coagulation Cascade, Coagulation Factors, Auto Regulation, Bleeding time(BT), Clotting time(CT), PT, PTT, Thrombin Time
9. Acid-Base Balance - Basic Principles & Common Abnormalities like Hypokalemia, Hyponatremia, Hyperkalemia, Hybernatremia, Hypocalcemia, Hypercalcemia, pH, etc.

SUGGESTED READING

1. Textbook of Medical Physiology" by Guyton and Hall, 13th edition (Publisher, Elsevier)
2. Textbook of Physiology for MBBS students by A.K. Jain
3. Textbook of Physiology by Chaudhuri Sujit K
4. William Davis (P) understanding Human Anatomy and Physiology – McGraw Hill
5. Ghai's textbook of practical physiology by VP Varshney & Mona Bedi
6. Brenner & Rector's The Kidney- Maarten W Taal, Glen M. Chertow, Philip A

SUBJECT CODE: BDTT-202

NUTRITION

1. Introduction to the science of nutrition
2. Food patterns and their relation to health
3. Factors influencing food habits, selection, and foodstuffs.
4. Classification of Nutrients, Macronutrients, and Micronutrients
5. Proteins – types, sources requirements, and deficiencies of proteins
6. Carbohydrates sources, requirements & efficiency
7. Fats – types, sources, requirements, deficiency, and excess of fats
8. Water – sources of drinking water, requirements, preservation of water
9. Minerals – types, sources, requirements deficiencies of minerals
10. Vitamins – types, sources, requirements deficiencies of vitamins
11. **Need for planning diets:**
 - a. Concept of a balanced diet
 - b. Food group & a balanced diet
 - c. Introduction to RDA's
 - d. Influence of age, sex, occupation & physiological state
 - e. Recommended dietary intake in planning diet.
 - f. Steps in planning a balanced diet.
 - g. Planning a renal diet
 - h. Purpose and methods of cooking
 - i. Effects of heat on the cooking of foods
 - j. Preparation of basic recipes - clear fluids, Full fluids, vegetable preparation, egg recipes, fish and meat recipes, light puddings
12. Nutrition Guidelines for dialysis patients

SUGGESTED READING

1. Nutrition in kidney disease-2nd edition, Laura D.
2. Handbook of Dialysis therapy- John T Daughirdas
3. Principle & practice of dialysis, William L Henrich
4. Clinical Dialysis- Allen R Nissenson, Richard N Fine
5. Dialysis Therapy- Allen R Nissenson, Richard N Fine
6. Handbook of Dialysis Therapy- Allen R Nissenson, Richard N Fine
7. NKF KDOQI Guidelines for RDA in CKD & Dialysis patients

SUBJECT CODE: BDTT 203

PRINCIPLES OF NURSING

In the teaching of the principles of nursing, stress shall be laid on the basic principles of the subject with more emphasis on its applied aspects.

(i) Goal: The broad of teaching undergraduate students the Principles of Nursing aims at providing comprehensive knowledge of the principles of asepsis, assessment of vital signs, dressings, small procedures, assisting the physician in the care of the sick patient, and adequate documentation of therapy instituted.

(ii) Objectives

(A) Knowledge: At the end of the course the student shall be able to:

- (a) Explain the principles of asepsis and its necessity in the clinical area;
- (b) Assess the medical condition of the patient with respect to his vital signs;
- (c) Triage the patient needing immediate medical attention.

(B) Skill at the end of the course the student shall be able to;

- (a) Perform small procedures like bed making, insertion of intravenous canulae, administering Injections, cleaning and dressing of wounds, care of bedridden patients, and bladder catheterization.
- (b) Assist the physician in procedures and therapy of patients;
- (c) Document all treatments undertaken with medico-legal completeness.

(C) Integration: At the end of the integrated teaching the student shall acquire an integrated knowledge of nursing principles and their importance in the care of the sick patient

SYLLABUS:

The course in Principles of Nursing is to provide an understanding of essential principles in the care of the sick patient as to well as to learn the skills needed to assist the physician in the practice of dialysis therapy.

- i. Bed making
- ii. Injections – intravenous, intramuscular, subcutaneous
- iii. Care of bedridden patients
- iv. Documentation
- v. Collection of blood, urine, and stool specimens and their transfer aseptic precautions to the laboratory
- vi. First aid
- vii. Bladder catheterization

Nice to Know.

- i. Introduction of IV cannula independently
- ii. Minor suturing

SUGGESTED READING

1. Foundations of Nursing
2. Principles & Practice of Nursing- Sr Nancy
3. Textbook on First Aid & Emergency Nursing- I Clement

SEMESTER III

CREDIT POINTS: 20

SUBJECT CODE: BDTT-301

APPLIED PATHOLOGY & MICROBIOLOGY RELATED TO DTT

UNIT 1: APPLIED PATHOLOGY
<ol style="list-style-type: none">1. Congenital abnormalities of the Urinary system.2. Classification of renal diseases.3. Glomerular diseases: causes, types & pathology.4. Tubulointerstitial diseases.5. Renal vascular disorders.6. End stage renal diseases: causes & pathology.7. Pathology of kidney in hypertension, diabetes mellitus, pregnancy.8. Pathology of peritoneum, peritonitis, bacterial, tubular & sclerosing peritonitis, dialysis induced changes.9. Pathology of urinary tract infections10. Pyelonephritis & tuberculous pyelonephritis
UNIT 2: APPLIED MICROBIOLOGY
<ol style="list-style-type: none">1. Hepatotropic viruses in detail: mode of transfusion, universal precautions vaccinations.2. Human immunodeficiency virus (HIV), mode of transfusion, universal precautions.3. Opportunistic infections.4. Microbiology of urinary tract infections.5. Microbiology of vascular access infection (femoral, jugular, subclavian catheters).6. Sampling methodologies for culture & sensitivity.
SUGGESTED READING
<ol style="list-style-type: none">1. Oxford handbook of dialysis 2nd edition, Jeremy Levy, Julie Morgan2. Clinical companion in Nephrology, Christopher Isles, Mark Findlay3. Primer on Kidney Disease- Greenberg4. Brenner & Rector's The Kidney- Maarten W Taal, Glen M. Chertow, Philip A5. Principle & practice of dialysis, William L Henrich6. Diagnostic Pathology: Kidney Diseases E-Book: By Matthew R Lindberg, Anthony Chang7. Ananthanarayana & Panikar Medical Microbiology- University Press8. Basic Pathology: An introduction to the mechanisms of disease: Sunil R Lakhani, Susan A9. Robert Cruickshank- Medical Microbiology- The Practice of Medical Microbiology

SUBJECT CODE: BDTT-302

INTRODUCTION TO QUALITY & PATIENT SAFETY

UNIT 1: Quality assurance and management
<ol style="list-style-type: none">1. Concepts of Quality of Care2. Quality Improvement Approaches3. Standards and Norms4. Quality Improvement Tools5. Introduction to NABH guidelines6. Quality assurance guidelines for the dialysis unit

UNIT 2: Basics of emergency care and life support skills

1. Basic life support (BLS)
2. Vital signs and primary assessment
3. Basic emergency care – first aid and triage
4. Ventilations including the use of bag-valve-masks (BVMs)
5. Choking, rescue breathing methods
6. One- and Two-rescuer
7. Using an AED (Automated external defibrillator).
8. Managing an emergency including moving a patient

UNIT 3: Biomedical waste management and environment safety

1. Definition of Biomedical Waste
2. Waste minimization
3. BMW – Segregation, collection, transportation, treatment and disposal (including color coding)
4. Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste e.
5. BMW Management & methods of disinfection
6. Modern technology for handling BMW
7. Use of Personal protective equipment (PPE)
8. Monitoring & controlling of cross infection (Protective devices)

UNIT 4: Infection prevention and control

1. Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],
2. Prevention & control of common healthcare-associated infections,
3. Components of an effective infection control program, and
4. Guidelines (NABH and JCI) for Hospital Infection Control

UNIT 5: Antibiotic Resistance

1. History of Antibiotics
2. How Resistance Happens and Spreads
3. Types of resistance- Intrinsic, Acquired, Passive
4. Trends in Drug Resistance
5. Actions to Fight Resistance
6. Bacterial persistence
7. Antibiotic sensitivity
8. Consequences of antibiotic resistance
9. Antimicrobial Stewardship- Barriers and opportunities, Tools, and models in hospitals

UNIT 6: Disaster preparedness and management

1. Fundamentals of emergency management,
2. Psychological impact management,
3. Resource Management,
4. Preparedness and risk reduction,
5. Key response functions (including public health, logistics and governance, recovery, rehabilitation, and reconstruction), information management, incident command, and institutional mechanisms.

SUGGESTED READING

1. Handbook of healthcare quality & patient safety- Gyani J Girdhar
2. Patient safety & quality (NCBI)- Ronda G Hughes

3. KDOQI, CDC Guidelines

SUBJECT CODE: BDTT 303

HEALTHCARE MANAGEMENT, PROFESSIONALISM & VALUES

UNIT 1: Principals of Management

1. Introduction to management
2. Strategic Management
3. Foundations of Planning
4. Planning Tools and Techniques
5. Decision Making, conflict and stress management
6. Managing Change and Innovation
7. Understanding Groups and Teams
8. Leadership
9. Time Management
10. Cost and efficiency

UNIT 2: Health care management

1. Departments in Hospital
2. Clinical services management
3. Organising of support services
4. Management of utility services
5. Evaluation of Hospital services
6. Issues related to Healthcare technology
7. Present trend in healthcare technology
8. Problems & constraints
9. Planning & adopting appropriate technology in healthcare
10. Evaluation method of health technology

UNIT 3: Professional values

1. Integrity, Objectivity, Professional competence and due care, Confidentiality
2. Personal values- ethical or moral values
3. Attitude and behaviour- professional behaviour, treating people equally
4. Code of conduct, professional accountability and responsibility, misconduct
5. Differences between professions and importance of team efforts
6. Cultural issues in the healthcare environment

SUGGESTED READING

1. Principles of management- LM Prasad
2. Hospital planning & administration- B.M. Sakharkar
3. Organizational behaviour- Stephen Robins
4. Hospital Administration- CM Francis

SEMESTER IV

CREDIT POINTS: 20

SUBJECT CODE: BDTT-401

PHARMACOLOGY RELATED TO BDTT

1. IV fluid therapy & Formulations with special emphasis on renal diseases.
2. Diuretics: classification, actions, dosage, side effects & contraindications.
3. Anti-hypertensive: classification, actions, dosage, side effects & contraindications, special reference during dialysis, vasopressors, and drugs used in hypotension.
4. Drugs & dialysis: dose & duration of administration of drugs.
5. Dialyzable drugs
6. Vitamin D & its analogues, phosphate binders, iron, folic acid & other vitamins of therapeutic value.
7. Erythropoietin in detail.
8. Common antibiotics used in dialysis patients.
9. Heparin, low molecular weight heparin, and heparin-induced thrombocytopenia
10. Protamine sulfate as an antidote and indication.
11. Alternative anticoagulants.
12. Formalin, citrate, sodium hypochlorite, hydrogen peroxide: role as disinfectants & adverse effects of residual particles applicable to formalin.
13. Haemodialysis concentrates: composition & dilution (acetate & bicarbonates).
14. Peritoneal dialysis fluid in particular hypertonic solutions: composition.
15. Potassium exchange resins with special emphasis on mode of administration.

SUGGESTED READING

1. Essentials of Medical Pharmacology – Tripathi
2. Basics and Clinical Pharmacology – Katzung
3. Handbook of CKD Management- John T Daughirdas
4. Comprehensive Clinical Nephrology- Feehally
5. Principles & Practice of Dialysis, William L Henrich

SUBJECT CODE: BDTT-402

CONCEPT OF RENAL DISEASE & DIALYSIS THERAPY TECHNOLOGY

UNIT 1: BASIC CONCEPTS OF RENAL DISEASES

1. Acute Kidney Injury & Chronic Kidney Disease.
2. Nephrotic syndrome – primary & secondary.
3. Nephritic syndrome.
4. Glomerular disease overview
5. UTI (urinary tract infections.)
6. Asymptomatic urinary abnormalities.
7. Renal stone diseases.
8. Obstructive uropathies.
9. Congenital & inherited renal diseases.
10. Tumours of the kidney.
11. Pregnancy-associated renal diseases.

12. Renal vascular disorders & hypertension-associated renal diseases.
13. DM Nephropathy

UNIT 2: BASIC CONCEPTS OF DIALYSIS THERAPY TECHNOLOGY

1. Basic science related to Dialysis.
2. Indications for Dialysis
3. Types of Dialysis
4. Vascular access
5. Dialyser-types, membrane, surface area, clearance, and Kuf
6. Dialysis solutions compositions
7. Pre & Post-dialysis assessments
8. Monitoring during Dialysis
9. Complications during Dialysis
10. Haemodialysis machines preparation and settings
11. Haemodialysis machine alarms during Dialysis and troubleshooting
12. Anticoagulation
13. Dialyser reprocessing
14. Water treatment system – basics
15. Setting up a Dialysis Unit (Guidelines, Area, location, distance of beds, etc.)
16. Peritoneal Dialysis- Physiology of PD and apparatus for PD
17. BCLS and Crash-cart management
18. Equipment used in Dialysis and its monitoring and safety check.
(Hemodialysis machine, Dialyser Reprocessor, CRRT machines, Cardiac monitors, Defibrillator, ECG machines, BP apparatus, USG machines, Acid Bicarbonate mixing system, Water treatment system)
19. Infection control practices and universal precautions:
 - i. Hand wash
 - ii. Waste management
 - iii. Needlestick management and prevention
 - iv. Personal protective equipment and appropriate usage
 - v. Cleaning and disinfection of dialysis machines
 - vi. Managing patients with HIV HBsAg and HCV
 - vii. Vascular access- infection prevention
 - viii. Blood spill management.
 - ix. Hazardous material storage and spill management

PRACTICAL

1. Pre –Dialysis and post Dialysis assessments
2. Dialysis machine connection and disconnection
3. Monitoring during Dialysis
4. Checking blood pressure, temperature and heart rate
5. Priming blood system
6. Reuse of dialysers
7. Assisting haemodialysis
8. Water treatment system monitoring
9. Preparation of dialysis solution.
10. Demonstrate Hand wash techniques.
11. Peritoneal dialysis apparatus

SUGGESTED READING

1. Primer on kidney disease- Greenberg
2. Brenner & Rector's The Kidney- Maarten W. Taal, Glenn M. Chertow, Philip A.
3. Handbook of CKD Management- John T Daughirdas
4. Comprehensive Clinical Nephrology- Feehally
5. Handbook of dialysis therapy- John T Daughirdas
6. Principles & Practice of Dialysis, William L Henrich
7. Clinical Dialysis- Allen R Nissenson, Richard N Fine
8. Dialysis Therapy- Allen R Nissenson, Richard N Fine
9. Handbook of Dialysis Therapy- Allen R Nissenson, Richard N Fine
10. Replacement of renal function by dialysis- JF Maher
11. Renal Nursing- Nicola Thomas
12. Review of hemodialysis for nurses and dialysis personnel- Judith Z Kallenbach
13. Core Curriculum for Dialysis 6th Edition- Medical Education Institute

SEMESTER V

CREDIT POINTS: 20

SUBJECT CODE: BDTT-501

APPLIED DIALYSIS THERAPY TECHNOLOGY PART-1

INTRODUCTION

1. Chronic Renal Failure and Acute Renal Failure causes, stages, and management.
2. History & types of Dialysis
3. Indications for Dialysis
4. Choice of renal replacement therapy (RRT) modality
5. Principles of hemodialysis

UNIT 1: VASCULAR ACCESS FOR HAEMODIALYSIS

1. Arteriovenous fistula

- 1.1. Types of vascular access
- 1.2. Vessel preservation
- 1.3. Preoperative evaluation
- 1.4. Physical examination
- 1.5. Possible locations for upper extremity AV fistulas
- 1.6. Perioperative care and fistula maturation:
- 1.7. Initial trial cannulation of a new AV fistula
- 1.8. Initial cannulation procedure

2. Arteriovenous grafts:

- 2.1. Potential AV graft locations
- 2.2. Postoperative care
- 2.3. Maturation

3. Physical examination of AV fistulas and grafts

- 3.1. General issues relating to cannulation of either AV fistulas or grafts.
- 3.2. Skin preparation

- 3.3. Anaesthesia
- 3.4. Needle size
- 3.5. Needle position, spacing, and orientation.
- 3.6. Risk of inflow/outflow needle reversal
- 3.7. Cannulation techniques
- 3.8. Haemostasis post-dialysis.

4. AV access monitoring and complications:

- 4.1. Stenosis
- 4.2. Thrombosis
- 4.3. Needle infiltration
- 4.4. Ischemia
- 4.5. Congestive heart failure
- 4.6. Pseudo-aneurysm

5. Venovenous access

- 5.1. Catheter types and design
- 5.2. Insertion location
- 5.3. Factors favouring different temporary (Non-tunnelled) Catheter Insertion
- 5.4. Cuffed catheter advantages and types
- 5.5. Insertion-related complications
- 5.6. Care and use of venous catheters
- 5.7. Catheter locks
- 5.8. Prophylactic antibiotics

6. Venous catheter infections and other Complications:

- 6.1. Infections
- 6.2. Poor catheter flow (catheter dysfunction)
- 6.3. Thrombosis
- 6.4. Central venous stenosis
- 6.5. Catheter adhesion

UNIT 2: HEMODIALYSIS APPARATUS

1. Blood circuit:

- 1.1. Inflow bloodline: Pre-pump segment
- 1.2. Roller pump segment and calibration
- 1.3. Inflow (arterial) bloodline: post-pump segment
- 1.4. Outflow (venous) bloodline: Air trap and pressure monitor

2. Dialysis fluid circuit:

- 2.1. Proportioning system.
- 2.2. Heating and degassing
- 2.3. Monitors and alarms.
- 2.4. Conductivity
- 2.5. Temperature
- 2.6. Bypass valve
- 2.7. Blood leak detector
- 2.8. Dialysate outflow pressure monitor
- 2.9. Ultrafiltration control

3. Advanced control options:

- 1.1. Adjustable bicarbonate

- 1.2. Variable sodium
- 1.3. Programmable ultrafiltration
- 1.4. Monitoring UV absorbance of spent dialysate (online Kt/V)
- 1.5. Online sodium clearance monitors.
- 1.6. Blood temperature control module
- 1.7. Blood volume monitors.
- 1.8. Single blood pathway (“single needle”) devices

4. Dialysers and Membranes

5. Dialysis solutions:

- 5.1. Fluid quality standards
- 5.2. Ultrapure dialysis solutions
- 5.3. Different types of mixing ratios
- 5.4. Content of dialysis solution
- 5.5. Bicarbonate concentrates mixing and distribution systems.
- 5.6. Dialysis solution preparation:
- 5.7. Final dialysis solution composition

6. Anticoagulation

7. Disinfection of dialysis machines

UNIT 3: HEMODIALYSIS PRESCRIPTION & ADEQUACY

1. Acute haemodialysis prescriptions & Chronic haemodialysis prescriptions

- 1.1. Dialysis concentrates levels.
- 1.2. Ultrafiltration guidelines
- 1.3. Dialysis solution flow rate (Qd)
- 1.4. Dialysis solution temperature
- 1.5. Blood flow rate (Qb)

2. Clearance and adequacy

- 2.1. Urea Kinetic modelling
- 2.2. Mechanisms of solute transport
- 2.3. Solute removal from the perspective of the dialyser & patient
- 2.4. Concept of clearance
- 2.5. URR, Kt/V
- 2.6. Solute removal
- 2.7. Access recirculation
- 2.8. Residual renal function

UNIT 4: COMPLICATIONS DURING HEMODIALYSIS

1. Complications during HD & their prevention, management & treatment

- 1.1. Hypotension
- 1.2. Hypertension
- 1.3. Vascular access complications
- 1.4. Hemolysis
- 1.5. Air embolism
- 1.6. Infections
- 1.7. Hypoglycemia
- 1.8. Pyrogenic reactions
- 1.9. Dialysis disequilibrium syndrome
- 1.10. Withdrawal of dialysis
- 1.11. Others: headache, nausea, vomiting, body pain, etc.

2. Clinical consequences:

- 2.1. Uremic syndrome
- 2.2. Anaemia
- 2.3. Malnutrition
- 2.4. Mineral bone diseases
- 2.5. Hormonal imbalance
- 2.6. Electrolyte imbalance

3. Biochemical investigations for dialysis patients and its significance

UNIT 5: DIALYSER REPROCESSING

1. Types
2. Advantages & disadvantages
3. Chemicals/ disinfectants
4. Safety protocols

UNIT 6: PERITONEAL DIALYSIS

I. Physiology of peritoneal dialysis:

1. Anatomy of the peritoneal cavity
2. Peritoneal membrane histology
3. Models of peritoneal transport
4. Physiology of peritoneal transport
5. Clinical assessment of and implications of peritoneal transport
6. Peritoneal equilibration test (PET) and Classification
7. Peritoneal clearance
10. Protein losses
11. Residual renal function

II. Apparatus for peritoneal dialysis:

1. Dialysis solution
2. Non-glucose solutions
3. Transfer set and exchange procedure
4. Various connectors for PD
5. Automated peritoneal dialysis
6. Tidal peritoneal dialysis(TPD)
7. APD with day time exchanges

III. Peritoneal dialysis catheter, placement and care:

1. Acute and chronic catheters
2. Catheter selection

3. Catheter placement procedures
6. Acute complications of catheters
7. Complications of chronic peritoneal catheters
9. Care of the chronic peritoneal catheters
10. Catheter removal and secondary embedding

IV. Peritoneal dialysis for the treatment of acute kidney injury:

1. Indications
2. Technical aspects
3. Advantages and Disadvantages of Peritoneal Dialysis in Acute Kidney Injury
4. Complications

V. Adequacy of peritoneal dialysis and chronic PD prescription

1. Modalities of peritoneal dialysis therapy and prescription
2. Measurement of clearance
3. Determinants of clearance
4. Prescription strategies to achieve clearance targets in chronic peritoneal dialysis
5. The nutritional issue in peritoneal dialysis.
6. Treatment of malnutrition

VI. COMPLICATIONS OF PERITONEAL DIALYSIS:

1. VOLUME STATUS AND FLUID OVERLOAD IN PERITONEAL DIALYSIS:

- i. Assessment of fluid status
- ii. Mechanism of fluid overload
- iii. Diagnosis of peritoneal membrane dysfunction and ultrafiltration failure
- iv. Prevention and management of fluid overload

2. INFECTIOUS COMPLICATIONS:

1. **Peritonitis:**
 - i. Pathogenesis
 - ii. Diagnosis
 - iii. Treatment
 - iv. Refractory peritonitis and indications for catheter removal
 - v. Relapsing, recurrent, and repeat peritonitis.
 - vi. Peritonitis with catheter obstruction

2. Exit -site and tunnel infection

3. MECHANICAL COMPLICATIONS:

- i. Hernia, leaks and encapsulating peritoneal sclerosis in Peritoneal dialysis
- ii. Abdominal wall and peri-catheter leaks
- iii. Respiratory complications
- iv. Genital Edema
- v. Back pain
- vi. Overfill
- vii. Encapsulating peritoneal sclerosis

4. METABOLIC COMPLICATIONS

- i. Metabolic, Acid-base and electrolyte aspects of peritoneal dialysis
- ii. Hyperglycaemia
- iii. Weight gain
- iv. Peritoneal protein loss

- v. Lipid abnormalities
- vi. Hypokalemia/ hyperkalemia
- vii. Hypo/Hyponatremia

PRACTICAL

1. Dialysis machine preparation for dialysis
2. Dialyser and bloodlines priming
3. AV fistula / AV graft cannulation
4. Initiation of dialysis through central venous temporary and tunnelled catheters
5. Catheter dressing
6. Closing/termination of dialysis
8. Post dialysis sample collections
9. Preparation of acid and bicarbonate concentrates
10. Reuse of dialysers - manual and reuse machines
11. Machine disinfection
12. Isolated ultrafiltration settings
13. Dialysis machines minor troubleshooting- Treatment-related and machine-related
5. Performance of peritoneal dialysis exchange

SUGGESTED READING

1. Handbook of dialysis therapy- John T Daughirdas
2. Principles & Practice of Dialysis, William L Henrich
3. Clinical Dialysis- Allen R Nissenson, Richard N Fine
4. Dialysis Therapy- Allen R Nissenson, Richard N Fine
5. Handbook of Dialysis Therapy- Allen R Nissenson, Richard N Fine
6. Replacement of renal function by dialysis- JF Maher
7. Oxford handbook of dialysis- Jeremy Levy, Edwina Brown, Anastasia Lawrence
8. Textbook of Peritoneal Dialysis – Ram Gokal
9. Renal Nursing- Nicola Thomas
10. Review of hemodialysis for nurses and dialysis personnel- Judith Z Kallenbach
11. KDOQI guidelines

LIST OF JOURNALS FOR DIALYSIS THERAPY

1. Journal of Indian society of Nephrology
2. Journal / News Letter for Dialysis Technologist and Nurses
3. Nephrology, Dialysis, Transplantation
4. Seminars in Dialysis
5. Seminars in Nephrology

SUBJECT CODE: BDTT-502

RESEARCH METHODOLOGY

- I. Overview of research process
- II. Research problem
- III. Hypothesis & Assumption
- IV. Literature review
- V. Research Approaches & Designs
- VI. Population Samples, Sampling
- VII. Tool & Methods of Data Collection
- VIII. Analysis of Data
- IX. Communication Format of Thess

REFERENCES:

1. **Research Methodology and Statistical Techniques** by S. Gupta
2. Nursing Research and Statistics Paperback– 1 Jan 2010 by **Suresh K. Sharma**(Author)

SEMESTER VI

CREDIT POINTS: 20

SUBJECT CODE: BDTT601

APPLIED DIALYSIS TECHNOLOGY PART 2

UNIT 1: DIALYSIS IN SPECIAL SITUATIONS
<ol style="list-style-type: none"> 1. Children & infants 2. Pregnancy 3. Elderly 4. Bleeding manifestation 5. Sepsis 6. Diabetic patients 7. Patients with congestive cardiac failure 8. Advanced liver disease 9. Patients positive for, HIV, HBsAg & HCV 10. Failed transplant. 11. Dialysis in a pandemic & isolation 12. Telemedicine in dialysis practice
UNIT 2: SPECIAL PROBLEMS IN DIALYSIS PATIENTS
<ol style="list-style-type: none"> 1. PSYCHOLOGY & REHABILITATION <ol style="list-style-type: none"> i. Depression ii. Dementia/ Delirium iii. Anxiety and behaviour disorders. iv. Other psychosocial issues in the CKD population: <ol style="list-style-type: none"> a) Marital issues. b) Sexual dysfunction c) Socioeconomic issues

- d) Rehabilitation.
- e) Quality of life (QOL)

2. DIABETES

3. HYPERKALEMIA

4. CEREBROVASCULAR DISEASE

5. CARDIOVASCULAR DISEASE AND HYPERTENSION

6. HYPERTENSION:

- i. Definition and Measurement
- ii. Pathophysiology
- iii. Treatment
- iv. Common clinical problems
- v. Antihypertensive drug use.
- vi. Hypertensive urgencies and emergencies

7. INFECTIONS

- i. Immune dysregulation of uraemia
- ii. Bacterial infections in dialysis patients
- iii. Viral infections
- iv. Vaccinations

8. BONE DISEASES

- i. Pathophysiology
- ii. Bone disease in CKD
- iii. Control of hyperphosphatemia
- iv. Optimising serum calcium
- v. Parathyroid hormone levels
- vi. Aluminium toxicity

9. HEMATOLOGIC ABNORMALITIES

- i. Anaemia
- ii. Haemolysis
- iii. Disorder of Haemostasis

10. NERVOUS SYSTEM AND SLEEP DISORDER

- i. Dialysis Disequilibrium syndrome
- ii. Dialysis modalities for Intracranial bleeding and ischemic stroke
- iii. Dementia & cognitive abnormalities in dialysis patients
- iv. Seizures in Dialysis Patients
- v. Sleep-related disorders
- vi. Peripheral neuropathy.

UNIT 3: RENAL TRANSPLANT COORDINATION

- 1. Renal transplantation basic- principles, immunology
- 2. Donor & recipient workup
- 3. Surgical procedure
- 4. Complications
- 5. Rejection & management
- 6. Preparing dialysis patients for transplantation

UNIT 4: WATER TREATMENT SYSTEM

- 1. Components of the water treatment system
- 2. AAMI and EPA Maximum Allowable Levels of Contaminants in Water
- 3. Signs and Symptoms and Possible Water Contaminant-Related Causes

4. Feed Water Components
 - i. Back-flow preventer.
 - ii. Temperature blending valve
5. Booster pump:
 - i. Pre-treatment Components
 - ii. Chemical injection systems
 - iii. Sediment filters.
 - iv. Water softener
 - v. Carbon adsorption
 - vi. Reverse Osmosis Systems
 - vii. Cartridge prefilter
6. RO System:
 - i. RO pump and motor assembly
 - ii. RO membranes
 - iii. Post-treatment Components
 - iv. Deionisation.
 - v. Ultraviolet irradiator (UV).
 - vi. Submicron and ultrafiltration (UF)
7. Distribution System
8. Bacteria and Endotoxin testing of product water
9. Ultrapure dialysate.
10. Dialysate for infusion (Water for online HDF)

UNIT 5: EXTRACORPOREAL BLOOD THERAPIES

- 1. EXTRACORPOREAL TREATMENT FOR POISON AND DRUG OVERDOSE:**
 - i. Criteria for Consideration of Dialysis or Hemoperfusion in Poisoning
 - ii. Choice of therapy:
 - a) Peritoneal dialysis
 - b) Haemodialysis
 - c) Haemoperfusion
 - d) Continuous Haemodiafiltration or haemoperfusion
 - iii. Technical requirements
 - iv. Complications
 - v. Examples of a few drugs that can be removed by dialysis and haemoperfusion
- 2. ONLINE HAEMODIAFILTRATION (HDF):**
 - i. Basics of hemodiafiltration
 - ii. Diffusion versus convection-based clearance
 - iii. Substitution: Post-dilution, pre-dilution, and mixed dilution
 - iv. Advantages and Shortcomings of HDF Modalities
 - v. Technical issues
 - vi. Prescription of HDF
 - vii. Clinical benefits of convective therapies
 - viii. Clinical comparisons of HDF versus haemodialysis
 - ix. Morbidity and mortality benefits
- 3. CONTINUOUS RENAL REPLACEMENT THERAPY (CRRT):**
 - i. Continuous Haemodialysis (C-HD)
 - ii. Continuous Hemofiltration (C-HF)
 - iii. Continuous Hemodiafiltration (C-HDF)
 - iv. Slow continuous ultrafiltration (SCUF)

- v. Sustained Low-Efficiency Dialysis and Hemodiafiltration (SLED and SLED-F)
- vi. Clinical indications for CRRT versus intermittent renal replacement therapy
- vii. Differences among C-HD, C-HF, and C-HDF in the clearance of small- and large molecular-weight solutes
- viii. Filtration fraction
- ix. CRRT filters
- x. Dialysates and replacement solutions
- xi. Prescribing and delivering CRRT
- xii. Anticoagulation for continuous RRT
- xiii. Isolated ultrafiltration and slow continuous ultrafiltration (SCUF)

4. MOLECULAR ADSORBENT RECIRCULATING SYSTEM (MARS):

- i. Pathophysiology of acute liver failure
- ii. Indications
- iii. MARS techniques
- iv. Mechanism of action
- v. Prescription
- vi. Advantage and disadvantage

5. HOME HAEMODIALYSIS AND INTENSIVE (FREQUENT)

- i. Modality selection
- ii. In-center HD
- iii. Technical consideration for home HD
- iv. Patient safety and precautions.

6. HOME HEMODIALYSIS:

- i. Prescription of intensive HD
- ii. Follow-up
- iii. Comparative effectiveness and safety of home and intensive HD versus other modalities
- iv. Frequent HD
 - a) Short and standard frequent HD
 - b) Long, frequent HD
 - c) Long-session dialysis given three times per week or every other day

7. SORBENT DIALYSIS TECHNOLOGY:

- i. Principles of sorbent dialysis
- ii. The sorbent cartridge
- iii. Removal of contaminants
- iv. Changes to the electrolyte composition of the prime solution during pre-dialysis recirculation
- v. Adjusting dialysis solution sodium
- vi. Adjusting dialysis solution bicarbonate
- vii. Sorbent based dialysis machines

8. PLASMAPHERESIS:

- i. Indications
- ii. Pharmacokinetics of immunoglobulin (IG)
- iii. TYPES & COMPARISON; Membrane plasma separation and centrifugal apheresis
- iv. Complications

<ul style="list-style-type: none"> v. Replacement solutions vi. Double filtration plasmapheresis (DFPP) vii. Other apheresis procedures
PRACTICAL
<ul style="list-style-type: none"> 1. CRRT -Priming and starting treatment. 2. Plasmapheresis- Priming and starting the treatment. 3. BCLS/ACLS demonstration. 4. RO water sample collection for water culture, endotoxin and chemical analysis 5. RO plant monitoring and disinfection. 6. Pediatric dialysis settings -Pediatric Hemodialysis, Peritoneal dialysis 7. Online HDF preparation and demonstration 8. Hemoperfusion- Priming and starting treatment. 9. APD Machine settings
SUGGESTED READING
<ul style="list-style-type: none"> 1. Critical Care Nephrology- John A. Kellum 2. Handbook of dialysis therapy- John T Daughirdas 3. Principles & Practice of Dialysis, William L Henrich 4. Clinical Dialysis- Allen R Nissenson, Richard N Fine 5. Dialysis Therapy- Allen R Nissenson, Richard N Fine 6. Handbook of Dialysis Therapy- Allen R Nissenson, Richard N Fine 7. Replacement of renal function by dialysis- JF Maher 8. Handbook of kidney transplantation- Gabriel M.Danovitch 9. Kidney transplantation- Principles & practice- Peter M 10. Renal Nursing- Nicola Thomas 11. Review of hemodialysis for nurses and dialysis personnel- Judith Z Kallenbach 12. KDOQI guidelines.
LIST OF JOURNALS FOR DIALYSIS THERAPY
<ul style="list-style-type: none"> 1. Journal of Indian society of Nephrology 2. Journal / News Letter for Dialysis Technologist and Nurses 3. Nephrology, Dialysis, Transplantation 4. Seminars in Dialysis 5. Seminars in Nephrology

SUBJECT CODE: BDTT 602

BASICS OF BIOMEDICAL INSTRUMENTATION

<ul style="list-style-type: none"> 1. INTRODUCTION TO BIOMEDICAL INSTRUMENTATION <ul style="list-style-type: none"> i. The Age of Biomedical Engineering ii. Development of BM instrumentation iii. Biometrics iv. Introduction to the man-instrument system v. Components of the man-instrument system vi. Physiological systems of the body vii. Problems encountered in measuring a living system. 2. Physical Principle and various parts of equipment used in Dialysis Technology (Haemodialysis

machine, CRRT machine, APD machine), RO plant and monitoring devices (multi-parameter monitors in ICU care)

3. Disinfection and Maintenance of Equipment used in Dialysis Technology

PRACTICAL

1. Identification of various parts of a dialysis machine & reprocessing machine

SUGGESTED READING

1. Biomedical instrumentation & measurements- Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer
2. Fundamentals of Biomedical Engineer- G.S. SAWHNEY

INTERNSHIP

- 12 months compulsory rotational clinical posting.
- Project work & Submission of dissertation.
- Evaluation of internship & project work- practical & viva.
- Minimum 2120 hours (calculated based on 8 hours per day, if 265 working days in 12 months)